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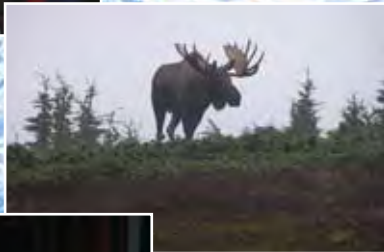
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# Science and Stewardship to Protect and Sustain Wilderness Values

## Eighth World Wilderness Congress Symposium

September 30–October 6, 2005  
Anchorage, Alaska



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## Abstract

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The Eighth World Wilderness Congress met in Anchorage, Alaska, in 2005. The symposium on science and stewardship to protect and sustain wilderness values was the largest of multiple symposia held in conjunction with the Congress. The papers contained in this proceedings were generated at this symposium, submitted by the author or authors for consideration for inclusion in this proceedings, and have been organized into nine major topics: (1) Alaska: past, present and future; (2) connections between wilderness and communities; (3) values to local and distant societies of wilderness protection; (4) establishing priorities and developing policies for wilderness protection; (5) wilderness stewardship challenges in a changing world; (6) encouraging stewardship through education; (7) place and spirit: commitment to wilderness; (8) protecting ecological integrity of wilderness; and (9) wilderness, water, and wisdom.

**Keywords:** wilderness, biodiversity, protected areas, economics, subsistence, tourism, traditional knowledge, community involvement, policy, stewardship, education, spiritual values

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# Science and Stewardship to Protect and Sustain Wilderness Values

**Eighth World Wilderness Congress Symposium**

**September 30–October 6, 2005**

**Anchorage, Alaska**

Compilers:     Alan Watson  
                     Janet Sproull  
                     Liese Dean



Murphy Morobe from South Africa passed the torch from the 7th World Wilderness Congress leadership to the 8th World Wilderness Congress leadership.



# Preface

The World Wilderness Congress met in Alaska at a crucial time in 2005. Over one-half of the U.S. National Wilderness Preservation System acreage is within the single State of Alaska, and most of it became protected as wilderness with one piece of legislation in 1980 (the Alaska National Interest Lands Conservation Act). Besides extending wilderness protection to nearly 55 million acres of remote, pristine wilderness lands in this State, ANILCA added a human component to the National Wilderness Preservation System in the United States by assuring continuance of traditional subsistence activities for rural people of this State, largely indigenous residents. Convening this Congress in Alaska in 2005 provided opportunities for international partnership building, sharing of successes and failures, and better understanding of important wilderness stewardship and science issues.

The Congress first met in South Africa in 1977, followed by meetings in Australia (1980), Scotland (1983), the United States of America (1987), Norway (1993), India (1998) and again in South Africa in 2001. We were fortunate to have the Honorable Murphee Murobe of South Africa travel to Alaska for the 8<sup>th</sup> World Wilderness Congress to pass leadership responsibilities to the Alaska contingent.

The papers included in this proceedings represent the knowledge brought together and shared at the symposium entitled "Science and Stewardship to Protect and Sustain Wilderness Values: Eighth World Wilderness Congress Symposium." Every paper in this proceedings received peer edit by at least one of the compilers and one other reviewer. Some science papers received several reviews and comments.



World Wilderness Congress Fellows from Brazil, China, Canada, and Zambia, with Office of International Programs staff, Watson, Sproull, Dean, and Forest Service Deputy Chief Joel Holtrop (photo by Claudia Sellier).



Good room hosts, moderators, poster session coordinators, and technical wizards are the key to a successful, professional and fun symposium (photo by Claudia Sellier).

Critically acclaimed author, Ms. Jay Griffiths, delivered the final paper of our symposium to the Congress. Ms. Griffiths read an excerpt from a chapter in her book *A Sideways Look at Time* entitled, 'Wild Time.' Congress delegates gave her a standing ovation, ending the gathering on a positive, high-energy note. Ms. Griffiths' paper, a blending of art and science, is included in the plenary section of the 8WWC Proceedings published by the WILD Foundation and Fulcrum Press.

The Aldo Leopold Wilderness Research Institute and the USDA Forest Service Rocky Mountain Research Station are proud to cooperate in compiling, publishing and distributing this publication. The WILD Foundation exhibited leadership and patience in coordinating facilities, schedules, and supporting Congress delegates to attend and present in this symposium. We thank the Rocky Mountain Research Station Publishing Services Staff for, once again, an outstanding job of coordinating publication of these proceedings.

The Office of International Programs of the USDA Forest Service contributed to this symposium by sponsoring four international students as World Wilderness Congress Fellows to attend and engage in the Congress and this symposium. Claudia Sellier of Brazil, Abraham Nkhata of Zambia, Jeffrey Ross of Canada, and Yang He of China made presentations, chaired sessions, photographed sessions, and provided logistical support for all aspects of the symposium. Additionally, Adam Liljebblad, Jeff Barney and about 30 federal employees generously donated their time and talents to make sure this symposium was professional, successful, and fun.

This publication was funded by a combination of support from the Rocky Mountain Research Station and the U.S. Fish & Wildlife Service.

**The Compilers, January 2007**





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# **1. Alaska: Past, Present, and Future**



## **2. Connections Between Wilderness and Communities**



## **3. Values to Local and Distant Society of Wilderness Protection**



## **4. Establishing Priorities and Developing Policies for Wilderness Protection**



## **5. Wilderness Stewardship Challenges in a Changing World**



## **6. Encouraging Stewardship Through Education**



## **7. Place and Spirit: Commitment to Wilderness**



## **8. Protecting Ecological Integrity of Wilderness**



## **9. Wilderness, Water, and Wisdom**







# 1. Alaska: Past, Present, and Future



*The Chugach Mountains formed a magnificent backdrop to the 8th World Wilderness Congress (photo by Claudia Sellier).*





# Wilderness Insights From Alaska: Past, Present, and Future

Deborah L. Williams

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**Abstract**—For many reasons, a significant percentage of Alaska's wildlands have been successfully protected. The passage of the Alaska National Interest Lands Conservation Act (ANILCA), in particular, represents one of the greatest land protection measures in human history. Numerous important factors have contributed to Alaska's conservation successes, and many of these factors can be used by other nations in achieving and sustaining wilderness areas throughout the world. As in other places, however, Alaska's natural lands and waters face multiple threats and challenges. If we are to continue to experience the significant benefits of wilderness areas and intact ecosystems, these threats and opportunities must be addressed.

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## Introduction

Alaska contains abundant wilderness areas and intact ecosystems that have been thoughtfully protected as a result of remarkable efforts from literally thousands of people. As hosts of the 8<sup>th</sup> World Wilderness Congress, it is a pleasure to share the history of these accomplishments, in the hope that our experiences may benefit conservationists, agency personnel, indigenous peoples, and others throughout the world. As in other states, provinces and countries, however, Alaskans are also facing significant threats and challenges to our natural heritage. We know that many of these threats, such as global warming, require coordinated national and international action. To protect Alaska and other great natural places in the future, we must work together to meet these challenges.

## Background

For over 100 years, men and women with extraordinary vision have legally protected a significant percentage of Alaska's magnificent natural areas. Currently Alaska, which is greater than 365 million acres (147 million ha) in size, holds over 40 percent of its land in varying degrees of protected status. Most significantly, over 57.9 million acres (23.4 million ha) are congressionally designated wilderness, representing over 50 percent of all federally designated wilderness in the

United States. This wilderness is contained in the following management units in Alaska: National Parks (33.49 million acres/13.55 million ha), National Wildlife Refuges (18.67 million acres/7.55 million ha), and the Tongass National Forest (5.75 million acres/2.32 million ha) (BLM 2003).

More generally, when combining both wilderness and non-wilderness designations, Alaska's National Parks protect a total of 54 million acres/21,853,025 ha (over 65 percent of all national parkland in the United States); Alaska's National Wildlife Refuges protect 70.7 million acres/28.6 million ha (over 83 percent of all national wildlife refuge land in the United States); and Alaska's National Forests contain 22 million acres/8,903,084 ha (representing the two largest National Forests in the United States) (BLM 2003). Other nationally protected areas in Alaska include 3,131 miles (5,039 km) of Wild and Scenic Rivers and two Bureau of Land Management (BLM) protected areas. In addition to these federally designated areas, the State of Alaska has placed some of its most ecologically significant land into state parks and state refuges, totaling 11.3 million acres (4.57 million ha), with 6.5 million of those acres (2.6 million ha) designated as state parks, refuges, sanctuaries, and critical habitat areas (Hull and Leask 2000).

Alaska's conservation success story, however, consists of much more than the numbers of acres that have been protected. Notably, we have sought to honor human relationships with Alaska's lands and waters. This is especially reflected in the subsistence laws and practices that are authorized on federally protected lands (ANILCA Title VIII) and in the recreational and other uses of these lands. The laws governing Alaska also recognize, both explicitly and implicitly, the important economic benefits, ecosystem service benefits, and existence values of protected lands for present and future generations (ANILCA Title I).

As a result, Alaska's intact ecosystems are providing tremendous cultural, economic, and social values. Alaska's rural indigenous peoples are able to subsistence hunt and fish on tens of millions of acres of lands and waters, sustaining one of the most important foundations of their heritage. At the same time, over 26 percent of all jobs in Alaska rely on healthy ecosystems, representing more than 84,000 jobs and providing \$2.5 billion a year in wages and even more contributions to the economy overall (Colt 2001). Key economic sectors that depend on healthy ecosystems include commercial fishing and processing, tourism, subsistence, recreation, and government employment. Our wild places also contribute tremendously to our quality of life and our identity, as reflected in polls that show that over 90 percent of Alaskans believe a healthy environment is necessary for a strong economy and over 70 percent identify themselves as conservationists (Moore 2001).

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## Achieving the Protection of Alaska's Wildlands

There have been four primary factors underlying the successful protection of Alaska's wildlands. While each is individually important, these factors have also complemented and reinforced each other. The four factors are: (1) thoughtful stewardship by Alaska's indigenous peoples, (2) bold protection actions by elected and appointed officials, (3) supportive science and scientific analyses, and (4) broad, positive, coordinated, generous, and strategic engagement by the public and non-governmental organizations (NGOs).

### Thoughtful Stewardship by Alaska's Indigenous Peoples

To begin with, Alaska was tremendously fortunate to be well stewarded by its First Peoples for thousands of years. Living in close connection with the lands and waters, Alaska Natives harvested fish and game sustainably, leaving few permanent traces. When the first non-Natives came to Alaska in the 1700s, they encountered robust populations of fish and wildlife and unscathed ecosystems. Because of Alaska's remoteness, few non-Natives lived here until the mid-1900s, and Alaska's indigenous people continued to demonstrate outstanding stewardship.

### Bold Protection Actions by Elected and Appointed Officials: Thinking Big, Acting Boldly

The United States purchased Alaska from Russia in 1867. Shortly thereafter, great political leaders, such as President Theodore Roosevelt, began to take bold actions to protect areas in Alaska. From the beginning, these leaders thought in terms of protecting millions of acres; they had a large vision, not small. Among other places, President Roosevelt protected the Tongass and Chugach National Forests. This was an early example of the second basis of Alaska's conservation successes: far-sighted, significant, bold legislative and administrative actions by brave political leaders.

Similarly, when he fought for the passage of the Alaska National Interest Lands Conservation Act (ANILCA), President Jimmy Carter was instrumental in achieving protection of over 100 million acres (40 million ha) of Alaska lands. By intrepidly invoking the Antiquities Act of 1906, President Carter administratively protected over 50 million acres (20 million ha) until Congress acted. At the same time, Secretary of Interior Cecil Andrus also exercised his regulatory powers through the Federal Land Management Policy Act (FLPMA) to protect tens of millions of additional acres.

At the Congressional level, several great Senators and members of the House of Representatives, including Representative Morris Udall, Representative John Seiberling, and Senator Paul Tsongas, heroically sought national public engagement in the protection of the Last Frontier (Cahn 1982). They knew that to achieve significant land protections—at an ecosystem scale—Congress needed to hear a mandate from citizens throughout the United States. At Congressional field hearings located in numerous states,

Americans from every walk of life testified in unprecedented numbers and demanded that Alaska's unscathed ecosystems be protected for current and future generations.

In the end, Congress passed ANILCA and proclaimed: "It is the intent of Congress in this Act to preserve unrivaled scenic and geological values associated with natural landscapes; to provide for the maintenance of sound populations of, and habitat for, wildlife species of inestimable value to the citizens of Alaska and the Nation, including those species dependent on vast, relatively undeveloped areas; to preserve in their natural state extensive unaltered arctic tundra, boreal forest, and coastal rainforest ecosystems; to protect the resources related to subsistence needs; to protect and preserve historic and archeological sites, rivers, and lands, and to preserve wilderness resource values and related recreational opportunities including but not limited to hiking, canoeing, fishing, and sport hunting, within large arctic and subarctic wildlands and on freeflowing rivers; and to maintain opportunities for scientific research and undisturbed ecosystems" (ANILCA 1980, Section 101(b)). Without doubt, this is one of the boldest, most inspiring statements ever made by a legislative body regarding the protection of wildlands.

### Supportive Science and Scientific Analysis

To buttress, substantiate, and, in some cases, spur, many of our great conservation protection actions, Alaska has benefited from outstanding scientific studies, analyses, and vocal support by fish and wildlife and other agency and academic personnel. This third factor in Alaska's success story cannot be overemphasized. The articulate voices of wildlife, wilderness, and ecosystem experts have been pivotal in achieving the conservation of extensive areas. Armed with scientific knowledge and ecosystem-level understanding, men and women in government agencies and universities have often led the way in insisting on large area protections and providing crucial data and mapping capabilities.

### Broad, Positive, Coordinated, Strategic and Generous Public and NGO Engagement

Especially in the last 50 years, Alaska has also benefited from broad, coordinated and strategic public engagement, at both the local and national levels. This has been the fourth basis for Alaska's conservation successes. Of importance, as noted above, the support for Alaska's protection has been widespread throughout the United States, at both the grassroots and the "grassstops" levels. Millions of Americans have urged Congress and the White House to protect Alaska, while at the same time a large number of individuals with significant political influence have done the same.

It is noteworthy, indeed, that so many Americans, from Florida to Washington state and from Maine to California, have taken time to write letters, call their Congressmen, and even travel to Washington, DC, on behalf of Alaska. It speaks to the deep passion of the American people for protecting one of the world's last great wild places. It also

reinforces the importance of the word “national” in Alaska’s national parks, national wildlife refuges, and national forests. Everyone in the country has a stake in the future of these publicly owned places, and as a result, everyone has a voice that needs to be heard when making decisions about the protection and management of these lands.

Numerous, effective conservation organizations have helped inform and coordinate these efforts, supported by the contributions of thousands of members, other individuals, businesses, and foundations. This generosity, coupled with the effectiveness of non-profit conservation organizations, has been instrumental in Alaska’s conservation success story. At the same time, the mix of national, state and local organizations working together in a coordinated fashion has also been crucial. In this regard, the Alaska Coalition has served a critical function in coordination and communication, with over 400 groups in the late 1970s and over 900 groups today.

It is also important to note that ANILCA, and many other great conservation achievements in Alaska, have only been realized because conservationists have worked with Alaska Natives in recognizing subsistence rights and needs. Subsistence uses are defined as “the customary and traditional uses by rural Alaska residents of wild, renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of non-edible byproducts of fish and wildlife resources taken for personal or family consumption; for barter, or sharing for personal or family consumption; and for customary trade” (ANILCA 1980: Sec.803). Title VIII of ANILCA explicitly protects the rights of rural Alaskans to engage in subsistence hunting and fishing on most federal lands.

In the end, of course, conserving great natural places takes time, perseverance, focus, optimism, and dedication. Conservation representatives, scientists, Alaska Natives, politicians and others spent over 10 years to achieve the passage of ANILCA. Other areas have taken even longer. Is it worth it? The answer to this question is definitively yes, not only for present generations, but also for future generations, and for the intrinsic values of the ecosystems individually and collectively.

## **Sustaining Conservation Victories and Protections**

As every conservationist knows, achieving legal protections for wildlands is the beginning, not the end, of the journey. Conservationists must continue to be vigilant in monitoring against subsequent legal encroachments and detrimental management decisions. For the most part, Alaska conservationists have been successful in this regard, for five major reasons: (1) constant vigilance, (2) supportive funding, (3) outstanding coordination and communication among conservation groups, (4) making the case for protection, and (5) creating champions.

### **Constant Vigilance**

First, there has been tremendous vigilance. Instead of relaxing after an area has been protected, Alaska-based

and national conservationists have sharply maintained their focus on defense. We often use the phrase, “constant vigilance, constantly applied.” There has always been so much at stake, as many powerful challengers and threats have arisen. While constant vigilance has meant an ongoing, high level of commitment and effort, it has also meant that virtually all of Alaska’s conservation victories have been maintained.

### **Supportive Funding**

To sustain this level of effort has required a steady flow of funding. Fortunately, individual contributors from across the United States have understood this and have continued to be loyal and generous. Far-sighted foundations and businesses have also been instrumental in funding the analyses, outreach, litigation, administrative work, and communications necessary to uphold the initial victories. In this regard, it is important to remember that to obtain funding, you must ask, year after year, and continue to present a compelling case.

### **Coordination, Collaboration, Cooperation Among Conservation Groups**

To make a compelling case, it is important to demonstrate that the groups working to protect an area are operating together in a complementary fashion, without duplication of effort. In Alaska, there has been excellent coordination, communication, and collaboration among conservation groups, at both the state and national levels. This is the third important factor in Alaska’s success.

### **Making the Case**

It is also crucial that advocates for protection continue to make a compelling argument for safeguarding an area, and broadcast that case effectively using all available means of communication. Alaska conservation advocates have done this well, using web sites, list serves, films, books, member magazines, and newsletters, while also working closely with all segments of the media. As we learn more about the importance of natural systems, and as these systems become more scarce and valuable, we have an even stronger case for their continued protection.

### **Creating Champions**

Finally, Alaska has been successful in maintaining its protected lands because we continue to create new champions in two ways. Conservation organizations and others have repeatedly invited political decision makers to Alaska to show them, first-hand, what is at stake. There is no substitute for a direct experience, whether it be standing on fragrant, spongy tundra, while hundreds of caribou run across a nearby hill; or catching a salmon on a pristine icy river, while eagles fly overhead. Alaskan conservationists have also recognized the importance of cultivating youth and nurturing their leadership skills and enthusiasm, both at the high school and college level. Through college intern

programs and an outstanding project called Alaska Youth for Environmental Action, diverse numbers of young people are bringing fresh enthusiasm and insights to the efforts to defend Alaska's wildlands.

## Major Threats

Going forward, there are many serious threats to Alaska's wildlands and intact ecosystems. Even though Alaska is experiencing some of these especially intensely, these are threats that, if unaddressed, will also imperil other wildlands throughout the world.

### Global Warming

I firmly believe that global warming poses the single greatest threat to the wildlife and wildlands of Alaska, the nation, and the world that we have ever faced. Global warming also jeopardizes the indigenous peoples who rely on our wildlife and wildlands.

No place in the United States has warmed more than Alaska: over 4 degrees F in the last four decades, with our winters warming over 7 degrees F during the same period. The adverse ecological and human impacts are being felt across the state. These have been well documented by scientists, Alaska Native elders, and others (ACIA 2004).

The adverse consequences of global warming are too extensive to list in full here, but selected examples are illustrative. Lakes and wetlands are drying up, reducing habitat for migratory birds and other animals (O'Harra 2005a). Alaska has experienced unprecedented forest die-offs from spruce bark beetles and other insects and diseases. In the last two years, Alaska has had devastating forest fires, with the 2004 season breaking all records when over 6.7 million acres (2.7 million ha) burned. Ecologically critical ice sheets are thinning and retreating, while on land, permafrost is melting. If current melting trends continue, the entire Arctic Ocean is projected to be ice-free during the summers well before the end of the century (O'Harra 2005b). Many animal species are in jeopardy, most notably polar bears and other ice dependent species like ring seals. These and other species are at serious risk of being displaced or losing their habitat altogether. If extensive warming continues, extinctions for many species are easily predicted (ACIA 2004).

All of these global warming consequences affect not only the plants and wildlife in Alaska, but also the people who rely on those plants and animals for their subsistence way of life. Humans are also adversely impacted by global warming, from the spread of diseases to crumbling infrastructure, all of which will cost billions of dollars to address. Very recently, for example, due to a severe, unusually fierce fall storm with waves 10 ft (3 m) above normal high tide, Nome lost 20 ft (6 m) of beach (Holland 2005).

In short, Alaska—right now—is unequivocally demonstrating dramatic, adverse, scientifically measurable, and readily observable effects of loading our atmosphere with an excess of greenhouse gases. Alaska is the canary in the mine; the melting tip of the iceberg; the Paul Revere of global warming: "The BTUs are coming!!" We must cap emissions immediately if we are to save our arctic and other ecosystems in the long run. This is a national and international imperative.

## Two Other Threats

In this paper, I will briefly list two other major threats that Alaska, in particular, is facing: (1) persistent organic pollutants, and (2) 19<sup>th</sup> century thinking versus 21<sup>st</sup> century solutions.

Persistent organic pollutants migrate from many different sources to Alaska, using a diverse array of transporters including air, water, and animals. These toxic compounds are bioaccumulated in higher trophic species such as whales, seals, and polar bears, raising concerns about the health and reproductive capabilities of these species and human consumption (AMAP 2002). Like global warming, the global transport of toxic chemicals underscores our international inter-dependence, regardless of where we live, and the widespread consequences to our wildlands of behaviors that are destructive and unsustainable.

Alaska is also threatened by 19<sup>th</sup> century thinking that stands in the way of 21<sup>st</sup> century solutions. The rush to drill the coastal plain of the Arctic National Wildlife Refuge is a prime example. Instead of spearheading 21<sup>st</sup> century efforts to conserve energy, promote energy efficiency, and enhance alternative energy production, the 19<sup>th</sup> century mindset of drilling for oil, at any cost, prevails among the current Administration and Alaska's Congressional delegation. Drilling for oil in the Arctic National Wildlife Refuge or in other protected wildlands will not, of course, have any meaningful impact on America's energy needs or on America's energy dependence. The United States has only 3 percent of the world's oil reserves, yet consumes 25 percent of the world's oil. If we are to bequeath our children an earth rich in wildlands, we can and must demand that our elected officials engage in 21<sup>st</sup> century thinking, 21<sup>st</sup> century solutions, and 21<sup>st</sup> century ecosystem and ecological services knowledge and appreciation.

Lastly, I would also like to note an overall concern about the risk of detachment from our wildland roots. Similar to so many other places in the world, America is becoming more urbanized. If people become disassociated from, or even worse, alienated from, wilderness, then it will be harder to justify the protection of wildlands based on experiential, spiritual, and existence value rationales.

## Opportunities

Fortunately, there are many opportunities to affirm and expand the protection of wildlands. I will briefly discuss three present opportunities: (1) growing understanding about the value and economic importance of protecting wildlands and biodiversity, and the costs of not doing so; (2) renewed commitment to future generations and intergenerational equity; and (3) expanded involvement by diverse constituencies.

## Protection Values

As people throughout the world watched the devastation from Hurricane Katrina, it became increasingly clear that this catastrophe was both a natural and a human-enhanced disaster. The wreckage in Katrina's wake underscored, in dollars and human suffering, the costs of destroying wetlands, forests, and natural rivers, as well as the costs associated

with global warming. The graphic lesson from Katrina and several other recent disasters is that destroying wildlands and disrupting ecosystem services is very expensive in real dollars and human misery.

As economists and others expand their understanding about the monetized values of ecosystem services, it is critical that this be communicated clearly to the general public. We need to publicize success stories as well as explain catastrophes, using teachable moments wherever possible. The insurance industry can be an important ally in this effort. In addition to ecosystem services, it is equally important to value direct and secondary employment benefits from wildlands. There is excellent work being done in this regard. As noted above, the Institute of Social and Economic Research (ISER) successfully quantified in economic terms many of the employment and other benefits from intact ecosystems in Alaska (Colt 2001). Personally, I presented a speech throughout Alaska explaining these impressive income and ecosystem services statistics, and received an amazingly positive response from Chambers of Commerce and Rotary Clubs. We must redouble efforts to generate this information and disseminate it widely.

## Intergenerational Equity

While it is very important to define and discuss the economic benefits of wildlands protection, it is equally important to explain the value-basis of our intergenerational equity responsibilities. Very simply, what kind of world are we leaving for our children and grandchildren, and how does that compare to the world that we inherited from our ancestors? As a corollary, do we have any right to leave future generations a diminished planet, a planet with fewer wildlands, less biodiversity, compromised ecosystem services, and less wilderness? By any ethical standards, the answer is no. Accordingly, we must be responsible stewards, not hedonistic, unsustainable consumers of the earth's resources. The spiritual, intrinsic, ecological and other values of wilderness can only be bequeathed if these areas are carefully protected by us.

We should talk proudly about intergenerational equity. This is a fundamental value that is critical to the long-term survival of our species. We have the opportunity and the need to invoke this tremendously important value more frequently.

## Diversification

To protect ecosystems and wilderness areas in the long run, we must maintain a majority view that safeguarding wildlands is appropriate, desirable, or, better yet, necessary. Accordingly, we must continue to diversify the ethnic and cultural support base for ecosystem protection.

Every culture has its special relationship with the natural world. It is important to recognize this, celebrate it, and share it with others. In Alaska, we created the "Guide to

Alaska Cultures" as a starting point for understanding the histories and relationships that different cultures have to our state and its wildlands (Alaska Conservation Foundation 2004). This successful publication is now used by the Anchorage School District as a text for the required course, Alaska Studies.

## Conclusion

For all of us in Alaska, it has, indeed, been an honor to host the 8<sup>th</sup> World Wilderness Congress. We hope that Alaska has provided and will continue to offer helpful insights and inspiration to those who attended the Congress and to those who are reviewing the Proceedings. As wildlands become scarcer, more imperiled, and more valuable, the job of protecting wilderness areas is more vital than ever. In closing, I want to thank all members of the international community who are dedicating their lives and careers to safeguarding wildlands. Whether it is through science, economics, advocacy, management, governance, writings, cultural understanding, photography, or other endeavors, every effort strengthens the likelihood that future generations will be able to experience the extrinsic and intrinsic values of wilderness areas that are essential to our survival, well being, and identity. There is much to do, but together, we will succeed. We must.

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# A History of Alaska Wilderness

Frank Norris

**Abstract**—Today there are approximately 222 million acres (90 million ha) of federal land in Alaska – that’s about 60 percent of the state. And of that vast acreage, there are about 57.5 million acres (23.3 million ha) of designated wilderness, along with some 16.5 million acres (6.7 million ha) of proposed wilderness areas. Alaska’s designated wilderness acreage makes up approximately 54 percent of the entire nation’s wilderness, but it’s only about 26 percent of Alaska’s public lands. So depending on your point of view, the amount of Alaska’s wilderness acreage is either a triumph or an opportunity not yet fulfilled. And Alaska has one more singular distinction: more than 99 percent of the state’s existing and proposed wilderness areas were established by the stroke of one man’s pen.

How those wilderness areas came to be, and why so much wilderness acreage was preserved all at one time, has as much to do with Alaska’s geography and politics as with any other factor. In the popular book, *The Nine Nations of North America*, Joel Garreau (1981) characterized a huge expanse that included Yukon Territory and Alaska, where climate dictated that people and their improvements would be scattered more thinly than elsewhere, as the “Empty Quarter.” Not surprisingly, quite a few of our country’s wilderness areas are found in the Empty Quarter, but the scattered few that live there have usually been pragmatic thinkers who are far more concerned about utilization and commercial development on the land than the esthetic joy of preservation.

A consistent theme of conservation history during the past century has been the growth of public interest in wilderness and the environment, and the tension and resistance of that interest from those in the development community. Nowhere has this tension been more dramatic than here in Alaska, where there is one additional factor to consider. Maybe it’s our geographical separation from the Lower 48, maybe it’s the late date at which we emerged from territorial status, or maybe it’s our image as the “Last Frontier,” but for 50 years or more, many outsiders feel that Alaska is an environmental icon that has to be saved and preserved in response to mistakes made elsewhere. The history of how wilderness has come to Alaska cannot be told without constant reference to these two related themes.

The public’s high regard of Alaska’s wilderness character goes back a long way. When the United States bought Alaska from Russia back in 1867, the Senate debates over the purchase suggested that Alaska was inhabited by Eskimos, polar bears, igloos, and glaciers. Most of those images were pretty fearful, and for more than a decade virtually no one

came north. But in 1879, the ever curious John Muir gave it a try, and by 1884, public interest had increased to the point that the first excursion boats began to ply the waters of southeast Alaska (Norris 1985).

Between 1895 and 1915, Alaska and nearby Yukon Territory became famous to just about everyone because of various gold discoveries: first the Klondike stampede, and later frenzies that put Nome and Fairbanks on the map. Gold fever scattered prospectors all over Alaska. These were men—and a few women—who appreciated the wilderness but also had a strong utilitarian streak (Borneman 2003). So they had little sympathy for people—most of them from the East Coast—who wanted to establish parks and other federal withdrawals. They didn’t mind the bill that established Mount McKinley National Park, primarily because it had provisions that allowed both mining and hunting. But they were less charitable about Katmai National Monument and Glacier Bay National Monument; both, after all, were over a million acres in size, both mining and hunting were prohibited, and both were signed into law by the President without a chance for Alaskans to weigh in on the matter (Williss 1985). An angry Governor Thomas Riggs, for example, told NPS Director Stephen Mather in late 1918, “Katmai National Monument serves no purpose and should be abolished,” and he further remarked, “the Territory has been at the mercy of any faddist who could go to Washington and get the proper endorsements.” Six years later, when the idea of a monument at Glacier Bay first surfaced, the *Juneau Empire* stated that “the suggestion that a reserve be established to protect a glacier that none could disturb if he wanted ... is the quintessence of silliness. ... When it is proposed to put millions of acres [into a withdrawal] that are capable of supporting people and adding to the population of Alaska, it becomes a monstrous crime against development. It leads one to wonder if Washington has gone crazy through catering to conservation faddists” (Norris 1996:38; Williss 1985:6). Alaskans had much the same reaction when Washington officials created other reservations, because they were imposed from the outside and prevented Alaskans from gaining access to local resources (Borneman 2003; Cook and Norris 1998).

From the mid-1920s through the mid-1950s, the tug-of-war between the Federal Government and Alaska continued. Wildlife advocates and scientists continued to advocate the preservation of new reservations: at Admiralty Island, Aniakchak Caldera, and on Kodiak Island. Park Service and Biological Survey officials, who had virtually no money to manage their properties, responded to these pressures by either expanding existing reservations or creating new ones. But these actions aggravated Alaskan officials because most of the early parks and other reservations were de facto wildernesses that the Federal Government either could not or would not develop (Norris 1996; Williss 1985). In 1946, for example, the Territorial House of Representatives asked

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“that steps be taken to have the Katmai National Monument abolished ... so that fishing and mining may be carried on legally in that area,” and a year later, Delegate Bob Bartlett introduced a statehood bill that would have transferred to the state most of Alaska’s public lands, including those within Katmai National Monument. Over at Glacier Bay, development pressures came mainly from residents in the Gustavus area, and their letter writing proved so effective that they succeeded in eliminating about 19,000 acres (7,690 ha) from the monument (Catton 1995; Norris 1996).

Throughout this period, even the most casual Alaska visitors continued to think of the territory as the icon of wilderness, as the journals and guidebooks from that era consistently show (Norris 1985). But few visitors, primarily hunters, ventured away from the road system, and rarer still were advocates such as Bob Marshall who wrote books extolling Alaska’s wilderness. Federal agencies like the National Park Service, which had long been tied to railroads, automobile clubs, and other development groups, showed little interest at the national level in promoting wilderness as a resource. Within Alaska, moreover, NPS reports prior to the mid-1950s ignored the subject of wilderness almost completely. (The only known instance in which Alaska NPS officials mentioned wilderness prior to the mid-1950s was in March 1949 [Mount McKinley NP, Superintendent’s Monthly Report, p. 3], when Acting Superintendent Grant Pearson objected to the naming of an Alaska Range peak because “this is one of the few NPS areas that are really wilderness areas.”)

Between 1956 and 1964, the period in which Congress was considering the Wilderness Act, the NPS in general—and Director Conrad Wirth in particular—was less than enthusiastic about legislated wilderness areas. The Service, instead, was firmly wedded to the park zoning concept, in which intensive use areas and road corridors were separated from administratively-designated backcountry areas. But over time, the Service’s attitude (according to one agency employee) eventually moved from “very cold” during the 1950s to “somewhat neutral” when the Wilderness Act was signed into law in September 1964. The Wilderness Act established eight instant wildernesses in Alaska; all were administered by the U.S. Fish and Wildlife Service (which had been an enthusiastic wilderness supporter), and all eight were fairly small, with a combined area of just 76,000 acres (30,756 ha) (JFSLUPC 1977).

The Wilderness Act mandated that the various Federal land management agencies conduct their wilderness inventories within a 10-year timeframe, so within a year, the NPS dispatched a master planning team to Mount McKinley. The team recommended that virtually all of the park should be included in either the Toklat Wilderness, which was north of the road, or the Denali Wilderness to the south. Planners carried on much the same process at Katmai, and by September 1965, they had recommended that slightly over two million acres (809,000 ha)—which was most of the monument—should be part of the National Wilderness Preservation System (NPS 1965). A similar study was contemplated at Glacier Bay but was never conducted.

Beginning in 1970, the NPS conducted a new round of wilderness studies. Glacier Bay and Katmai were inventoried as part of a multi-park effort, and public hearings were conducted on the two plans in November 1971. The Katmai

plan was eventually approved at the agency level, and in June 1974, President Nixon forwarded to Congress a 2.6 million acre (1 million ha) wilderness plan. But at Glacier Bay, a 2.2 million acre (890,308 ha) wilderness recommendation stalled because of proposed mineral development, and in July 1974, Nixon asked Congress to defer action on a wilderness proposal until a mineral survey could be completed. At Mount McKinley, wilderness studies were delayed for an entirely different reason: since 1964, various master plans had recommended park boundary expansions, and beginning in 1969, various congressional bills were submitted to enlarge the park. So given the state of flux, Congress agreed to defer all wilderness decisions until the boundary issue was settled.

Other agencies also produced wilderness plans during this period. The Fish and Wildlife Service, which had been an enthusiastic supporter of the Wilderness Act, was able to forward to Congress four Alaskan wilderness proposals, which totaled 6.1 million acres (2.5 million ha). The Forest Service did not have to work within a 10-year deadline, but even so, it developed several wilderness study areas in the Chugach and Tongass forests that encompassed 2.6 million acres (1 million ha). But agencies deferred proposals for five other areas that comprised more than 10 million acres (4 million ha), primarily because of unsettled land patterns and pending land selections (JFSLUPC 1977).

These studies of existing areas, however, paled by comparison to what was going on all over Alaska regarding proposed conservation areas. In December 1971, Congress had passed the landmark Alaska Native Claims Settlement Act, and Section 17(d)(2) of that act stated that the Interior Secretary could withdraw up to 80 million acres (32.4 million ha) of land to be used for national parks, wildlife refuges, forests, and wild and scenic rivers (Williss 1985). This action, predictably, set off a mad effort among federal agencies to select and justify appropriate lands for inclusion in new conservation areas. At first, all efforts were concentrated on the acquisition of acreage, but before long, questions of management also came to the fore, and one of those questions concerned wilderness.

By December 1973, when agencies were required to submit their master plans and draft EISs for the various conservation area proposals, it was broadly recognized that passing a final lands bill would precede any actions regarding wilderness. Specifically, agencies would usually have three years after the passage of a lands bill to study each area for its wilderness characteristics, and Congress would then decide whether to enact wilderness legislation.<sup>1</sup> It should be noted, however, that descriptions of certain proposed areas were far more conscious of a wilderness resource than others. And the National Park Service went so far as to propose

<sup>1</sup> See, for example, Alaska Planning Group, *Harding Icefield-Kenai Fjords National Monument, Alaska Master Plan*, December 1973, p. 29, and Alaska Planning Group, *Harding Icefield-Kenai Fjords National Monument, Final Environmental Statement*, December 1974, p. 1. Exceptions to the three-year wilderness study rule included the Noatak National Arctic Range proposal (to be co-managed by the Bureau of Land Management and the Bureau of Sport Fisheries and Wildlife) which mandated a 20-year study deadline, and new Forest Service areas, which were expected to “propose and identify wilderness study areas within three years.” Rogers Morton (Interior Secretary) to Speaker Gerald R. Ford (President of the Senate), December 17, 1973, p. 23, in “ANILCA-Various Proposals, Volume I” binder, AKRO Ranger Library.

Gates of the Arctic as a National Wilderness Park, which called for “instant wilderness” designation. But the Office of Management and Budget struck down that idea, and with just one day remaining before a Congressionally-imposed deadline, that proposal was renamed Gates of the Arctic National Park with a standard three-year wilderness study period (Alaska Planning Group 1973).

By early 1975, final environmental statements had been submitted for each of the proposed conservation areas. While waiting for Congress to act on an Alaska lands bill, conservationists met repeatedly, exchanged information, and tried to put forth the best possible legislative language. Throughout 1975 and 1976, members of the Washington-based Alaska Coalition, along with Alaska-based conservationists, remained committed to the concept of a wilderness study provision, except at the proposed Gates of the Arctic National Park.<sup>2</sup>

But the election of President Jimmy Carter in November 1976 changed everything. Carter, as a candidate, had campaigned for a strong Alaska lands bill, and he had told Cecil Andrus, his choice for Interior Secretary, that the passage of a strong Alaska lands bill would be a top priority. Within weeks of the election, another key event took place in the House of Representatives when Morris Udall (D-AZ) became the chairman of the House Interior and Insular Affairs Committee (Carson and Johnson 2001). Udall, a strong conservationist, soon met with leaders of the Alaska Coalition, and when the 95<sup>th</sup> Congress opened in January 1977, Udall introduced H.R. 39, the Alaska National Interest Lands Conservation Act.

The bill, which was admittedly a work in progress, was a conservationist’s “wish list,” and among its other provisions, it called for 64 million acres (25.9 million ha) in new or expanded national parks, 46 million acres (18.6 million ha) in national wildlife refuges, and an astounding 145 million acres (58.7 million ha) of wilderness—not wilderness study, as had been advocated all along, but “instant wilderness” that would become law as soon as the bill was passed. This acreage included most of the acreage in the existing parks and refuges, virtually all of the land proposed for new parks and refuges, and 5.4 million acres (2,185,302 ha) of existing Forest Service land (Williss 1985). The move to include a huge acreage of “instant wilderness” was a radical departure from previous Alaska land planning efforts, it was inconsistent with the language in previous park and refuge bills, and it brought howls of protest from the Alaska Congressional delegation and from various development-oriented groups. But given the fact that H.R. 39 had the personal support of Morris Udall, who as Interior Committee head was the prime mover of Alaska lands legislation, it was widely recognized that a large amount of “instant wilderness” would be included in the final lands package.

Udall subjected his bill to more than 25 public hearings during the spring and summer of 1977, and as the bill became a more accurate reflection of Alaska’s land use patterns and economic potential, the number of acres in the various conservation areas and in wilderness changed as a result.

<sup>2</sup> See, for example, Al Henson to Keymen, etc., “Alaska Coalition d-2 Proposal Memo,” August 5, 1976, pp. 17-18 and 26, in “ANILCA-Various Proposals, Volume I” binder, AKRO Ranger Library.

By the time H.R. 39 finally passed the House in May 1978, its wilderness acreage had shrunk to just 65 million acres (26.3 million ha). Even that level, however, was too much for the Senate, which in October 1978, reported a committee bill with just 36 million acres (14.6 million ha) of instant wilderness. The 95<sup>th</sup> Congress, however, adjourned before a compromise could be reached, so in January 1979, the process began all over again, and that May the House passed a bill calling for 67 million acres (27.1 million ha) of wilderness. But the more conservative Senate bill, a year later, included only about 57.5 million acres (23.3 million ha). House leaders then pushed for a conference that would increase the overall wilderness acreage, but the 1980 election of Ronald Reagan forced House leaders to drop their demands and agree to the Senate bill. President Carter signed the Alaska National Interest Lands Conservation Act (ANILCA) into law on December 2, 1980, with wilderness access and wilderness transportation provisions that realistically reflected the realities of Alaska’s rural residents (Williss 1985).

The push to establish more wilderness areas, however, was by no means through. Included within the lands act was a general wilderness review provision that asked both the Park Service and the Fish and Wildlife Service to inventory their non-wilderness lands and to report to the President on the suitability of those lands to the National Wilderness Preservation System (ANILCA 1980). Given that mandate, the NPS conducted numerous wilderness suitability reviews during the mid-1980s as part of the General Management Plan process, and in 1988 the agency produced a series of environmental impact statements specifically tailored toward wilderness recommendations. That process resulted in a recommendation of 7.8 million acres (3.2 million ha) of additional Park Service wilderness, and during the same period, the Fish and Wildlife Service produced a series of conservation plans and directorial recommendations for an additional 8.7 million wilderness acres (3.5 million ha). These recommendations were approved by the agencies involved. Congress, however, has not yet acted on them (NPS 1988).

Although a broad spectrum of critics stated back in 1980 that the imposition of millions of acres of Alaska wilderness would “lock up” resources and prevent further development, such has not proven to be the case. The strong growth of ecotourism in recent years, and the emergence of tourism as Alaska’s healthiest industry, has proved that Alaska’s wilderness resources, if anything, have been “locked open” and are now permanently available to a wide variety of recreational and traditional pursuits. And the continuing benefit of these areas has also been shown by the fact that never, in the past 25 years, has any serious legislative attempt been made to diminish the state’s wilderness acreage.

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# The Virtues of Localism and Arctic Wilderness Politics

James N. Gladden

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**Abstract**—An analysis of co-managing structures and land use issues in three case studies of arctic wilderness politics shows that more formal and informal power sharing by government officials with local people results in less conflict. Greater input and control by nearby communities may also help to protect wilderness ecosystems and traditional values of northern cultures. Especially for hunting and gathering societies, agency managers should work more closely with rural communities to realize the local virtues of vested interests, traditional knowledge, and voluntary compliance. But the success of co-managing renewable resources in arctic wilderness areas is limited by the type of land use issues active in policy debates and the capacity of public agencies to build a history of cooperative relations.

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This paper focuses on ways to lessen resource use conflicts between rural arctic residents with hunting and gathering traditions and national government agencies that manage designated wilderness areas. It is a problem with a global context, and concern has been growing for decades over the place of indigenous people in rural communities living close to national parks and other protected natural areas (Hough 1988; Stevens 1997). In the nineteenth century, the United States established a protectionist model of national parks to exclude all people except tourists as visitors. Local residents were not permitted to live inside legal boundaries or to continue traditional uses of renewable resources. The modern governments of some developing countries have adopted this model, forcing local residents to leave newly established parks and denying them customary uses of natural resources (Harmon 1987). The Ik and the forced loss of their homeland in northeastern Uganda is a tragic example of this ethically unfair and socially harmful policy (Turnbull 1972).

The circumpolar North has had its share of troubled relations between rural communities and southern-based national governments over managing lands legally designated as wilderness. One explanation for this is that some public lands were classified as protected natural areas without the consent or participation of affected local people. Another is that the land use rules for managing wilderness areas were designed by outsiders to exclude the traditional users of renewable resources. A third reason is that either weak

or no institutional forms were established by statute and regulation to take input from local residents when deciding how best to manage national parks to protect ecosystems and realize other policy goals.

In recent decades some national governments in the circumpolar North have passed laws to establish cooperative arrangements with local communities for managing wilderness areas. In 1980, the U.S. Congress passed the Alaska National Interest Lands Conservation Act (P.L. 96-487). Title VIII established subsistence resource commissions for local communities to work with the National Park Service (NPS) in managing renewable resources on newly created wilderness areas. In 1984, the Canadian Parliament enacted the Western Arctic Claims Settlement Act, also known as the Inuvialuit Final Agreement (IFA). It established a co-management regime of five boards, bringing together officials in the territorial and national governments and Inuvialuit representatives living in local communities. In 1991, the Finnish Parliament passed the Act on Wilderness Reserves (Erämaalakki). The Finnish Forest and Park Service (Metsähallitus) had already established citizen advisory councils for local input on state land use issues in Finnish Lapland, and they began discussing how to manage the new wilderness areas. These national laws sought to protect the natural and cultural heritage of different regions in the circumpolar North.

Castro and Nielsen (2001) note there is a trend in the co-management literature to define the concept in ways that include a variety of institutional forms and levels of authority. Berkes and others (1991:12) define it as “the sharing of power and responsibility between the government and local resource users.” Berkes (1994) distinguishes between local-level and state-level systems for managing natural resources in the Canadian arctic. He describes local-level systems as having decentralized power, traditional knowledge and resource users who self-enforce informal rules. A shift of political control to the state-level system in the last century is marked by centralized power, scientific knowledge, and external authorities who enforce bureaucratic rules. Berkes (1994) notes federal managers are making greater co-managing efforts to merge state-level and local-level systems and offers a participatory model to assess power sharing interactions between the two systems.

This paper discusses the findings of a study of ways to reduce political conflict between agency managers and local resource users (Gladden 2005). An analysis of three cases found that more power sharing in co-managing bodies reduces conflict over land use issues. A second finding was that conflicts over core values in land use debates are usually not amenable to compromise efforts through any form of a co-managing institution. A last finding was that informal power sharing by agencies in efforts to cultivate

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cooperation and trust helps in an earlier detection and containment of conflict. Wilderness managers should find it in their interest to share more decision making power with co-managing boards for three reasons. This argument is based on the local virtues of vested interests, traditional knowledge, and voluntary compliance.

## The Research Project

Does more cooperative management between local communities and national wilderness agencies reduce political conflict over resource use issues? Can co-managing institutions better assist public managers to protect natural areas and provide subsistence opportunities for traditional hunters and gatherers? To investigate these questions I did a study of ways to reduce land use conflicts in arctic wilderness areas (Gladden 2005). My hypothesis was that more power sharing results in less political conflict and I chose three arctic wilderness areas in Canada, Finland, and the United States: (1) Ivvavik National Park (INP) in the Yukon Territory, (2) Hammastunturi Wilderness Reserve (HWR) in Finnish Lapland, and (3) Gates of the Arctic National Park and Preserve (GAAR) in Alaska. The cases were chosen because the areas were located above the Arctic Circle and designated as wilderness by acts of national legislatures. They had rural residents who made traditional use of renewable resources and who were represented on legally established co-managing boards. My research findings are specific to the three case studies, but may also offer insights into how to reduce conflict and better protect the natural and cultural values of arctic wilderness areas.

An important part of the fieldwork was locating documents and conducting 54 interviews with wilderness managers, co-managing board members, and leaders of environmental groups. I used semi-structured interviews, asking questions to gain information on resource use issues and the intensity of value conflicts. Conflict in land use issues for each case was categorized as low, moderate, or high from the perspective of the interviewee. The first two levels indicated secondary value conflicts wilderness managers and local users believed they could work out together. I ranked an issue as primary (high) in conflict over core values if most interviewees saw it as charged with negative politics and mostly closed to a dialogue of compromise. These types of issues were similar to the intangible values inherent in larger cultural and philosophical questions (Kluwe and Krumpke 2003).

To study power sharing in the co-managing bodies, I did interviews and located documents to evaluate levels of participation by local resource users. The levels were little input (informing), moderate input (consulting), and high input (partnering), based on a model explained by Berkes (1994). I distinguished between formal and informal types of power sharing in co-managing bodies. The first looked at legal authority and institutional design and the second at existing levels of mutual trust and cooperation between local board members and agency officials. I compared the three cases by applying the qualitative measures of conflict intensity and power sharing to evaluate the effect of local participation through co-managing boards on political conflict.

## Findings of the Study

There were three major findings from an analysis of the three cases of arctic wilderness politics. The first from the case in Canada was that a high level of formal power sharing by government agencies with local resource users through co-managing boards results in less political conflict. By legislative design it had the strongest form of cooperative management of the three cases and I ranked it at the partnering level of power sharing. In 1984, the Inuvialuit Final Agreement (IFA) set up a regime of five institutions to co-manage lands and waters in the Inuvialuit Settlement Region, including Ivvavik National Park (INP). For example, Section 12 (56) of the IFA directs the Wildlife Management Advisory Committee (North Slope) to advise Canadian government ministers on wildlife policy issues, prepare a wildlife conservation plan, and decide harvesting quotas for game animals. The IFA also authorizes the committee to approve a park management plan before it can be sent to the ministerial level, giving it additional leverage in the political arena (East 1991). Doubleday (1989) argues the IFA slightly favors the government side of the power equation in that national ministers make the final decisions. But she notes the IFA gives the Inuvialuit a strong legal base to participate in a public policy process where the outcomes have direct impacts on their lives.

I assessed the level of value conflict in INP over land use issues between local people and wilderness managers as low. The disputes were over secondary values, given that those with conflicts expressed a willingness to discuss alternatives and work out solutions. One issue between local user groups and agency managers was over the expanding range of musk oxen and a concern that it may displace the caribou. Inuvialuit hunters prefer to harvest (Snow 2003). Another was that some locals argue Parks Canada should do more to provide economic opportunities for Inuvialuit beneficiaries through nature tourism (Fehr 2003). For example, no permit holders who operate commercial float trips on the Firth River are IFA beneficiaries. The agency is studying these issues and there is an open policy dialogue on the best way to resolve resource use conflicts to the satisfaction of all parties.

One reason to explain low value conflict is that local users and park managers appear to share the same policy goals of protecting ecological and subsistence values. Earlier in the history of the park, agency managers were highly protectionist and wanted to govern uses based on standards of wilderness purism (McLean 2003). The culture of INP managers has shifted to consider the needs and concerns of local resource users. Another way to account for levels of low conflict is that after nearly two decades of operation of the IFA, the members of the co-managing bodies have evolved a positive climate of politics resistant to the outbreak of core value conflicts. A third possibility is the Canadian government was able to preempt future outbreaks of core value conflicts with a land claims settlement in 1984.

A second major finding, from the Finnish case, is that land use conflicts driven by core value disputes strongly resist efforts at compromise between local users and agency managers. I rated the amount of power sharing as weak consulting in that local citizens serving on the co-managing body had the least amount of legal or formal power to shape decisions for

managing an arctic wilderness area. The Finnish case also had the highest amount of political conflict but the issues the advisory board confronted were about political collisions over core or primary values. The Hammastunturi Wilderness Reserve (HWR) is managed by the Natural Heritage Services and the co-managing body is the Metsähallitus Advisory Committee for Inari Municipality. An agency official chairs the committee and the Inari Municipal Council, Sodankylä Municipal Council and Finnish Sami Parliament appoint members who serve in a strictly advisory capacity. The agency uses it as a forum to gain perspectives on issues from the viewpoint of local communities and to circulate information about management plans and actions (Kajala 2003). The committee holds formal meetings twice a year and many informal interactions occur, such as field trips and other forms of contact.

I rated the overall level of conflict in HWR over resource use issues between particular local user groups and Metsähallitus as high. The overarching political issue is a core value conflict over who either owns or controls Finnish Lapland and has power to make decisions for land uses. The Finnish Sami Parliament has posed these basic questions for public debate and the Helsinki government has not yet responded to them with clear policy declarations. As a result, Sami land claims and rights overshadow most other resource use issues on state lands (Saarinen 2003). For example, Sami leaders oppose agency plans to use primitive methods for logging two tracts of old growth forest in HWR, arguing this will harm the economic and cultural values of Sami reindeer herders. These stands provide arboreal lichen for winter forage and reindeer herding serves as an iconic symbol of traditional Sami culture. The issue of primitive logging in HWR also challenges a core value of environmental groups who maintain that any commercial forestry is incompatible with a philosophy of wilderness (Leskelä 2003). However, the Inari Municipal Council in 2003 went on record by a majority vote to support primitive logging in the wilderness reserve as a source of jobs and income for local people (Niemelä 2003). It wanted the agency to manage the area by finding a balance between logging, herding and tourism, noting that the 1991 law provides for careful logging in the Hammastunturi Wilderness Reserve.

The Finnish case shows the effect of core value conflicts on land use issues, and in this politically volatile climate it is unlikely any restructuring of power sharing arrangements to cooperatively manage the wilderness area will lessen differences. The co-managing board in the Finnish case differs from the other two cases because it represents several interests beyond those mostly concerned with hunting and gathering as subsistence activities. This makes it more difficult for the agency to work out land use conflicts within its own statutory constraints because those serving on the board have opposed positions on issues. The case in Finland shows that heterogeneous land use values in local communities may decrease the capacity of co-managing bodies to work out conflicts over issues with wilderness managers.

A third and last major finding of the study is that more informal power sharing helps to explain why some co-managing institutions are more effective than others. An informal sharing of power is critical for building trust between managing agencies and local residents, and in this regard it

may also serve as a buffer of good will to prevent core value conflicts. This finding is drawn mostly from the United States case, but there is evidence to support it in the other cases. I rated the co-managing body in the Alaska case study of arctic wilderness politics as having a strong consulting level of power sharing with the National Park Service (NPS). This rating was based largely on efforts by NPS officials to informally share power for making decisions with the Subsistence Resource Commission (SRC) for Gates of the Arctic National Park and Preserve (GAAR). Although the members of the SRC represent several ethnic groups spread over a wide geography, they share a remarkable degree of consensus on the issues. One reason for this is that they share a common set of values oriented around respecting the land and desiring to protect a subsistence way of life (Ulvi 2004).

I found the level of conflict over land use values in GAAR between the NPS and local communities with residents using park resources to be moderate. This evaluation was based largely on conflict between some air taxi pilots in Bettles and the agency over efforts to regulate recreational uses in the park (Pendergrast 2004). But the SRC has good working relations with agency officials and sees the managers as sharing its goals to protect the natural and cultural values of the park (Simon 2004). The SRC realizes that some resource issues threatening subsistence use are beyond the jurisdictional control of the NPS. For example, a bill has been introduced in the Alaska State Legislature to open the Dalton Highway Corridor to all-terrain-vehicle use near the eastern boundary of GAAR. There are also efforts to explore for oil and gas deposits in the northern foothills of the Brooks Range along the northern boundary of the park (Reakoff 2004).

The early history of relations between the SRC and the NPS was charged with conflict, when the agency appeared to view subsistence as a threat to the wilderness values of the park (Schwarber 2004). New GAAR officials were needed to shift the culture of the agency and begin working cooperatively with the SRC to support subsistence activities in the park. The NPS began to ask how it could protect the wilderness character of the park and also provide rural residents with subsistence opportunities. Today the SRC and the NPS appear to agree on the value of the co-managing body to identify and discuss resource use issues at early stages of conflict. The Alaska case shows that formal legal arrangements may be less important to the success of co-managing land uses than the informal element of power sharing founded on building a history of mutual trust and cooperative relations.

## The Virtues of Localism

Based on an analysis of the case studies, there are three reasons why wilderness managers should support more power sharing with rural residents who practice modified traditions of local resource use: (1) vested interests, (2) traditional knowledge, and (3) voluntary compliance. These are the virtues of localism, where a virtue is defined as a favorable trait of character and localism refers to a special attachment people have to where they live and to their capacity to be good stewards of the land. Rural residents have a vested interest in protecting the ecological quality of

the geography on which they depend for hunting and other uses. A second virtue of rural residents is their ability to practice traditional knowledge as a set of skills enabling them to harvest renewable resources in sustainable ways. A last virtue is that local people who help to make the policy decisions they will be governed by are more likely to obey those rules on a voluntary basis.

In this paper, localism refers to any rural community that displays four criteria: (1) a relatively small and stable population, (2) depends significantly on local resources for economic needs, (3) uses traditional knowledge to manage environmental resources, and (4) has a meaningful amount of political control over a geographical area. Societies with these characteristics have the capability to manage renewable resources in sustainable ways. Arctic communities with hunting, fishing, gathering and herding traditions meet some or all of these criteria, even if not in an ideal or paradigm form. The research literature on common pool resources (Agrawal and Ostrom 2001; Ostrom 1990; Pinkerton 1989) uses similar constructs to explain why some small rural societies are able to manage natural resources in ecologically sustainable ways and others are not.

## Vested Interests

The first reason why agency managers should partner with local people through cooperative institutions is that subsistence users have a long-term interest in protecting the land health of arctic wilderness areas. Rural residents with economic traditions such as hunting and gathering know the importance of natural and healthy ecosystems to their lives. They realize that over-harvesting wildlife populations and degrading habitats threaten to destroy the economic basis of their community. Based on this insight, the traditional resource use behavior of rural residents fits well with agency goals to protect the naturalness of wilderness ecosystems.

The Inuvialuit who negotiated the IFA with the Canadian government wanted to establish Ivvavik National Park (INP) as a means to prevent the construction of an oil or gas pipeline across the North Slope of the Yukon Territory into the Mackenzie River Valley. The reason was to protect the habitat of the Porcupine Caribou Herd as a critical resource for subsistence uses. Placing this much land off limits to any form of industrial development is a clear sign of a genuine desire to protect the natural environment of the wilderness park. Opposition by the Finnish Sami Parliament to any logging of old growth forest in Hammastunturi Wilderness Reserve (HWR) symbolizes the idea of protecting natural areas so that reindeer herders may continue a traditional use. In the past, arboreal lichen in old growth trees was important late winter forage for reindeer. However, most ancient forest lands in Finnish Lapland have been cut and reindeer herders cannot now realistically count on arboreal lichen as a source of forage. In Gates of the Arctic National Park and Preserve (GAAR), local hunters in Wiseman and other rural communities have an interest in maintaining the genetic quality of moose populations. Sport hunters want to harvest the largest bulls as trophies and some locals argue that over time this may result in a smaller body size and less ability to survive deep snow winters (Reakoff 2004). Unlike sport hunters, subsistence users depend on natural

and healthy moose populations in the local areas where they live for the long term.

## Traditional Knowledge

Sharing local expertise on land use problems associated with sustaining the use of renewable resources is a second reason why more local input and control makes sense for agencies managing arctic wilderness areas. Traditional knowledge can provide valuable information on how to better protect natural areas for their ecological and subsistence values (Sherry and Myers 2002). Aboriginal societies have adapted to often harsh arctic conditions for centuries and this is a good measure of their economic and cultural robustness. It suggests arctic cultures have important things to teach newcomers about how to adapt to changing environmental conditions. Traditional knowledge is a specific set of practical skills for the sustainable use of natural resources and a worldview integrating humans with the natural world. This cultural way of seeing the place of humans in the world can help in constructing a larger environmental ethic to realign modernity with nature.

In the case study for Canada, participation by rural residents who share traditional knowledge insights results in an improved making of land use decisions. For example, the Environmental Impact Screening Committee is an IFA co-managing body that approves or refers for final assessment and review, proposals for economic development and other types of projects. It values the input gained from Inuvialuit members who can provide the committee with detailed information about the natural conditions of a proposed project area (Klassen 2003). The Finnish case also provides evidence of the value of traditional knowledge for wilderness managers to help protect natural and cultural values. The local users of renewable resources are experts on where the best places are to hunt, fish and gather wild resources. Metsähallitus could use this information through its advisory body to better protect the local resource use traditions of Sami residents (Aikio 2003). The case in Alaska shows that SRC members can provide the NPS and other government agencies with valuable information on the general health of local ungulate populations and their habitat conditions (Reakoff 2004). They are hunters and have frequent contact with other subsistence hunters who live as neighbors in their rural communities.

## Voluntary Compliance

If local people help to approve land use rules through co-managing institutions they are more likely to comply with those rules. This is important, given the vast and remote land areas of many arctic wilderness areas. Officers of the law cannot always be at the right place to enforce rules governing uses of natural resources. It is in the interest of wilderness managers to have local resource users voluntarily comply with land use rules. If they have meaningful input into the policy making process two results may be anticipated. Local people will be able to get more of what they want written into policy rules by arguing for their positions on the issues. They will also be inclined to accept the framework of a rule-making system that gives them a fair measure of control over policy outputs. A political theory of democracy argues

those closest to a problem often are the most affected by a policy outcome and have the most detailed knowledge about the nature of the issue (Dahl 2000). These two points help to justify the cooperative management of arctic wilderness areas. They suggest that rural communities with self-governing capacities have a key role to play in the making of resource use decisions.

The case study in Canada provides a model for a vigorous regime of co-managing institutions that overlap authority between local, territorial, and national levels of interest. This regime provides local people with meaningful input and control over land use policy in the park and elsewhere in the Inuvialuit Settlement Region. As a result, the subsistence values of local communities are reflected in agency policy outputs and compliance with the rules by rural residents is more likely. Although feelings are often intense in the Finnish case and the co-managing body is strictly advisory to Metsähallitus, I found little evidence of rule violations in the wilderness reserve. The ideological dispute over land claims and political rights have yet to provoke any larger acts of civil disobedience. The disposition of feelings on both sides of the conflict over core values and the direction of future events are unknown. In the Alaska case, a high level of mutual trust and cooperation between the SRC and the NPS suggests a desire by the agency to fully include local communities in its decision making process. It is more likely local residents who help to make the rules for managing GAAR will freely comply with them, and may even help to enforce them.

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# A GIS-Based Method to Evaluate Undeveloped BLM Lands in Alaska

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**Abstract**—As Alaska's largest land management agency, the Bureau of Land Management (BLM) has responsibility for over 87 million acres (35 million ha) of public lands throughout the state. By using datasets and Landsat scenes within a Geographical Information System (GIS), this study prioritizes wilderness protection through the ranking of BLM blocks (contiguous land parcels), in Alaska based on proximity to current 'development.' Development is defined as 1,000 m (3,280.8 ft) around towns, active oil and gas leasing, mining claims, infrastructure, dams, and disturbance (visible scars on Landsat scenes). A Development Index (DI) was calculated based on the percentage of developed area and size of each BLM block. Of the BLM blocks evaluated, 36.8 percent have no development within 1,000 m of block boundaries. BLM lands with less than 1 percent development comprise 35.6 percent, while 17.6 percent of BLM lands are between 1 and 10 percent developed. Based on the DI, the highest ranking blocks free of development are the National Petroleum Reserve-Alaska (DI = 2,517.3), Nulato Hills (DI = 2,377.3), and Ruby (DI = 2,244.3). This study both demonstrates that under these criteria additional BLM lands qualify for potential Wilderness designation and prioritizes these areas for BLM review and Citizen Wilderness Inventories.

## Introduction

The Bureau of Land Management manages some of Alaska's most diverse, spectacular, and unprotected wilderness. As Alaska's largest land management agency, the BLM has responsibility for over 87 million acres (35 million ha) of surface land and 245 million acres (99 million ha) of subsurface mineral estate (BLM 2001). In Alaska, only 780,000 acres (315,655 ha) of BLM lands are classified as Wilderness Study Areas (Central Arctic Management Area WSA) and no BLM lands are designated as Wilderness (BLM 2001) (fig. 1).

The idea of wilderness is a historically controversial subject in Alaska, and thus the BLM has not yet designated any wilderness areas on its lands within the state. Section 603 of the Federal Land Policy and Management Act of 1976 (FLPMA) required the Secretary of the Interior to review all public lands and determine which contain wilderness characteristics. Findings were reported to the President on

recommendations for new units of the National Wilderness Preservation System (NWPS) by 1991. The Alaska National Interest Lands Conservation Act (ANILCA), passed by Congress in 1980, exempted the vast majority of BLM lands in Alaska under Section 1320 from the FLPMA-Section 603 wilderness review process. This was changed in 2001 when former Secretary of the Interior Bruce Babbitt lifted that directive and freed the agency to review wilderness values on BLM lands in Alaska. In 2003, Secretary of the Interior Gale Norton reinstated the old directive for BLM to cease wilderness reviews in Alaska and consider wilderness only when broadly supported by elected Alaska officials. Currently, the majority of Alaska's elected officials are opposed to any new wilderness designation on BLM lands within Alaska.

Per the BLM's Wilderness Inventory and Study Procedures Document (H-6310-1; Release 6-122; dated January 1/10/2001), the "primary function of a wilderness inventory is to document the presence or absence of public lands with wilderness character. The inventory will include gathering information and preparing a file for each inventory area." Several conservation organizations throughout the United States have conducted Citizen Wilderness Inventories (CWI) within BLM lands. The California Wilderness Coalition identified 7.4 million acres (2.9 million ha) as potential Wilderness through the use of volunteers across the state (see <http://www.calwild.org/resources/inventory.php>). The Oregon Natural Desert Association inventoried 363,000 acres (146,901 ha), either wholly or partially within the Andrews Resource Area (see <http://www.onda.org/projects/index.html>).

This project may serve as a model for a CWI and to help prioritize efforts within the State of Alaska. Alaska's enormous size and lack of infrastructure limits the ability of a CWI on BLM lands in Alaska. Thus, this project focused on available spatial datasets, satellite imagery, and GIS technology to evaluate and prioritize BLM lands for future wilderness inventories.

A geographic information system (GIS) is used to determine areas considered 'not-developed.' For this project, the term 'developed' describes areas within 1,000 m (3,280.8 ft) of existing infrastructure, such as roads, railroads, pipelines, electrical transmission lines, oil and gas leases, dams, mining claims, and towns. This report blends concepts from past citizen inventories of wilderness and methods from similar studies utilizing GIS technology.

This project follows similar methods developed by the Conservation Biology Institute (CBI) in the assessment of intact forest within Alaska. Strittholt and others (2006) found 72 individual forest blocks greater than 50,000 ha (123,533 acres) in size within the boreal region of Alaska. Methods used to determine intact forest include the buffering of roads, pipelines, and populated areas at varying distances ranging

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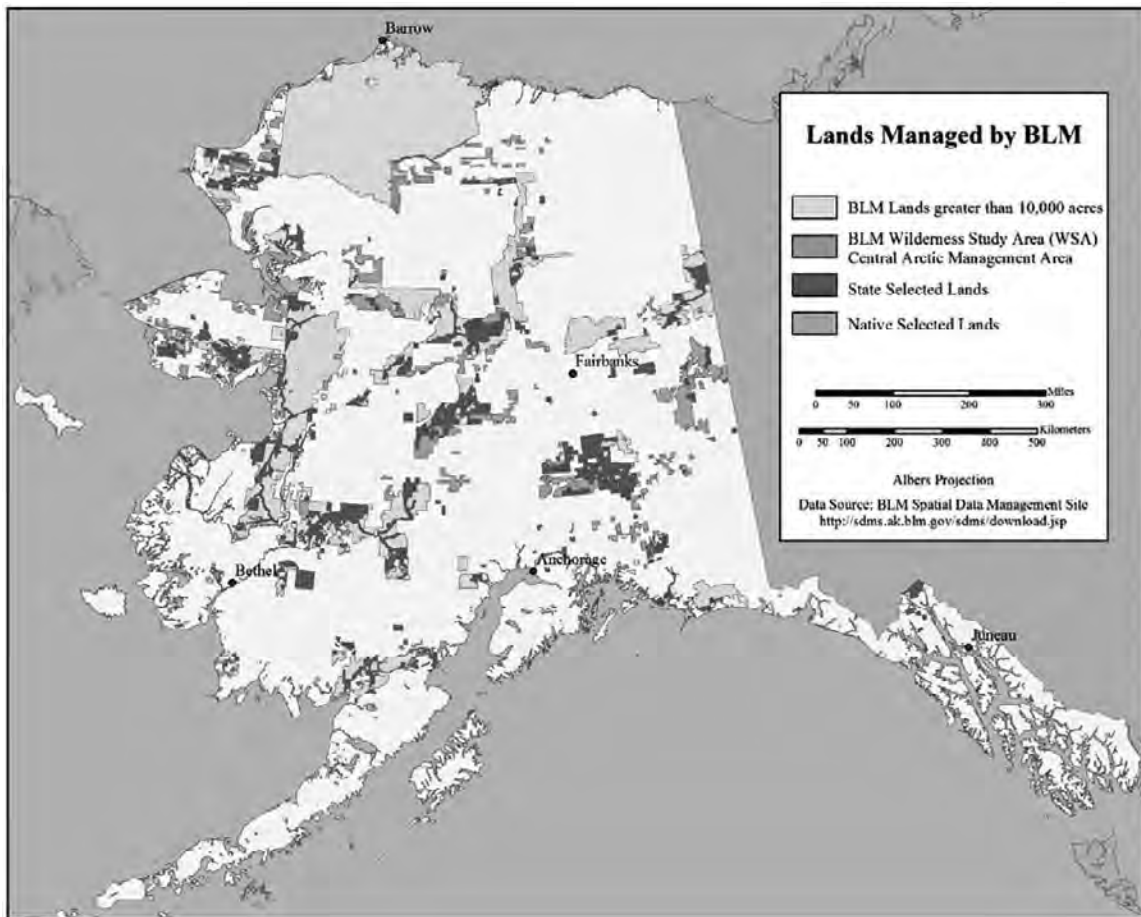


Figure 1—BLM lands in Alaska.

from 1 to 5 km (.62 to 3.1 miles). Landsat satellite imagery was used to identify additional human impacts. Buffered areas were used to eliminate human impacts to reveal areas of intact forests.

Additionally, this project furthers a study conducted by Pacific Biodiversity Institution (PBI), which evaluated the current extent of wildlands within the United States. PBI (Karl and others 2001) found that Alaska has 46.6 percent of the unprotected roadless area within the United States, with 85.6 percent of these wildlands remaining in patches greater than 1 million acres (404,686 ha). However, PBI's methods for Alaska included only the infrastructure GIS layer produced by the Alaska Department of Natural Resources. The infrastructure layer is one of six layers used within this study.

Other studies have focused on perceptual indicators of wilderness to create a continuum or index. Aplet (2000) evaluated the wilderness indicators of solitude, remoteness, uncontrolled processes, natural composition, unaltered structure and pollution to create a Wilderness Index for the contiguous United States. Carver (2002) described remaining wilderness areas in the United Kingdom from public opinion solicited via a website where users defined the minimum level of wilderness quality indicators. This study differs from others by using multiple GIS layers and Landsat scenes to

evaluate altered landscapes on BLM lands in Alaska. The indicators used within this study focus on geographic elements to help prioritize areas for further evaluation using other wilderness attributes.

## Methods

This project utilized GIS technology to evaluate “non-developed” BLM lands within Alaska. A GIS is a computer application that stores, retrieves, manipulates, analyzes, and displays geographically referenced information (see <http://www.esri.com>). Several GIS layers are used for analysis to represent phenomena occurring within Alaska's BLM lands.

GIS data layers used within the study came from multiple sources including several divisions within the Alaska Department of Natural Resources (DNR) (see <http://www.asgdc.state.ak.us/homehtml/pubaccess.html>) (Department of Environmental Conservation, Department of Oil and Gas, Department of Community & Economic Development), as well as, the U.S. Army Corps of Engineers and U.S. Environmental Protection Agency. Note that most layers only document phenomena occurring on Federal lands, which is of specific interest to this project. Below is an explanation of the GIS layers used within this study.



- **BLM Lands Layer**—The BLM lands layer is the foundation of this study, as it depicts solely the lands used within the analysis (<http://sdms.ak.blm.gov/sdms/download.jsp>). All lands currently managed by BLM are analyzed, including state selected and native selected lands. Information for this layer is extracted from the statewide land status layer produced by BLM using information within the attribute table. Note that only BLM managed lands greater than 10,000 acres (4,047 ha) are used for analysis, resulting in 552 individual polygons. The smallest unit size is 10,026 acres (4,057 ha); maximum size is 21,901,526 acres (8,863,233 ha); mean size is 147,184 acres (59,563 ha).
- **Oil and Gas Lease Layers**—The oil and gas lease layers included the active lease boundaries for the North Slope Foothills, and North Slope area wide, and Cook Inlet Area. Downloaded layers are from the Alaska Department of Natural Resources (DNR), Division of Oil and Gas in August, 2004 (<http://www.dog.dnr.state.ak.us/oil/products/data/downloads/downloads.htm#>).
- **Dams Layer**—The dam layer is derived from the National Inventory of Dams produced by the U.S. Army Corps of Engineers, who inventories all dam locations in the United States. A file containing downloaded latitude and longitude coordinates from the National Inventory of Dams web site was imported as a GIS layer. The layer contains 112 dams located within Alaska (<http://crunch.tec.army.mil/nid/webpages/nid.cfm>).
- **Mining Layer**—The mining claims layer is a combination of state mining claims, prospecting sites, and Federal claims either selected or patented within the State of Alaska. The layer includes both active and inactive mining claims. Source for layer is the Alaska State DNR (<http://www.asgdc.state.ak.us/metadata/vector/resource/mining/minefs.html>).
- **Towns (Population) Layer**—A towns/villages layer representing Alaska communities is derived from the 2000 census data. The Alaska State Department of Community & Economic Development maintains an online Alaska Communities Database with latitude/longitude locations and current population figures on communities in Alaska ([http://www.dced.state.ak.us/cbd/commdb/CF\\_COMDB.htm](http://www.dced.state.ak.us/cbd/commdb/CF_COMDB.htm)). These coordinates are used to create a GIS layer depicting community locations.
- **Infrastructure Layer**—The infrastructure layer consists of the infrastructure digitized primarily from USGS 1:24,000, 1:63,360, and 1:250,000 quadrangles. Source for this layer is the Alaska State DNR (<http://www.asgdc.state.ak.us/metadata/vector/trans/infra63.html>). This includes such themes as roads, transmission lines, tractor trails, airfields, pipelines, railroads, etc. Themes such as foot trails and the Alaska Marine Highway are excluded from analysis.
- **Disturbance Layer**—The method of evaluating human-made disturbance on the landscape using Landsat satellite scenes comes from CBI. All BLM lands greater than 10,000 acres (4,047 ha) are evaluated for disturbance. Disturbance is defined as a linear scar visible within the landscape through Landsat Scenes (30 m/98 ft pixel resolution) at a scale of 1:50,000. Landsat Satellites are part of the Landsat Project, an enterprise for acquisition of imagery of the Earth from space.
- **Pollution Layer**—The pollution layer was obtained from Alaska Community Action of Toxics (ACAT), an organization that aims to protect human health and the environment from the toxic effects of contaminants. ACAT integrated various state and federal databases into a comprehensive view of the location of over 1,600 toxic sites in Alaska (<http://www.akaction.net/pages/mapping/mapindex.html>). Toxic sites vary from gasoline spills to Superfund sites. The pollution layer is used only as reference to determine disturbance scars visible on the landscape.
- **Administrative Boundaries**—The Administrative boundaries layer was obtained from the Alaska State DNR (<ftp://ftp.dnr.state.ak.us/asgdc/adnr/adminbnd.e00.gz>). The layer represents the state and federal boundaries of lands with varying levels of protection. Examples include all Fish and Wildlife Refuges, National Parks, National Forests, and State Critical Habitat Areas. The layer was used for within ecoregional and vegetation analysis. Although each area is managed differently, for purposes of this study administrative boundaries parcels are considered a greater level of protection from development than lands outside administrative boundaries.
- **Ecoregions**—The ecoregions layer was developed cooperatively by the U.S. Forest Service, National Park Service, U.S. Geological Service and The Nature Conservancy (<http://agdc.usgs.gov/data/projects/fhm/index.html#G>). The layer depicts the major ecosystems of Alaska. Examples include the Bering Tundra, Coastal Rainforests, and Seward Peninsula. This layer was used within ecoregional analysis.

Two GIS layers are modified from their original form; these include the towns and infrastructure layer. Communities with a population of zero are eliminated from the town layer. Examples include the towns Flat, Hobart, and Miller Landing. The infrastructure layer has a large degree of modification through the removal of several line segments using layers' attributes. Descriptions labels vary from specific descriptions (for example, Rabbit Creek Road) to general descriptions (for example, Forest Development Roads). Several segments are removed from this layer as they are not included in the definition of disturbance. Examples of removed segments include the Alaska Marine Highway and hiking trails (such as, Lost Lake Trail). Additional infrastructure layer segments were removed, as they are not visible on Landsat scenes.

The definition of disturbance is a scar visible on the landscape through a Landsat Scene (30 m/98 ft pixel resolution) at a scale of 1:50,000. The pollution layer is used as a reference to find disturbance locations on Landsat satellite scenes. Examples of scars included old roads from military sites and old mining sites. Scars were digitized into the disturbance layer. Scars were also found adjacent to existing infrastructure. These are also added into the disturbance layer. Thus, the disturbance layer is comprised of 'missing' roads and pipelines from the infrastructure layer, plus historical roads and trails not captured in any of the other GIS layers.

## GIS Analysis

To perform GIS spatial analysis, data modification is needed. This includes converting from points, lines, and polygons (vector data model) to rows and columns of pixels (raster data model) and calculating a Euclidean distance function to each 'source' cell for all GIS layers. The Euclidean distance function determines the distance to all cells from a specific set of source cells (for example, dams within the dams GIS layer). A conditional statement changes all values greater than 1,000 m (3,280.8 ft) to a value of zero, while values less than 1,000 m become a value of one. This allows for each layer to be added together, resulting in a range of values of zero to six. A value of six equates to an area where a pixel is within 1,000 m (3,280.8 ft) of each of the six GIS layers considered. A combined layer was converted back to a vector layer to determine overlap with BLM lands. Calculating the developed area of each BLM block is done to determine a Development Index (DI). A detailed description and graphical representation of GIS analysis is found in figure 2.

## Development Index

A Development Index (DI) is created to allow ranking of BLM managed land units based on both the degree of development and the size of unit. Large areas with little development are ranked higher than small areas with little development. It is advantageous to focus on the management of larger blocks versus smaller blocks in terms of ecological processes and opportunities for isolation and remoteness, thus size is considered as a critical factor in the index. The index is calculated by multiplying the percent non-developed for each block by the natural log of the size of the unit. Taking the natural log of block area normalizes the value, thus allowing comparisons for degree of development. The equation is as follows:

$$(\% \text{ Not developed}) (\ln (\text{Block Area}))$$

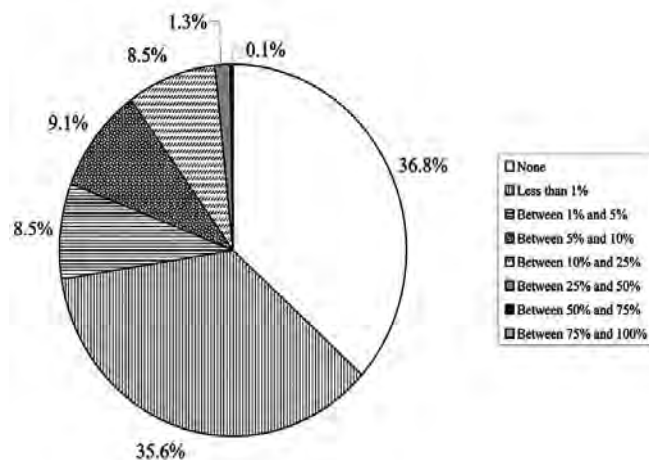


Figure 2—Percentage of developed BLM blocks.

The range of index values is 40.4 to 2,517. A higher index value reflects low development and a large block area and thus a higher wilderness value potential. A low index value reflects both high development and a small block area and lower wilderness value potential. The scenarios below provide a few examples of index scores.

**Low Development Scenario—10 Percent Developed**  
Non-development (90%) of large block area (8,000,000 acres)

$$DI = (.9) (\ln 8,000,000)$$

$$DI = 14.30$$

Non-development (10%) of small block area (100,000 acres)

$$DI = (.9) (\ln 100,000)$$

$$DI = 10.36$$

**High Development Scenario—85 Percent Developed**  
Non-development (15%) of large block area (8,000,000 acres)

$$DI = (.15) (\ln 8,000,000)$$

$$DI = 2.38$$

Non-development (15%) of small block area (100,000 acres)

$$DI = (.15) (\ln 100,000)$$

$$DI = 1.73$$

## Discussion and Results

In this study, we ranked individual BLM blocks greater than 10,000 acres (4,047 ha) based on the percentage of current 'development.' Recall that the definition of development is determined from a distance of 1,000 m (3,280.8 ft) within towns, active oil and gas leasing, mining claims, infrastructure, dams, and other identified disturbance. Of the BLM blocks evaluated, 36.8 percent have no existing development within 1,000 m (3,280.8 ft) of the block boundary. BLM lands with less than one percent development comprise 35.6 percent, while 17.6 percent of BLM lands have between one and 10 percent development (fig. 2). The remaining 10.1 percent of lands are found to have development greater than 25 percent.

The BLM currently manages lands that are selected for conveyance of land ownership by both the State of Alaska (state selected) and Native Alaskans/Corporations (native selected). Within this study, the evaluated BLM lands greater than 10,000 acres (4,047 ha) represent 81,245,323 acres (32,878,816 ha). Unencumbered BLM lands represent 50,088,982 acres (20,270,292 ha) (61.6 percent) of the total lands evaluated, while state selected lands represent 17,473,094 acres (7,071,110 ha) (21.5 percent) and native select comprise 13,683,246 acres (5,537,413 ha) (16.9 percent).

## Top Twenty-Five Overall Ranked Blocks

Of the BLM lands, the highest ranking block is the National Petroleum Reserve-Alaska (NPR-A), suggesting a large block with the least amount of development. NPR-A is located north of Noatak National Preserve (NPr) extending to the Arctic Ocean and covers 21.9 million acres (8.8 million

ha). NPR-A has a development index of 2,517.3; this index is based on the percentage of development and the size of block. The second highest ranked block is the Nulato Hills parcel encompassing over 5.2 million acres (2.1 million ha) and has a development index of 2,377.3 with no development present within the block. The third highest ranking block is the Sheklukshuk block, found North of Koyukuk NWR and South of Gates of the Arctic National Park (NP). The Sheklukshuk block is over 1.3 million acres (526,000 ha) with a development index of 2,241.9. Additional ranked BLM block sizes and development indexes are found in table 1; figure 3 graphically represents the top twenty-five BLM blocks.

## Top Ranked Native and State Selected Blocks

Of the Native Selected BLM managed lands, the highest ranking block is Fortymile, suggesting a large block with a small amount of development. Fortymile is located North of Selawik NWR and South of Yukon-Charley National Preserve. The Fortymile block is over 1,191,000 acres (481,981 ha) with a development index of 2,133.9. The Denali Block is the largest State Selected Block with over 2 million acres (809,371 ha) and a Development Index of 2,107. The highest ranking State Selected Block is the Ruby State Block. The Ruby block is located South of Nowitna NWR and North of Denali NP. The Ruby block is over 1,458,000 acres (590,032 ha) with a development index of 2,244.3. Figures 4 and 5 locate the top five Native and State Selected Blocks.

## Validation

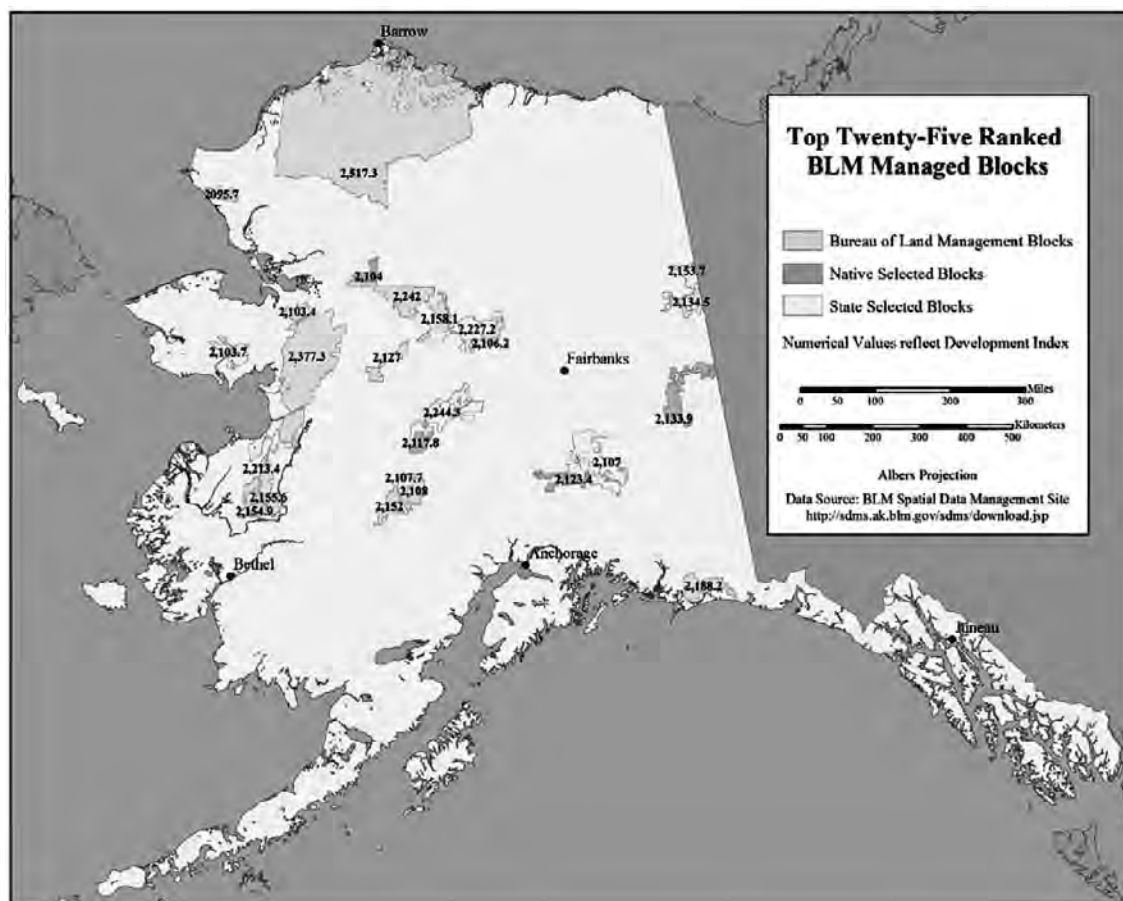
Validation of the 1,000 m from 'developed' areas measure was done by examining several other distances. Distances of 250, 500, 1000, 2000, 3000, 4000, and 5000 m determined the sensitivity of impact on the percent developed for each BLM land unit. The process was conducted in the same manner as previously discussed with the various input distances changed. After comparing varying distances, results are consistent with block ranking. NPR-A was ranked with the greatest index value for all distances evaluated (table 2). Blocks Nulato Hills, Holy Cross—East, Black River, Lime Village, Kandik, Minchumina, McGrath, and Tonzona all had the same index regardless of the distance evaluated. This is attributed to their location away from any existing 'development.' Table 2 shows the Index values at varying distances for the top 20 blocks.

## Percentage of Development

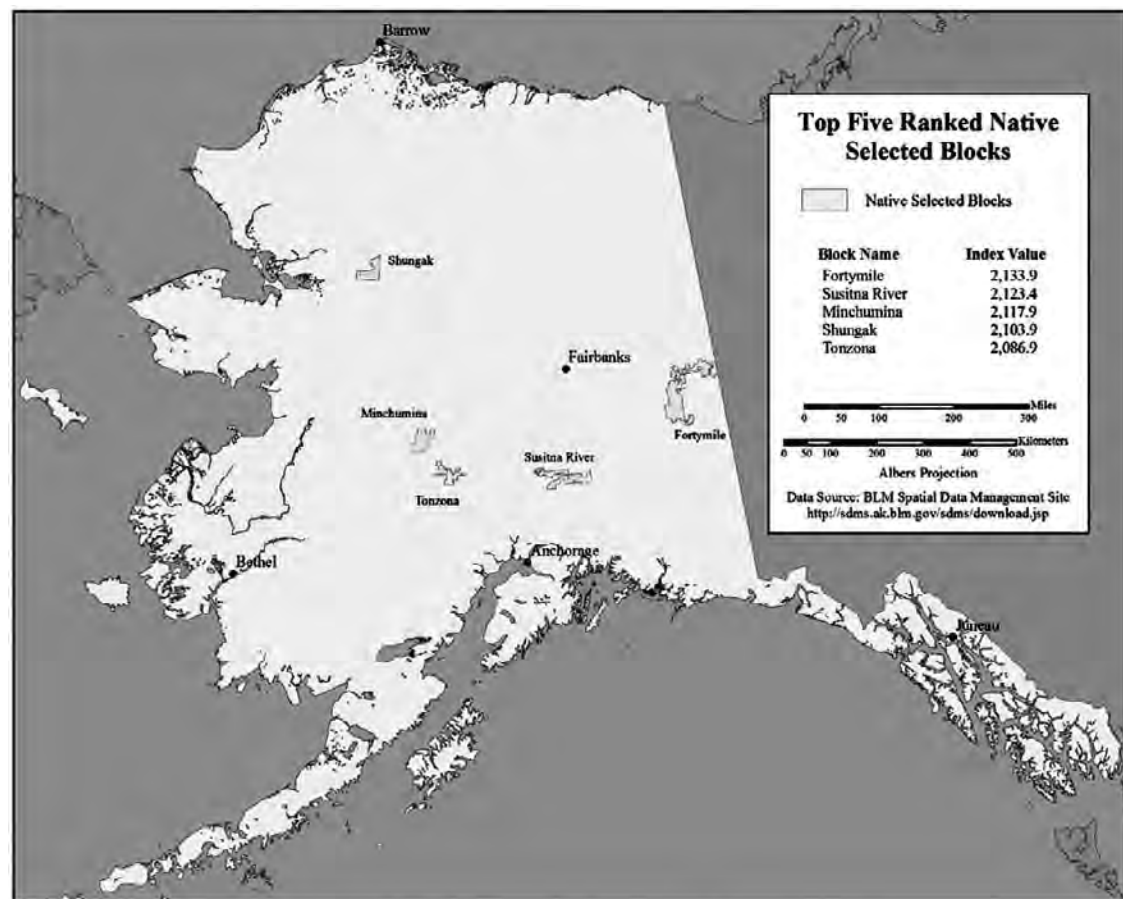
Table 3 shows the percentages of development at varying distances for the top 20 blocks. As the distance increased for areas near development, the percentage 'developed' decreased for several ranked blocks. Blocks Nulato Hills, Holy Cross—East, Black River, Lime Village, Kandik, Minchumina, McGrath, and Tonzona again had no change in percent due to distance from 'developed areas.' Table 3 illustrates the top 20 ranked blocks in relation to all GIS used to determine development level.

**Table 1**—Top 25 ranked blocks of BLM managed lands (based on Development Index).

Rank	Block name	Management	Percent undeveloped	Acres	Index
1	National Petroleum Reserve-Alaska	BLM	99.9	21,901,526.0	2,517.3
2	Nulato Hills	BLM	100.0	5,217,097.0	2,377.3
3	Ruby	SS	99.8	1,458,735.7	2,244.3
4	Sheklukshuk	BLM	100.0	1,347,593.4	2,241.9
5	Tanana	SS	99.8	1,208,116.5	2,227.3
6	Unalakleet	SS	99.9	1,027,210.3	2,213.4
7	Bering Glacier	BLM	100.0	787,081.8	2,188.2
8	Hughes	BLM	99.5	652,930.6	2,158.1
9	Holy Cross (East)	BLM	100.0	568,002.4	2,155.6
10	Holy Cross (West)	BLM	100.0	564,612.7	2,154.9
11	Black River	SS	100.0	557,716.2	2,153.7
12	Lime Village	BLM	100.0	548,015.7	2,151.9
13	Kandik	BLM	100.0	459,927.8	2,134.4
14	Fortymile	NS	95.7	1,191,404.1	2,133.9
15	Dulbi-Kaiyuk Mountains	BLM	100.0	426,925.2	2,127.0
16	Susitna River	NS	98.7	545,009.5	2,123.4
17	Minchumina	NS	100.0	389,561.7	2,117.9
18	Lone Mountains	BLM	98.0	540,969.0	2,108.0
19	McGrath	SS	100.0	352,211.4	2,107.8
20	Denali	SS	92.0	2,174,811.4	2,107.0
21	Tozitna	BLM	100.0	346,878.9	2,106.2
22	Shungak	NS	100.0	342,705.9	2,104.0
23	Bendeleben Mountains	SS	97.3	611,408.8	2,103.7
24	Selawik	BLM	100.0	337,103.7	2,103.4
25	De Long Mountains	BLM	100	312,240.3	2,095.7



**Figure 3**—Top 25 ranked BLM managed blocks and Development Indices.



**Figure 4**—Top five ranked native selected blocks.

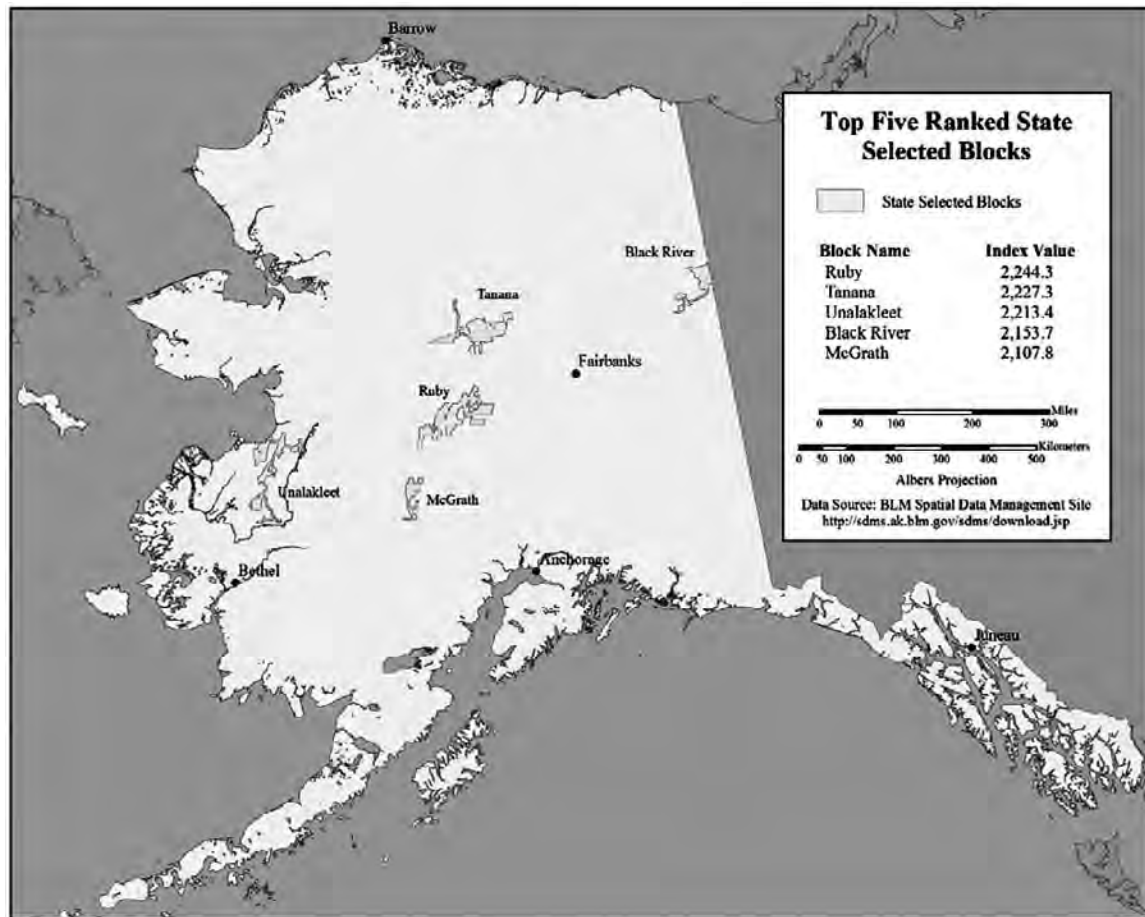


Figure 5—Top five ranked state selected blocks.

Table 2—Development Index values at varying distances for top 20 blocks.

Block name	Index value						
	(250 m)	(500 m)	(1000 m)	(2000 m)	(3000 m)	(4000 m)	(5000 m)
NPR-A	2,520.3	2,519.7	2,517.4	2,509.5	2,498.2	2,483.7	2,466.3
Nulato Hills	2,377.3	2,377.3	2,377.3	2,377.3	2,377.3	2,377.3	2,377.3
Ruby	2,248.2	2,247.3	2,244.3	2,236.7	2,225.6	2,211.5	2,194.8
Sheklukshuk	2,242.0	2,242.0	2,241.9	2,241.4	2,239.0	2,231.2	2,218.4
Tanana	2,229.7	2,229.0	2,227.3	2,223.5	2,219.0	2,212.4	2,205.8
Unalakleet	2,214.8	2,214.3	2,213.4	2,210.0	2,202.1	2,190.8	2,177.1
Bering Glacier	2,188.2	2,188.2	2,188.2	2,188.2	2,188.2	2,186.5	2,181.0
Hughes	2,166.6	2,164.1	2,158.1	2,145.0	2,128.2	2,107.3	2,083.4
Holy Cross—East	2,155.6	2,155.6	2,155.6	2,155.6	2,155.6	2,155.6	2,155.6
Holy Cross—West	2,155.0	2,155.0	2,154.9	2,154.1	2,149.4	2,133.6	2,102.9
Black River	2,153.7	2,153.7	2,153.7	2,153.7	2,153.7	2,153.7	2,153.7
Lime Village	2,151.9	2,151.9	2,151.9	2,151.9	2,151.9	2,151.9	2,151.9
Kandik	2,134.5	2,134.5	2,134.5	2,134.5	2,134.5	2,134.5	2,134.5
Fortymile	2,195.7	2,178.5	2,133.9	2,032.8	1,907.3	1,776.3	1,646.5
Dulbi-Kaiyuk Mts.	2,127.0	2,127.0	2,127.0	2,127.0	2,124.8	2,118.1	2,106.6
Denali	2,137.0	2,133.3	2,123.4	2,093.3	2,052.4	1,994.7	1,920.3
Minchumina	2,117.9	2,117.9	2,117.9	2,117.9	2,117.9	2,117.9	2,117.9
Mcgrath	2,107.8	2,107.8	2,107.8	2,107.8	2,107.8	2,107.8	2,107.8
Shungak	2,105.0	2,105.0	2,103.9	2,100.9	2,097.8	2,092.2	2,086.3
Tonzona	2,086.9	2,086.9	2,086.9	2,086.9	2,086.9	2,086.9	2,086.9

**Table 3**—Percentage of development at varying distances for the top 19 blocks.

Block name	DI							
	(1000 m)	250 m	500 m	1000 m	2000 m	3000 m	4000 m	5000 m
		<i>percent</i>						
NPR-A	2,517.3	100.0	100.0	99.9	99.6	99.1	98.5	97.8
Nulato Hills	2,377.3	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Ruby	2,244.3	99.9	99.9	99.8	99.4	98.9	98.3	97.6
Sheklukshuk	2,241.9	100.0	100.0	100.0	100.0	99.9	99.5	98.9
Tanana	2,227.3	99.9	99.9	99.8	99.7	99.5	99.2	98.9
Unalakleet	2,213.4	100.0	100.0	99.9	99.8	99.4	98.9	98.3
Bering Glacier	2,188.2	100.0	100.0	100.0	100.0	100.0	99.9	99.7
Hughes	2,158.1	99.9	99.8	99.5	98.9	98.1	97.1	96.0
Holy Cross—East	2,155.6	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Holy Cross—West	2,154.9	100.0	100.0	100.0	100.0	99.7	99.0	97.6
Black River	2,153.7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Lime Village	2,151.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Kandik	2,134.4	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Fotymile	2,133.9	98.5	97.7	95.7	91.2	85.5	79.7	73.8
Dulbi-Kaiyuk Mts.	2,127.0	100.0	100.0	100.0	100.0	99.9	99.6	99.0
Denali	2,123.4	99.3	99.2	98.7	97.3	95.4	92.7	89.3
Minchumina	2,117.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Mcgrath	2,107.8	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Tonzona	2,086.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0

## Ecoregion Analysis

The State of Alaska covers a vast land surface with a number of diverse ecoregions. Ecoregions are geographic units that are differentiated by climate, subsurface geology, physiography, hydrology, soils, and vegetation. The ecoregions of Alaska were developed cooperatively in 2001 by the Forest Service, National Park Service, Geological Survey, and The Nature Conservancy (Nowacki 2001). A large portion of Alaska is managed by various federal and state governmental agencies at varying levels of protection, such as Wilderness designation and multiple use management. An analysis evaluating current ecoregional representation by lands within the administrative boundaries layer occurred. For purposes of this study, lands with the administrative boundaries layer are considered more protected from development than lands outside the boundaries. Further analysis included the addition of the top 25 ranked BLM blocks. Table 4 lists the acreage and percent of each ecosystem currently protected.

The top three ecoregions with the greatest representation includes the Wrangell St. Elias (100 percent), Kluane (100 percent), and Alexander Archipelago (99 percent) ecoregions. The Wrangell St. Elias and Kluane ecoregions represented within Alaska are within Wrangell St. Elias National Park and Preserve. The Kluane ecoregion is partially within Wrangell St. Elias National Park and Preserve and extends into Canada's Kluane National Park and Reserve. The Alexander Archipelago ecoregion is completely within the Tongass National Forest.

The World Conservation Union (IUCN) suggests that a representation of 10 percent of each ecoregion is adequate for biodiversity conservation. Currently, three ecoregions in Alaska lack adequate protection based on IUCN recommendations. These include the Kuskokwim Mountains (6.2 percent), Beaufort Coastal Plain (7.1 percent), and Brooks Foothills (7.2 percent) ecoregions. With the addition of specific BLM lands to a conservation status, additional ecoregional

representation would occur in ecoregions currently under-represented (table 5).

The addition of only the top 25 ranked BLM managed blocks would increase representation of the Kuskokwim Mountains by 2,176,427.6 acres (880,769 ha) to 16.5 percent. The Beaufort Coastal Plain would drastically increase acreage with an additional 9,554,660.9 acres (3,866,634 ha), bringing the total to 72.6 percent. The Brooks Foothills would increase 11,593,694.9 acres (4,691,802 ha) to 47.9 percent. The Beaufort Coastal Plain and Brooks Foothills ecoregions representations increase due to the National Petroleum Reserve—Alaska (NPR-A) having a form of protection status. Inclusion of even portions of NPR-A would allow adequate protection of biodiversity according to the 10 percent level suggested by IUCN. Further analysis is needed to determine such portions.

In this study, 72.4 percent of BLM lands greater than 10,000 acres (4,047 ha) are found to have less than one percent 'development.' It should be noted that lack of development does not constitute wilderness quality lands. Rather, these areas should be prioritized for further evaluation. The ranking of lands provides a list of prioritization for citizen evaluation to occur.

NPR-A is the largest BLM managed parcel within both Alaska and the entire United States. However, at the time of writing, several areas within NPR-A have been opened for oil and gas leasing, thus the magnitude and continuity of the original block is much smaller. Identifying the remaining areas currently not leased requires additional analysis.

## Recommendations for Future Work

The ranking of blocks in this report represents the most extensive inventory of Alaska BLM lands to date through use of a GIS. Various future steps are possible to refine the

**Table 4**—Percentage of ecoregions currently in a form of protection status.

Ecoregion	Total acres	Represented	
		acres	percent
Kuskokwim Mountains	21,092,616.4	1,298,096.2	6.2
Beaufort Coastal Plain	14,588,338.0	1,033,316.2	7.1
Brooks Foothills	28,474,359.8	2,064,210.8	7.2
Seward Peninsula	11,699,497.2	1,532,031.1	13.1
Bristol Bay Lowlands	7,903,904.4	1,485,669.5	18.8
Lime Hills	7,095,642.6	1,410,279.2	19.9
Nulato Hills	14,433,468.7	2,929,858.4	20.3
Ray Mountains	12,662,292.3	2,692,525.5	21.3
Tanana-Kuskokwim Lowlands	15,818,452.4	3,777,518.2	23.9
Yukon-Tanana Uplands	15,751,751.5	5,315,907.3	33.7
Cook Inlet Basin	7,186,328.5	2,560,747.2	35.6
Alaska Range	25,534,335.6	9,131,743.6	35.8
Kobuk Ridges and Valleys	13,624,067.3	5,752,655.2	42.2
Copper River Basin	4,729,188.3	1,998,695.9	42.3
Bering Sea Islands	2,347,535.3	1,032,700.0	44.0
North Ogilvie Mountains	3,140,003.5	1,464,040.8	46.6
Kodiak Island	3,144,990.6	1,928,596.6	61.3
Alaska Peninsula	15,745,598.2	10,449,710.0	66.4
Ahklun Mountains	9,565,898.9	6,679,602.1	69.8
Yukon River Lowlands	12,782,649.2	8,992,486.3	70.3
Davidson Mountains	7,167,008.2	5,309,821.6	74.1
Chugach-St. Elias Mountains	19,562,085.2	14,556,968.0	74.4
Kotzebue Sound Lowlands	3,359,282.8	2,598,297.6	77.3
Brooks Range	31,810,902.8	24,640,947.3	77.5
Yukon-Old Crow Basin	13,991,868.5	10,926,244.3	78.1
Gulf of Alaska Coast	4,346,173.0	3,631,847.6	83.6
Boundary Ranges	5,000,643.1	4,778,493.2	95.6
Yukon-Kuskokwim Delta	18,964,960.7	18,471,824.1	97.4
Alexander Archipelago	13,005,243.6	12,869,937.2	99.0
Kluane Range	1,242,338.8	1,242,250.9	100.0
Wrangell Mountains	3,537,150.0	3,537,150.0	100.0

Note: The Aleutian Islands ecoregion was excluded from analysis.

**Table 5**—Increase in percentage of ecoregions with top 25 BLM block addition.

Ecoregion	Total acres	Represented acres	Representation	
			Increase	Top 25 BLM blocks
			percent.	
Brooks Range	31,810,902.8	684,095.2	2.2	79.7
Yukon River Lowlands	12,782,649.2	367,442.3	2.9	73.2
Yukon-Old Crow Basin	13,991,868.5	500,464.8	3.6	81.7
Chugach-St. Elias Mountains	19,562,085.2	750,044.8	3.8	78.2
Tanana-Kuskokwim Lowlands	15,818,452.4	1,102,100.2	7.0	30.9
Yukon-Tanana Uplands	15,751,751.5	1,191,404.1	7.6	41.3
Alaska Range	25,534,335.6	2,193,698.3	8.6	44.4
Kuskokwim Mountains	21,092,616.4	2,176,427.6	10.3	16.5
Seward Peninsula	11,699,497.2	1,240,193.3	10.6	23.7
Copper River Basin	4,729,188.3	526,132.9	11.1	53.4
Kobuk Ridges and Valleys	13,624,067.3	1,942,913.4	14.3	56.5
North Ogilvie Mountains	3,140,003.5	517,179.1	16.5	63.1
Ray Mountains	12,662,292.3	2,266,849.1	17.9	39.2
Brooks Foothills	28,474,359.8	11,593,694.9	40.7	47.9
Nulato Hills	14,433,468.7	6,814,183.0	47.2	67.5
Beaufort Coastal Plain	14,588,338.0	9,554,660.9	65.5	72.6

Note: Only ecoregions overlapping with top 25 BLM blocks would have an increase.

results. The following recommendations for future work cover the accuracy of GIS Data, Landsat scenes quality and dates, verification of results, and use of collected GIS data and results.

## Accuracy of GIS Layers

For this report, it is assumed that all GIS layers are accurate in their depiction of mines, dams, infrastructure, etc. The GIS layer presenting the greatest concern is the infrastructure layer. Several segments of the layer were not attributed. If such segments passed through BLM lands in study, the presence of scars with Landsat scenes occurred. Landsat scenes may not allow all scars to be detected due to 30 m (98 ft) resolution.

## Landsat Scenes

Landsat scene dates varied from 1986 to 2002. Scenes are obtained for free from the University of Maryland's Global Land Cover Facility (see <http://glcf.umd.edu/index.shtml>). Using the scenes allowed all BLM lands to be evaluated for disturbance, however, the using of older scenes may lead to an underestimation of disturbance. It should be noted that most of the disturbance was found around historic military sites in the state. The resolution of Landsat scenes is 30 m (98 ft) pixels. This may lead to a large number of trails and roads being overlooked when searching for disturbance. Gravel or dirt roads are visible, but not all historical tractor trails are visible on scenes. A better resolution of satellite scenes may allow off-road vehicle trails to be mapped. This would prove a critical layer not only within a Wilderness Inventory, but also as a way to manage off-road vehicles on all lands in Alaska.

## Verification of Results

The described methods were conducted through a GIS with no fieldwork involved to assess or verify accuracy of data layers. It is recommended that future steps involve such verification to confirm results. Volunteer fieldwork within past Citizen Wilderness Inventories comprised most of the labor component. Within Alaska it would prove difficult to orchestrate a large CWI due mostly to difficulty of access to BLM blocks. However, this report prioritizes areas for examination of wilderness qualities.

## Use of GIS Data and Results

This report recommends the top ranked BLM blocks be prioritized for field verification of wilderness characteristics outlined in BLM's Wilderness Inventory and Study Procedures Document. Data collected and created within this study should be refined and field checked in prioritized BLM blocks. GIS datasets and Landsat scenes should be used when working with neighboring communities of top ranking BLM blocks. These datasets, in conjunction with other existing GIS datasets, will allow questions on local knowledge of wilderness quality to be answered as well as the conservation value by providing connectivity between existing conservation units in Alaska.

## Conclusion

Of the BLM lands greater than 10,000 acres (4,047 ha), 36.8 percent have no 'development.' BLM lands with less than one percent development comprise 35.6 percent, while 17.6 percent of BLM lands had between one percent and 10 percent 'development.' These results confirm the long held notion that Alaska remains relatively pristine. Wilderness is unique in that once it is altered it cannot be recreated. Further study focused on identifying BLM lands in Alaska for potential Wilderness designation is necessary before wilderness qualities are degraded by development activities. It is unlikely that all of these lands can be designated as Wilderness. However, using these prioritized blocks, conservation planning can better identify significant areas with wilderness and conservation potential.

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# Subsistence, Tourism, and Research: Layers of Meaning in Lake Clark National Park and Preserve

Karen Gaul

**Abstract**—Overlapping designations of park, preserve, and wilderness are assigned to Lake Clark National Park and Preserve in south-central Alaska. The Park was established in 1980 as a result of the Alaska National Interest Lands Conservation Act (ANILCA). Consisting of over four million acres, it includes homelands and hunting and fishing grounds for the inland Dena'ina, a northern Athabaskan-speaking people, who still engage in subsistence practices within the park. Dena'ina understandings of the environment include multiple spiritual dimensions. The Park and Preserve are also used by sport fishers and hunters, backpackers, rafters, and other park visitors who are in search of a variety of wilderness experiences. National Park Service researchers conduct a range of research projects that contribute to efforts to monitor and protect cultural and natural resources in the area. In the midst of these multiple layers of designation, meaning and use, differences in perspective and value are constantly negotiated.

## Dena'ina People and Lake Clark National Park

Telaquana Mountain is a site of special significance to the Dena'ina people. Ruth Koktelash (1981), a Dena'ina elder who passed away some years ago, relayed this creation story:

“They went up on a mountain, and when they got to the mountain, they didn’t see anything [no animals]...they didn’t even see a ground squirrel. So they told a medicine man to look. When he looked, he saw mountain people. The mountain people put all the game on the mountain called Nduk’eyux Dghil’u, which means animals go on the mountain [Telaquana Mountain]. Ch’iduchuq’a [the shaman] went up and took the pica with him. There was no doorway. He took his cane and struck it on the top and then the door opened a little.

Inside they saw every species of animal. People were singing and dancing. In his song Ch’iduchuq’a named each species of animal, and they went out through the door. That’s why we’ve got wild game. All the wild animals out in the country, Ch’iguchuq’a let out,” Ruth concludes.

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This creation story has as its locus not some mythical place or unearthly realm, but features the very real and spectacular Telaquana Mountain (fig. 1) in what is now the wilderness area of Lake Clark National Park and Preserve. From Telaquana, according to this Dena'ina story, all the animals of the Earth tumbled out. This story represents just one set of meanings read into the complex and beautiful landscapes that now make up Lake Clark National Park and Preserve.

Cultural resource specialists in the National Park Service (NPS) have been increasingly attentive to the cultural history that is part of every national park, no matter how wild or remote. In this discussion, I consider the cultural use of the park, preserve and wilderness areas of Lake Clark National Park and Preserve in historical and contemporary times. Because Lake Clark National Park and Preserve was created by the Alaska National Interest Lands Conservation Act (ANILCA), cultural practices such as subsistence hunting, fishing, and gathering continue in the park. The majority of this mountainous park and preserve area is also designated wilderness, and park managers must respond to wilderness as well as to ANILCA legislation. In addition to the use of this area by Dena'ina people, there are multiple other interests and uses of the area: sport hunters and fishers, backpackers and river runners, sightseers and other tourists. Additionally, park staff assesses, measures and monitors park lands according to their own systems of meaning, contributing to multiple “layers of significance” across the area. It is essential to keep these multiple interpretations in mind as we conduct research, manage and enjoy our wild lands.

Contemporary Dena'ina people live in Resident Zone Communities of Lake Clark National Park and Preserve in the villages of Iliamna, Lime Village, Newhalen, Nondalton, Pedro Bay and Port Alsworth. The Telaquana travel route that passes near Telaquana Mountain, of which Ruth Koktelash speaks, was one of many travel corridors across vast distances that Dena'ina people traveled in the area. We have numerous recordings of oral histories that refer to regular use and intimate knowledge of the Telaquana route by Dena'ina ancestors. Evidence of relatively recent Dena'ina occupation is visible at the Old [Telaquana] Village site, and at stopping spots along the way such as Votive Rock, where one can still find bits of rolled up birch bark, and hewn pieces of wood most likely used by travelers in the past for constructing shelter. These are cultural features tucked into the landscape that, if visitors know about them, can be read and appreciated as they travel along.

Lake Clark National Park and Preserve was established in December 1980, by section 201 (7)(a) of the Alaska National Interest Lands Conservation Act (ANILCA) (94 Stat. 2383;



**Figure 1**—Telaquana Mountain is a site of special significance to the Dena'ina people (NPS photo).

Public Law 96-487). The park (2.6 million acres or 1,052,183 ha) and preserve (1.4 million acres or 566,560 ha) areas, consist of over 4 million acres (1.6 million ha) as of 2001, and of these, close to 2.5 million acres (1,011,714 ha) are designated wilderness. The park area is at the juncture of the Alaskan and Aleutian mountain ranges, which include a dynamic combination of glaciers and active volcanoes. ANILCA's mandate for Lake Clark National Park and Preserve was the preservation of all of these natural features, as well as sockeye salmon habitat and that of many other wildlife species.

The park area also encompasses homelands, and hunting, fishing, and gathering grounds for the inland Dena'ina, a northern Athabascan-speaking people. Prehistoric and historic Dena'ina settlements are found throughout what are now the Park and Preserve, and Yup'ik occupation runs along the southern portion of Lake Iliamna. Numerous archeological sites have been located along lakes, rivers, and coastal areas, and other strategic places. The Dena'ina lived along shorelines for easy fishing access and water transportation routes. They moved with the seasons across the tundra and into the high hills for hunting, trapping, berry picking and other subsistence activities, and covered vast ranges of territory. ANILCA provides for their continued ability to hunt and fish and gather plant resources in Lake Clark National Park and Preserve.

We have many oral accounts of Dena'ina people describing their traditional seasonal round. In the spring, they moved to spring fish camps to fish for whitefish and pike, to hunt waterfowl, and to trap muskrats (Ellanna and Balluta 1992); following the break up of the ice, they would move to summer fish camps at strategic locations along rivers, streams and lake edges to catch salmon, which came in species-specific waves throughout the spring and summer. Salmon was and is central to the Dena'ina people's sense of well being, and their sense of identity. There were countless ways to dry,

store and prepare the many parts of the fish (fig. 2). One common way to dry the fish is to split the two large fillets away from the spine of the fish, make lateral cuts in the flesh, and hang it to dry or smoke it. The backs were fed to the dogs, during the period up until recently when people kept dogs for assistance in snow travel for hunting, trapping, packing wood, and other chores. Fish heads were boiled for their oil, fish skins were sewn into storage bags for fish oil or even sewn into boots.

Summertime also meant gathering blueberries, cranberries, salmonberries and many others. Families still gather many gallons of different berries, and preserve them in a number of ways. One of the most popular traditional methods was to mix the blueberries with bear fat or other lard, and sugar, to make nivagi or Native "ice cream" (aguduc in Yup'ik) (Johnson and others 1998).

People would then prepare for fall hunting, and move to camps up into the lands around their village sites where they might find moose, caribou, black bear, and ground squirrels. Late in October, the Dena'ina fished for spawned out salmon (or redfish), hunted Dall sheep and Brown bears. As the fall turned to winter, snow covered the ground and waterways froze up. Dena'ina would then trap fox, wolverine, mink, lynx and marten, and hunt moose (which have only been available since about the 1940s in the region) and caribou. They would set up winter camps for beaver trapping from January through April. By then, stores of fish for dogs and humans alike, as well as berries and meats may have been running quite low. Early spring fishing was always a welcome turn of the seasons, signaling a move into the flush times of rich summers of plenty of salmon.

Oral accounts record intricate details on how this mobile, subsistence lifestyle was maintained. People describe gathering and processing wood and hides to make snowshoes; how to make good spears or the packboard for tying on loads; the making of clothing; and many detailed accounts of how



**Figure 2**—Dena'ina people describe their traditional seasonal movements from spring fish camps to summer fish camps. Mary Ann Trefon and daughter Katie with fish and furs (NPS Photo Archives H23).



to catch, process, store, cook and eat fish, moose, berries and many other resources. And they talk of the travel, over lands that were rich with meaning, housed by spiritual beings in various dimensions, and how to live right in such a world. They have offered thousands of names that mark their landscape, guide their routes, and capture events that happened in particular places.

Cultural resource managers in the NPS are interested in identifying and documenting such associations people have with what are now park lands. We research and write Ethnographic Overview and Assessments, or baseline documents on the cultural history and use of areas. We identify sacred sites and places of cultural and spiritual significance. We also conduct place-names studies that show the ways cultural meanings are inscribed on the landscape through the very way it was named and talked about. A study documenting Native place-names in Lake Clark National Park and Preserve is currently underway.

However, identifying culturally significant meanings inscribed on the landscape can prove a challenging undertaking, especially given the fact that people move, new layers of people move in, and new meanings are applied. We need to consider not simply the traditional use, associations, and

meanings of an area, but layers of such associations, and uses.

In addition to the Dena'ina and Yup'ik associations to the Lake Clark area, new layers of significance came from Russian promyshlenniki or entrepreneurs, in the fur business, who made their way into these interior areas by the 1790s. These newcomers perhaps read the land as bountiful, rich in resources, and full of opportunity to make good money. It was a place from which to extract resources. The Native Dena'ina participated in fur trade endeavors and served as middlemen, facilitating the extraction and transport of fur animals from interior areas to the trade routes that started in local trade posts on Lake Iliamna (fig. 3), for example, and ended up in far away fashion shops in London or Moscow. Jointly, they recrafted new sets of meanings on the landscape. Similarly, when gold prospectors entered the area, setting up staging camps at the Port Alsworth area for exploration in interior areas, some Dena'ina assisted and participated in gold prospecting as well. Commercial fishing and canning entered the area around the same time as gold prospecting (1890s), and many Dena'ina participated in that—and still do. The commercial approach to fishing was on a scale thousands of times larger than subsistence fishing, but it offered



**Figure 3**—Native Dena'ina people participated in fur trade endeavors and served as middlemen, facilitating the extraction and transport of fur animals from interior areas into the trade routes that started in local trade posts. Pictured here is Wilhelm Neilsen with his furs at Pete Anderson's house in Old Iliamna, circa 1908–1909 (NPS Photo Archives H1217).

local people an opportunity to earn cash and to participate in a cash economy.

Through these early interactions, Dena'ina people and some of the Russian and American newcomers married, had children and built family and community, merging cultural backgrounds, lifeways, and sets of understandings of place. As trappers, traders, prospectors, and explorers moved into the area, new languages and new names were assigned over the top of Dena'ina names. Lake Clark, for example, was previously called Qizhjah Vena in the Dena'ina language, meaning "a place where people gathered." John W. Clark was a member of an exploration party in January of 1891, a group of explorers who traveled to the upper tributaries of the Nushagak River. They followed the Nushagak River to the Mulchatna River, and then followed the Chulitna to where it drained into a long lake. They named it in honor of John W. Clark, and the name has been mapped and called Lake Clark ever since.

## Other Meanings of Lake Clark National Park

Alaska—or the rights to it—was purchased by the United States from Russia in 1867. Then followed many years of treaties and legislation that imposed new layers of meaning (and new rules about basic rights to lands). Alaska became a State in 1959. After many years of debate, 1971 brought the Alaska Native Claims Settlement Act (ANCSA), which extinguished aboriginal title to 365 million acres (147.7 million ha) of land, conveyed 45 million acres (18.2 million ha) to Native corporations, and paid out \$962.5 million to Native corporations (Case and Voluck 2002). A decade later, ANILCA (The Alaska National Interest Lands Conservation Act of 1980) identified new Federal lands including national parks and preserves. Lake Clark National Park, as mentioned, is one such new "ANILCA" parks. ANILCA also helped to designate Native allotments, and village and regional corporation lands. Even now, many lands remain unconveyed, so that the land status map around Lake Clark looks like a colorful patchwork.

We can view the inscription of the National Park and Preserve designation, and its wilderness designation, as yet more layers of meaning assigned to this area. Even though the ANILCA parks provide for recognition of resident zone peoples, and their continued subsistence, they also embody something of the identity of other big, western parks. That is, they extend the sense of the wild, wilderness, isolation, ruggedness, and a promise of solitude. Indeed, these are the very things that many visitors come to Lake Clark to seek out.

One key assumption underlying the national park idea in general, and the big western nature parks in particular, and particularly wilderness, is that nature is something fundamentally different and separate from human culture. Another is that nature started out pure, devoid of human influences, and it should be protected as such, returned to its pristine state. Nature, and nature parks, can serve as a sanctuary for us to enter into as a refuge from hectic urban life. Braun (2002: ix) describes this externalizing of nature in mainstream American thought, noting that nature is seen as: "a place to which one goes—the site of 'resources,'

a stage for "recreation," a source for "spiritual renewal," and a scene for "aesthetic reflection." And, we might add, a laboratory for research. Indeed, these are the many reasons visitors come to Lake Clark: for river running, backpacking, camping, sport hunting, and so on. Because it is thought about in a number of ways and serves a variety of purposes for those who visit it, Braun (2002: 10) suggests that nature is always inherently social, and calls it "social nature" (see also Cronon 1995).

Research is another set of meanings inscribed on or read from the landscape. Assessing plant and wildlife diversity and numbers is an activity that land managers deem important for resource management. The NPS, with its identification, inventorying and monitoring of natural and cultural resources, and its presentation of these resources to the public, promulgates its own sets of landscape meanings. But these landscape meanings are also multiple, as "wilderness" folks debate with "cultural resource" folks over issues such as what kinds of equipment archeologists can use to do their jobs within wilderness, or what forms of transportation are acceptable in wilderness. Such disputes wage at the agency level, even as subsistence users bristle and grumble about catch and release fishing, and sport hunters who are only after the trophy antlers.

We can easily see, even in this brief sketch, that layers of significance for this particular area are not of the same shape, size and weight. The scale and reach are different. What Dena'ina subsistence users claim as their hunting and gathering grounds, and the reasons they claim it, lie pretty close to home. They are fairly local. Larger international claims or attachments of meaning such as those of Russian fur traders mean that the stretch of significance reaches pretty far. When a country like the United States purchases the rights to the whole region of Alaska, sets of national claims and laws are assumed to apply to these lands. And when an area is set aside as a national park, it is defined as land belonging to the American public. Our lands. Our national heritage.

Local interests are accommodated—and indeed, subsistence needs are given [nominally] a preference over commercial and sport hunting and fishing—but ultimately are subsumed under the goals and jurisdiction of a national entity. Native experience is codified into mandated management. People's lives, their history, their places now become the material of cultural resource management. Thus, multiple layers of meaning are held onto, and multiple experiences pursued, simultaneously. Certain definitions of or discourses about environments, or certain landscape ideas, take precedence over others. Thus, even for areas designated Park, Preserve or Wilderness, there are political battles that necessarily link them to cultural agendas.

## Conclusions

As park managers, or stewards, we must acknowledge these multiple and changing layers of significance. Wilderness is not unknown territory, but homeland well-known by people who have lived on it and traversed it, using countless plants, animals, water and mineral resources for millennia. Subsistence practices—even as they have radically changed—represent a strong strand of continuity of

connection Dena'ina have with the land (fig. 4). These ties are celebrated and strengthened as Dena'ina people themselves reinterpret their past and their traditions, and reinvigorate their language and culture through strong revitalization efforts.



Figure 4—ANILCA recognizes and keeps central the cultural connections of people with the landscape in Alaska (photo by Dan Young, Lake Clark NP&P).

In June of this year, I set off with our park historian, John Branson, and Samson Ferreira of the NPS Cultural Landscapes program, to walk the upper part of the Telaquana Trail near the mountain from which all of the world's animals are said to have emerged. We were there to photo document and record GIS data about cultural sites along the Telaquana travel corridor, which connected people from the Telaquana Lake area to the Kijik area. I loved being out on the Telaquana plateau, slogging through the brush and boggy tundra and enjoying its hugeness. I'm from Montana, but Montana's "Big Sky" seemed diminished compared to that over the wildness of Lake Clark National Park and Preserve. But what made the trip so rich for me was imagining Dena'ina women of 200 years ago packing their kids on their backs, or hunters with dogs cooking fresh caribou over campfires, building tent shelters from birch bark; or looking up at Telaquana Mountain and thinking of the shaman who tapped the mountain with his cane, and so many other ways Dena'ina and others interacted symbolically and materially with their environment. This is now "wilderness." But this rich cultural history should not disappear with new layers and designations of meaning, or with new names given to features on the landscape. ANILCA, even as we struggle to apply and interpret it 25 years later, recognized and kept central those cultural connections. In the ANILCA parks, wilderness was and must remain a peopled landscape.

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# Economics of Wild Salmon Ecosystems: Bristol Bay, Alaska

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**Abstract**—This paper provides an estimate of the economic value of wild salmon ecosystems in the major watershed of Bristol Bay, Alaska. The analysis utilizes both regional economic and social benefit-cost accounting frameworks. Key sectors analyzed include subsistence, commercial fishing, sport fishing, hunting, and nonconsumptive wildlife viewing and tourism. The mixed cash-subsistence economy of Bristol Bay supports a population of 7,611 (2000 census) that is 67 percent Alaska Native. Estimated expenditures and net economic values for all sectors were based on a literature review and available data, with the exception that original data was collected for 2005 on the sport fish sector using a random sample of licensed Alaska anglers. Methods included use of a regional input-output model maintained at the University of Alaska, and survey research and contingent valuation methods for the sport fishermen. Potential respondents included 886 resident anglers and 1,514 nonresident anglers contacted through a mail/internet approach. Additionally, 300 licensed anglers, 330 clients of Bristol Bay fishing lodges, and 46 lodge owners were contacted through a mail survey. Response rates ranged from 25.6 percent for resident anglers to 44.1 percent for nonresidents. Estimated direct expenditures/sales were \$234.4 million in 2005 for commercial fishing and processing, \$61 million for sport fishing, \$17.1 million for wildlife viewing, \$7.2 million for subsistence-related expenditures, and \$12.4 million for sport hunting. Nearly 100 percent of the private basic sector in Bristol Bay and 5,540 full-time equivalent jobs are supported by this \$324 million estimated direct economic impact associated with wild salmon ecosystem services. Direct net economic values are estimated at \$104 million to \$179 million per year, and are primarily associated with the subsistence sector.

## Introduction

This paper provides estimates of the economic values associated with sustainable use of wild salmon ecosystem resources, primarily fisheries and wildlife, of the major watersheds of the Bristol Bay, Alaska region. This study reviews and summarizes existing economic research on

the key sectors in this area and reports findings based on original survey data on expenditures, net benefits, attitudes, and motivations of the angler population.

The major components of the total value of the Bristol Bay area watersheds include subsistence use, commercial fishing, sport fishing, and the preservation values (or indirect values) held by users and the United States resident population. The overall objectives of this paper are to estimate the share of the total regional economy (expenditures, income and jobs) that is dependent on these essentially pristine wild salmon ecosystems, and to provide a preliminary but relatively comprehensive estimate of the total economic value (from a benefit-cost perspective) that could be at risk from extractive resource development in the region.

The Bristol Bay region is located in southwestern Alaska. The area is very sparsely populated and the large majority of its population is comprised of Native Alaskans. The region includes Bristol Bay Borough, the Dillingham Census Area, and a large portion of Lake and Peninsula Borough. Although median household income varies among census areas within the region, outside of the relatively small Bristol Bay Borough, income is somewhat lower than for the State of Alaska as a whole. Native Alaskans make up over two-thirds of the total population within the region as compared to approximately 16 percent for the entire state. The rivers that flow into the Bristol Bay comprise some of the last great wild salmon ecosystems in North America (fig. 1). The Kvichak River system supports the world's largest run of sockeye salmon. While these are primarily sockeye systems, all five species of Pacific salmon are abundant, and the rich salmon-based ecology also supports many other species, including Alaska brown bears and healthy populations of rainbow trout. The Naknek, Nushagak, Kvichak, Igushik, Egegik, Ugashik, and Togiak watersheds are all relatively pristine with very little roading or extractive resource development. Additionally, these watersheds include several very large and pristine lakes, including Lake Iliamna and Lake Becherof. Lake Iliamna is one of only two lakes in the world that supports a resident population of freshwater seals (the other is Lake Baikal in Russia). The existing mainstays of the economy in this region are all wilderness-compatible and sustainable in the long run: subsistence use, commercial fishing, and wilderness sport fishing. The commercial fishing is largely in the salt water outside of the rivers themselves and is closely managed for sustainability. The subsistence and sport fish sectors are relatively low impact (primarily personal use and catch and release fishing, respectively). Additionally, there are nationally important public lands

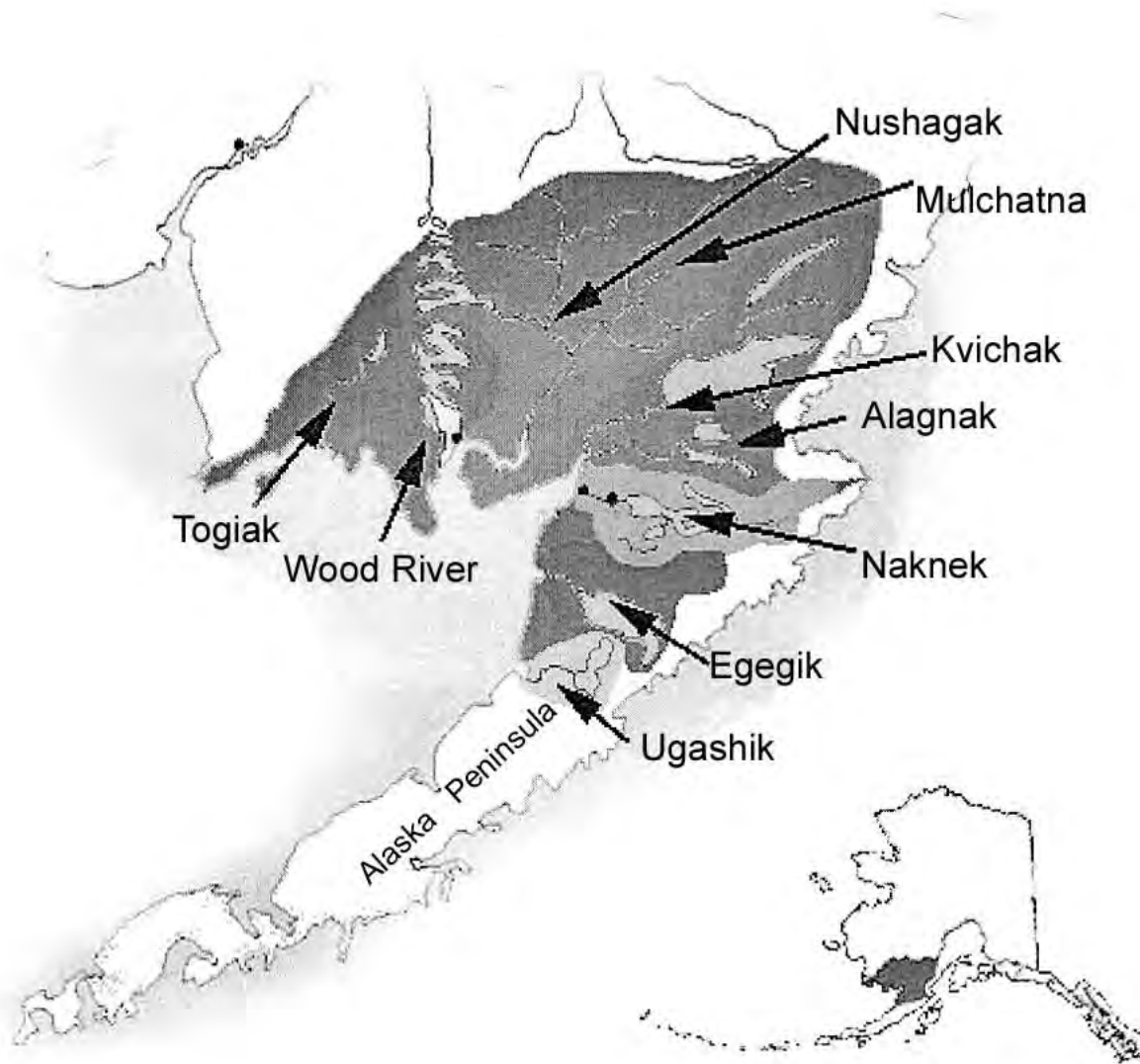
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**Figure 1**—The Kvichak River system, in the Bristol Bay Region, supports the world's largest run of sockeye salmon.

in the headwaters, including Lake Clark National Park and Preserve, Katmai National Park and Preserve, Togiak National Wildlife Refuge, and Wood-Tikchick State Park (the largest state park in the U.S.).

There are currently proposals for major changes in these drainages that could significantly impact fisheries and related ecosystem services: a proposed major copper-gold mine in the headwaters and a proposed road connecting Bristol Bay to Cook Inlet through the heart of this region.

A complete economic analysis would be conducted in several phases. This paper focuses on: (1) an overview of values based on existing data and previous studies, (2) original data collection focused on the sport fish sector, including angler surveys, and (3) estimation of both the regional economic significance (focusing on jobs and income) of these ecosystems using an existing regional economic model, as well as total value in a social benefit-cost framework. The objective is to provide a preliminary but relatively comprehensive estimate of the range of fishery-related values that are at stake in this region. Within the larger study area (fig. 1),

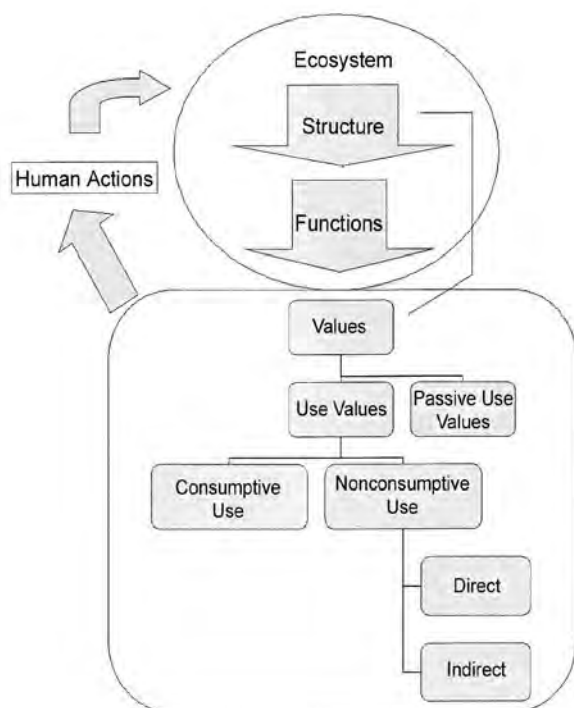
the Kvichak and Nushagak drainages are currently at the most risk from proposed development. However, the entire study area could be either directly or indirectly impacted.

## Methods

The National Research Council in their 2005 publication, *Valuing Ecosystem Services: Toward Better Environmental Decision Making*, provides a model for valuing ecosystem services. The conceptual framework for this paper is summarized by figure 2, which diagrams the flow of ecosystem services and associated economic values. Both passive use values (Krutilla 1967; Weisbrod 1964) and direct use values, including fishing and hunting are included in a total value framework (Hoehn and Randall 1989; Randall and Stoll 1983).

A comprehensive economic evaluation of these Bristol Bay wild salmon ecosystems needs to include two accounting frameworks: (1) regional economics or economic significance, focused on identifying cash expenditures that drive income





**Figure 2**—Flow of ecosystem services and associated economic values (adapted from NRC 2005).

and job levels in the regional economy; and (2) a net economic value framework that includes all potential costs and benefits from a broader social (usually national) perspective. The latter necessarily includes nonmarket and indirect benefits, such as the benefits anglers derive from their recreational activity, over and above their actual expenditure. Further details on methods and data collection are omitted here for the sake of brevity.

The remainder of this paper provides a brief characterization of each of the major sectors, followed by summary economic findings.

## Characterization of Key Sectors

### Subsistence Use

The Bristol Bay economy is a mixed cash-subsistence economy. The primary features of these socio-economic systems include use of a relatively large number of wild resources (on the order of 70 to 80 specific resources in this area), a community-wide seasonal round of activities based on the availability of wild resources, a domestic mode of production (households and close kin), frequent and large scale noncommercial distribution and exchange of wild resources, traditional systems of land use and occupancy based on customary use by kin groups and communities, and a mixed economy relying on cash and subsistence activities (Wolfe and Ellanna 1983; Wolfe and others 1984). The heart of this cash-subsistence economy is the resident population of 7,611 individuals (in the year 2000) located in 25 communities

(table 1) spread across this primarily un-roaded area (fig. 3). Archeological evidence indicates that Bristol Bay has been continuously inhabited by humans at least since the end of the last major glacial period about 10,000 years ago. Three primary indigenous cultures are represented here: Aleuts, Yupik Eskimos, and the Dena'ina Athapaskan Indians. The share of the population that is Alaska Native is relatively high at 70 percent, compared to Alaska as a whole, with 16 percent.

Wild renewable resources are important to the people of this region and many residents rely on wild fish, game, and plants for food and other products for subsistence use. Total harvest for these 25 communities is on the order of 2.4 million pounds based largely on surveys undertaken in the late 1980s and early 1990s, as summarized in the Alaska Division of Subsistence community profile data base. A new round of surveys is now underway to update these data. Estimates for the 2004 study year (Fall and others 2006) for five communities (Newhalen, Nondalton, Iliamna, Pedro Bay, and Port Alsworth) are included in the data presented in table 1. Per capita harvests average about 315 pounds. Primary resources used include salmon, other freshwater fish, caribou, and moose. Subsistence use continues to be very important for communities of this region, based on a new round of community-level subsistence harvest surveys being conducted by the Division of Subsistence (Fall and others 2006). Participation in subsistence activity, including harvesting, processing, giving and receiving is quite high. Compared to other regions of Alaska, the Bristol Bay area has some characteristic features, including the great time depth of its cultural traditions, its high reliance on fish and game, the domination of the region's market economy by the commercial salmon fishery, and the extensive land areas used by the region's population for fishing, hunting, trapping and gathering (Wright and others 1985).

The primary source of cash employment for participants in Bristol Bay's mixed cash-subsistence economy is the commercial salmon fishery. The compressed timing of this fishery's harvesting activity makes it a good fit with subsistence in the overall Bristol Bay cash-subsistence economy. Many commercial fishing permit holders and crew members, as well as some employees in the processing sector, are residents of Bristol Bay's dominantly native Alaskan villages. In 2004, there were 952 resident commercial fishing permit holders in the Bristol Bay study area, as well as 920 crew members. This is a significant share of the area's total adult population. An Alaska Department of Fish and Game (ADF&G) summary of subsistence activity in Bristol Bay (Wright and others 1985) noted that as of the mid-1980s traditional patterns of hunting, fishing, and gathering activities had for the most part been retained, along with accommodations to participate in the commercial fishery and other cash-generating activities. In the abstract to this 1985 paper, the authors characterize the commercial salmon fishery as "a preferred source of cash income because of its many similarities to traditional hunting and fishing, and because it is a short, intense venture that causes little disruption in the traditional round of seasonal activities while offering the potential for earning sufficient income for an entire year." Commercial fishing is a form of self-employment requiring many of the same skills, and allowing nearly the same freedom of choice as traditional subsistence hunting and fishing (Wright and others 1985: 89).

**Table 1**—Bristol Bay area communities, populations, and subsistence harvest.

<b>Bristol Bay area community/ year of harvest data</b>	<b>Population (2000 census)</b>	<b>Per capita harvest</b>	<b>Total annual harvest</b>	<b>Native population <i>percent</i></b>
Aleknagik 1989	221	379	54,079	81.9
Clark's Point 1989	75	363	20,325	90.7
Dillingham 1984	2,466	242	494,486	52.6
Egegik 1984	116	384	37,450	57.8
Ekwok 1987	130	797	85,260	91.5
Igiugig 1992	53	725	33,915	71.7
Iliamna 2004	102	508	51,816	50.0
King Salmon 1983	442	220	81,261	29.0
Kokhanok 1992	174	1,013	175,639	86.8
Koliganek 1987	182	830	154,705	87.4
Levelock 1992	122	884	97,677	89.3
Manokotak 1985	399	384	118,337	94.7
Naknek 1983	678	188	72,110	45.3
New Stuyahok 1987	471	700	247,494	92.8
Newhalen 2004	160	692	110,720	85.0
Nondalton 2004	221	358	79,118	89.1
Pedro Bay 2004	50	306	15,300	40.0
Pilot Point 1987	100	384	24,783	86.0
Port Alsworth 2004	104	133	13,832	4.8
Port Heiden 1987	119	408	41,985	65.6
South Naknek 1992	137	297	39,893	83.9
Ugashik 1987	11	814	8,144	72.7
Togiak City	809	--	--	86.3
Portage Creek	36	--	--	86.1
Twin Hills	69	--	--	84.1
Total communities	7,447	--	--	--
Unincorporated areas	164	--	--	--
Total (interpolated to include unincorporated areas)	7,611	315	2,397,970	69.6

Sources: U.S. Census Bureau (2000 census statistics), Alaska Department of Fish and Game, Division of Subsistence Community Profile Data Base, and Fall and others 2006. Note: percent Native indicates those who classify themselves as Native only.

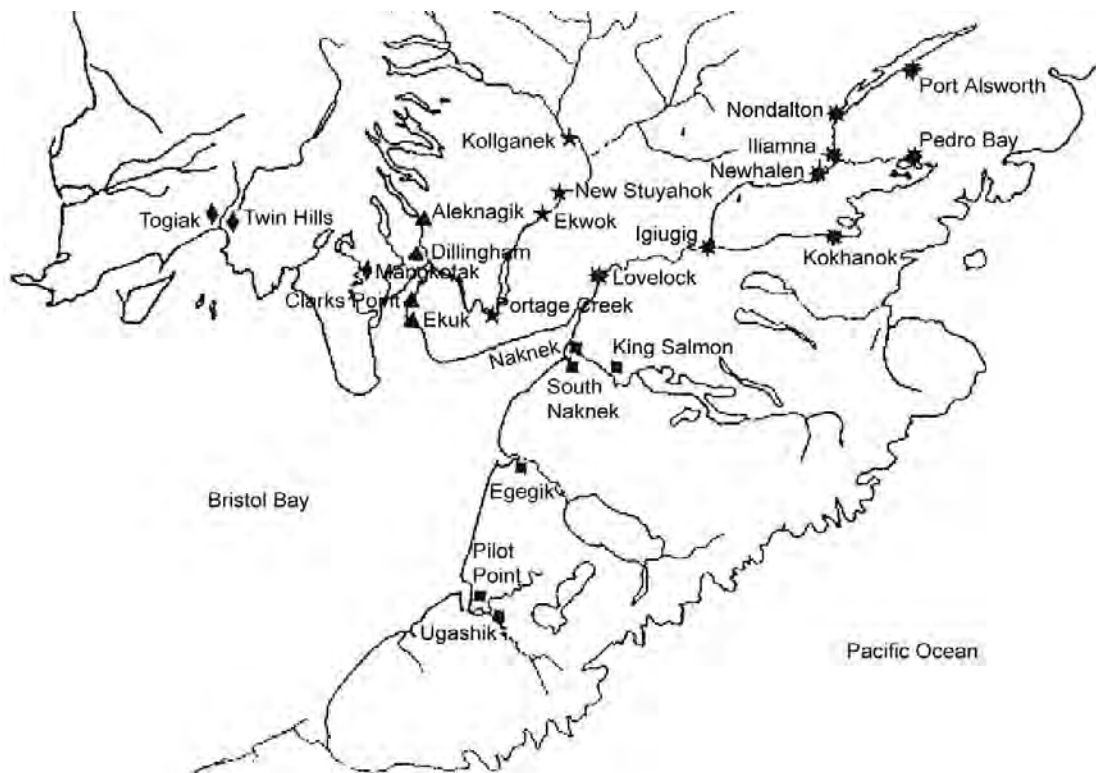
## Commercial Fishing and Processing

The Bristol Bay commercial fisheries management area encompasses all coastal and inland waters east of a line from Cape Menshikof to Cape Newhenham (fig. 4). This area includes eight major river systems: Naknek, Kvichak, Egegik, Ugashik, Wood, Nushagak, Igushik and Togiak. Collectively these rivers support the largest commercial sockeye salmon fishery in the world (ADF&G 2005). This is an interesting and unique fishery, both because of its scale and significance to the local economy, but also because it is one of the very few major commercial fisheries in the world that has been managed on a sustainable basis.

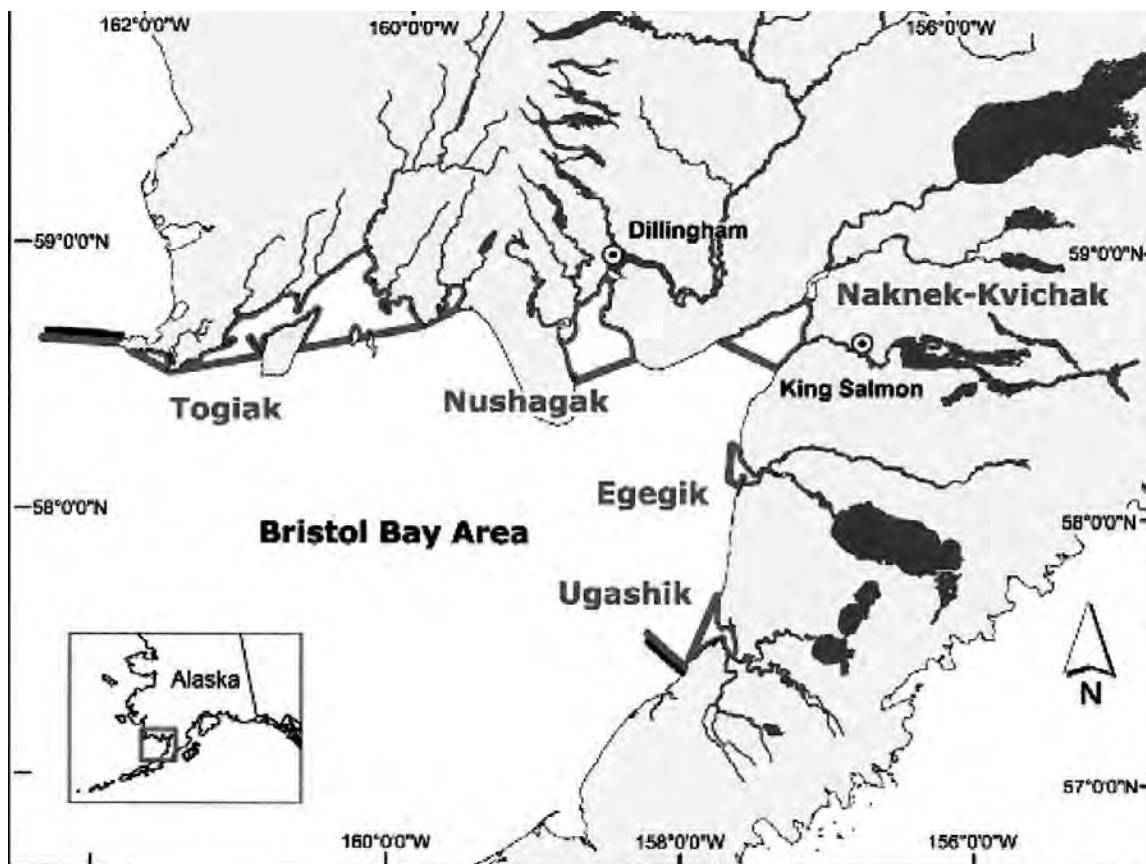
The five species of Pacific salmon found in Bristol Bay are the focus of the major commercial fisheries. Sockeye salmon are the primary species harvested both in terms of pounds of fish and value. Annual commercial catches between 1984 and 2003 averaged nearly 24 million sockeye salmon, 69,000 Chinook, 971,000 chum, 133,000 coho, and 593,000 (even year only) pink salmon (ADF&G 2005). Prices for sockeye salmon are typically higher than for other salmon species, making the Bristol Bay fishery the most valuable of Alaska's salmon fisheries (see Commercial Fish Entry Commission at [www.cfec.state.ak.us](http://www.cfec.state.ak.us)). Nearly one-third of all earnings from

Alaska salmon fishing come from the Bristol Bay fishery (table 2). This is also the largest Alaska fishery in terms of the number of permit holders. In 2004, there were 1,857 potentially active entry permits in the drift gillnet fishery and 992 in the set gillnet fishery (CFEC 2004).

The fishery is organized into five major districts (fig. 4) including Togiak, Nushagak, Naknek-Kvichak, Egegik, and Ugashik. Management is focused on discrete stocks with harvests directed at terminal areas at the mouths of the major river systems (ADF&G 2005). The stocks are managed to achieve an escapement goal based on maximum sustained yield. The returning salmon are closely monitored and counted and the openings are adjusted on a daily basis to achieve desired escapement. Having the fisheries near the mouths of the rivers controls the harvest on each stock, which is a good strategy for protection of the discrete stocks and their genetic resources. The trade-off is that the fishery is more congested and less orderly, and the harvest is necessarily more of a short pulse fishery, with most activity in June and early July. This has implications for the economic value of the fish harvested, both through effects on the timing of supply, but also on the quality of the fish. Most fish are canned or frozen, rather than sold fresh.



**Figure 3**—Nearly 8,000 residents are distributed across 25 communities in the primarily un-roaded Bristol Bay Region.



**Figure 4**—Bristol Bay area commercial salmon fishery management districts.

**Table 2**—Bristol Bay and Alaska commercial fishery permits, harvest, and gross earnings (2002).

Sector	# Permit holders	# Permits	Pounds	Gross earnings
Bristol Bay salmon				
Drift gillnet	1,862	1,447	135,549,944	77,243,936
Set gillnet	988	829	30,032,259	17,327,819
All Bristol salmon	2,850	2,276	165,582,203	94,571,755
All Alaska salmon	10,594	7,508	872,577,336	293,147,368
All Alaska fisheries	14,318	13,463	3,842,853,863	990,099,365

Source: Derived from ADF&amp;G 2005.

The fishery is quite cyclical in terms of run size and potential harvest. For example, harvests were as low as only several million fish in the early 1970s, but exceeded 45 million fish in the early 1990s. Prices have also varied quite dramatically historically. In real terms (constant 2005 dollars) prices peaked at \$3.15 per pound in 1989 and reached a recent historical low of about \$0.40 a pound in 2002. Prices are currently low because of competition with farmed salmon and other factors. For the period 1985 to 2005, total production value for processors averaged about \$288 million, with a low of \$95 million in 2002. Total production value in 2005 was \$225 million. According to the Commercial Fish Entry Commission (2004) the total salmon return to Bristol Bay is strongly influenced by sockeye returns to the Kvichak River, which is historically the largest salmon resource in the region, and perhaps the largest in the world. The sockeye return to the Kvichak is highly variable, and exhibits a pattern of oscillating cycles. In recent years the Kvichak sockeye return has been weaker, and the river has been classified as a “stock of management concern” by the Alaska Department of Fish and Game and the Alaska Board of Fisheries.

## Sport Fishing

Next to commercial fishing and processing, recreational angling is the most important economic sector in the Bristol Bay region. The 2005 Bristol Bay Angler Survey, which was undertaken for purposes of this report, confirmed that the freshwater rivers, streams, and lakes of the region are a recreational resource equal or superior in quality to other world-renowned fisheries.

In their survey responses, Bristol Bay anglers consistently emphasized the importance of Bristol Bay’s uncrowded, remote, wild setting in their decisions to fish the area. Additionally, a significant proportion of respondents to the survey specifically traveled to the region to fish the world-class rainbow fisheries. These findings indicate that Bristol Bay sport fishing is a relatively unique market segment, paralleling the findings of Romberg (1999) that angler motivation and characteristics vary significantly across Alaska sport fisheries.

Recreational fishing use of the Bristol Bay region is roughly divided between 65 percent trips to the area by Alaska residents and 35 percent trips by nonresidents. These nonresidents (approximately 13,000 trips in 2005 (personal communication, ADF&G, 2006)) account for the large majority of total recreational fishing spending in the region. It is estimated that in 2005 approximately \$48

million was spent in Alaska by nonresidents specifically for the purpose of fishing in the Bristol Bay region. In total, it is estimated that \$61 million was spent in Alaska in 2005 on Bristol Bay fishing trips.

## Sport Hunting and Nonconsumptive Wildlife Viewing

While sport fishing within the Bristol Bay region comprises the largest share of recreational use and associated visitor expenditures, several thousand trips to the region each year are also made for the primary purpose of sport hunting and wildlife viewing.

## Regional Economic Analysis

Table 3 through table 8 detail the summary results of this preliminary analysis. Table 3 shows estimated direct expenditures related to harvest or use of Bristol Bay area renewable resources. Total estimated direct expenditures (that drive the basic sector of the economy) were estimated to be \$324 million in 2005. The largest component is the commercial fishing harvesting and processing sectors. These estimates were obtained from the Alaska Department of Revenue and the Commercial Fishing Entry Commission. The range shown of low and high estimates reflects the cyclical nature of this sector, and is based on a 95 percent confidence interval for total earnings in this sector 1985-2005. The next most significant component is sport fishing at \$61 million in 2005. This estimate is derived from original survey data. A 95 percent confidence interval for this 2005 estimate is relatively imprecisely estimated at zero to \$123.2 million (this includes the statistical uncertainty in Alaska Fish and Game total angler trips estimates). Sport hunting and non-consumptive wildlife viewing are less important economically. The wildlife viewing and tourism estimates are approximate, and reflect a small share of the visitation at Katmai National Park. Most of the visitation at Katmai is expected to be picked up in the sport fishing use estimates and is excluded here to avoid double-counting.

Table 4 provides additional detail on the recreation expenditure estimates, including number of trips and spending by residence of the participants. A large share of sport fish expenditures, and hence of total recreation expenditures, is by nonresident anglers (at \$48 million of \$61 million sport fish expenditures). This reflects the high quality of this fishery, in that it is able to attract participants from a considerable distance in the Lower 48 States as well as

**Table 3**—Summary of regional economic expenditures based on wild salmon ecosystem services (million 2005 dollars).

Ecosystem service	Estimated direct expenditures	Low estimate	High estimate
	<i>sales per year</i>		
Commercial fish wholesale value	226.0	226.0	346.0
Subsistence harvest expenditures	7.2	7.2	7.2
Sport fisheries	61.2	0	123.2
Sport hunting	12.4	12.4	12.4
Wildlife viewing / tourism	17.1	17.1	17.1
Total estimated direct annual economic impact	323.9	262.7	505.9

**Table 4**—Total estimated recreational direct spending due to Bristol Bay wild salmon ecosystems, 2005.

Sector	Local residents	Nonlocal residents	Nonresidents	Total
<b>(A) Trips</b>				
Sport fishing	19,488	4,450	12,966	36,904
Sport hunting	—	1,538	2,310	3,848
Nonconsumptive recreation	—	1,000	9,000	10,000
Total trips	19,488	6,988	24,276	50,752
<b>(B) Spending</b>				
Sport fishing	\$6,606,432	\$6,397,747	\$48,207,588	\$61,211,767
Sport hunting	—	\$2,214,720	\$10,870,860	\$13,085,580
Nonconsumptive recreation	—	\$970,010	\$16,168,280	\$17,138,290
Total direct spending	\$6,606,432	\$9,582,477	\$75,246,728	\$91,435,637

foreign countries. From a regional economic perspective this is a positive feature in that nonresidents are bringing new cash into the region and Alaska from the outside.

Table 5 summarizes the full time equivalent employment associated with the sectors of the Bristol Bay economy that are dependent on wild salmon ecosystems. A total of 5,540 full-time equivalent jobs are supported, with 1,598 of these held by local residents of Bristol Bay, 1,829 by non-local Alaskans (for a total of 3,430 Alaska jobs) and 2,110 by nonresidents. Three-fourths of these jobs are in the commercial fish sector and about one-fourth in recreation. A small number of jobs (49) are also shown for subsistence, based on expenditures made by subsistence participants for supplies and equipment to support subsistence activity. However,

this perspective on subsistence is somewhat misleading, as it is only from the cash side of the mixed cash-subsistence economy. The level of full-time equivalent subsistence jobs was estimated for a similar sized population of Bristol Bay residents by Goldsmith and others (1998) at 762 jobs. This is based on the approximation that the average Alaska Native (3,048 in Goldsmith's population) participates in subsistence activities a total of three months a year, and that non-natives participate not at all. Unfortunately, there is not much evidence to support or refute this estimate, but it does indicate the possible significance of subsistence employment from a broader perspective than that of just the cash economy.

The overall structure of the Bristol Bay economy is shown in table 6. This estimate was derived by starting from the

**Table 5**—Total 2005 estimated full time equivalent (FTE) employment dependent on Bristol Bay wild salmon ecosystems.

Sector	Local Bristol Bay	Nonlocal Alaskan	Total Alaska	Nonresident	Total FTE jobs
Salmon commercial fishing	689	667	1,357	1,172	2,529
Commercial processing	465	449	914	796	1,710
Commercial fish total	1,155	1,116	2,271	1,968	4,238
Sport fishing	288	435	723	123	846
Sport hunting	60	105	165	2	167
Nonconsumptive wildlife & tourism	82	139	222	17	239
Recreation total	430	679	1,110	142	1,552
Subsistence	14	34	49	0	49
Total FTE jobs	1,598	1,829	3,430	2,110	5,540

obviously incomplete official employment data reported by the U.S. Bureau of Economic Analysis and the Alaska Department of Labor, which primarily focus on wage and salary employees and only resident local proprietors. This revised data developed for purposes of this study shows that the annual average employment in the Bristol Bay economy is 7,691 jobs. It is apparent that the private sector basic employment in this economy is almost entirely dependent on Bristol Bay's wild salmon ecosystems. The only other major basic driver is government employment (here including hospitals, which are publicly funded). There are also some private sector jobs in mineral exploration, which are not readily identifiable in existing data. As a share of all basic employment, the salmon ecosystem-dependent sectors account for 64 percent of all the basic employment that essentially drives this cash economy. A good share of the non-basic employment is also derived through induced and indirect effects (multiplier effect) from the ecosystem sectors as well. Furthermore, although government is here considered a BASIC sector activity because it brings money into the local economy, in the absence of the salmon ecosystem, regional population would surely be smaller and the government presence would also shrink.

It is very interesting to note the extreme seasonal nature of this economy. Summer employment climbs by almost 13,000 jobs to a total of 16,631 jobs, and declines in winter to 3,640 jobs. It is useful to recall that the entire resident population (including children and the elderly) is only about 7,600. Subsistence users are not the only hunter-gatherers in this economy. Essentially the entire private economy is "following the game" (or, in this case, the fish), with many commercial fishers, processors, sport anglers, sport hunters and wildlife viewers coming from elsewhere in Alaska or the Lower 48 to be part of this unique economy at the time that fish and game are available. The most stable component of the economy is government, which actually declines by about 300 jobs in summer, probably reflecting the academic year schedules of teachers. The winter employment pattern reveals the bare bones of the local cash economy, absent almost all of the cash employment jobs associated with fishing

and recreation, except for about 200 jobs in commercial fish processing.

The estimated payroll associated with the salmon ecosystem-dependent jobs is shown in table 7. The total is \$161 million in 2005, including \$46.8 million to Bristol Bay residents and a total of \$103.4 million to all Alaska residents.

## Net Economic Values

Net economic values associated with the wild salmon ecosystem services are summarized in table 8. The preceding discussion has focused on a regional economic accounting framework. Table 8 introduces the value measures relevant for a social benefit-cost evaluation of the renewable Bristol Bay resources. Commercial salmon fishery net economic values are derived by annualizing permit values, which are exchanged in an open market and reported by the Commercial Fish Entry Commission. These are on the order of \$51,200 for a drift gillnet permit in 2005 in total, but have been as high as \$200,000 as recently as 1993. Subsistence harvests are valued based on the willingness-to-pay revealed through tradeoffs of income and harvest in choice of residence location (Duffield 1997).

Sport fisheries net economic values are based on original data collected for purposes of this study. Estimated willingness to pay per trip, using contingent valuation (payment card question format), range from \$455 for nonresident anglers to \$350 for resident anglers. These estimates are consistent with values from the extensive economic literature on the value of sport fishing trips (for example, see Duffield and others 2002). Sport hunting and wildlife viewing values are based on studies conducted about 15 years ago in Alaska, and which need to be updated (McCollum and Miller 1994). Direct use values total from \$104 million to \$179 million.

A major unknown is the total value for existence and bequest (also called passive use values). Goldsmith and others (1998) estimated the existence and bequest value for the Federal wildlife refuges in Bristol Bay at \$2.3 billion to \$4.6 billion per year (1997 dollars). There is considerable uncertainty in these estimates, as indicated by the large range of values.

**Table 6**—Structure of the Bristol Bay economy.

	Annual average	Summer	Winter	Swing
<b>Total jobs by place of work</b>	7,691	16,631	3,640	12,991
<b>Basic</b>	6,251	15,028	2,304	12,724
Harvesting	2,552	7,657	0	7,657
Processing	1,150	4,193	200	3,993
Recreation	311	933	0	933
Govt. + health	2,098	1,795	2,104	-309
<b>Non-basic</b>	1,440	1,603	1,336	267
Construction	64	80	56	24
Trade/transport/leisure	642	765	580	185
Finance	127	118	116	2
Other WS	180	213	157	56
Non fish proprietors	427	427	427	0
<b>Resident jobs</b>		5,741	3,640	2,101

**Table 7**—Total estimated payroll associated with use of Bristol Bay wild salmon ecosystems, 2005 (millions of 2005 dollars).

Population payroll paid to	Commercial fishing	Sport fishing	Hunting	Other recreation	Subsistence	Total
Local Bristol Bay residents	34.554	8.180	1.536	2.015	0.525	46.810
Nonlocal residents	33.242	14.491	3.392	4.235	1.183	56.543
All Alaska residents	67.796	22.671	4.929	6.250	1.707	103.353
All payroll (residents + nonresidents)	120.490	26.974	5.016	6.847	1.707	161.034

**Table 8**—Summary of Bristol Bay wild salmon ecosystem services, net economic value per year (million 2005 dollars).

Ecosystem service	Low estimate	High estimate
<i>Net economic value per year</i>		
Commercial salmon fishery	9.4	18.8
Subsistence harvest	77.8	143.1
Sport fisheries	13.5	13.5
Sport hunting	1.8	1.8
Wildlife viewing / tourism	1.8	1.8
Total direct use value	\$104.3	\$179.0
Existence and bequest value	Not estimated	Not estimated

Goldsmith's estimates for the Federal wildlife refuges are based on the economics literature concerning what resident household populations in various areas (Alberta, Colorado) (Adamowicz and others 1991; Walsh and others 1984, 1985) are willing to pay to protect substantial tracts of wilderness. Similar literature related to rare and endangered fisheries, including salmon, could also be appealed to here. It is possible that from a national perspective the Bristol Bay wild salmon ecosystems and the associated economic and cultural uses are sufficiently unique and important to be valued as highly as wilderness in other regions of the U.S. Goldsmith and others (1998) estimates assume that a significant share of U.S. households (91 million such households) would be willing to pay on the order of \$25 to \$50 per year to protect the natural environment of the Bristol Bay Federal wildlife refuges. The number of households is based on a willingness to pay study (the specific methodology used was contingent valuation) conducted by the State of Alaska Trustees in the Exxon Valdez oil spill case (Carson and others 1992). The findings of this study were the basis for the \$1 billion settlement between the State and Exxon in this case. These methods are somewhat controversial among economists, but when certain guidelines are followed, such studies are recommended for use in natural resource damage regulations (for example, see Ward and Duffield 1992). They have also been upheld in court (Ohio v. United States Department of Interior, 880 F.2d 432-474 (D.C. Cir.1989)) and specifically endorsed by a NOAA-appointed blue ribbon panel (led by several Nobel laureates in economics) (Arrow and others 1993).

Goldsmith's estimates for just the federal refuges may be indicative of the range of passive use values for the unprotected portions of the study area. However, there are several caveats to this interpretation. First, Goldsmith and others estimates

are not based on any actual surveys to calculate the contingent value specific to the resource at issue in Bristol Bay. Rather, they are based on inferences from other studies (benefits transfer method). Second, these other studies date from the 1980s and early 1990s and the implications of new literature and methods have not been examined. Additionally, the assumptions used to make the benefits transfer for the wildlife refuges may not be appropriate for the Bristol Bay study area. This is an area for future research.

The estimates in table 8 are for annual net economic values. Since these are values for renewable resource services that in principle should be available in perpetuity, it is of interest to also consider their present value (for example, total discounted value of their use into the foreseeable future). Recent literature (EPA 2000; Weitzman 2001) provides some guidance on the use of social discount rates for long-term (intergenerational) economic comparisons. Rates as low as 0.5 percent have been recommended by the EPA (2000). Weitzman, based on an extensive survey of members of the American Economic Association, suggests a declining rate schedule, which may be on the order of 4 percent (real) in the near term and declining to near zero in the long term. He suggests a constant rate of 1.75 percent as an equivalent to his rate schedule. Applying this parameter to the net economic values shown in table 8 implies a net present value of \$6.0 billion to \$10.2 billion for just the direct uses.

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# Traditional Ecological Knowledge: Applying Principles of Sustainability to Wilderness Resource Management

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**Abstract**—Traditional ecological knowledge within specific cultural and geographical contexts was explored during an interactive session at the 8th World Wilderness Congress to identify traditional principles of sustainability. Participants analyzed the traditional knowledge contained in ten posters from Canada and Alaska and identified and discussed the traditional principles of sustainability inherent in specific examples. An invited panel discussed the opportunities and challenges of incorporating traditional principles of sustainability in wilderness management. This paper reports on principles of sustainability and associated cultural concepts related to indigenous engagement with homelands and makes suggestions for how to bridge cultural differences when considering traditional principles of sustainability. A co-management relationship was preferred as the most effective strategy for incorporating the traditional expertise of Native peoples into wilderness policy where a wilderness area encompasses the homelands of a surviving indigenous population.

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## Introduction

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Indigenous populations lived on lands now designated as wilderness for thousands of years without significantly altering the core values associated with their use of their homelands. In recent years, there has been an upsurge of interest in the locally specific and cumulative knowledge that Native peoples possess about their homelands—a body of knowledge that has been termed “traditional ecological knowledge” (TEK) or in some cases just “traditional knowledge” or “local knowledge.” This interest is mainly based on the desire by governments, and more specifically resource managers, to include local residents in research conducted on their lands. The idea is to incorporate TEK into the management scheme.

The definition and description of traditional ecological knowledge varies in the literature. Some researchers have included aspects such as knowledge transmission over multiple generations and considered the kinship and cultural systems in both the transmission and application of traditional ecological knowledge (Berkes 1999; Nadasdy 1999; Usher 2000). In addition—although it is now evident that

many indigenous peoples transformed their environment (Iutzi-Mitchell 1981; Kreck 2000), for example through fire or ameliorating salmon runs—it remains clear that one of the central tenants of TEK is some semblance of sustainability. It appears that each case in the literature where a researcher tries to define TEK comes back to one central tenant—for each group that is being studied, TEK takes on a different form determined by culture and environment and that is why we as anthropologists, who like to define such things as TEK, have a hard time coming up with definitions. Stevenson (1996: 281) says that one of the integral parts of TEK is “specific environmental knowledge.” We would add that this has to apply to a specific environment or set of circumstances within the context of a specific culture; and how that culture has both shaped their environment to fit their subsistence needs, and has in turn had their cultural systems shaped by the environment. For each culture to survive, they had to come to an understanding with their environment, and create a semblance of sustainability.

This research sought to explore traditional ecological knowledge within specific cultural and geographical contexts, to identify the core values or principles inherent in how indigenous peoples engaged in a sustainable manner with their homelands. Traditional principles of sustainability are the linkages that allow us to translate models of indigenous “engagement” (Langdon, poster) to Western natural resource management. Indigenous models of engagement evolved in relation to a specific place, but the core principles within these practices can be identified and applied to new situations. Indigenous ways can be translated into management principles by removing the context of the situation and recognizing the core essence of the traditional practice.

There exists a common ground between traditional systems of engagement and modern management. Although the form and semantics may differ substantially, both traditional and contemporary models (1) manage people’s activities relating to a resource, (2) have systems of taxonomy, (3) monitor or assess resources, (4) have rules governing appropriate behavior, and (5) have technologies for harvesting resources that evolve with changing needs and opportunities. In addition both systems are fundamentally based on deeply held cultural beliefs.

The process of identifying traditional principles of sustainability within locally specific knowledge requires recognizing the essence within the form—the form being the geographical, species and culturally specific information contained within the traditional knowledge. A traditional principle of sustainability when distilled to its essence could be applied to other locations, cultural contexts and resources. For example, Tlingit traditional halibut hooks, by design, only captured

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mid-sized halibut. By utilizing this technology, Tlingit fishermen avoided harvesting the smallest halibut before they had had a chance to spawn and also the largest, which are generally the most productive breeding females. A principle specific to fisheries management would be to concentrate harvests of long-lived species to the mid-sized fish to maximize the recruitment of young fish into the breeding population and conserve the most productive breeding individuals. A more distilled principle applicable to other species would be to avoid harvesting immature members of a population and the most productive breeding individuals—a principle contradictory to the trophy approach of contemporary hunting and fishing, which encourages the harvest of the larger most successful breeders.

A second traditional principle of sustainability—inherent in the design of the Tlingit halibut hooks—is that the conservation of immature and large breeding females is accomplished through the design of the harvest technology, rather than dependent on regulatory restrictions. The Tlingit halibut hooks were highly sophisticated technologies in that they allowed for an efficient harvest while eliminating the potential mortality that results from catch and release policies. The second principle—when distilled to the basic premise, making it applicable to other situations beyond halibut harvests—is to incorporate conservation strategies into the design of harvest technologies.

The following excerpt from Newton and Moss (2005: 30) provides an example of the complexity and multiple traditional principles of sustainability that can be contained in one context specific quote, in this case relating to Tlingit forestry practices:

The Tlingit believed within the tree was a spirit of good luck—as a man chopped, the spirit of good luck moved. Only by chopping to the end of each branch tip can a man have good luck. All were carried home and used. If a man was caught taking a tree from the special areas, he was punished by the house chief and the council, by taking from him all his hunting equipment (Lydia George, Village of Angoon, 1983).

The following principles might be discerned from the quote:

- Do not waste any parts of the tree.
- Good luck resulted from correct action.
- Certain areas were off-limits from harvesting.
- Punishment involved the confiscation of hunting equipment.
- Judgments were made by community leaders.

The previous statements might be further distilled from the original context and reworded as the following traditional principles of sustainability:

- Utilize all parts of a resource.
- Provide high incentive for correct action.
- Protect special areas from harvest.
- If rules are broken, punish the perpetrator by taking something of great value.
- Justice is to be administered by respected members of the community, preferably someone known and respected by the perpetrator.

In developing a session on traditional principles of sustainability for the 8th World Wilderness Congress, the authors sought to explore the diversity and commonality of

traditional principles of sustainability from various contexts and consider multiple viewpoints concerning core principles within examples of traditional knowledge. This paper reports on the interactive poster session followed by a panel response—held during the 8th World Wilderness Congress in Anchorage, Alaska—with the stated purpose to (1) share knowledge concerning traditional resource management and sustainable use of wild resources from various regions, and (2) develop a list of principles utilized by various indigenous cultures worldwide for managing their traditional harvests and maintaining wilderness use areas.

## Methods

On October 4, 2005, the authors facilitated a three-and-a-half-hour session concerning the identification and application of traditional principles of sustainability for wilderness management. The forum—a poster session, focused discussion groups and a panel discussion—was used to generate ideas and dialogue concerning the identification, application, opportunities, and challenges involved in identifying and applying traditional principles of sustainability in contemporary management situations. In order to encourage a plethora of ideas, researchers conducting TEK research worldwide were invited to submit posters. The call for posters was posted on the 8th World Wilderness Congress website. Individual contacts were also made by the authors/facilitators to potential contributors.

Participants were invited to submit abstracts for a poster, detailing concepts and practices that reflect the traditional ecological knowledge or local knowledge of groups with whom they work. The call for posters encouraged participants to address resource management considerations on their posters, such as (1) taxonomy practices and ideas, (2) cultural beliefs concerning resources, (3) monitoring and recording of harvests and uses, (4) regulations and management of resources, (5) harvest methods, and (6) harvest technology relating to “conservation” measures. Ten posters were submitted for the session, all from Alaska or Canada.

The session began with a short introduction to the concepts of “traditional ecological knowledge” and “traditional principles of sustainability,” including the examples provided above. Following the introductory comments, participants had 40 minutes to study the posters and were given worksheets to fill in each of the poster’s author(s), poster title, traditional principles expressed in the poster, and examples of each principle. Following the poster session, participants sat with one of four groups, discussed the posters, and then a spokesperson from each group reported their findings to all the participants. Each group had a predetermined facilitator either from the Alaska Department of Fish and Game, Division of Subsistence or the National Park Service. Participation and choice of group were self-selected. Group size varied between about 8 to 12 people with a total participation of about 45 people.

Following the poster session and group reports, three panelists were invited to discuss what they learned from the poster session and give ideas from their work on traditional principles of sustainability. These panelists included a resource manager and Tlingit person, Adrienne Fleck of Lake Clark National Park and Preserve, Wilson Justin, a

tribal administrator and Athabaskan person from the Copper River Basin, and Dr. Stephen J. Langdon, professor of anthropology at the University of Alaska, Anchorage. Dr. Langdon chose to have a Tlingit elder who was in attendance, Elaine Abraham, speak in his place. Dr. Langdon then gave a brief summation of the session.

## Results

Three of the groups focused their discussion on the worksheet, identifying principles from the posters; one of these groups then diverged into a discussion on other considerations of incorporating and considering TEK. The fourth group ignored the original intent and engaged in an energized discussion about traditional ecological knowledge, its use and application in natural resource management. The results reported here summarize the traditional principles identified by one or more groups. Not all groups cited the poster that was the source of the principle, as some posters related similar principles of sustainability in different geographical and cultural contexts. The results are organized under the following topics: (1) cultural beliefs and values, (2) monitoring and assessment, (3) regulations and management, and (4) harvest methods and technologies. In addition, comments from the panelists who summarized the poster session are included below.

### Cultural Beliefs and Values

Most of the posters expressed “respect” as a highly significant cultural value for practicing sustainability (for example: Holen; Ramos and Mason; Ratner, posters). Other, almost universal values include sharing and taking only what you need and not wasting. All resources are considered sentient and as such people are considered to be in a spiritual relationship with the land and sea and the resources they harvest, a relationship that continues even after death of a plant or animal. For example, in Tlingit and Athabaskan cosmology animals and plants are aware of how they are being treated (Brock; Holen; Ramos and Mason; Ratner, posters). The spirit is believed to continue after death and continues to be aware of the care taken with its body. Respectful behavior includes maintaining respectful speech. Thornton (poster) described the offering of dog salmon eggs to the berry spirits by the Tlingit of Glacier Bay. Plants and animals are recognized as individuals rather than averaged into a population. As such, connectivity and communication are emphasized versus the emphasis on controlling resources of Western resource management. Wilson Justin (poster) highlighted the nature of indigenous languages and tradition, which require a person to ask permission to walk on someone else’s grounds or take a life.

One of the posters (La Vine and McCabe, poster) expressed the Yupik belief, “if you don’t use a resource; it will go away,” suggesting the need to maintain a continuous reciprocal relationship between humans and other species in a localized ecological setting. Balancing human activities with what the land and sea can afford to provide is a common traditional theme and was expressed by one Tlingit elder in the Brock poster as “don’t break the plate.”

The panel discussion following the poster session emphasized the inappropriateness of the term “wilderness.” Elaine Abraham (panelist) said that the Tlingit translation for “wild” was “crazy” and as such, wilderness translates as “crazy land.” What is designated as “wilderness” by park managers is considered “homelands” by indigenous peoples. The “ecological” in TEK is also offensive to Native people, according to the panelists, because ecology is a Western science concept and traditional knowledge is more holistic than the term TEK implies.

### Monitoring and Assessment

Monitoring and assessment of resources is traditionally accomplished through long-term observations and detailed knowledge of homelands, passed down from generation to generation. Detailed observations of life cycles and physiology are made and characteristics of individual stocks are recognized (Moncrieff, Wiswar and Crane; Ramos and Mason; Ratner, posters). In-season monitoring assures an appropriate level and timing of harvests (for example, Tlingit salmon harvests; Ramos and Mason; Ratner, posters).

Rules or regulations for harvests are embedded in cultural values: don’t waste, respect the resource, share the harvest, don’t take more than you need. For example, Tlingit seal hunting is self-regulated and self-limited by these strong cultural values (Brock, poster). Resources with limited abundance, such as Tlingit sockeye salmon streams and important berry patches, were allocated to kinship groups (Ramos and Mason; Ratner; Thornton, posters). “Ownership” implied long-term stewardship and emphasized communal property rights. For example, Tlingit clan leaders were responsible for monitoring the abundance and timing of salmon, decisions about when and how much to harvest occurred in-season; as opposed to preset dates of hunting or fishing seasons. Rules about when to start were based on natural observations and indicators rather than set by calendar dates. Harvests were community focused through the strong cultural value of sharing and reciprocity—“what you give is what you get.”

In his comments during the panel discussion, Wilson Justin (panelist) related how his clan was the guardians of a herd of well-known caribou in his country; caribou that managers of the Wrangell-St. Elias National Park (NPS) in Alaska’s Copper River Basin did not know existed. This herd of caribou belongs to the Naltsiine people (Kari 1990), the Sky Clan also known as the medicine people. Justin’s clan, the Alts’e’ tnaey, or One-way Clan (Kari 1990), have been the guardians of this herd for centuries. They protect the herd from outsiders and only the medicine people are allowed to harvest them. Recently, NPS managers have “discovered” the herd and are now discussing how to best manage these newly found caribou. The Atna’ Athabaskan of the Copper River Basin, and Justin’s Alts’e’ tnaey clan in particular, find this insulting because they have been guarding this herd for centuries. It was an obligation to monitor the herd and create a relationship with the caribou to in turn maintain their obligations to the medicine people. Now, they are being pushed aside so that the herd can be managed by outsiders.

## Regulations and Management

Knowledge and harvest rules are expressed in the form of mythic charters rather than through regulation booklets (Langdon; Ramos and Mason, posters). Elaine Abraham stressed that the raven myths of the Tlingit people are about “now.” Larry Merculieff (of the Bering Sea Council of Elders) in his talk on Sunday evening at the 8th World Wilderness Congress said that “before time” in a myth means before concepts of past or future, in other words, the present moment.

The cultural value of “not wasting” is translated as “use all parts of a resource.” Although, there are laws in Alaska against wanton waste, unlike traditional principles of sustainability where “not wasting” would mean using every part, these laws really mean using a majority of the meat. For example, in Klawock, Alaska, Tlingit salmon harvesters scraped the backbone after filleting a fish to make fish hash or smoked the backbones (Ratner, poster). Sport fishermen routinely discard the meat left on the salmon backbones, a practice seen as wasteful by traditional Tlingit standards. Likewise, a Tlingit elder in Klawock found the non-retention of king salmon in the Pacific Salmon Treaty to be a wasteful practice, requiring purse seiners to discard king salmon that died in the net.

A Dena'ina Athabaskan elder of Nondalton said “They [sport fishermen] just fish and release. When they release the fish, the fish die. You are not supposed to do that you know.” When relating rules about harvesting large land mammals, two Nondalton residents relate, “They utilized everything from the animals, the bones they used to make tools out of. [You are] supposed to never leave the bones laying around anywhere, you put it back in the water, don't leave bones where people walk...because they feel, that their spirits, it could change your luck if you did not take care of the animal properly, your luck would change and next time you went hunting you might not get that animal because you did not properly take care of it, you treat that animal respectfully” (Holen, poster). One thing to note here is that this relates not only to regulation and management of the resource but to cultural beliefs and values; you cannot separate the two. The poster also noted that bones from salmon were thrown back in the water after the harvest. As one elder of this community noted, “The trout have to eat too.”

## Harvest Methods and Technologies

Strategies for times of low abundance included shifting effort to other species or locations; harvesting only males, or avoiding the taking of pregnant females (seals); and emergency closures based on in-season monitoring (Brock; Holen; Ramos and Mason; Ratner, posters). Harvest technologies allow for selective harvest or have built-in conservation strategies—for example, the traditional Tlingit intertidal weirs and traps only harvested salmon on certain stages of the outgoing tide, effectively “closing” a fishery on every flood tide (Langdon; Ratner, poster). Gaffs, spears and clubs allowed harvesters to selectively harvest male salmon (Ratner, poster). The sophistication of the Tlingit fishing technologies—such as the halibut hooks, gaffs and spears, and intertidal traps—was that the harvest methods achieved conservation of fishing stocks without sacrificing efficiency.

The Tlingit technology supported conservation strategies by allowing for selective harvests, only capturing certain segments of the population or only functioning during part of a day (Ramos and Mason; Ratner, posters). Salmon genetic diversity was maintained by spreading out harvests over the entire salmon run.

Tlingit people practiced habitat enhancement and in some cases, predator control. Salmon eggs or mature salmon were moved from a productive stream to a failing stream (Ratner, poster), habitat was manipulated to maximize berry production (Thornton, poster) and Dolly Varden char and merganser ducks were harvested to reduce their predation on salmon fry (Langdon and Austin, 2006).

Several of the posters and panelists expressed the importance of cultural specificity and empowering indigenous people with decision-making authority (for example, Burwell; Meek, posters). One panelist (Justin) said that it was okay to use traditional knowledge in Western management, but not to circulate it back to traditional people afterwards. In his words, the transmission of traditional knowledge is a “one way street.” The implication is that Western wilderness managers bend the knowledge to fit their perceptions and situations in ways foreign to the original meaning.

## Discussion

The distillation of traditional principles of sustainability from the original geographical and cultural context requires overcoming both traditional and Western scientific cultural taboos and as such is a creative problem solving process incorporating both vertical thinking (rational reasoning) and lateral thinking. Lateral thinking requires thinking “outside the box,” a process on which there may be multiple correct answers. The lateral thinking process, as described by De Bono (1970), is a generative thinking process distinct from vertical rational thinking, in that information does not need to be true at every step in order to be correct or useful in solving a problem.

As previously mentioned, the identification of core principles of sustainability removes the inherent principle from its original culturally and geographically specific context—an act considered taboo by most proponents of TEK (Justin; Langdon, panelists) (Nadasdy 1999). Where indigenous societies live adjacent or within wilderness boundaries; it makes better sense to retain the site-specific knowledge and apply it within a co-management context. But where this is not possible, the recognition of traditional principles of sustainability could provide guidance for wilderness management and a theoretical foundation and practical understanding to support effective communication in co-management collaborations.

There are, however, Western science cultural taboos that directly contradict indigenous ways of knowing. To consider practical applications of indigenous engagement with homelands without acknowledging the spiritual basis and cultural values underpinning the principles would ignore the holistic foundation of the principles and overlook a central principle that sustainable practices be incorporated into cultural values. The absence of spirituality in resource management is considered by some Native people to be a major shortcoming of Western society and the “borrowing”

of indigenous wisdom without acknowledging the spiritual relationships with non-human life can be considered inappropriate and offensive (Cyrus Peck Jr., Tlingit elder, personal communication). The spiritual connection to homeland and the process of attributing human characteristics to all non-human life—and everything is considered to be alive—is central to indigenous perception of nature and relationships with homelands; however, the Western scientific belief structure strictly forbids the inclusion of spirituality and anthropomorphism.

Western science tends to define “reality” based on the ability to measure or quantify a perception and “truth” is discerned by a rational, vertical thinking process where each step of the process must be true to prove a hypothesis and support a theory. The mythic charter of indigenous science is based on lateral thinking where the actual events don’t have to occur in physical waking reality, as long as the resulting knowledge is “true.”

The different cultural ways of coding reality, including the black and white thinking of Western society—a hypothesis is either true or false—contrasts with the simultaneous acceptance of both mythological and scientific explanations by traditional societies. The simultaneous acceptance of multiple perceptions of reality might be compared to viewing a landscape through the windows of a house. The front and back windows give very different perceptual views, but both are accurate and in combination give a more complete understanding of the environment in which the house is sited. Western science has examples in which black and white thinking is supplanted by multiple perceptions such as in the statement, “light is both a particle and a wave.” Accepting simultaneous perceptions of reality, as long as the belief serves to sustain or support a balanced relationship between human activities and core wilderness values, would encourage cross-cultural understanding without negating the central tenants of Western science. Lateral thinking provides a vehicle for identification and application of traditional principles of sustainability and could help facilitate co-management opportunities.

## Conclusion

This paper reported on an introductory effort to identify traditional principles of sustainability and consider their application in wilderness management. To further this effort, a resolution concerning the identification of traditional principles of sustainability was passed by the 8th World Wilderness Congress, which resolved that the IUCN wilderness task force should identify traditional principles of sustainability and explore their relevance and application to wilderness resource management.

When a wilderness area encompasses the homelands of a surviving indigenous population, a co-management relationship is preferred as the most effective strategy for incorporating the traditional expertise of local indigenous peoples into wilderness policy. As stressed by Wilson Justin (panelist) in the panel discussion, the traditional system must not be integrated into the Western management scheme. It must be respected for what it is and a co-management situation where each of the actors has a place at the table is preferable.

It must be recognized that indigenous groups have been and should remain the guardians of the resources they currently, as in the past, depend on for subsistence—resources they have created a reciprocal relationship with, founded on mutual respect. In situations where indigenous groups exist, either with or without co-management opportunities, the identification of traditional principles of sustainability could provide natural resource managers and students with a conceptual framework in which to understand and consider the traditional knowledge of indigenous populations.

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### Panelists

- Stephen J. Langdon, Professor of Anthropology, University of Alaska, Anchorage
- Adrienne Fleek, Management Assistant, Lake Clark National Park and Preserve
- Wilson Justin, Vice President, Mount Sanford Tribal Consortium
- Elaine Abraham, Tlingit Elder and Chair, Alaska Native Science Commission

### Poster Participants

- Kristi Benson, TK Coordinator, Gwich'in Social and Cultural Institute and Catherine Lambert, Wildlife Biologist. Incorporating Traditional and Local Knowledge in the Development of a Management Plan for Dall's sheep in the Gwich'in Settlement Area.
- Matthew Brock, Division of Subsistence, Alaska Department of Fish and Game. Tsaa Aani (Seal Country).
- Michael Burwell, Minerals Management Service, U.S. Department of the Interior. Western Science & Traditional Ecological Knowledge: Consensus or Conflict?
- Davin L. Holen, Division of Subsistence, Alaska Department of Fish and Game. Local Knowledge of Environmental Change and

Sustainable Subsistence Practices in the Kvichak Watershed of Southwest Alaska.

Robbin La Vine, Bristol Bay Native Association, and Sarah McCabe, Bureau of Land Management. Elder's Traditional Ecological Knowledge of 20th Century Ecosystems and Fish Population Changes in the Kuskokwim Bay Region.

Chanda Meek, University of Alaska, Fairbanks. The Political Influence of TEK in Co-management Regimes.

Catherine F. Moncrieff, David Wiswar, and Penelope Crane. Phenotypic Characterization of Chinook Salmon in the Yukon River Subsistence Harvest.

Judith Ramos, Yakutat Tlingit Tribe, and Rachel Mason, National Park Service. Traditional Ecological Knowledge of Tlingit People Concerning the Sockeye Salmon Fishery of the Dry Bay Area.

Nancy Ratner, Division of Subsistence, Alaska Department of Fish and Game. Traditional Principles of Sustainable Salmon Harvests from Prince of Wales Island, Alaska.

Thomas F. Thornton, Visiting Associate Professor, Department of Anthropology, Trinity College. Tlingit Knowledge and Conservation of Berries: A Case Study from Glacier Bay National Park.



## 2. Connections Between Wilderness and Communities



*Delegates from 52 countries represented their communities at the 8th World Wilderness Congress (photo by Claudia Sellier).*





# People and Watersheds: The Case of the Totem Fish of the North Pacific

Gus diZerega

**Abstract**—Emergent processes dominate modern social orders as well as natural ones. Research in the 1920s concluded that complexity and importance of local knowledge made it impossible to centrally plan complex economies. Subsequent experience in the Soviet Union and elsewhere confirmed these arguments. Further, organizations charged with performing tasks they could not accomplish redefined their tasks in terms that were good for them. The same pattern of organizational impossibility and redefining of tasks appears in studies of salmon hatcheries and salmon farms: attempts to impose centralized control on complex natural orders. The conclusion is that the argument against central economic planning is a special case of the impossibility of successfully substituting deliberate control for complex emergent phenomena, including ecosystems.

Modernity requires different institutions to successfully engage with wild nature. Institutions of care rooted in civil society such as watershed restoration groups and democratic trusts are most able to adapt the complex needs of human societies and natural orders in ways that preserve the well-being of both. In the absence of well-developed institutions of this sort, modernity is unsustainable.

## Human Relations With the Natural World

Ecosystems and many social orders, such as the market, are complex, adaptive systems. In nature and society alike, these patterns intermingle and overlap, each becoming visible when a human question focuses on it. Questions such as, “What distinguishes the world of salmon or Douglas fir from the rest of life on earth?” or “What distinguishes market phenomena or science from the rest of society?” separate these systems out from the larger whole within which they exist. But in the absence of such questions, they blend together into natural and social worlds of incredible complexity, but possessing sufficient order that their denizens can navigate within them reasonably successfully.

These emergent systems constitute discovery and coordination processes integrating breathtaking degrees of complexity. In so doing they appear to make “mistakes” because, like all processes of discovery, more avenues will be explored than turn out fruitful. This leads some observers

to think they can be overridden by those possessing expert knowledge and exercising purposive control to “improve” these “anarchic” or “wild” processes.

This belief is a mistake. Such orders can not be improved by attempts at substituting deliberate control, at least by players who are themselves within the system, because spontaneous ordering processes coordinated by systemically generated feedback are able to deal with far more complexity and uncertainty than any centrally coordinated system could manage. This argument was first developed by Ludwig von Mises and F. A. Hayek, who applied it against proposals for central economic planning (Hayek 1948; Mises 1951). However, theirs is in fact a very important case of the broader principle that complex adaptive systems are not amenable to centralized control. It is equally true of ecosystems (Pimm 1991).

The failure of fish hatcheries (Lichatowich 1999; Montgomery 2003) and salmon farms illustrate that the same kinds of problems that plagued Soviet central planners also plagued these other efforts at centralized control. Further, in all these instances the organizations established to pursue tasks they were not competent to do then redefined the tasks in terms that were good for the organization, regardless of the impact of its self-serving actions on the original task. The failure was therefore two fold: the task could not be done well, and the organizations charged with performing the task then redefined it in terms of serving the organization’s interests, often leading the job to be done even worse. This finding means that if we as a society are to exist indefinitely with the world of nature, we must learn to live with its processes rather than seek to override them.

There is another dimension to the problem. While both social and natural emergent orders have the same abstract characteristics, their specific details are disturbingly at odds with one another. That is, the feedback processes that coordinate the social world are not harmonious with those that bring order to the natural world. Markets and democratic politics are irretrievably wedded to time cycles based on individual calculations as they manifest either through the rate of interest or the electoral cycle. As such, they can change with the speed of thought, or at least the speed of thought as it is transmitted throughout a system via these feedback processes. In their own terms this is not a disadvantage, for they exist to serve individuals.

Ecosystems however, are geared to far more complex and often very long run cycles. Each species receives and passes on feedback by biological transmission from one generation to the next. Sometimes this process is very rapid, as with bacteria. In other cases it is slow, such as with redwoods, elephants, and rock fish. In nearly all cases, it is slower than analogous processes in society.

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So long as the impact of human societies on natural orders was relatively small, this lack of harmony between human and natural emergent processes was not usually a problem. Traditional societies further embedded their interaction with the natural world in a moral, spiritual, and ritual framework that often served to harmonize them even more, by subordinating human instrumental goals to an ethical framework able to give human action a longer term orientation than would otherwise have been the case.

Both of these buffering circumstances no longer apply. First, the Enlightenment dealt a powerful blow to earlier ways of conceiving our relationship with the natural world in non-instrumental terms. The ethical restraints of the past were weakened, and at a social and spiritual level, little has yet evolved to take its place.

Second, the rise of social emergent processes enormously increased the human impact on the natural world. They facilitated the rise of increasingly powerful social networks able to adapt with the speed of thought rather than generational change, and these networks transformed the character of human life, in a great many ways for the better. At the same time they further weakened ethical and customary constraints on how social power was exercised over the natural world.

But while the power of human impact in the short run has grown enormously, it has not come close to undermining the definitive long-term power of the natural over the social world. Many modern people often treat nature as simply a collection of resources for their benefit. In addition, even when individuals themselves do not believe this to be true, their participation within the social emergent orders of the market and democratic politics leads to additional unintended strengthening of impersonal processes that act as if they do. Put bluntly, the relation of social emergent processes to natural ones is ultimately unsustainable if those relationships continue to be defined primarily in terms of markets and politics. Science by itself is incapable of serving as an adequate guide here because scientific knowledge must be utilized by institutions, and the institutions needing to use it are expressions of either the market or the political order. The most tragic example of this truth is the fate of New Orleans, for the problems the city faced and the ways government and market alike contributed to them, were well known to science years ago (Fischetti 2001).

Consider the case of salmon, where people consistently say they value the preservation of these fish, while at the same time economic and political institutions supposedly responsive to people's desires, continue pushing salmon towards extinction. Despite this widespread desire for their preservation, salmon populations continue to decline. Clearly the relevant institutions have a bias of their own, a bias often able to override the values of the people who act within their framework. We are dealing with institutional failure. It would not be the first time such a problem arose.

While people have all but universally desired economic prosperity, many societies long enforced institutions and practices that kept most of their members in poverty. Since the decline of hunting and gathering societies and their egalitarian circumstances thousands of years ago, it is modernity's unique achievement that the poor have become a minority group rather than the overwhelming numbers

of any society. Similarly, from at least the time of Jesus and the Buddha, most people have long said they preferred peace to war, but it appears that only with the rise of liberal democracies that an institution developed that does not war on others of its own kind. There has never been a war between two representative democracies (Rummel 1997). Like contemporary material prosperity, this record of peace is institutionally rooted. People have not so much changed as the institutions within which they act economically and politically have changed.

The same point can prove true for human relations with the natural world. The modern world's dominant institutions were never developed with any intention of preserving sustainable human relationships with nature. They arose for different purposes, and on balance serve them well. If they also contributed to long-term sustainability with nature, that was a side effect not a criteria for success for actions within these systems. The market rewarded successful exchanges of goods and services. Democracies rewarded successful appeals for votes where simplified appeals covered very complex areas of choice and value. We have seen how, in both systems, the natural world and maintaining its well-being almost always takes second place.

Yet we must remember that in their own terms, these institutions were successful. They are well worth preserving for their own sake. If markets are abolished or seriously undermined, poverty will return to many now free of it. If democracies are abolished or seriously undermined, incidents of war will grow.

Certainly many reforms can and need to take place within existing institutions to improve the interface between human societies and nature. Perhaps most important is pushing the industrial economy towards abandoning the concept of waste, internalizing all outputs that do not contribute to natural well-being, ceasing to treat the natural world as a garbage can for dumping what we can no longer handle (Hawken and others 1999; McDonough and Braungart 2002). If approached wisely, this goal is quite feasible. But, however laudable and useful by itself, this goal is insufficient.

However, there is still the lack of fit between social and natural time horizons. Time horizons reflecting individual willingness to put off present benefits for more in the future are necessary to the functioning of social emergent orders, however poorly adapted they are to the natural world. For example, the rate of interest reflects people's willingness to put off present consumption for future benefits, and so performs a central role in the market order. Democracies focus on the electoral cycle, with politicians risking their careers if they take very different time horizons into consideration. The solution cannot be found within the market or democracy, or even science.

There is also little to no room for genuine care to guide either large organizations or the impersonal emergent processes that both sustain and challenge them. Yet it takes institutions of care to make the complex decisions and judgments required to harmonize the powerful forces released by modernity with the slower manifesting but ultimately even more powerful forces of the natural world (Leopold 1966). This point is demonstrated by the Menominee Indian reservation in Wisconsin, where the tribe manages a profitable lumber operation while maintaining its forest in near old

growth condition (Davis 2000). The tribe certainly seeks to make money, but its members' cultural and religious values require them to subordinate it to the long-term well-being of the forest itself. The need for ethics is therefore built into the requirements for ecologically sustainable human societies.

## Institutional Ethics and Restraint

The great challenge lies in developing institutions sensitive to the full depth of human values, rather than the abstracted simplifications of those values as served in politics, the market, and even science. These institutions need to be able to handle far more ambiguous and complex feedback than is coordinated by either market or democratic political systems. In particular, they need to be able to address values abstracted away by systems of political and economic feedback. This requires them to be able to act at a more concrete level of human experience, and therefore on a smaller scale than either impersonal market institutions or large-scale democratic government.

Such institutions need to be ethical in Aldo Leopold's and F. A. Hayek's sense: ethics as a restraint on action (Hayek 1973; Leopold 1966). It is significant that a major theorist of social emergent order and another of ecological order should agree that in the absence of ethical relationships, neither order can survive the temptations of intervention for short-term gains.

In markets the only unavoidable ethic in this regard is free and equal contract. But over the long haul it lacks the requisite sensitivity to address ecological issues in other than market terms. In democratic politics, the only unavoidable ethic is the rule of free and equal voting. It suffers from similar problems. These ethical limitations on actions are genuine, important, but they are also highly circumscribed. Compared to individual action, they are ethically shallow. As a consequence they cannot sustain ethical relations with natural processes.

Large instrumental organizations attuned to these systems are even less restrained. They abide by the rules when the rules are reliably enforced. But they basically weigh actions based on what is good or bad for the organization and its goals. Ethics in this sense is replaced by the requirement to be a good member of the team. Hayek developed this argument in his critique of collectivism, but it is in fact a critique of organizational logic in general (Hayek 1944).

When institutions oriented towards the relatively short run have enormous power to override natural processes that operate on a longer time horizon, but the latter ultimately support the social institutions, the ethic we need is one of restraint not just within the systems of rules generating the social orders, we need restraint in their impact upon the natural orders. Neither democracy nor markets have proven very adept at this task.

The location for institutions of care must be elsewhere. That "elsewhere" is what political and other social scientists call civil society, that realm of voluntary cooperation that gets so much of the work done in daily life, and offers a framework for productive and meaningful freedom for all individuals (Cornuelle 1993; Putnam 2000; Tocqueville 1961).

Such institutions must be responsive to both the market and representative democracy, but must not be dominated by the systemic biases of either. Their task is to harmonize the boundaries between the human and natural orders, rather than attending simply to the human order.

Studies of watershed restoration groups, such as those recounted in work by House and Zuckerman help demonstrate that the intricate networks of cooperation we find in civil society are better able to address the complex interweaving of ecological and social knowledge, especially local knowledge, than can the one-sided traditional political and market institutions (House 1999; Zuckerman 2001). They may in fact prove essential to maintaining the ecological health necessary for the maintenance of the modern world.

The ethical depth that makes civil society so difficult to study compared to markets and politics is crucial in integrating these powerful but ethically simpler institutions with the natural world. We have described ecosystems, markets, science, and representative democracy as all emergent orders. So also is civil society considered as a network of relationships separate from the market order and democracy. In fact, civil society is the most central emergent order arising from the institutions of liberal modernity. It is the order that integrates the impersonal and abstract emergent institutions of the market and democracy with the more concrete relationships that constitute the full richness of human life. But because it is comparatively invisible due to the lesser clarity of its feedback, it has also been the least appreciated.

## Integrating Community and Ecological Care

Compared to the market and prices or democracy and votes or even science and agreement about the status of theories, feedback in civil society is ambiguous, its patterns harder to depict, the values it serves more complex. Yet this is also its strength. For civil society is the sole encompassing order able truly to defend individuals from the impersonal commands of the market order, the corruption of power and interest that characterizes so much in government, and the flattening of values associated with fixation on only the scientific image of truth. Civil society is deeply human.

These institutions of community and ecological care empower people at two levels. First, they enable people effectively to care about their home places, as well as other natural values of importance to them, hopefully from national forests to small urban streams. But these institutions also empower people politically, for to be effective they need to influence, even if only defensively, the market and traditional liberal democratic institutions. The market order and democratic government march to different beats, beats often inimical to the values institutions of care and the people who comprise them support. In the absence of real power these values will be swept aside, as was done by salmon farms and their political allies to the inhabitants of Echo Bay in British Columbia (Hume and others 2004), and to efforts to restore salmon on a stream draining valleys running through Maxxam's woods (Zuckerman 2001).

Institutions of care, therefore, need to be integrated into both their local and their national communities. But they can only accomplish this reliably when they do it themselves.

Perhaps this is why the politicians and corporations have done so much to extirpate salmon and the rest of wild nature. For many of us, the natural world challenges their claims to define the character of reality. It offers an alternative, one not able to be reduced to relations of power and money. But politicians and corporations can only claim our loyalty on the basis of their power and wealth. This is a loyalty of the pocketbook and perhaps the ego, but not often of the heart. Nature speaks to our hearts. For many of us she speaks very loudly.

Exploring institutional forms rooted in civil society offers perhaps the best means for bridging individual sensitivity to nature with the impersonal processes of the modern world. There are many promising possibilities. Land trusts have proven effective, and suggest an approach that could be applied to national forest reform. Democratic trusts have been tried successfully in England, and suggest a far more responsive institutional context for overseeing complex ecosystems of substantial size, such as our national forests. It is difficult to imagine them doing worse than current practices by government and corporation alike.

Community based watershed groups that focus on anything from restoring small urban streams in Tacoma, Washington, to entire western rivers such as the Mattole and Carmel Rivers in California, and the Walla Walla in Washington, offer another model. These groups are as varied in their character as any natural system, bringing together local knowledge about a particular beloved place with local personalities and talents available in an area, to serve the needs of the place. They are maintained by people not as a career but in many cases at least, as a calling. As such, these are inevitably ethically deeper institutions than traditional economic or political bodies.

Not only are these groups often able to successfully restore the conditions for viable salmon populations in their respective watersheds, they mutually encourage one another. There is every reason to believe that as these groups grow and prosper they will reach out to one another for mutual support and inspiration, and in so doing begin to provide a countervailing force to the lobbyists and bribes of industry, the venality of politicians, and the arrogance of bureaucracies, to ensure that good laws on the books are enforced, and flawed laws replaced by better ones. For the failure of harmonizing the human with the salmon world has not been for lack of laws, it has been for lack of political will and integrity to see they are enforced.

In short, local watershed groups, democratic forest trusts, and similar organizations can serve as crucial linkages binding the human world to greater attentiveness to the needs of the natural world, and also binding the systemically independent worlds of markets and democratic politics to the ecological values most of us share as residents of this beautiful land.

## Of Science and Values

These considerations bring us to a deeper level of analysis, one I hope strengthens a venerable criticism of industrial modernity, while simultaneously acknowledging and praising modernity's considerable strengths. Modernity's conception of what constitutes a decent human life is incomplete, its

conception of the possibilities of human power, inflated. No one will feel satisfied as a parent if their child grows up to be only a satisfied consumer — the main common role available for modern people. What is left out of the modern mindset is important, probably crucial, for our own long-term survival and flourishing. This criticism is an old one, made by genuine conservatives and the Romantics alike. But its salience has been weakened by the failure of both to really embrace the strengths of modernity. The critics' view has often been as selective as those they criticize.

If the above argument is valid, modernity as either the domination of decisions by the ideal of technical expertise, or subordinating natural emergent processes to the impersonal power of social emergent processes, is not sustainable. But it also carries within itself the promise of its own salvation. Modernity must be leavened by the human heart because limited only to itself, it is heartless. Confronted with the hideous breakdown of politicized Christianity into religious war, Enlightenment thinkers sought to find impersonal standards and laws to enable us to live peaceably with one another. In seeking to find reliable knowledge for all places and times, the Enlightenment necessarily abstracted away from the concrete and particular. The fruits of this project have been the great achievements of modern science, human rights, and unequalled economic prosperity, embedded within its most unique signature institutions: science, democracy, and the market. But a price was paid for forgetting what has been lost in focusing only on the abstractions making these achievements possible.

Abstracted away from the concrete and local, modernity is collectivist in its core because only power and process count, with individuals valued only to the degree they serve either or both. Awhile back, a person told me that well, it just might be that salmon have to go extinct in the name of progress. They are incompatible with the modern world. But we have seen that they are compatible with the wishes of modern people, and that appropriate institutions can preserve them, at the cost of limiting the scope of the modern idols of Power and Profit.

Like the Communists, single-minded modernizers value the present only as a means to reaching the future. They have little difficulty sacrificing it on the altar of their fantasies. Ironically, this point holds as much for economic "individualism" as for ideals of organizational control of society. In both cases, concrete individuals derive their value solely from their capacity to serve what is beyond them: the organization or the market order; in either case, "the future." Because the valued individual is only the abstract individual, this pseudo individualism has little regard for real individuals. Both modernity's libertarian as well as progressive guises deny the value of the concrete, unless it is in harmony with their vision of the future.

The abstract principles empowering modern institutions do not negate the importance of the concrete and the local. In any given instance these abstractions manifest within a particular time and place and through particular people. It is in the balancing and harmonizing of the abstract principles underlying modernity's achievements with the concrete experiences of living upon this Earth that modernity's accomplishments will be preserved, enabling our civilization to endure, rather than flaring brightly, only to die away like an ember that has consumed all its fuel.

The framework developed here integrates our understanding of modern emergent institutions with their interaction with the world of nature. I believe this argument is an important correction of the current vogue for reducing all complex social relations to economic categories, as well as critiquing the previous vogue for technocratic planning by government agencies guided by experts. For even now, this alternative technocratic Enlightenment dream is far from dead.

## Toward an Ethical Relationship With Nature

If these considerations are well grounded, a powerful argument follows that the long-term well-being of human life requires us to respect the long-term well-being of non-human life, and that we can only reliably accomplish this when we genuinely care for and value that life. Nothing less can stay the hand of our power and ability to rationalize away the future to serve the desires of today.

Perhaps we verbalize this care through the insights of "deep ecology" or see the material world as reflecting God's creation, of which we are the "keepers." Perhaps we do so through the feelings of peace and well-being we find when we immerse ourselves in nature, or are enraptured by a sunset or the sight of intrepid fish braving the risks of thousand mile migrations to reproduce and die. How each of us gets to this place of insight is deeply personal. But in the absence of such insights we will inevitably undermine the conditions for our long-term well-being.

As Leopold (1966) observed in *A Sand County Almanac*, what most fundamentally distinguishes us from the natural world is our capacity to care for forms of life of no utility to ourselves. Ironically perhaps, it is this capacity that may be crucial to the future flourishing of human beings on this beautiful planet. For without this fundamental difference, we are extraordinarily ill equipped to survive at the level of technical impact we currently wield. We are too powerful given the short range of our narrowly self-interested vision. We need a check, and the check must be to some extent internal.

Only human care can provide such a check, and the dominant institutions of modernity, despite their many strengths, all work to render individual care a minor factor in the world. Yet for us to do well over the long run, it must become a major factor. And to do that, we need to develop institutions linked to the human heart, not the market, not politics, not even to science, although to work well they must be in harmony with all these.

It is perhaps an irony, or a paradox, that what most appears to separate us from the rest of nature, is also what can most connect us. For we are paradoxical beings. We are individuals and we are parts of wholes larger than ourselves. We would not be who we are, were we only one or the other. Rather like photons of light in physics, we exhibit either quality, depending on the questions we ask. Given that we are both, we are more than either or the two together, for we are also a kind of unity that brings effortlessly together what logic and reason cannot bridge. And what makes that unity possible is the capacity of the human heart to attend to the needs and demands and excesses of both.

That is why we need, desperately need, institutions of care to offset the institutions of wealth and power. For only such institutions can turn our recognition of these truths into the power to defend what we value against forces that are not so much malevolent as they are blind. They give us the power to defend, the power to preserve, and the power to rehabilitate and restore.

Thus, the environmental movement, people motivated by the insight that we need to share this planet with the other beings that also find it home, far from being anti-human, is vital to humanity's future. Even with its errors, exaggerations, and failings, it is an example of humanity at its best: demonstrating our capacity to care for and value beings for what they are, not just their ability to serve us.

To take watershed groups as an example, if salmon are to be preserved all the region needs defending. And it is only logical that the local networks arising in towns and neighborhoods and rural areas will come to see that they share certain things in common that are at risk from those motivated primarily by power and money. They will see that uniting together is the only way to stop those who would sacrifice their lives on the altars of Mammon and Power, even if working independently, each focused on a particular place, is the best way to preserve their loves.

In this Internet age, there is little reason for networking to stop within the confines of a city. Should these efforts succeed, civil society will prove as vigorous, creative, and powerful as a check to men of money and power as it ever was. And what it can do for the totem fish of the North Pacific it can potentially do everywhere. Because the motivation to care, and to care effectively, is deeply human, it is also able potentially to finally make the modern world at home on this Earth, that we may share this awesome place with the magnificent, fascinating, and beautiful life forms that, like us, make it home.

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# Wild Cemeteries?

Les Wadzinski

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**Abstract**—One aspect of wilderness often not considered by managers is that of how to manage cemeteries within wilderness boundaries. In wildernesses where humans have left their mark, particularly such as those found in the eastern United States, wilderness staff may find themselves in the role of cemetery manager as well as wilderness manager. The challenges are many. A manager must balance wilderness values with the deep emotional need of people to bury and honor their dead. This may require making decisions regarding requests for motorized access, burial, maintenance, and reconciling national wilderness laws with local laws. In this case study, wilderness managers developed a policy for motorized access to cemeteries that preserved wilderness character but still met the intent of the legislation that created this wilderness. Wilderness staff, upon request, will provide motorized transportation for cemetery visitors. Visitation criteria are in place, and routes to the cemeteries are maintained to a minimal level for motorized use. Regular wilderness users are educated as to the rationale behind this apparent conflict with wilderness character. The results have been positive due to a sense of understanding by cemetery visitors and wilderness visitors, and by the diligence of wilderness managers to be responsive to all concerned parties.

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## Introduction

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In the United States, the concept of wilderness is encased in the Wilderness Act of 1964. Among other things, it prohibits roads, motorized vehicles, mechanical transport, and motorized equipment. This even applies to the managing agency, which must use primitive tools and techniques when accomplishing management functions. These restrictions can be problematic for some special situations regarding wilderness management, particularly in the eastern portion of the United States.

Designated wilderness areas in the eastern United States offer a markedly different setting than what one might find in the West. Typical wildernesses in the East have no towering mountain ranges, no vast acreages of land, and no pristine areas that were untouched by humans. They do, however, provide visitors with at least some level of a wilderness experience in a landscape often characterized by urbanization, crowding, and many remnants of previous human occupation.

One specific issue unique to eastern wilderness is that of what to do with cemeteries. If the law were taken to the extreme, a wilderness would not have any permanent evidence

of human presence. Indeed, the Wilderness Act contains text such as “....without permanent improvements....” and “.... with the imprint of man’s work substantially unnoticeable....” (Wilderness Act 1964). Fortunately the law is not applied to that extreme, but one would have to admit that a cemetery is a relatively permanent establishment and it is certainly a noticeable imprint of man’s work.

When eastern wildernesses were designated, most came with many noticeable imprints of man’s work since most were previously occupied in one form or another. The laws creating eastern wildernesses generally recognize and accept that, and rightfully so, since to do otherwise would essentially eliminate the concept of wilderness in previously inhabited areas. Fortunately, many of these remnants of civilization can be dealt with. Old roads and pastures will eventually be reclaimed by the forest. Old buildings, car bodies, fences, and the like can be left to deteriorate or can be removed (using primitive means of course). In some cases, non-native species such as fruit orchards can be allowed to reach the end of their lifespan to be replaced by naturally occurring vegetation. But cemeteries have another dimension in addition to the mere physical presence of grave markers. That dimension is the human dimension; the still living souls who wish to visit and honor their deceased ancestors on a regular basis.

## Case Study

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The Charles C. Deam Wilderness is a relatively small wilderness of 13,000 acres (5,260 ha) located on the Hoosier National Forest in south central Indiana in the Midwestern United States. Managed by the U.S. Department of Agriculture (USDA) Forest Service and designated by Congress in 1982 with the passage of the Indiana Wilderness Act, it is Indiana’s only wilderness. That designation included approximately five cemeteries (the exact number is still in question), and old roads that at one time provided access to these cemeteries.

The cemetery issue is just one of numerous challenges facing this small but heavily used wilderness, which only raises the importance of trying to make the right choices in the context of the other issues. The reader is referred to Management Actions to Protect Wilderness Experiences and the Resource (Wadzinski 2003) for more details regarding specific management issues in this wilderness.

## Problems and Difficult Questions

**Need for Access.** In the 1930s the area was populated with 78 homes and farms, and many of those former residents are buried in the cemeteries. These properties (including cemeteries) were purchased by the USDA Forest Service in the late 1930s. Although these home sites have long been vacated, many of the descendants of these residents still live

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in the area and still wish to visit these cemeteries. Many of those desiring visitation are elderly, and are not physically able to walk the distance needed to get to the cemeteries. Some of these people have requested motorized access and at least one person has demanded that the routes be upgraded to a standard to accommodate passenger vehicles. Oftentimes an extended family of 10 to 12 people will request motorized access.

How does a manager balance wilderness values with the deep emotional need of people to visit and honor their dead? Wilderness values and law dictate that transportation should not involve motorized vehicles. Yet no one wants to keep an elderly person from visiting the gravesite of a loved one because they can no longer walk long distances. In this case, the cemetery visitor is not coming for a wilderness experience; they simply want to visit a gravesite with minimum inconvenience. It is just a matter of happenstance that the gravesite is now in a designated wilderness, but that happenstance does complicate the situation. Managers needed guidance in resolving this conflict.

There was also the question of upgrading the old roads to passenger vehicle standards. Since wilderness designation, some of the old roads have been converted to trails while others became overgrown with vegetation. To meet this request, approximately 5 miles (8 km) of road would need to

be reestablished within the wilderness. The cost would be astronomical, not to mention the impacts on the wilderness setting in this small wilderness. A feasible solution was not apparent.

**Private Inholding.** One of the cemeteries, the Terril Cemetery (fig. 1), is privately owned and excluded from the wilderness designation. It still accepts burials and is located on a gated road that is maintained as an all weather road so the cemetery owners may drive on it. The owners have a key to the gate and regularly drive back to it and mow it with power equipment. The road doubles as a trail used by wilderness hikers and horseback riders. These arrangements were made immediately upon designation of the wilderness.

The cemetery owners have a legal right to access and maintain their land. In conflict with this, visitors trying to have a wilderness experience may have to deal with the sound of lawn mowing equipment, or share the access road (also a trail) with a vehicle if they happen to be on it when the cemetery owners are accessing their property. In addition, the road is maintained on a regular basis by the USDA Forest Service. Because it is used by vehicles, it is necessary to use motorized equipment for this maintenance. Managers wanted to promote the concept of wilderness to users, but found it hard to explain when motorized use occurs on a regular basis.



**Figure 1**—The Terril Cemetery was excluded from wilderness designation in 1982 (photo courtesy of the Hoosier National Forest).



Forest Service staff were sometimes tempted to use the road when needing to get into the interior. Local law enforcement also requested use of the road for search and rescue and other purposes. It had been suggested by some that these other uses should be liberally granted because, it was noted, the cemetery owners are allowed to drive on it on a regular basis just to cut the grass. Again, a clear policy was needed.

**Vague Legislation.** The legislation that created the Charles C. Deam Wilderness in 1982 contains vague and very brief text thus offering little guidance in regard to cemetery access. The Act states: “.....Nothing in this Act shall affect the right of public access to cemeteries located within the Charles C. Deam wilderness, including the Terril Cemetery” (Indiana Wilderness Act 1982) (fig. 2).

Taking the text at face value, it does not specify if that means motorized or foot access. The Forest allows any member of the public to visit any cemetery at any time without the need to obtain permission. You can’t drive a car to it, but yes, the right of access is present. Managers needed clarification on this issue.

**Legal Entanglements.** Several years prior to wilderness designation, agreements with the local county government further complicated things. These agreements stated that the routes to the cemeteries would be transferred from the

county to Forest Service jurisdiction, and that the Forest Service would keep those routes open and maintained. At the time of transfer the roads were in bad shape and the Forest Service lacked the resources to bring them back to serviceable condition. In the meantime, along came the wilderness designation, which to some Forest Service officials meant there was no longer a need to worry about roads. The upshot was that the Forest Service acquired several miles of roads that hadn’t been maintained in years, and managers were unclear as to their current responsibility after wilderness designation.

Another legal unknown was that of whether or not someone had the right to be buried in the cemeteries that were on National Forest System (NFS) lands. Again, there were no textbook answers.

**Who Gets Access?** Members of the public and even elected officials sometimes asked for special consideration for cemetery access. Youth groups, university classes, and others had all asked for motorized access. Forest Service managers needed to decide if the request was legitimate or simply someone looking for an excuse for easier access. A clear policy did not exist and managers needed a good basis from which to say yes or no.

**Wilderness Versus Cemeteries.** Some wilderness advocates had suggested letting the cemeteries become overgrown



**Figure 2**—The Indiana Wilderness Act of 1982 promised that the Act would not affect the right of public access to cemeteries (photo by Les Wadzinski).

and return to nature while cemetery advocates argued for regular maintenance and restoration work. Taken to the extreme, one would actually remove the gravestones to erase all evidence of human presence. On the other extreme wilderness managers would spend vast resources manicuring cemeteries that were miles from nowhere. A sensible middle ground was needed.

## Analyzing the Situation

As often is the case, these wilderness managers found themselves in the throes of conflicting laws and values, and with plenty of advice and strong feelings from their constituents. It was recognized that some aspects of the Indiana Wilderness Act that established the Deam Wilderness were inconsistent with the Wilderness Act of 1964. Such inconsistencies are common in the process of many wilderness designations, where certain variances were written into the legislation for the sake of local compromise.

Fortunately, at least one of the issues was relatively easy to reconcile. Because the Terril Cemetery was privately owned, clear legal guidance existed. Access to the private property is guaranteed under Section 5 of the Wilderness Act of 1964, and the Terril Cemetery is specifically mentioned in the Indiana Wilderness Act. The all weather road that was in place at the time of wilderness designation simply remained in use and no further action was necessary.

The most difficult issue was that of access and management of the other cemeteries. Managers set out to develop a cemetery policy that preserved wilderness character as much as possible and provided for the human needs of cemetery descendents. The managers' goal was to meet the intent of the Indiana Wilderness Act, but not end up with an extensive (and expensive) road system in a designated wilderness.

The first step in the process was to investigate the legal background of the Indiana Wilderness Act. Even though laws are often vague, a legislative history usually exists for laws and one can review the hearings, reports, and testimony leading up to the final text. It is here where many issues are discussed in greater detail, and the intent of the lawmakers made known. Here is what the lawmakers said in one of the reports to Congress a few weeks prior to passage of the law: "The bill would provide for the right of public access to the Terril Cemetery. We recommend continued visitation be allowed to all the cemeteries. However, motorized access should be limited to relatives of the deceased. Uncontrolled public motorized use of the roads would degrade wilderness value. We would gate the roads and allow family access on a request basis" (United States Senate 1982).

After reviewing the legislative history, it became clear that the intent was for relatives of the deceased to be allowed motorized access. To their credit, the lawmakers also recognized that wilderness values could be compromised by keeping roads open in a wilderness, and suggested gating these roads and managing access.

Another step involved asking for legal advice. The USDA Office of General Counsel offered legal opinions and suggestions regarding burial, maintenance, and road access. Based on a review of state law, they offered an opinion that no one had a right to be buried in the cemeteries currently owned by the United States. They also stated that they believed the cemeteries may be maintained with hand tools. They further

suggested that access be granted to the same degree as was present when the wilderness was designated in 1982. (USDA Office of General Counsel 1985a,b). With the exception of the Terril Road, the routes were reportedly drivable only in dry weather conditions, and usually required a 4-wheel-drive vehicle (4WD). Overall, the roads were in poor condition at the time of designation and access was sporadic.

Staff also reviewed the USDA Forest Service Wilderness Access Decision Tool, which addresses decision-making regarding use of wilderness by persons with disabilities (USDA Forest Service undated). In this case, the issue was only partially related to disability (one could say getting old comes with disabilities). The issue was more related to the legal question of the right of access, because the Indiana Wilderness Act did not state that one had to be disabled in order to be entitled to cemetery access.

For the reader's edification, it is noted that another tool has become available since this analysis was conducted. That tool is the Minimum Requirements Decision Guide and is designed to help managers select the minimum action necessary (Carhart Training Center 2004).

Another critical part of the analysis was to connect with potential cemetery visitors. A working relationship already existed with the Terril Cemetery owners, and managers had already been talking to other people who had requested access to the other cemeteries. These people were asked what they would like in terms of an access policy and a sign was placed at the gate to the Terril Cemetery road inviting potential visitors to call the Forest Service.

Managers evaluated the routes to the cemeteries to document their condition and location. A range of conditions were found, from totally impassable to the already serviceable road to Terril Cemetery. In two cases, the route was also a designated trail.

Forest staff also analyzed potential means of transportation for cemetery visitors, and considered horse travel, a custom made ATV with multiple seats, wheelchairs, and a 4WD vehicle. They looked at safety, cost, impacts to the resource, seating capacity, travel time, and the reasonableness of being able to transport elderly people or people with disabilities over several miles of rough terrain. It was determined that a street legal 4WD vehicle was the best conveyance to meet these needs.

## Working Toward Solutions

Wilderness managers developed a cemetery policy based on this analysis. The Forest Supervisor required approval because the policy included a need for authorization of limited motorized use. This authorization was granted after a review of the analysis, legal opinion, and legislative history. The policy is summarized below.

**Terril Cemetery.** The policy for the privately owned Terril Cemetery remained the same as it was when the wilderness was designated. The Forest Service maintains the road to the minimum level necessary to provide for all weather use by a passenger vehicle or hearse. Mechanized equipment such as a gravel truck, backhoe, and bushhog are used for road maintenance. The road is gated and the owners have been issued a key and may access the cemetery by vehicle at any time. Requests for motorized visitation by individuals

other than the cemetery owners are coordinated with those owners. Such visitors are generally granted a key on a short-term basis.

**Other Wilderness Cemeteries.** The policy for the other wilderness cemeteries contains the following guidance:

- Routes to the other cemeteries will remain gated and the routes not upgraded to passenger vehicle status.
- Persons requesting motorized cemetery visitation may be asked to provide proof of being related to the deceased. Forest Service staff will explain wilderness concerns and see if they are willing or able to walk to the site. If not, the Forest Service will provide motorized access in a government vehicle or rent a 4WD vehicle. A Forest Service employee will drive the cemetery visitors to the site. If other wilderness visitors are encountered during the trip, the Forest Service employee will stop and explain the situation. Cemetery visitors will be encouraged to plan their trips during the dry seasons, and will be cautioned that wet conditions may require rescheduling.
- Routes to the cemeteries will be cleared of fallen trees periodically or as needed in response to an access request. This work will be accomplished using primitive methods and tools.
- Routes will be mowed once a year with a motorized tractor to maintain a minimum width for passage by the 4WD vehicle.
- A chainsaw is authorized if during the trip to the cemetery the group encounters a log across the trail. At all other times only primitive methods and tools may be used.
- Cemeteries will have woody vegetation removed as needed and at least every other year using primitive methods and tools. In addition to benefiting cemetery visitors, such maintenance would also help preserve a historical value of the wilderness. This is consistent with the Wilderness Act of 1964 where it states that wilderness may contain features of historic value.
- Other than the conditions specified above, Forest Service staff will not be allowed to use motorized transport on any of the routes for the purpose of more convenient access. This includes the road to the Terril Cemetery. Motorized transport on the routes may be used for search and rescue operations per the guidelines established for such situations (generally a life threatening incident).

## Is It Working?

The policy seems to be working fairly well. One key is that Forest Service staff make every effort to provide the trip at the convenience of the requester. The goal is to avoid situations where cemetery visitors are dissatisfied and therefore motivated to request an upgrade of the road system. To keep cemetery visitors satisfied, the Forest will rent whatever type of vehicle is needed to accommodate the group, schedule extra employees, and provide access any time as long as the weather is dry. Fortunately, only a few requests are received annually and the volume is manageable. Other wilderness visitors have occasionally questioned the practice, but seem satisfied when the background information is explained.

Ideally, managers would prefer to let nature be the dominant force as stated in the Wilderness Act. The need to accommodate motorized access results in some “non-wilderness” situations: a wide trail in one area, clearing of routes that would otherwise be allowed to return to nature, and the need to occasionally use motorized equipment for route maintenance. But managers also recognize the needs of the cemetery descendants and the intent of Congress to meet those needs. While not perfect, managers feel they have a workable plan in hand.

Not all cemetery visitors are happy. One cemetery advocate still wishes to have the roads upgraded to all weather passenger vehicle status. Managers have attempted to provide rationale as to why that is not feasible and remind the visitor that the Forest Service does offer a reasonable alternative by providing motorized transportation upon request. Perhaps this is a situation where both parties can only agree to disagree. In the meantime, this individual has taken advantage of the Forest Service’s offer to provide transportation and has been able to visit the cemetery of his choice on numerous occasions.

## Looking Forward

For the near term the Forest Service has no plans to change the policy unless new information or changed conditions warrant. But looking into the future, the situation may change and managers need to be prepared. For example, as descendants die out or move away, it is possible that there will eventually be no more requests for cemetery visitation. At that point managers may wish to consider abandoning the policy, and let nature reclaim the cemeteries and the routes.

Another scenario could be increased interest. One example is the recent popularity of genealogy, which has resulted in interest in cemeteries in other parts of the Hoosier National Forest. Other unknown societal changes may also trigger new interest in these cemeteries. Managers may also want to conduct further analysis to determine if the cemeteries should be maintained for their historical value.

In summary, managers of the Deam Wilderness, most cemetery visitors, and most wilderness users are satisfied with the arrangement. An extensive road system has been avoided but the intent of Congress is still being met. Managers feel they have minimized the impact on wilderness values, and have provided reasonable access for cemetery visitors. Things appear to be in balance and wilderness managers plan to adhere to the cemetery policy and do their best to maintain that balance.

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# Community Involvement in Planning and Management for Outdoor Recreation in New Zealand Protected Areas

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**Abstract**—Managing New Zealand's protected natural and historic heritage falls largely on the Department of Conservation (DOC), which manages close to a third of the country's land area and increasing proportions of the coastal/marine setting. Providing public access to this shared heritage through a range of recreation opportunities is a key management outcome for DOC. This allows New Zealanders to derive beneficial outcomes from the protected lands and places, and become more connected to their conservation. Management of outdoor recreation includes significant roles for the public, based on a long tradition of community involvement and interest in providing outdoor recreation opportunities. This involvement includes participation in planning the recreation opportunities to be provided, and in maintaining the facilities that support those opportunities. This paper explores two recent examples of community consultation in park and protected-area management. First, the community role in a major national conservation policy review is explored, with particular reference to directions for outdoor recreation provision. Then a recent national process of public consultation on determining the balance of recreation opportunities across the country is explored.

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## Introduction

Parks are a social construct and their management is fundamentally a social process. "Parks are political manifestations of a society's interest in protecting its natural and cultural heritage. To a great extent then, planning for the future of these parks, and solving the challenges confronting them is a political process as well" (Eagles and McCool 2002: 148). This requires engagement with the public and the various "communities"<sup>1</sup> therein to ensure that the values being managed on their behalf by park management agencies truly reflect their wants and needs. The ongoing management of wildlife, weeds and pests, poaching, extractive uses, habitat loss, minimizing tourism and recreational impacts (as well as researching and monitoring in relation to these issues), are all financially demanding and often politically contentious. Resources committed to protected

area management are seldom enough, and conservation is typically not a high priority for most government's funding of "public good" services. This is especially so in those places where provision of basic public services is a greater challenge, or demands for other resource uses are high. Enhancing the relationship between the public and their parks is one major step towards guaranteeing the continuance of protected areas (Booth 1986). Or as put in the well known saying . . . *"Tell me and I forget. Show me and I remember. Involve me and I understand."* The working assumption for park managers here is that community involvement is good—that where it demonstrably influences a change in management, public consultation can enhance wider understanding of conservation goals, and that this may ultimately contribute to greater public support and resource allocation for management in these protected areas. This paper explores active community involvement in park and protected area management by the Department of Conservation (DOC) by summarizing some historical developments, describing the scope of community involvement in DOC's management role, and then summarizing two recent examples of community involvement in key national management and policy processes for providing outdoor recreation opportunities.

## Some History of Community Involvement in Outdoor Recreation Facilities

To set the scene for understanding current community involvement in New Zealand park recreation management, it is useful to have a brief historical perspective. New Zealand outdoor recreationists have a long history of active involvement in the visitor facilities network (Young 2004). Clubs with an outdoor recreation focus formed early in New Zealand's contemporary history, with common titles such as tramping clubs (for example, hikers, overnight walkers), alpine clubs (climbers) and deerstalkers (deer hunters). An early example was the New Zealand Alpine Club, which was established in 1891 based on the British Alpine Club model (Burrell 1981). The first 'tramping club' in New Zealand, the Tararua Tramping Club, was established in 1919, and, with 650 members, is currently the largest of all the tramping

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<sup>1</sup> "Communities" in this paper refers to communities of interest, which are highly variable in definition according to the situation or topic at issue. In this case, the interest area is management of conservation areas and visitor use of those areas.

clubs (FMC 2005). These interest groups became much more common in the post-World War II economic and social boom (Devlin 1995). Ninety tramping and alpine clubs now exist across the country, affiliated together within the Federated Mountains Clubs (FMC). This national group was established in 1931 because, at that time, the Government establishment of parks and promoting access was seen to be unplanned and unregulated, and a united public lobby group was considered necessary (Burrell 1981). True to its origins, the FMC has been providing vigorous public advocacy on protected area management until the present day. In addition, there are currently 50 branches of the NZ Deerstalkers Association (established 1937) with its overarching national executive also active in advocating its members' interests.

Many of the individual clubs have developed tracks and built huts as part of their club activities over the years. Indeed, for many members it is still a matter of some significance and pride that their club was responsible for the construction of particular huts and tracks. Quigg (1993) describes several ways by which people relate to backcountry huts: as a practical shelter, as an incentive to visit a location, as a style of habitation that is enjoyed in the backcountry setting but which would not be tolerated in a modern urban setting, and as a valued relic of past generations and culture. Huts could be considered a central part of how the NZ outdoor recreation community identifies itself, and to this day are often the focus of debate over facility decision-making. At the time the first tramping clubs were exploring New Zealand's mountain ranges, the need for huts and marked tracks was made clear by the not uncommon loss of life in exposed locations due to sudden changes in weather conditions (McLean 1994). It would not be out of place to state that the hut and track network represents the backbone of New Zealand's outdoor recreation opportunity in protected areas.

There has been a dynamic nature to both the private and public commitment to the provision and use of this network over time. Some facilities established by community groups were absorbed into the overall facility network managed by government departments, notably as the need increased to employ hunters to control introduced deer in forests. In the same period, some government huts and tracks no longer being used by these government hunters were sometimes adopted by clubs, as a useful compromise to building their own. In some cases the community group support withered and as a result, many early huts were neglected and eventually destroyed by nature (McLean 1994; Wright 1986). However, in other cases many groups retained strong membership, which has enabled them to remain largely responsible for managing their own huts or those hut and tracks adopted into recreation from other management purposes. Notable in this respect are a number of alpine huts built by alpine clubs to support climbing at premier peaks. When such huts required replacing, the club tended to become involved in planning a new building. This still applies today and, as an example, the Tararua Aorangi Huts Committee, a coalition of 16 tramping clubs and deerstalker branches, is active in working with DOC to coordinate the ongoing management and replacement of the local huts network in its region.

In more recent years, the management of these hut and track networks has become more stable and consistent. For much of the 20th century, two government agencies were predominantly responsible for managing much of the

undeveloped lands where facilities such as huts and tracks were being built. The Department of Lands and Survey Department was responsible for national parks, and the NZ Forest Service was charged with other lands held for forestry, water catchment protection or other uses yet to be determined. In these lands, they had inherited the uncoordinated variety of huts, tracks and other facilities created by diverse groups for different reasons described above. Based on these inherited facilities, and in response to their own needs and objectives, both agencies developed and managed wider infrastructure networks for visitors, including road-end picnic areas with campgrounds, as well as tracks and huts of varying standards. Many of the inherited huts and tracks were created for highly localized and specific recreation needs by communities, clubs, and individuals. When these government agencies were themselves combined into the new Department of Conservation (DOC) in 1987, the new agency took on the obligations resulting from all this relatively ad-hoc facility development, including the need to ensure a network of safe and sustainable facilities. With huts continuing to fulfill all of the practical, recreational and identity purposes described, there remains strong public interest in the hut and track network. The policy and management consultation processes reported in this paper comprise an important part of the DOC's initiatives to meet these obligations more sustainably into the future.

## Community Involvement and the Department of Conservation

To understand the importance the Department of Conservation accords to the community involvement and consultation component of its work, it is important to know that the DOC has a strong mandate for advocating conservation through encouraging community involvement in conservation and recreation. Key legislation requires the DOC to "... advocate the conservation of natural and historic resources" and "... promote the benefits to present and future generations of the conservation of natural and historic resources."<sup>2</sup> Based on this mandate, encouraging community involvement in protected area management to enhance cumulative benefits to conservation has been reflected in the DOC's strategic planning documents. The strategic conservation outcomes underpinning its Statement of Intent (DOC 2005a)<sup>3</sup> are simply:

- **Protection**—New Zealand's natural and historic heritage is protected and restored.
- **Appreciation**—People enjoy and benefit from New Zealand's natural and historic heritage and are connected with conservation (emphasis added).

A key component of the Appreciation Outcome is that people are to be increasingly connected with conservation. The DOC has drawn on reviews of community involvement in its management (CRESA 1998; DOC 1998; Fitzgerald

<sup>2</sup> Sections 6(b) and 6(c) of the Conservation Act (1987).

<sup>3</sup> The Statement of Intent, Conservation with Communities Strategy, and other strategic information can be viewed on the DOC webpage [www.doc.govt.nz](http://www.doc.govt.nz).



1999; Forgie and others 2001; Ringer and O'Brien 1997) to consolidate best practice knowledge into a specific "Conservation with Communities Strategy" (DOC 2003a). This provides a comprehensive guide for determining the direction of future initiatives towards achieving the appreciation outcome (fig. 1), and has been subsequently supported by specific publications on various component processes, tools and methods (for example, DOC 2003b; Wilson 2005).

The strategy is based on two parts: the first focuses on How We Work, emphasizing the underlying organizational culture, skills and capability to engage with communities; the second explores What We do, outlining the range of ways through which the department actually engages with

communities, and how the effectiveness of this engagement can be improved. A commitment to actively involve communities and to facilitate ways to share conservation work with them through a range of opportunities is clear from figure 1. More specifically under theme 2.1, Sharing Conservation Work, the Subtheme 2.1.1 Opportunities for Participation, states that the DOC will "Provide, and help others provide, a range of opportunities to be involved in conservation work and to contribute to decision-making." There is a range of participation types that will be appropriate for different situations, and this spectrum is illustrated in figure 2. The range of the DOC management contexts in which such community involvement can occur are summarized in figure 3.

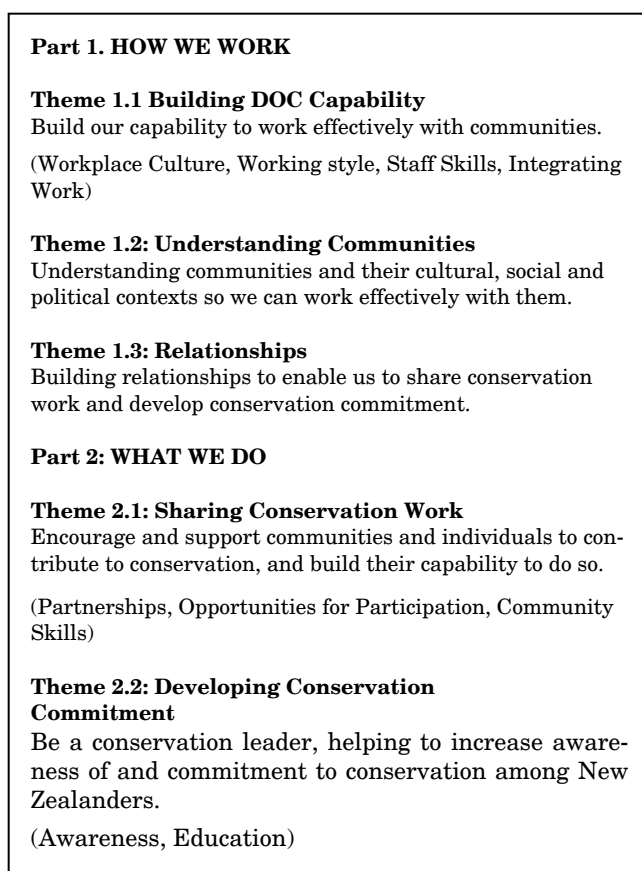


Figure 1—Conservation with Communities Strategy.

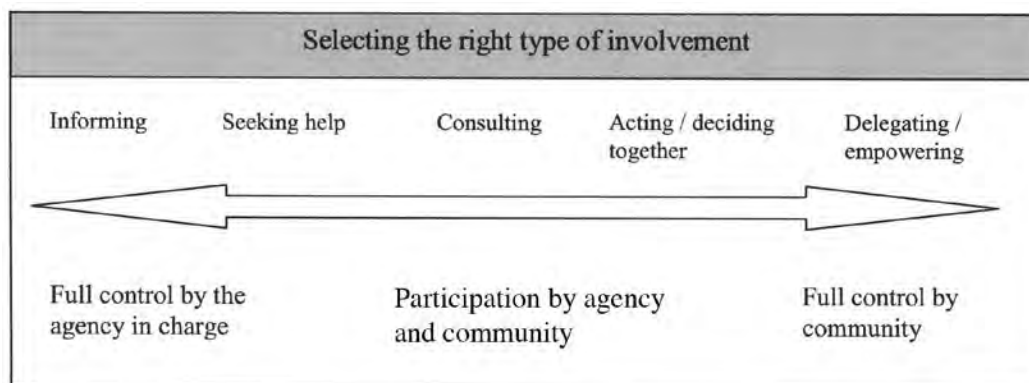
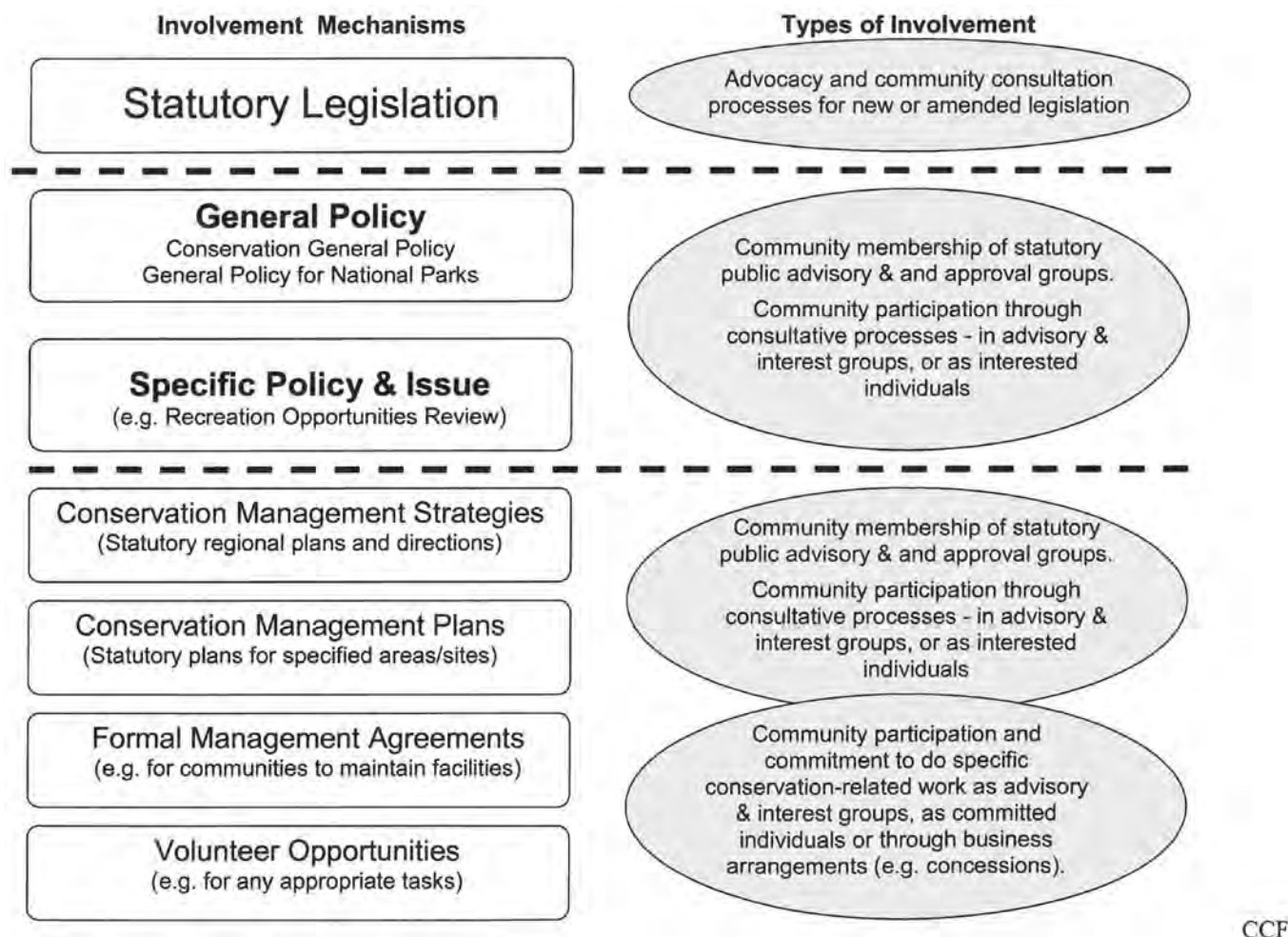


Figure 2—The spectrum of community participation (DOC 2003b, adapted from Arnstein 1969).



**Figure 3**—Community participation opportunities in the DOC management processes.

Typically New Zealanders' general wants and needs for conservation are expressed through the government legislation that guides the work of park management agencies. Communities have opportunities to participate in these legislative processes. Regional and local level management planning involves different levels of detail, and provides different opportunities and challenges for community involvement. The outcomes are expressed through strategic policy, the region-specific Conservation Management Strategies, and the park-specific Conservation Management Plans. Within all this are a variety of opportunities to contribute directly to conservation work.

Voluntary effort covers a wide range of conservation activities from care of coastal and river environments, protecting historic sites, pest monitoring and control, weed eradication, ecological restoration, and work with endangered species, as well as involvement in recreation opportunity and facility initiatives. The role of voluntary work can be significant across all of these different tasks. For example, when a recent methodology used to calculate the value of voluntary effort across 10 nationwide voluntary agencies (NZFVWO 2004) was subsequently applied to the DOC related voluntary work, it was estimated that during 12 months of 2003/04, this voluntary contribution was equivalent to 63 fulltime

staff. This equated to over 5 percent of the permanent ranger staff capacity (Wright, personal communication). In the last year, the DOC provided opportunities for hundreds of volunteers and more than 31,000 workday equivalents were contributed by individuals or groups. There are estimated to be over 3,000 community groups actively involved with ecological restoration projects on public and private land. In addition, 260 partnerships are in operation, most of which are with community-based voluntary groups. And going beyond fostering simple involvement in doing work, the DOC has now also undertaken more than 100 initiatives to actively build the conservation skills and knowledge of over 4,000 regular participants in volunteer activities (DOC 2005b).

The value of such community involvement is increasingly being recognized by the department, including the role of training to enhance relevant community skills. In the last 5 years the DOC has started including information about community contributions to management, community training programs, and related communication initiatives as performance measures in its annual reports to Government. This represents a fundamental recognition that this community involvement can enhance the sense of "outcome ownership" fostered among participants, increase flow-on advocacy effects to others, and result in even greater community support for conservation.



Matching the importance increasingly associated with the role of active voluntary work in supporting conservation management work, the role of active and engaging public consultation has also become more significant in recent times. In the sections below, the results of two national and highly strategic consultative processes are described—the General Policy Review and the Recreation Opportunity Review—(fig. 3). Both relate to setting the long-term strategic policy and planning directions that guide key management programs and decisions. Both processes created long-term statements of the communities' conservation priorities, which also underpin the development and ongoing review of the critical Conservation Management Strategies (CMS's)<sup>4</sup> (fig. 3). These processes are discussed here in order to illustrate some of the possibly unique ways in which New Zealand has developed significant community involvement in its management of parks and protected areas.

## General Policy Review

General Policy is the highest level of statutory policy for directing conservation management in New Zealand and provides the fundamental interpretations of New Zealand's key conservation legislation<sup>5</sup>. It has recently been reviewed and enhanced, and is included here as an example of statutory and formalized community involvement at the highest levels of conservation decision-making (fig. 3). As stated by the DOC's Director General in 2004:

When confirmed, our General Policy will act as a guide for developing our Conservation Management Strategies and in the way that current policies are interpreted and implemented. I expect it will have a significant bearing on many aspects of our departmental work for many years to come. Practically speaking, this is the most significant development in conservation policy since the passing of the Conservation Act (Hugh Logan, Director General of DOC, March 2004).

This overarching General Policy comprises two overlapping but distinct components: (1) the General Policy for National Parks, which was established in 1983 under the National Parks Act (1980); and (2) the Conservation General Policy, which was developed much later (2003-2005) to cover those conservation lands not managed as national parks. A combined consultative process was set up to review the existing General Policy for National Parks and undertake the consultation required to establish the new Conservation General Policy. Both General Policy components were approved in late 2005 (DOC 2005c,d) after an extensive consultation process. This featured a nationally coordinated and consistent public notification program, which consisted of: (1) detailing the release of the draft policies, (2) holding hearings on more substantive issues as required, (3) submission receipt and processing, and (4) independent analysis and reporting of

the content. While its national scale and significant policy context was notable, this process was otherwise a largely conventional public consultation approach.

However, a notable feature was the involvement of the New Zealand Conservation Authority (NZCA)—an independent statutory body representing community interests at a national level—in the approval process for these Policies. The NZCA has a responsibility for contributing to the development, approval and implementation of general policy, conservation management strategies, and conservation management plans (fig. 3) that represent the fundamental strategic directions for the DOC. The activities of the NZCA and conservation boards<sup>6</sup> reflect a long-term expectation of formalized public involvement in conservation management (Young 2004) at a level that may not be common elsewhere.

The resulting new General Policies (DOC 2005c,d) largely reflected a public endorsement of most existing approaches to conservation management being taken by the DOC. A notable exception related to mountain biking access. Of a total of 1,644 public submissions, 69 percent (1,133) represented a desire for some provision being made for mountain-biking access to tracks in national parks, an activity previously prohibited in national parks except on designated roads. This change in policy was significant because it illustrated the evolution of regulations as society's interests in recreation activities change. The mountain biking example was interesting because of the lessons they learned about achieving successful advocacy. For the mountain bike community this outcome was the result of a long campaign beginning in 1996, when the designation of the new Kahurangi National Park resulted in loss of access to the renowned Heaphy track. After several unsuccessful attempts, their eventual success in having the more bike-friendly General Policy for National Parks approved in 2005 was attributed by mountain biking representatives to a combination of patience, persistence, consistency, strategy, collaborations, and time (Wyn-Williams, personal communication) (fig. 4). Consultation is an opportunity for change, but change will only result when the engagement is meaningful and occurs at the right time and place. In this case, the mountain biking community used the unique opportunity represented by this strategic consultation process to their benefit.

## Recreation Opportunities Review

When the DOC was established, it inherited a hut track and facility system that was financially unsustainable. Clarity and direction was needed to identify priorities for allocating the limited resources. What would the optimum facility network look like? The need for the Recreation Opportunity Review (ROR) came from fundamental issues of facility governance, safety, suitability, and sustainability. The ROR has been the largest consultation process ever carried out on outdoor recreation facilities in New Zealand's protected natural areas. In it, the DOC's extensive visitor

<sup>4</sup> These 10-year strategic plans are a statutory requirement for each of DOC's 13 regional management areas (Conservancies) and require public consultation on all conservation management outcomes, including the nature of the various recreation services, facilities and opportunities to be provided.

<sup>5</sup> Key conservation legislation for the Conservation General Policy: Conservation Act 1987, Wildlife Act 1953, Marine Reserves Act 1971, Reserves Act 1977, Wild Animal Control Act 1977, Marine Mammals Protection Act 1978a; and for the General Policy for National Parks, the National Parks Act 1980.

<sup>6</sup> While the NZCA is an independent national body established by statute to represent the national public interest in the work of DOC and conservation in general, the 14 Conservation Boards represent a regionally defined level with similar mandates and fulfilling similar functions in a more localized regional context.

- **Timing**—We put ourselves in position to be at the right place at the right time, by being prepared and staying in touch with stakeholder, manager and statutory timetables and processes.
- **Patience/Coming of Age**—The Heaphy campaign started 10 years before and we experienced setbacks on past attempts to change policy. We showed tenacity by hanging in there until our perspective became more understood, fears diminished, and through succession over time our advocates became increasingly part of the decision-making establishment.
- **Strength of Argument**—Using the weight of well-analyzed research, observation and anecdotal experience to back the case, and emphasizing the benefits from allowing the change.
- **Conservation Authority Membership**—Getting to know the NZCA system, roles, responsibilities and members, engaging directly with them on a personal level, finding common ground, supporting those who supported our objectives.
- **Resources and People**—Having enthusiastic people who know the consultative processes, agencies and stakeholders—and the factors driving them, and also people who can also analyze, synthesize and present good submission material.
- **Dialogue with Stakeholders**—Contacting everyone both for and against our proposals, engaging with them to identify common ground, being open to what they can teach us, and discussing contentious issues to overcome prejudices, resolve differences or to just agree to disagree.
- **Submissions in Quantity and Quality**—Most of the 1,100 mountain bike submissions were form letters. But as well as the substantial main submission made, some others were from strategic organizations, including some Conservation Boards, District and City Councils, national recreation associations, Tramping and Climbing representative associations, and individual tramping clubs.
- **Federated Mountain Clubs (FMC) Accord**—Developing a formal accord with FMC that recognized areas of commonality, including mountain bike access to National Parks. FMC represents most of the country's tramping clubs, including the increasing numbers who are mountain bikers, and also some mountain bike clubs which have joined FMC.

**Figure 4**—Successful advocacy in general policy review—an example from the mountain biking community.

facility infrastructure<sup>7</sup> was reviewed in site-specific detail by those members of the public interested in its future.

**The ROR Process.** The ROR was established to better align the existing network of recreation facilities with the range of recreation opportunities desired by users. This exercise was subject to existing conservation objectives within the context of known budget projections. The ROR was preceded by an inventory and review of the existing facility network. Government made a decision to retain the existing range of recreation opportunities, with funding sufficient to maintain “most, but not all” of the facility network currently

available, but accepting that some new facilities were needed (DOC 2003c). All facilities had to be managed to appropriate service standards of construction, maintenance, and safety. Some new facilities would be needed to meet new or strategic needs, and some facilities would need to be reclassified and managed to a lower standard or removed altogether (fig. 5). The aim of the ROR process was to assist the DOC to decide, in consultation with the community, which overall combination of visitor facilities would best meet public needs to the level of guaranteed funding.

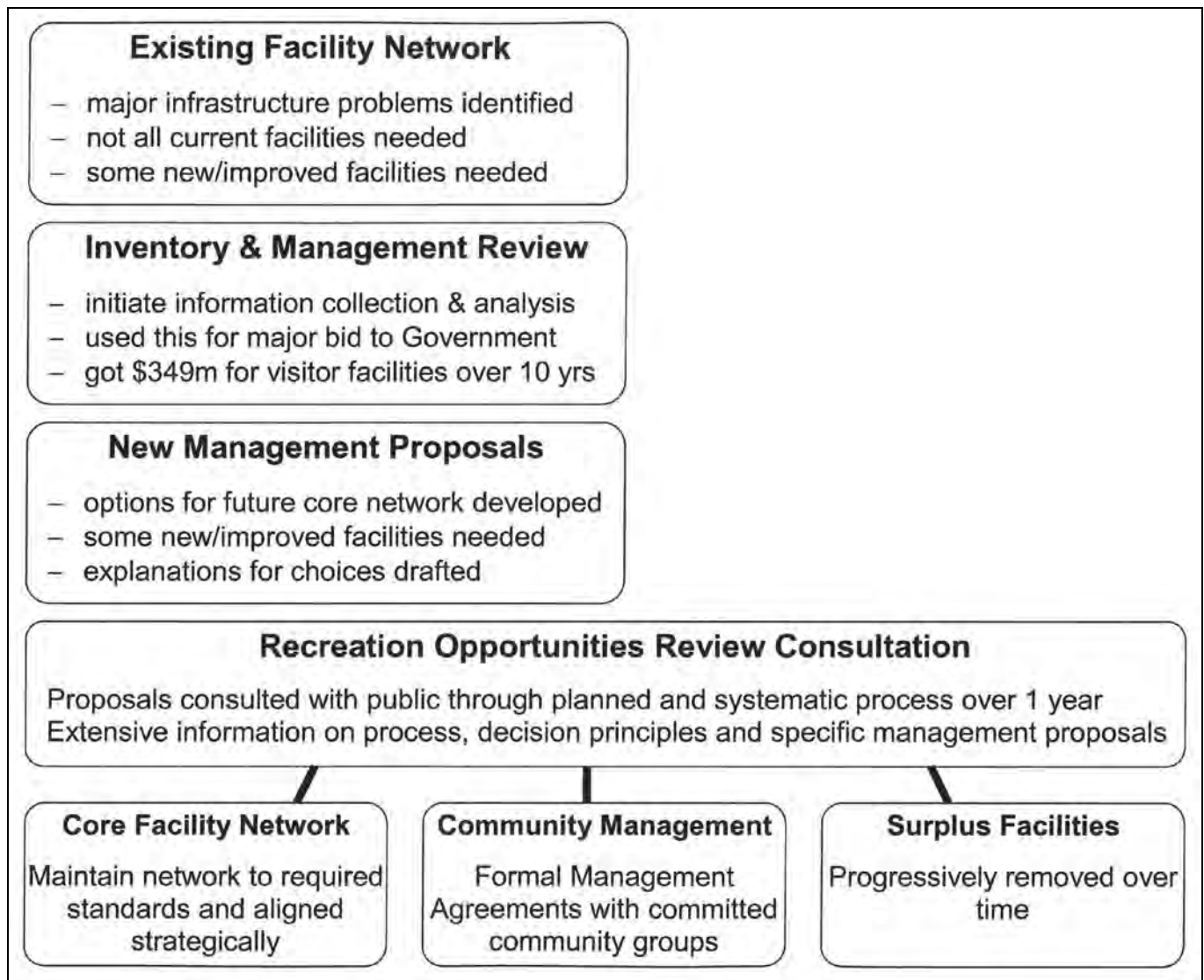
The ROR process was developed using a national reference team, which included representatives of key outdoor recreation and tourism interest groups. This enabled early discussion regarding issues of concern about process and style, and a commitment to resolving any issues that might otherwise have negatively affected progress. Such issues included how long the process should take, the decision-making steps to be followed, and what initiatives to take to involve the public of New Zealand in the process. A national public resource document was compiled—“Toward a better network of visitor facilities” (DOC 2003c)—which included a comprehensive background of the process, the consultation principles on which it was operating, the management principles guiding the DOC's decision-making, and detailed the ways in which people could be involved.

While nationally coordinated with standard process guidelines, the consultation process itself was carried out concurrently by each of the DOC's 13 Conservancies, who developed specific management proposals for each of the identified visitor facilities in their regions. The DOC has made a commitment to provide a core network of facilities across the country, but community groups were directly encouraged to become involved in maintaining non-core facilities if they specifically valued them (fig. 5). Each of the 1,220 management proposals was to either create, maintain, improve, reduce, remove, or find some community support for a specific visitor facility. Overall the proposals tended to emphasize some reduction in facilities in the backcountry and remote locations, based on the department's view that there was an existing high level of facility provision there, and enhancing options in frontcountry areas. The changes included proposed reductions in huts from 991 to 781, and of total track length from 12,800 km/7,954 miles to 12,000 km/7,456 miles.

These management proposals were presented online and in published proposal documents. Both included an overall vision for the recreation opportunities in the conservancy, the rationale used to make the management proposals, lists of proposed changes to specific facilities, and explanations for each of the specific proposals. The public and recreation groups were invited to make submissions on the proposed changes in writing or online. Local meetings and workshops were held to introduce the process, and later to address issues that were deemed to warrant specific attention. Almost 1,500 individual submissions were received, many commenting on more than one of the proposed changes presented for consultation. In total, responses to the specific facility proposals totaled around 8,600 (DOC 2004). Without getting into site-specific examples, the overall responses emphasized the following general themes:

- A strong lobby for traditional backcountry tramping opportunities, representing a desire to retain the essential

<sup>7</sup> This visitor facilities network includes 1,000 huts, 300 campsites, 12,500 km/7,767 miles walking and overnight hiking tracks, 1,600 toilets, 90 wharves, 14,000 bridges and boardwalks, 390 picnic and other amenity areas, 80 visitor centers and information outlets, and many information and direction signs.



**Figure 5**—Structure and context of the Recreation Opportunities Review.

undeveloped character of the backcountry, and to retain many of the small, low-use backcountry huts;

- Support for community management of desired facilities that fell outside of the DOC's proposed core network;
- Indication that some visitor types are not well catered to, particularly disabled visitors and those wanting to use 4-wheel drive vehicles;
- Some expectation that the DOC will develop some tourist-oriented facilities to support local community economies; and
- Clear indication that some local communities are very attached to their recreation opportunities, irrespective of national or strategic value to the core network.

In response to these submissions, meetings, and workshops, the DOC's overall management directions from this process were that:

- The DOC will now retain more huts as core facilities than originally proposed;

- The DOC will manage more tracks than it currently does. Some tracks will be phased out, but some new strategic links will be constructed;
- Some of the easily accessible huts close to roadends that were proposed for removal will now be retained for use by less able visitors and family groups;
- Facility service standards will generally be kept at more basic levels where possible; and
- The DOC remains supportive of the concept of community involvement in facility maintenance where suitable sustainable arrangement can be made.

The make-up of the core facility network proved to be particularly contentious with the recreating public who engaged in the consultation process. This suggests that it will be important to continue to focus public attention on any proposed changes to facilities as other planning exercises are undertaken, such as in forthcoming reviews of Conservation Management Strategies and Conservation Management Plans (refer to fig. 5).

**Community Management of Facilities.** Not all facilities could be retained by the DOC within the funding allocation. However, community groups, such as outdoor recreation clubs, could contribute to maintaining public visitor facilities. Groups expressing a strong desire to see particular low priority facilities retained were encouraged to volunteer to take on this responsibility, or to formalize existing commitments. Many submissions supported this concept, although these varied from simple acknowledgement that volunteers could take on this role, to groups making offers in relation to specific facilities. Most of these offers related to a total of 87 huts (out of a total of 991 huts), as well as offers to maintain 390 km/242 miles of track (out of a total of 12,800 km/7,954 miles). Their involvement does not end there, however, as interested user groups will retain an opportunity at any time to revisit their interest in actively maintaining some of the non-core facilities, by reviewing existing agreements, or by discussing new arrangements with the DOC. The consequences of ceasing to provide a contribution would mean the phasing out of the facility.

The concept of community involvement in facility management had been mooted prior to the consultation. Indeed, as noted, outdoor recreation clubs already have a long history of association with backcountry facilities. At the time of the ROR process, the DOC already had a standard process to allow community group proposals to be assessed (DOC 1998). The process steps include the DOC assessing if such an approach would be likely to succeed, and if so, a formal agreement could then be established between the DOC and each of the groups involved. Such an agreement outlines the obligations being accepted by both parties, which include adherence to standard procedures for health and safety for themselves and the public, the required standards to which the facility must be managed, and timeframes for that commitment.

As a result of the consultation, decisions about community management proposals increased the length of track to be managed by communities by 125 km/78 miles, and the number of huts by three. Since the release of the decisions for huts (which include 79 removals and a further 104 to be phased out over time), more interest in taking on a management role has been expressed by community groups. As a result, there are discussions occurring between the DOC and group representatives to progress formal agreements. It is also worth noting that the involvement of and benefits to groups are not confined to the maintenance of the facilities themselves, but include relationship building with communities involved, and through the example set that might encourage other groups and managers to engage in this sort of partnership.

An evaluation was undertaken of groups who took part in the consultation process and their attitudes towards the consultation process. After the launch of the consultation, 52 percent of 90 clubs who were affiliated with the Federated Mountain Clubs responded to a short questionnaire and reported a generally supportive view of what the DOC was seeking to achieve and how this was being done. Most had made submissions as part of the process. After the process had been completed and decisions published, 37 percent responded to another questionnaire and indicated a very favorable attitude towards the process, with 80 percent of respondents believing their submissions had been fully

or in part accommodated in the final decisions. The lower response rate at the finish of the process was influenced by the timing of the request for feedback, which was sent out not long before the summer holiday break when clubs tend to be preoccupied with planning and then undertaking trips.

The DOC staff were also canvassed for their perspective on the consultation process. There was a strong opinion that the engagement, which included stakeholder meetings, submission analysis and development of management responses, had established and strengthened relationships between the department and the community. Managers felt that they were more familiar with their stakeholders' views, and were more comfortable in dealing with them because of the exchanges that had occurred. Lessons learned included (1) the need to target proposals to the relevant community of interest more specifically to ensure representative feedback across the range of visitor groups; (2) that consultation is time-consuming, so the DOC and community groups need to plan for the time required for completing tasks; (3) that evaluation methods need to be more engaging of all participants to boost response rates; and (4) that decision-making in this context is not by formula, but by negotiation around key principles of seeking common good outcomes and aligning with legislative intent.

This last point is significant to any consultation process. It is typical for public agencies to consult over the general intent of ongoing management direction, and then, without further consultation, to manage the detail using criteria to guide actions within the broader policy context. Public engagement in these New Zealand examples demonstrated a clear focus on detail from communities here, and success at consultation was achieved through compromise over individual decisions rather than over the principles themselves.

## Conclusion

This paper has described two recent examples of the DOC involving the community in strategic management decision-making and policy setting. No matter the title used (national park, reserve, backcountry, wilderness), the communities of interest for any of these protected areas will have their own point of focus and hold their own opinions as to how their interest should be managed. Good management depends on the political and active support of the public. Recreation activity in the backcountry of New Zealand has a contemporary history almost as long as the history of European settlement itself. The public has been heavily involved in the development of the infrastructure that enables backcountry recreation opportunities, in the past and today. This has been achieved through formal groups and unassociated individuals undertaking tasks in pursuit of their own or collective goals. Outdoor recreation groups have been significant in helping shape the facility network that exists today, and they continue to take an active interest in the strategic direction of the DOC as more coordinated and sustainable priorities are being decided to match available funding into the future.

Recent public consultation processes have illuminated the key issues and opinions held in relation to recreation opportunities in the large tracts of wildlands that provide New Zealand's backcountry, remote, and wilderness experiences. The divergences and convergences of views expressed

in these processes reflect differing value sets that managers must accommodate in some way, a balancing act that is seldom completely harmonious. The processes of facilitating community consultation, as demonstrated here, represent a good way of identifying conflict issues and working toward solutions. The results of both of these exercises in consultation demonstrate that there is active and constructive community participation in the development of policy and management for New Zealand's conservation lands. This participation builds on the long history of public involvement in the provision of backcountry facilities. That involvement influenced the DOC as the administering agency to undertake consultation as part of its management practices, and has resulted in changes that reflect the preferences of those members of the public who engaged in the processes.

The purposeful decision taken by the DOC to engage in consultation on policy and management actions has established a community participation approach that is more empowering than has been the pattern in the past, because the requirement for that consultation is now both formalized in statute and promoted outside of legislative requirements. Political and advocacy activity is now occurring within a wider context of public engagement in conservation management, which is fundamentally supported by the DOC strategic policy. This strategy acknowledges the potential gains that can be achieved through greater community knowledge of, and involvement in, conservation.

The events reported in this paper support such an approach, and hopefully it will continue to be proven worthwhile in the future. Building on these successes, continuing and enhancing public engagement in decision-making will no doubt be important when tackling the many significant challenges faced in conservation management today.

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# Two Countries, One Forest: Working Beyond Political Boundaries in the Northern Appalachian/Acadian Forest

James Sullivan

Two Countries, One Forest (2C1Forest) is a collaboration of conservation organizations and researchers committed to the long-term ecological health of the Northern Appalachian/Acadian ecoregion of the United States and Canada. In our work we are:

- Increasing public awareness of the Northern Appalachian/Acadian region as a single, interconnected ecoregion that spans two countries;
- Promoting landscape-scale conservation as a vital regional goal;
- Providing a forum to enhance collaboration between conservation organizations, policymakers and scientists;
- Packaging and disseminating ecological information to build public understanding and influence conservation policy; and
- Working with partner organizations to design and implement specific conservation strategies.

2C1Forest began in 2001 when a core group of scientists, conservationists, and funders convened in Montreal for an afternoon to address the need to work more closely together to protect and restore the irreplaceable ecological heritage of the Northern Appalachian/Acadian region. More than 50 active participants have worked together since that time to establish a cross-border organization to help win the race against time to protect biodiversity and connected wildlife habitat in a region increasingly threatened by development and pollution.

2C1Forest has three principle roles:

1. Serve as a big picture, cross-border forum to enhance collaboration that includes conservation organizations and scientists at the ecoregional level;
2. Support, encourage, and facilitate the development of science at the ecoregional level; and
3. Promote ecoregional conservation and restoration that is based on science.

2C1Forest has made major advances in creating a forum for scientists, conservation organizations, and foundation funders to work together. 2C1Forest has facilitated the collaboration in a number of science projects that advance the study of the ecoregion and are designed to provide results that will inform the work of conservation organizations

and provide an ecoregional approach useful to them and to foundation funders.

2C1Forest has facilitated collaboration between organizations and researchers to develop science that describes the ecoregion. The first major projects that are now near completion include:

- Mapping the landforms, plants, and animals along with the conservation status of the entire ecoregion for the development of an ecological plan (led by The Nature Conservancy and Nature Conservancy Canada);
- Identifying areas of high biological value and mapping the key connections across the region to identify gaps in conservation for threatened species and ecosystems (led by the Wildlands Project);
- Developing a human footprint analysis for the entire ecoregion (led by the Wildlife Conservation Society Canada); and
- Projecting a future human footprint based on a number of scenarios for development of the ecoregion (led by 2C1Forest).

Building on these studies, 2C1Forest is working to facilitate networking and communication among our members and to support the programs of our member organizations in support of conservation and restoration of the ecoregion.

Networking is supported through a process that begins with facilitating a common vision for the region and supporting that vision with clearly identified conservation priorities. We also work to identify successful strategies and to share them among the partners. Throughout the process there is an effort to expand the network to involve a wider group of participating organizations all supporting the common vision and key conservation priorities for the region.

2C1Forest is leading a communication initiative to increase shared resources among members and to provide support to member organizations. A public launch will be held through an international conference in early spring of 2006. This will center on a presentation of the uniqueness of the ecoregion and be built upon the results of the scientific studies. Efforts will include outreach to governments, industry, international agencies and other institutions. 2C1Forest will work to increase awareness of the ecoregion and the conservation priorities outside the region in order to increase the resources available for this work.

2C1Forest is providing a forum for leadership in conserving and restoring the Northern Appalachian/Acadian ecoregion. This effort will be demonstrated by a clear vision and strategy that is shared across the ecoregion; an outreach and education program that promotes the significance of the ecoregion; enhanced networking and support for effective actions by our members; and increasing support for work in this region that brings more resources to this work.

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James Sullivan, Executive Director of Two Countries, One Forest (2C1Forest), Halifax, Nova Scotia, Canada.

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# Community Conservation Adjacent to Ruaha National Park, Tanzania

Sue Stolberger

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**Abstract**—In the areas adjacent to Ruaha National Park where rural communities exist, much more work and education is required to enable them to benefit directly and indirectly from tourism and managing their own natural resources.

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## Ruaha National Park History

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The first written record of the Ruaha area was 1877. It was noted then that it was a “wildlife haven” a “Garden of Eden.” In 1912, it was established as a game reserve, later it was enlarged by the British, and finally in 1964, the Tanzanian Government declared the area to be a National Park encompassing over 10,200 km<sup>2</sup> (3,938 miles<sup>2</sup>). Subsequently, several game reserves were added to the north, east and west, so that today the whole wilderness ecosystem is over 45,000 km<sup>2</sup> (17,375 miles<sup>2</sup>).

The park is situated in southern Tanzania, an area that has, until very recently, been off the beaten track. Because of this, it has, so far, escaped from mass tourism and other modern developments. As a result, it is still exceptionally wild and undisturbed. It is without doubt a beautiful haven, a pristine wilderness teeming with game, wonderful vistas, and masses of birds.

Unlike many African parks, Ruaha does not have a problem with human encroachment. There is only one area that is populated along the southern boundary, and it has been designated a Wildlife Management Area (WMA). The other park boundaries join onto more wilderness in the form of vast game reserves and game controlled areas.

No hunter/gathering is allowed in the Ruaha National Park, itself; however, it is allowed in the WMA and in the surrounding game reserves. Hence, Ruaha Park forms a nucleus—a core preservation zone—of flora and fauna for the surrounding reserves. The people in the existing villages are largely living on a subsistence level; maize, rice, and beans are the main crops; honey and bee keeping and hunter/gathering also form part of their livelihood. There are some livestock keepers in the area as well.

The Friends of Ruaha Society, (FORS) a local NGO, was originally set up in 1987 to help fund the day-to-day running of the park. In those days, visitors to Ruaha were few and the park was hopelessly under funded. Now however, the

situation is quite different, and FORS has shifted its goal to work outside the park with the local communities.

Here their growing focus has been to develop an environmental education program with nine primary schools situated outside the park. Until earlier this year, I was an integral part of the FORS team. However, after almost ten years of extremely active participation, I decided to step down from the committee. I am, however, continuing with conservation efforts together with my long-time Tanzanian FORS partner, Dr. Dulle, who is a government vet.

I am by profession an artist, and for the past 23 years have lived and painted in many, if not most of the beautiful, remote areas in Eastern Africa. My passion for painting goes hand in hand with my passion for the natural world and for the indigenous people who, up until recently, have been the successful stewards of Africa's wild lands.

As a child I would visit Ruaha with my parents, and it was without doubt, as a result of these childhood trips, I decided to make a life for myself in the African wilderness. So it is for me a great privilege that I have returned to this beautiful haven. For the past 11 years, my partner, sculptor Robert Glen, and I have been extremely honored to be allowed to actually live in the Ruaha Park itself.

Although I hope to bring the wonders of Ruaha to people through my art, I also feel that it is extremely important for me to do whatever I can to ensure that the Ruaha Park and its people, are eased into the 21st century with as few scars as possible.

Before I returned to Ruaha in 1994, my art took me on a wonderfully nomadic life. It was (and still is) filled with adventures, living and experiencing the most inspiring wild lands and people imaginable. But I became like a hare running in front of a jackal. Everywhere I went, I was forced to move on, to find new pastures, the ever hungry, ever growing destruction that uncontrolled mass tourism had on once beautiful places and rural communities was snapping at my heels.

The speed at which people and wild lands are abruptly transformed from a well structured rural co-existence into the harsh reality of the Western cash economy is very much a double-edged sword, that to me still has many more questions to it than answers.

Ruaha however, is an exceptional area, situated on the convergence zone of northern and southern species. It boasts not only both Greater and Lesser Kudu, but is also the southernmost range for the Grants Gazelle. It has a very healthy population of wild dogs, elephants, leopards, and cheetah. Quite apart from the large mammals that people flock to Africa to see, Ruaha also has, due to its geographical location, a very diverse bird population, with the current number of species recorded at 530. If this is not already enough to warrant Ruaha as a very special location, it also enjoys a very interesting and large variety of flora, with

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Sue Stolberger, Artist and Conservationist, Ruaha National Park, Tanzania.

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over 1,650 species of plants recorded. In comparison, the NE Serengeti has approximately 410 species recorded and the Selous Game Reserve has 830.

Interestingly, due to my eye for color and detail, plus the hours I spend sketching birds and animals, I have uncovered two new species of birds within the park itself. One is a variation of the Red billed Hornbill now called *Tockus ruahae*, and the other is a new variation of Arnots Chat, which has still to be named.

As in most parks in Tanzania, Ruaha has a large section of it set aside as a wilderness zone, which by law permits only limited activity. In the remote western corner of this wilderness zone is a very interesting plateau area rising to over 1,800 m (5,906 ft). Called the Isunkaviola Plateau, this important area, due to difficulties of access, has remained until now without detailed study.

The Chief Park Warden, Mr. Mtahiko, and my partner Robert Glen (who is also a well known ornithologist) planned together the first proper expedition to this exciting area. I, along with Park Ecologist, Gladys N'gumbi, accompanied them on these exciting trips.

It would appear from an initial study that altitude and isolation over a very long period have formed an extremely important niche of diversity. It has been suggested by the recent observations, that this remote plateau area has more affiliations to Western bird species, rather than to the Eastern Arc species. It could be that not only does the park represent the convergence zone of northern and southern species but it could also perhaps represent the convergence zone of eastern and western species.

This highland oasis of riverine forest is cool, green and lush with ferns and orchids adorning the damp thickets. Enormous *Newtonia Bucannanii* trees some 42 m (138 ft) high emerge from a canopy in which forest birds, such as the great Crowned Eagle, find nesting places. It is quite different from the hot, dry Ruaha valley floor below.

Unfortunately, however, the area is also well used by poachers, not as a base to hunt from, but as an access route to other remote areas of the park. Well-used bicycle trails are encountered. In order for these poachers to make easier access routes for themselves they light many fires which continue to be very destructive to the remaining forest sectors and much damage is evident. The situation is critical, as the remaining stands of this ancient forest are very small.

This area is in urgent need of protection, however with the park already struggling to keep up the required standards needed in the zones used by tourists, areas like Isunkaviola are very vulnerable as funds and resources are limited. So the Ruaha Park is developing a small conservation program for this unique plateau.

## The Great Ruaha River

In addition to this, for many years I have been sounding the alarm bells highlighting the ecological disaster of the annual drying up of the Great Ruaha River which happened for the first time in 1993. In the early 1970s the only access into the park was via the ferry, across the Great Ruaha. The river was perennial, flowing ferociously fast and strong for most of the year.

The Ruaha River runs along the entire length of its southern boundary and is the lifeline for the park during the dry season. The main reason for the drying up of the river is from the mismanagement and overuse of water in the catchment area, mainly by extensive rice farms upstream from Ruaha Park. This area is in itself a beautiful wetland area that is in danger of being irrevocably damaged. Unfortunately, with the annual drying of the river for increasingly longer periods, lasting up to three months at a time, irrevocable damage has already been done to the ecology of the river and to the Ruaha ecosystem as a whole. Two examples of this are the loss of fresh oyster beds and the reduced breeding success of the White crowned Plover, whose only known breeding ground in Tanzania is the Great Ruaha. Additionally, the movements of the larger, more popular mammals, such as elephants and wild dogs, are beginning to alter during the dry season.

Thanks to all the hard work done by the dedicated staff in Ruaha Park, and under the excellent guidance of Chief Park Warden Mr. Mtahiko, the park is literally teeming with game, a haven of peace for all who are lucky enough to visit. But now, looking ahead, it is difficult to believe that the Great Ruaha River will be there to sustain it in times of need. It is really tragic that the very reason for the game being here in the first place, the perennial Great Ruaha River, is no longer the life force that kept the system going throughout the dry months.

We hope that the government will continue to do its utmost to reverse this sad state of affairs. I will continue to highlight this issue and do what I can to ensure the future of Ruaha's abundant and beautiful wildlife heritage.

## The Future

After my brief summary, I am sure you can all see that Ruaha Park is endowed with an array of stunning wilderness experiences: the diverse flora and fauna along the Great Ruaha River, which follows an ancient finger of the Great Rift Valley system, the extensive areas of Miombo woodland with its specialized avifauna, plus the magnificent and unique Isunkaviola Plateau. Many days could be spent in Ruaha enjoying completely diverse habitats and activities.

However, as yet, the only area of Ruaha that is extensively accessed by tourists is the very small portion that runs along the Rift Valley floor, the rest of the park lies untouched as a huge wilderness zone. As we all know, looking after wilderness is a delicate balancing act that requires substantial funding and management. In an effort to address this situation, Ruaha Park is looking into diversifying activities and introducing limited use zones in the wilderness areas where trails for walking and fly camping may be introduced. However, these ideas are all very much still in the planning stage.

Despite these new developments, the fact remains that the vast wilderness areas are in need of immediate protection, more protection than the park can afford to give. Therefore, I have been collaborating with Chief Park Warden Mr. Mtahiko, to see how we could assist. A start has been made with the WILD Foundation coming to the rescue with \$10,000 to help protect the Isunkaviola Plateau. This generous donation was used in creating a route for the anti-poaching patrols to

access the remote area. The new track was carefully designed to use the existing cut-line along the western boundary. A temporary ranger post has also been established, which enables the rangers to be based closer to this unique area.

The immediate problems facing Ruaha are not how to rehabilitate, or how to stop encroaching villages, but how to introduce to the people here the concept of tourism. Until about two years ago, Ruaha was little known to the tourist industry, and the villagers themselves equally ignorant to the benefits that tourism can bring. However, once tourism hits a place it changes very fast and not necessarily to the benefit of those that live there, so we need to act quickly.

Ruaha Park has its own Community Conservation Department and has started programs with the villagers to address many of the pressing issues. They have assessed and identified, through some great teamwork, the specific issues or problems that are particular to each village. For example, some of the villages are a hot bed for poachers, some have a rampant charcoal trade resulting in deforestation, and some are harvesting timber illegally.

However, it is not all doom and gloom, as on the other hand there are villages who, from their own initiative, are starting re-forestation programs, another that has a successful bee keeping association, and yet another with a cultural program.

The Park Community Officers are now looking at ways to try to bring these people and issues together, to encourage them to initiate environmental programs that are income generating, and to try to discourage or find alternatives for the illegal practices that go on. It is important that these people benefit from the park and in so doing the park will benefit from them. I work closely with the Park Community Warden, as though they have identified the programs that should be addressed, funding and implementing them is always a problem. I have a list of programs that we would like to implement, and promoting local eco-tourism is high on the list.

However, as I said before, tourism and what it can mean is a totally new concept for most of the people around Ruaha. Without a vision, it is impossible to inspire people to implement new ideas. So one of the first programs that we need to address as soon as possible, is to take a group of villagers on a trip to northern Tanzania where there are successful eco-tourism activities going on. In so doing it will hopefully inspire and enlighten them to begin their own business in Ruaha and in the surrounding Washing Addition. There is a Village Association called MBOMIPA, which was set up

by DFID for dealing with village programs. This association currently includes the 19 villages that are closest to the park. This year, the association, through the sale of their hunting quota, made 36 million shillings, which is approximately \$36,000. From this sum, each of the 19 villages received \$1,000. The remaining \$17,000 was put back into the MBOMIPA coffers to go towards the yearly running costs. The Ruaha Park works very closely with this association, and tries to involve them in as many areas as possible. The Chief Park Warden, Mr. Mtahiko, is chairman of the Board of Trustees and I am also a member of the Board.

Additionally, in an effort to do something ourselves, my partner and I are building an environmental centre at the Idodi Secondary School. This school is the only secondary school in the vicinity of the park, and was largely built by funds donated from Ruaha Park. We hope this centre will become a nucleus for environmental incentives. It will be a place where meetings can take place involving all sections of the community, and will be the only facility in the area with audio-visual equipment. This equipment will be solar powered and will enhance lectures from teachers and invited speakers.

Dr. Dulle and I have also started a program called EMI (Elimu Mazingira Idodi), the Environmental Teachers of Idodi, which is the collaboration of primary and secondary school teachers together with village leaders. This committee is there to advise and coordinate environmental programs in the area, such as combating the growing charcoal trade, taking children and villagers on trips to the park, and other environmental issues. All these are co-coordinated with the Ruaha Park initiatives.

The people who live around the peripheral areas of the park are hunter/gatherers by tradition, their local knowledge of nature is intimate, handed down from generation to generation. The challenge is to learn how to honor these natural and man made systems and allow them to continue. We must keep the harmonious beauty of Ruaha alive, using local knowledge, folklore, and tradition to form an integral part of the Ruaha experience.

I will end with a quote from a speech by Valii Moosa, the previous environmental minister of South Africa, now head of the World Conservation Union (IUCN).

There is a common misconception that to invest in conservation is somehow contrary to investing in peoples' livelihoods. However, the idea that you need to get rich first and then worry about your environment is not only untrue, it is dangerous. It makes sense therefore that investing in better management of ecosystems will help reduce poverty.

# The Heritage Park Model: A Partnership Approach to Park Expansion in Poor Rural Areas

Charles Ndabeni  
Maretha Shroyer  
Willie Boonzaaier  
Gabriel Mokgoko  
Sam Mochine

**Abstract**—The initiative to create a conservation corridor—the Heritage Park—linking the existing 62,000 ha (153,205 acre) Madikwe Game Reserve with the 49,000 ha (121,082 acre) Pilanesberg National Park, to form a 275,000 ha (679,540 acre) nature-based tourism anchor project and primary economic catalyst for a poor rural region, originated in 1999. An innovative park expansion model was required as the land linking the two successful parks belongs to tribal communities (land held in trust by the government for the communities), private landowners, and the state (agricultural land leases to local farmers). A national program of land redistribution, active mineral rights and land claims further complicate land matters. The North West Parks and Tourism Board identified the opportunity, assessed the potential, developed the concept, sold the vision to key stakeholders, partnered with them, and set up an institutional model to facilitate the establishment of the Heritage Park.

## Background

Economic pressures for intensified utilization of natural and mineral resources, a lack of awareness and inadequate enforcement of conservation laws is posing a continued and increasing threat to biodiversity conservation in Africa. Within an increased global attempt to marry biodiversity conservation and economic development, the South African scenario is even more daunting, considering its history of racial segregation and in some instances forced removals to accommodate park expansions. Making conservation acceptable to a black, previously deprived and therefore rather suspicious majority is a serious challenge. South

African National Parks (SANParks) recognize that parks can make a significant contribution to rural development (Magome 2003). Magome implies that with only 4 percent of SANParks visitors being from the previously disadvantaged black communities, it is unlikely that the rural communities will outright support the expansion or creation of parks. The most important ingredient for successfully implementing park expansion or establishment models is, however, the creation of awareness and support among politicians, government departments, decision makers, communities and the general public. Relationships have to be built before support can be gained.

An important argument that is put forward (Magome and Fabricius 2004) is that although certain examples exist where the benefits from biodiversity conservation projects exceed the costs to rural communities, it is important to note that generally the benefits that rural communities derive from informal use of natural resources exceed those from formal biodiversity conservation. The Okavango Delta, which yields high tourism activities and therefore economic returns, is quoted as an exception. They further warn against benefits that have a tendency of flowing to beneficiaries outside of the affected communities.

It is now accepted that dialogue and participation is the expected norm in Southern Africa. The most significant factors that affect the success of community wildlife management in Southern Africa are the administrative/institutional capacities, the finances, the social and political environment, and the natural resource/ecological base (Fabricius and others 2001).

Fabricius and others (2001) recommend that facilitators should provide a high-quality, light-touch facilitation. They found that a high percentage of the donor (government) funding can be expected to go towards paying facilitators, community training needs should be carefully determined before training programs are designed and implemented, and advise that community (beneficiary) groupings should be clearly and regularly defined and segmented to facilitate effective communications and negotiations.

While conservationists are grappling with all these socio-political and socio-economic issues that have a direct bearing on biodiversity conservation in Southern Africa, a number of experimental (and successful) models have been tested. These projects are driven by a philosophy of incentive-led conservation that benefits the landholders and therefore the

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land (Child 2004). Child concludes that if we concentrate on enabling park managers and landholders to build on the comparative advantage of wildlife conservation (versus other land use, especially agriculture) and get the bureaucratic impediments out of the way, both conservation and rural development will be served.

## The Philosophy of Voluntary Land Incorporation

The philosophy of voluntary land incorporation is not a new one. The voluntary incorporation of land into Protected Areas for economic considerations in South Africa was initiated by private landowners adjoining Protected Areas who recognized the value of nature-based or eco-tourism and the value of established destinations such as Kruger National Park and opted to capitalize on the inherent potentials. When communities negotiated successful land claim settlements for land in Protected Areas, they opted to leave their land inside Protected Areas such as Kruger National Park with the intention of capitalizing on its tourism values.

Madikwe Game Reserve (MGR) was established on state land for economic reasons. The North West Parks and Tourism Board (NWPTB) later developed the necessary legal tools to incorporate neighboring private land into MGR to expand the conservation footprint. Similar models are now also developing elsewhere in South Africa. Examples are the Greater St Lucia Wetland Area, Blyde River Canyon National Park and the Greater Addo National Park.

What is different, however, in the case of the Heritage Park is the economic motivation and the pro-active intervention of the state as a driving force from the outset, combining the proclamation of a Protected Area for economic reasons with voluntary incorporation of private and community land. Unlike the historical South African model of establishing Protected Areas on government land set aside for conservation, the Heritage Park Expansion Model aims to establish a conservation corridor on land that belongs to tribal communities (land held in trust by the government for the communities), private landowners, and the state (agricultural land leases to local farmers). From the onset, competition for the land and territorial challenges between and within stakeholder groups were expected. The state, therefore, facilitates the expansion of Protected Areas on land not under its jurisdiction that was historically used for agriculture. The state can be expected to assist with the funding of infrastructure and game reintroductions.

## Heritage Park: A Unique Situation With a Unique Approach

The Heritage Park project is unique in that:

1. The successes of Pilanesberg National Park (PNP) and MGR are the driving force for park expansion. Both PNP and MGR were established on degraded farmland, required large-scale game reintroductions, and are benefiting local rural communities.

2. Undeveloped grazing land is available and offers the opportunity to link the two existing protected areas via a conservation corridor.

3. Its establishment is motivated on socio-economic grounds within a rural setting.

4. Its planning and development is facilitated by government for the benefit of communal and private landowners.

5. The model makes provision for voluntary incorporation of private and communal land to expand existing protected areas.

6. Landowners retain title to the land and are the primary beneficiaries of activities on their land.

7. There is an existing tourism demand.

8. There are complicated land issues in the form of land claims, mining rights, and national land reform policies.

## Built on Three Pillars: Partnerships, Conservation, and Cultural Heritage

The Heritage Park Expansion Model is built on three pillars: (1) partnerships, (2) wildlife conservation, and (3) the traditional African way of life and cultural heritage. The NWPTB, as protected area and tourism development and management agent of the North West Province, partnered with private landowners, communities, municipalities, government departments, mining companies, and development agencies to drive the implementation of this exciting project. The Heritage Park Expansion Model will eventually create a Protected Area of one million ha (2,471,054 acres) that is expected to have a significant positive influence on the immediate rural economy, the district, and the province.

## Goals

The first goal of the Heritage Park is to help relieve poverty by creating job opportunities and by stimulating a tourism economy. The second goal is to increase the area of conserved natural landscapes and ecosystems in the North West Province. The driving force is the rapidly growing tourism demand in the region.

## The Challenge

Achieving the aforementioned goals is rather complex when considering the mix of land ownership and related agendas, comprising:

1. Individually owned private properties.

2. State land held in trust for communities that have traditionally utilized the land for subsistence living.

3. The world's richest platinum belt running through the corridor with mineral prospecting and mining rights held by mining companies.

4. A national program of land redistribution in RSA that aims to reinstate land rights for blacks forcefully removed during the apartheid regime.

5. Land redistribution policies of the national government aimed at black economic empowerment;

6. Lack of sufficient funding to implement the project as government is expecting protected areas to "pay their own way."

7. Insufficient road and municipal service standards with the dangers of stray cattle, donkeys, and goats on the roads despite great advances having been made in the service

delivery of basic needs such as water, electricity, and waste removal.

8. The presence of acute unemployment, AIDS, and related social problems.

## Hypotheses Being Tested

By implementing the Heritage Park Expansion Model, the following hypotheses are being tested.

1. In areas of marginal agricultural potential—where adequate critical mass exists between the attractiveness of a wilderness landscape, its tourism potential, and accessibility to markets—the establishment of protected areas could be motivated on socio-economic grounds, where conservation motives on their own may have failed.

2. Over the long term, land use on private or communal land will be determined by socio-economics, although it is expected that the process will be slowed down by cultural considerations and traditional practices.

3. Where land with greater potential for nature-based tourism is held by private or communal landowners, it is possible to have such areas willingly proclaimed as formally Protected Areas, provided that:

a. Capacity, commitment, and perseverance exist within lead agencies to fulfill an ongoing facilitation role;

b. Understanding, support, and participation of key stakeholders and the occupants of the land is obtained through effective dialogue and partnership arrangements; and,

c. Support mechanisms for business partnerships are established and sustained to ensure benefits to local economies.

## Solution: A Home Grown Model

It was clear that a new Protected Area establishment model had to be conceptualized and designed by all the stakeholders, through mutual endeavor, if all of these complex issues were to be resolved.

The adaptive establishment model that emerged in broad terms provided for:

1. The establishment of a facilitation capacity;
2. Comprehensive, regular and structured communication, consultation and negotiations between parties;
3. The ongoing creation of awareness and building of capacities; and
4. Allowing the model to develop itself through an evolutionary process of joint conceptualization, design, review and adaptive implementation.

## Spatial Orientation and Phasing

The proposed Heritage Park runs in a band that stretches north of Pilanesberg National Park (PNP) before turning west to follow the Dwarsberg mountain range before joining with MGR. In the greater context, the Heritage Park is strategically situated between other Protected Areas in the North West and Limpopo Provinces and can become the catalyst in launching an important regional initiative—potentially crossing the border into Botswana (fig. 1).

The focus in the short term (5 years) is to convert areas immediately adjacent to PNP and MGR from agricultural use to eco-tourism use; in the medium term (15 years) to add the area in between; and in the long term, to eventually link up with a number of other regional projects in the Limpopo Province and to expand into Botswana to form a significant Conservation Area of some one million ha/2.5 million acres (10,000 km<sup>2</sup>/3,861 mi<sup>2</sup>).

## Anchor Projects

PNP and MGR form the spatial anchor projects from where the Heritage Park will grow.

**Pilanesberg National Park (49,000 ha/121,082 acres).** Pilanesberg National Park (PNP), an extinct alkaline volcanic site, was proclaimed as a Park in 1979. PNP's special features of rugged landscape, well-watered valleys, and the presence of abundant wildlife have made it a preferred site for human settlement for thousands of years. Prior to its proclamation, the Pilanesberg Complex was degraded and depleted of indigenous game populations due to fairly intense settlement by commercial farmers. At considerable expense, the land was restocked with game, the scars of human settlement were removed, and tourism infrastructure was developed during the first 15 years (1979 to 1993). This constituted the largest and most expensive game stocking and land rehabilitation project ever undertaken in any African game reserve at the time. A 110-km (68-mile) peripheral Big Game fence was erected over some very rugged terrain, 188 km (117 miles) of visitor roads have been developed, and more than 6,000 head of game were introduced during the Operation Genesis game translocation program. Today Pilanesberg attracts more than 500,000 visitors per annum.

The most important studies<sup>1</sup> that have shaped the development of PNP are:

- The ecological report by Willem Van Riet and Ken Tinley (PNP—Planning and Management Proposals, August 1978);
- The internal ecological publication on range conditions and large herbivore carrying capacities by Roger Collinson and Pete Goodman (Inkwe No 1., Environmental Research in Bophutatswana, March 1982);
- The development plan by Willie Boonzaaier, Roger Collinson and Willem Van Riet in 1983 [A Five Year Development Plan for Pilanesberg National Park, September 1983];
- The study on introduction of lion by Deborah and Frank Vorhies (Introducing Lion into Pilanesberg National Park: an Economic Assessment, 1993); and
- The management plan by Willie Boonzaaier and Roger Collinson in 2000 (Pilanesberg National Park Management Plan— Second Edition, 2000).

**Madikwe Game Reserve (62,000 ha/153,205 acres).** Madikwe Game Reserve (MGR) was proclaimed in 1991, based on a feasibility study that found wildlife conservation and tourism to be a more viable form of land use than

<sup>1</sup> Studies on file: Contour Project Managers CC, Reg. No CK 91/30370/23, PO Box 4906, Rustenburg 0300, South Africa, email: contour@mwweb.co.za.

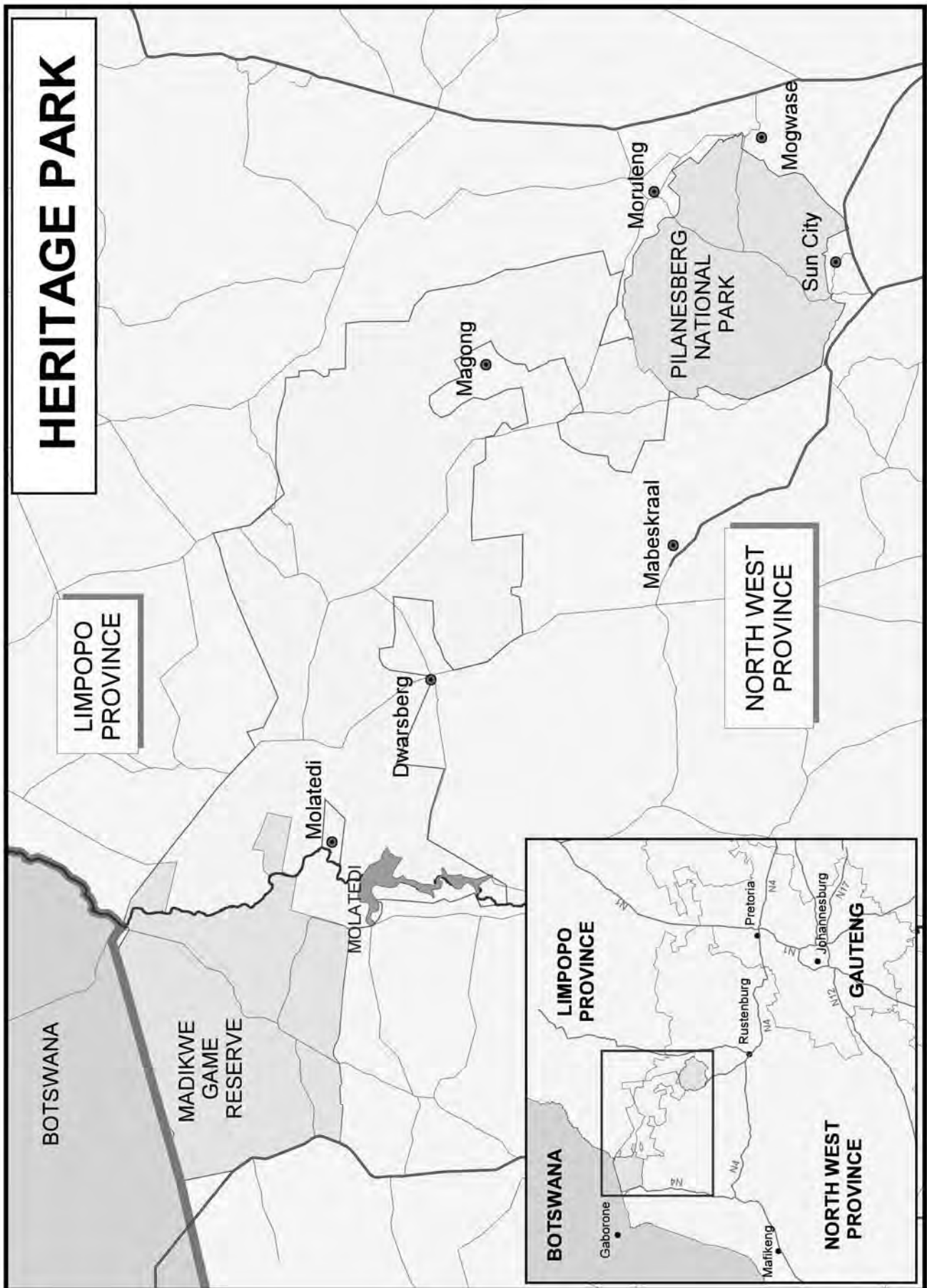


Figure 1—Heritage Park map.

agriculture in this semi-arid bushveld region, on the border with Botswana. The Madikwe Model, where a Protected Area was established to provide financial benefits to poor local communities, was a pioneering project in South Africa. MGR was established on degraded cattle farms. Fourteen years later, MGR has a proven success record as a socio-economic anchor project.

The calculated benefits from MGR over its development phase show an investment of R110 million (U.S. \$15+ million) by government and R224 million (U.S. \$31 million) by the private sector. A wage bill of R67 million (U.S. \$10 million) had been paid out for temporary jobs during this development phase. Compared to 80 agriculture jobs when the land was farmed, 650 direct permanent jobs have now been created in 27 operational luxury lodges. Considering the multiplier effect in the tourism sector, this translates to the creation of more than 2,500 jobs in the greater economy. Currently, the wage bill for permanent employees within the private lodges in Madikwe alone amounts to R90 million (U.S. \$14 million) per annum. A number of small local businesses also benefit through supplying wood, goods, and services to lodges and to park management. Four tourism concessions have been allocated to local communities on a competitive basis. One community lodge is operational, one is currently under construction, and the other two lodges are in the planning phase. The visitor numbers to Madikwe are almost 40,000 per annum.

The most important studies<sup>2</sup> that have shaped the development of MGR are:

- The development and restocking plan for Madikwe Game Reserve in 1991 by Willie Boonzaaier and Johan Kloppe (Madikwe Reserve Masterplan Proposals, April 1991);
- The regional plan by Settlement Planning in 1992 (Madikwe Reserve Regional Plan, October 1992);
- The management plan for Madikwe Reserve by the Madikwe Development Task Team in 1997 under editorship of Philip Johnson (The Madikwe Game Reserve Management Plan, August 1997);
- The financial and economic approach of Madikwe Game Reserve by Richard Davies, Carl Trieloff and Michael Wells in 1997 (Financial and Economic Objectives and management of the Madikwe Game Reserve, October 1997); and
- The partnership approach of Madikwe Game Reserve by Richard Davies in 1997 (Madikwe Game Reserve—a Partnership in Conservation, October 1997).

## The Heritage Park Expansion Model

### Components of the Model

The most important components of the Heritage Park model are reflected below.

<sup>2</sup> Studies on file: Contour Project Managers CC, Reg. No CK 91/30370/23, PO Box 4906, Rustenburg 0300, South Africa, email: contour@mweb.co.za.

**Significant Protected Areas in place.** Two successful Protected Areas, PNP and MGR, are established, both with a successful history of benefits to the management agency itself as well as to neighboring communities. This engenders a positive attitude and confidence among politicians, adjacent landowners, and the investment community. In addition, the region is established as a tourism destination with a growing tourist demand.

**Structure.** A competent and experienced management agency, the NWPTB is in place with the necessary legal mandate, policies, legal tools, institutional framework, and management capacities to manage this expansion model, which is based on land incorporation and partnerships.

**Support Through Awareness.** It is an absolute imperative that at least the political and community leaders, as well as the affected landowners, obtain a better understanding of the conservation and tourism environment, the model and its costs and benefits before they can be expected to support and constructively participate in a project of this nature. The fact that a history of conflicts exists between protected areas and landowners and communities and/or mining companies, and the fact that the different government departments may have conflicting ideas about the best use of the land, makes this aspect the most significant and time consuming challenge.

**Shared Vision and Commitment.** Unless the authorities and the landowners have a shared vision and unless they formally commit to each other as well as the project, the project is bound to fail and will therefore remain a pipe dream. Great effort has to be made to get firm written commitments as soon as possible in the project cycle. The need for partnerships cannot be overstressed.

**Signing for Land Incorporation.** A further requirement of the Heritage Park Expansion Model is that landowners should be enticed to incorporate on a voluntary basis. This requirement came about as a result of the NWPTB coming to the realization that they need not require the land to obtain conservation objectives. The examples in KNP and other areas in South and Southern Africa assisted in this regard. As soon as landowners and communities get the impression that they will be forced to participate, they can be expected to start questioning the motives of the lead agency and will start resisting and undermining the project. Therefore, honest negotiations combined with constant and open consultation and communication is essential.

**Statutory Framework.** The new Protected Areas Act in South Africa now makes it possible to formally proclaim private and community held land as Protected Areas, provided they meet with the necessary requirements.

**Stimulate.** It is necessary to create a positive and conducive climate, by proactively promoting the model and assisting voluntary landowners to participate in the program. To stimulate and sustain interest and remove impingements is essential for success.

**Support Infrastructure.** The Heritage Park project needs to be firmly integrated with the Local Economic Development Plans to ensure infrastructure is developed in an integrated fashion. Synergies created between municipalities and the



Heritage Park have many service delivery advantages for local communities and tourism operators.

## The Process

The Park Expansion process that was followed comprises the following steps.

### Concept Plan

A Concept Plan was developed in 2002 as an initial discussion document in consultation with key stakeholder representatives, to inform stakeholders and to direct and guide possible further planning and implementation processes. This Concept Plan formed the basis for further discussions with stakeholders who participated in the molding of a Business Plan for Phase 1. A Strategic Environmental Assessment is currently being done through which the Concept Plan will be updated with more recent information.

### Public Participation

During the planning phase, a full public participation program was followed (see fig. 2).

### Phase 1 Business Plan

A Phase 1 Business Plan was developed in 2003 by elected representatives from recognized social structures within the

target communities, who were assisted by a technical team comprising ecologists, park planners, tourism researchers and social scientists.

Situational Analysis studies were conducted to assist stakeholders in making the correct choices in terms of future land use options. These included (1) topographical assessments that mapped all relevant features and support infrastructure, (2) road counts to determine possibilities for future road closures and re-alignments, (3) soil and vegetation surveys that identified sensitive areas and unique and attractive features, (4) market research and gap analyses to determine demand and growth trends and potential tourism options, (5) demographic analyses to determine human and social dynamics and needs, and (6) expected economic impacts based on historical case studies within PNP and MGR.

The final prognosis was that the Heritage Park could make substantial contributions to the conservation and socio-economic objectives of the North West Province. The predicted results for the first phase, which represents about 50 percent of the corridor, indicated the requirement for an infrastructure investment of R43 million (U.S. \$6 million) and a further R60 million (U.S. \$9 million) for game introductions. It was, however, estimated that this investment of R103 million (U.S. \$15 million) would leverage a private sector investment of R451 million (U.S. \$64 million) in tourism products, increasing the conservation footprint, eco-tourism product, and game populations of the region by 50 percent over a period of 10 years. This would result in 1,500 construction related jobs, 905 permanent jobs in park

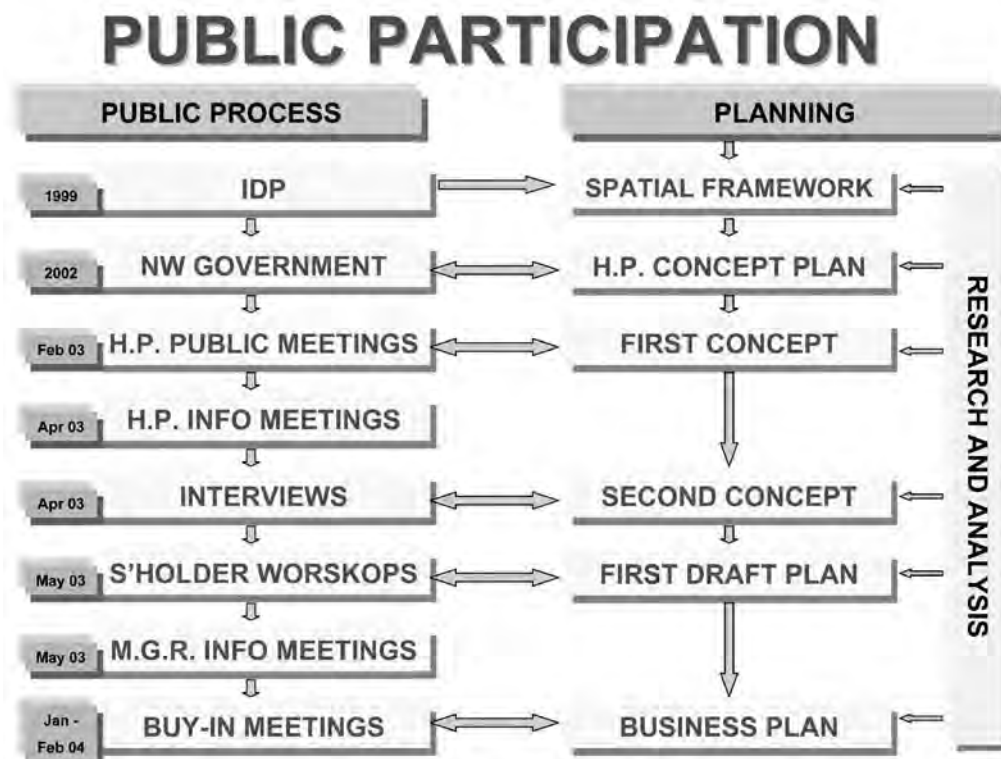


Figure 2—Public participation process during the planning phase.

and lodge management, 1,730 indirect jobs, a wage bill in temporary jobs of R123 million (U.S. \$18 million), and an annual wage bill in permanent jobs of some R32 million (U.S. \$5 million).

## Lead Partners

After having obtained provincial support, the NWPTB formally entered into a Memorandum of Understanding in April 2005 with their mother department, the Department of Agriculture, Conservation, Environment and Tourism, the two affected District Municipalities and the two affected Local Municipalities. The six partners jointly committed to the project and clarified roles and responsibilities in line with their respective mandates.

## Institutional Capacities

In 2003, during the planning phase, the key stakeholders comprising the aforementioned lead partners, the traditional leadership, key government agencies, and participating landowners formed a Steering Committee that was tasked to draft an Implementation Plan based on the recommendations of the Phase 1 Business Plan. By September 2005, they had met for 20 consecutive months since inception to

develop an Implementation Plan and to guide it through its first phases of execution.

The project management and secretariat service functions, as well as certain technical tasks, were contracted to a project management agency (Contour Project Managers).

The six key government partners are currently the only funding partners of the project. They registered a nonprofit company to manage the affairs of the Heritage Park. The Heritage Park Company will not own any land, game, or infrastructure because it is established purely as a facilitation entity. The land and game will belong to the appropriate landowners, whether it is the state, private sector, or communities. Between them they will have appropriate management capacities and institutional arrangements to govern the day-to-day administration of the Protected Area.

The Heritage Park Steering Committee and the newly formed Heritage Park Company set up working groups made up of specialists within the partner agencies that provide technical advice and support. The Heritage Park Company will make policy and direct the process, while the Steering Committee that represents a wider interest group will participate in a review session of the Implementation Plan every six months. Figure 3 illustrates the structure, roles, and relationships between the different components of the institutional model.

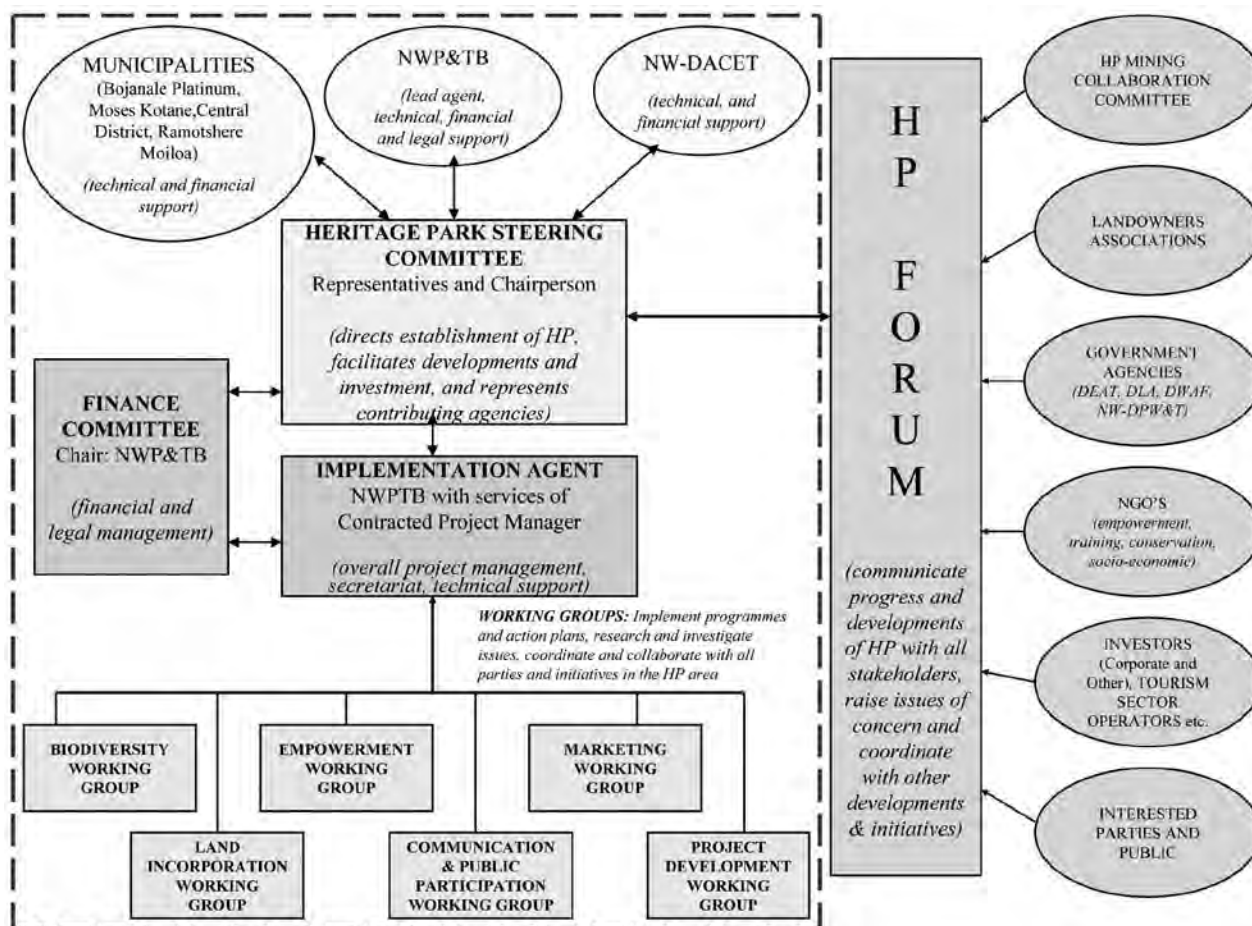


Figure 3—Institutional arrangements.

## Implementation Plan

The Implementation Plan addresses all the requirements of the model. The Implementation Plan is made up of three Programs. Each Program in turn is made up of several Action Plans. The Programs with their Action Plans are:

1. Commitments by Key Role Players (Final Buy-in Key Role Players, Support Agencies, Funding, Land-Right Issues, Negotiate Land Incorporation)
2. Marketing and Communications (Marketing, Communications, Investment Procurement, Public Participation)
3. Capacity Building (Institutional Structures, Technical Support, Empowerment Services)

## Review Process

During the biannual review process of the Implementation Plan, the results are measured against the objectives, strategies, and standards of each Action Plan within each Program. The Implementation Plan is then revised to address shortcomings and new challenges and to capitalize on successes and newly identified opportunities. The first review workshop was held during January 2005 and the revised Implementation Plan was approved in March 2005.

## Technical Support

The secretariat and working groups provide technical support in the form of project management and secretariat skills, educational tours, and interactions with comparable case studies, public participation and workshop facilitation, and standardized documentation such as landowner association constitution and land incorporation agreement templates, investor procurement processes and documentation, design criteria and specifications for protected area infrastructure, etc. Specialist advice and services include planning, marketing and communication, legal and contractual, empowerment services, funding procurement and investment procurement.

## Interested Land Owners

It was expected that landowners would only start expressing interest towards the end of this year. There was hope that interest for approximately 70,000 ha (172,974 acres) would be expressed by 2008; however, current interest already represents 100,000 ha (247,105 acres) within just more than one year of implementation. Figure 4 shows the current status of negotiations with interested landowners.

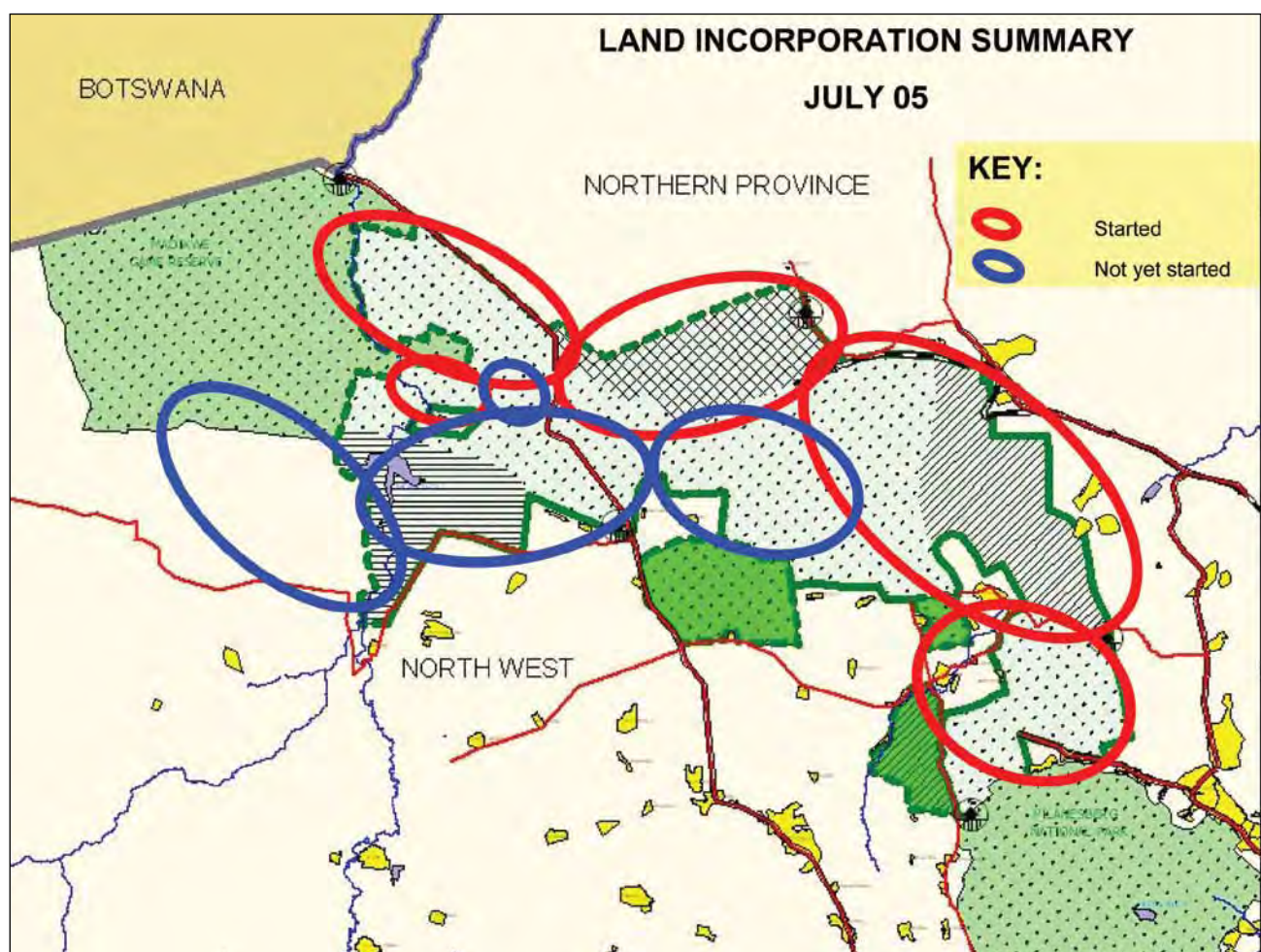


Figure 4—Interested landowners as of September 2005.

## Conclusions

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It is still premature to conclude on the acceptance or rejection of the hypotheses, as the Heritage Park Expansion Model has only been in its post planning implementation phase for a period of less than 2 years. However, considering the limited funding, significant progress has been made in addressing the diverse challenges of establishing a conservation corridor, following a philosophy of voluntary incorporation in a poor rural area.

The evaluation of the components of the Heritage Park Expansion Model has the following results.

1. A common vision has been created and commitments have been received from all key stakeholders.
2. Collaboration with Department of Land Affairs to achieve national Land Reform objectives is successful.
3. A collaboration agreement has been entered into with the mining companies for the joint planning and development of the area.
4. Landowners have expressed much greater interest much sooner than expected.
5. Awareness has been created among target communities and stakeholders and significant exposure has been obtained through media coverage of various events.

6. An open participative process has been followed.
7. Institutional structures are in place.
8. Technical support is in place.

At this rather early stage, the partnership and evolutionary approach of the Heritage Park Expansion Model already appears to be a successful mechanism in overcoming challenges and achieving goals in a complex socio-economic and political environment in a poor rural area of South Africa.

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# Making Connections Beyond the Choir

David Johns

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**Abstract**—Conservationists rely heavily on support from sectors of the population that want wildlife and wild places protected, but for whom it is not a priority. Support for conservation is widespread but not deep and seems to be weakening. This must be changed. Some of the obstacles are material—such as, fewer people have spent any part of their childhood immersed in nature. But many of the obstacles to deepening support among various constituencies rests with conservationists' prejudices: a belief that if people know the facts they will do the right thing; that truth by itself can overcome propaganda; that people are persuaded to act by argument. The evidence runs contrary to these assumptions. People are motivated by their needs and emotions; most political action is not the result of conscious decision processes; people respond to information encoded in symbols and stories, both religious and secular, to which they have been socialized; ritual and organization are more important than belief in motivating and sustaining political action. Conservationists, by using these findings and becoming more adept at understanding and speaking within the framework of existing mythologies and symbolic systems, can become more effective at mobilizing key constituencies.

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## Motivating Important Audiences

Some years ago the astronomer Timothy Ferris was asked why Americans were so enthralled with space exploration—especially in light of its expense and the many problems society confronts. His answer: many of us want to know whether we are alone in the universe.

To conservationists Ferris's explanation seems absurd. We are not alone. We are surrounded by life. How could an astute, thoughtful observer like Ferris miss this fact? I cannot say for sure in Ferris's case, not having had the opportunity to ask him. But more generally the answer is this. We miss the obvious—that life surrounds us—if we are not emotionally connected to it. It is this connection that generates meaning. It is the lack of this connection that proximately accounts for the timid social reaction to the accelerating loss of wildlife and wild places. Although conservation has made important progress in the last several decades, the overarching trend is one of loss.

Changing this situation will require the mobilization of important sectors of society that have up to now not acted on behalf of conservation. As Bruce Babbitt, U.S. Secretary

of the Interior (1993-2001), admonished conservationists: don't expect me to do the right thing, make me. We must catalyze the action of millions and forge more effective alliances with other powerful political players. Both of these goals depend on more effective communication. In short, the most pressing questions we face are not ones of biology and ecology, but of politics.

There are many aspects to mobilization—the process by which people come to devote their time, money, skills and other resources to collective political action. These include identifying important audiences, understanding what moves them, developing a strategy, and figuring out what they should do and when in order to achieve policy goals. Here, I focus on one element: how to speak effectively to the audiences in a way that will maximize the likelihood of mobilization. The principles are general; the examples are North American.

A first step is to dump some bad assumptions. Some conservationists think that if we give people information they will do the right thing. Some are only satisfied if people act to protect nature from the purest of motives, rather than for whatever reason moves them. Some fail to grasp just how diverse are the many constituencies that must be reached; conservationists talk to the world as if they were talking to themselves. And too often they offer answers to people who are not yet asking the questions. At root, conservationists tend to confuse the way the world is with the way they want it to be. Good strategy seldom emerges from such confusion. Conservationists need to remember that most of the people we need to mobilize are:

- Not scientists
- Not always well educated
- Often not interested in politics
- Concerned about conservation, but it is not a top priority
- Not readers

Some sobering statistics on the last point, again with a North American emphasis: 80 percent of Americans say they get their "news" from television. (National Public Radio's audience is a little over 5 percent of the radio audience, up from 1 percent 20 years ago; but radio listening overall is down.) Less than 30 percent read a newspaper daily. Those Americans who do read the press are not reading the New York Times or Washington Post, let alone the Guardian or Globe and Mail. They're reading USA Today and local papers that feature headlines about traffic accidents and local violence or scandal. According to recent polls by Gallup and ABC, 61 percent of Americans believe Genesis is literally true and say that religion is very important in their lives. The numbers are 28 percent for Canadians and 17 percent for the British. When D. H. Lawrence said that people want and need magic, mystery, and miracle he apparently had Americans in mind.

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In: Watson, Alan; Sproull, Janet; Dean, Liese, comps. 2007. Science and stewardship to protect and sustain wilderness values: eighth World Wilderness Congress symposium: September 30–October 6, 2005; Anchorage, AK. Proceedings RMRS-P-49. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.



To protect the natural world, to heal the many wounds we as a species have inflicted, we must catalyze mass political action. People must act politically to bring the pressure needed to change policies, and they must act personally in ways that are at least benign toward Nature. Fortunately there is little magic and mystery in understanding what causes people to act. People act based on emotion, need-states, and values linked to the sacred and a sense of efficacy.

Emotion and motivate come from the same root—to move. We need only reflect on ourselves to realize the power of emotion. We feel love for Nature. We fear that we're losing it. We're angry at those destroying it. Our emotions are what connect us to the world, they're our primary means of adapting to it. To be effective we must arouse strong emotion. Information and facts alone can't do that.

Even when we aim at emotion we frequently forget that many of those we need to mobilize are not moved by what moves us. We all have the same emotions (within a range of variation) but they are aroused by different things. We need to understand what arouses the group of people we are talking to and touch that. Some years ago, in an effort to halt the decimation of parrots by smugglers in the Caribbean, conservationists tried a new approach. Instead of appealing for the protection of the birds based on love or respect for nature per se, they appealed to nationalism and patriotism. Arguments that capturing and selling parrots to rich countries was a betrayal of one's national heritage and perpetuated neocolonial relationships achieved results.

Need-states are also powerful motivators. We need healthy food, clean water and air. We need to belong, to be valued, to love and be loved, to be creative, to believe in something bigger than ourselves. We need the wild. One of the problems with need-states is that they are easily co-opted, deformed, or we are distracted from them and settle instead for socially approved compensations. We don't belong, so we shop. We lack love, so we seek power and control. Conservationists must become better at penetrating these deformations and compensatory distractions and tap into genuine needs. When we do, we will unlock tremendous energy, as other social movements have demonstrated in the past. It's not easy. People are often afraid of the needs they have buried or ignored. They are afraid of change. As Jefferson wrote in the Declaration, we often tolerate the oppressive because it is familiar. But toleration has its limits.

Values are also powerful motivators, notwithstanding the findings of neurobiologists who say that about 95 percent of our emotional and cognitive processing is non-conscious. Not unconscious in the sense of that which is repressed, but non-conscious as when excessive heat causes us to sweat, or eating causes us to generate insulin. Notwithstanding this we all have a need to explain the world to ourselves and to believe our explanation is correct and proper. That's morality. We invest much emotion in our values and understanding. At the root of our sense of propriety and values are basic, unquestioned (and usually untestable) assumptions. These constitute our sense of the sacred, which can be religious or secular.

Thus, if some people hold Genesis to be literally true it does little good to argue to them that they should protect Nature in order to protect the theater of evolution. (In any event, convincing people to accept scientific findings that do not fit preconceptions can take more time than we have—

think of Galileo.) We must speak in a language that people understand, e.g. creation is good according to the creator. We must remember that what's important is to protect Nature; the reasons why people protect Nature are secondary at best. I must add something very important here: in speaking to others we cannot misrepresent our beliefs or pretend to share their beliefs. We find common ground in our goal of protecting nature.

Tapping into a sense of the sacred is not enough. To act, people also require a sense of efficacy, that they can make a difference. We cannot create this sense, but we can reinforce it by what we say and do in an effort to involve people in action.

## Using Stories, Ritual, and Organization

How do we touch people at the level of emotion, need-states and values? There are long-term strategies like making sure kids get into the woods, but I want to focus on the nearer term. We have three primary tools to evoke the link between conservation and emotion, needs and values: story, ritual, and organization. Not all scientists or advocates will be comfortable with using all of these tools, but it is important to understand them.

We are storytellers in our very souls. We understand the world through story. We place our lives in the context of story. We enjoy stories. Many conservationists are master storytellers. But we need to do more of it. And we need to develop stories that resonate with the audiences we are trying to reach. Talking to ourselves is important in maintaining our own sense of identity, but we need to talk to all those others whose support is vital to conservation success.

Our stories need to find their way into film and music and other performance media. Most people do not read and few attend talks. Almost everyone listens to the radio and watches television or rents videos. Millions still go to the movies and attend concerts.

We must become much better at using ritual and inventing new rituals. Amongst ourselves we engage in ritual, but probably not enough. We have dinners and give awards. Many aspects of the conferences we hold are ritualistic: the pep-talk keynotes, the obligatory slides accompanying talks, poster sessions, the breaks for networking. The Yellowstone to Yukon listserv is called "waterpolo," named after the ritual late night games held in the swimming pools at forgotten motels that hosted coordinating committee meetings. Many of these activities are quite substantive, but all have elements that are constituted by patterned behavior that codifies invariant meaning, helping establish our collective identity and promoting bonding. It's true we rarely dance ourselves into a trance-state, but we frequently approach that during late night drinking sessions.

We come up short in utilizing existing rituals or in fashioning new, mass-based rituals that will attract others to the conservation movement. Ritual is important for two reasons. First, ritual involves a public performance. What people proclaim publicly obligates them more strongly than a private pledge. Second, ritual is collective. When people act together to proclaim a belief or in support of a cause it creates a bond and people are more likely to act again

together. Collective action can generate tremendous energy. When the U.S. Declaration of Independence was published in newspapers the general response was tepid. When the Declaration was read publicly and followed by burning King George in effigy the crowds were moved to action.

Finally, we need to utilize and create organizational structures that provide a home for people's ongoing involvement with conservation. Too often we excite people without giving them anything to do. Following an inspiring talk, those in the audience invariably ask: What can we do? Our answers are too frequently vague and uninspiring. Soon people lose interest in our vision. To ensure that people will act when we truly need them, we need to keep them involved continuously in work and play. Involvement need not always result in some accomplishment. It may simply help people bond with each other and with the organization. These bonds

sustain involvement. Mutual support is critical to action. In short, organization fixes the level of mobilization.

Understanding ecosystems and other species is not enough. We need to better understand our own species, what moves us, and how to harness what moves us in the service of conservation. Such understanding will not work magic, but it is indispensable to success. We are up against institutions with enormous resources and the will to use force. We can't match their resources nor do we wish to match their violence. So we must be smarter and not just in a disconnected cerebral way. We possess a love of nature and an empathy with life that is the source of a profound intelligence and understanding. If we combine that with a good understanding of the political tools available, we can achieve our goals. We must remember that the battle we fight is not just to realize the dreams of conservationists—the lives of countless creatures are at stake.



# Creating Institutions of Care: The Case for Democratic Forest Trusts

Gus diZerega

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**Abstract**—Strong institutional and systemic barriers prevent traditional political and economic institutions from effectively managing national forests in the United States. Despite consistent support for ecological values by the public, Congress does not protect them, and existing political institutions are not designed to respond effectively to citizens with these concerns. The major difficulty is that modern institutions do not effectively represent publics that are not geographically isolated.

On the other hand, tribes such as Wisconsin's Menominee in governing their commons have managed forests for very long periods. This is so even when they also engage in the market economy. This is because their institutions are responsive to deeper and more complex values than are contemporary impersonal modern ones. Even so, traditional forms of organization can teach us but cannot be copied. However, the National Trust of England, Wales, and Northern Ireland suggests a way similar values can be applied in a modern context. These insights are then applied to building a case for democratic national forest trusts to govern American national forests, including how they require independent organizing, financial independence, and can successfully attend to both local communities and the environmentally aware larger public.

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## Forests and Public Values

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One general principle underlying civil institutions is that economic and political feedback enriches but does not dominate decisions made by people who genuinely care about the values at stake. The key criterion for inclusion is that decisions made within civil society can consider on a reasonably level playing field the full ethical range of acceptable human motivations. It is here that ethically deeper dimensions to human life can expand beyond the sphere of personal relationships to encompass the wider world.

Our 147 national forests represent public values for many, probably most, citizens. Within this context of support, the forests are sites of serious contention among citizens concerned with their well-being, but motivated by often conflicting priorities. These concerned citizens are immersed within a larger sea of citizens for whom these values are of relatively little importance.

Usually those elected to serve the more inclusive community owe little in their victory to their views on national

forests. Most elected representatives find forest well-being of little importance unless they have a personal commitment. The dispersed publics that do care for them have often been unable to protect these forests against assault by private interests or malfeasance by public agencies charged with protecting them, except through the courts. But policy by lawsuit is a poor way to administer anything.

The Mountain Maidu are a small Indian tribe presently involved in implementing a tribal approach to forest management on 2,100 acres (850 ha) of Plumas National Forest. The tribe is working at restoring the oak and pine woodlands that predominate in the lower elevations of that region of the Sierra Nevada. Loreena Gorbet, a tribal member, is coordinating the tribe's activities with the U.S. Forest Service.

In a recent account of their activities, Gorbet was quoted as saying her tribe views itself as deeply enmeshed within their natural landscape. "The plants and animals—they're our relatives. We talk to them to find out what they need." This is the language of relationship and ethical involvement. It is not the language of the U.S. Forest Service. In Gorbet's words, to do her job she has had to learn to speak "Forest Service" (Little 2005).

There is also a larger problem here. The Maidu are native to the place, the Forest Service to Washington, DC. Each is adapted to its own very different niche. This is why, as Little (2005) suggests, the stewardship partners also approach forest management with diametrically different concepts of time. The Maidu's initial proposal involved a 99-year demonstration—an eternity to an agency that gets its funding on a year-by-year basis. The Forest Service eventually agreed to a 10-year project.

When dealing with a forest ecosystem, 99 years is a far wiser framework for action than 10 years. The Maidu can think in those terms because they have been in this area for much longer than that, and they hope to stay well beyond that. The U.S. Forest Service is attuned instead to political and economic standards of relevant time.

The Menominee Tribe of Wisconsin has managed their forest for 146 years now, and it is more healthy and diverse than any other forest in the state, including national forests (Davis 2000). Their customs and values developed in the midst of long association with their land. The Maidu share such a perspective.

The Forest Service itself is about 100 years old, having been created largely through legislation passed between 1905 and 1911. It possesses a great deal of knowledge about the political ecosystem on which it depends. However, the Forest Service rotates its rangers on a regular basis, mostly to keep them loyal to the service rather than "going Native." As a consequence, while Rangers have a considerable knowledge about the Service and its traditions, they do not have nearly so much about the particular locality where they happen for the moment to be stationed (Kauffman 1967).

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Like any large organization, the U.S. Forest Service's primary loyalty is to itself. Randal O'Toole emphasizes budgetary incentives as primary motivations behind Forest Service decisions; Nancy Langston, emphasizes agency autonomy (Langston 1995; O'Toole 1988). For our purposes, both observations apply.

The point is not that people with different loyalties cannot rise to leadership in the Forest Service. Some have. But they will do so while playing with a political deck loaded against them. The career and budgetary incentives facing the Service and its employees are dependent on political and economic processes long before they are dependent on scientific and ecological ones. Government agencies are focused on the budgetary year and subordinate other values to it. There is a deep disconnect between the political feedback most important to the Service and ecological feedback helping it attend better to the health of our forests.

In addition, Congress is institutionally incapable of providing long-term oversight for our national forests. Occasionally it can adopt reforms and make wise decisions, but once made, the public pressure encouraging these reforms dissipates. Those who would undermine the reforms' intentions for financial gain patiently remain, to subvert the legislation as the opportunity arises and the public's attention wanes.

A frequent problem with serving public values through traditional political institutions is that their power to tax and pass laws encourages efforts to capture legislative and administrative processes in order to serve private interests, or to subordinate public values to the interests of organizations established in the name of serving these same values. Sometimes such approaches cannot be avoided, and these problems are simply the inevitable costs of getting things done that need doing. But if public values can be adequately served by institutions lacking both the power to tax and the capacity to pass laws, they will be freed from major sources of corruption and distortion.

The Progressive Era ideal of dispassionate scientific administration of our national resources never really existed in practice. To even the most idealistic advocate of traditional political solutions, government is a poor protector of such values. Government agencies can successfully serve well-defined values with clear standards for success, such as landing a man on the moon or delivering social security checks, to pick what are otherwise very different examples. Performance plummets as the values they are to serve multiply and standards of attainment become vague (Wilson 1989). Multiple values and vague standards are characteristic of the complexities of our relationships with the natural world.

However, people have repeatedly devised institutions taking truly long run perspectives on our interactions with the natural world. Wisconsin's Menominee tribe has successfully managed their forest as a working woodland since around 1860. The Menominee forest contains a varied forest community, with many trees of old growth size and age. While only about twice the size of neighboring Nicolet National Forest, the tribe cuts twice the timber, with a saw timber cut thirty times greater. Yet their land still resembles the great forests that once characterized this region, and its outline of great old trees is visible from Landstadt satellite photos (Davis 2000). Central to the Menominee's success is integrating market values with other values held by the tribe.

We can learn from them but cannot simply copy them. Still, what we can learn is very important. First, it is possible for people to develop institutions able to sustain long-term human interactions with their environment. Second, their institutions were self-governing, their decisions not normally subordinated to any other body whose members were less concerned with the health of their lands. Third, these people did not manage their land to maximize their financial income. While their lands served economic needs, and most people in any society would prefer more wealth to less, they also honored non-financial values in their decision-making. Fourth, they knew their lands personally and intimately, and acted accordingly. For us, the critical question is whether these enabling elements are robust enough to provide long-term protection and management even when people are mobile, individualistic, and despite good intentions, usually ignorant of the needs of any particular forest, let alone forest ecosystems in all their variety and complexity.

## A Way Forward

Snyder has written that the public domain in North America constitutes a kind of national commons we "are all enfranchised to work on" (Hardin 1968; Snyder 1990). Unlike Hardin's misleading use of the term, the village commons of the Middle Ages and of many other places and times were managed by the community in order to preserve the land from exploiters (Ostrom 1990; Snyder 1990). But there is more to a commons than this. Snyder emphasized "the commons is both specific land and the traditional community institution that determines the carrying capacity for its subunits and defines the rights and obligations of those who use it, with penalties for lapses. . . it is traditional and local" (Snyder 1990, p. 30).

Public lands are not governed by communities that care about them. Most politicians are uninterested in their fate, at least compared to other values, and their votes are up for grabs. So the basic requirement for a successful commons does not exist at the level of national administration. The mediocre to poor results we have experienced should surprise no one. Consequently, Snyder advocates returning these public lands to regional control (Snyder 1990). But what defines the region? The small Sierra Nevada watershed where he lived for many years was well suited to his vision. But many areas are larger and less well defined.

Some political conservatives and advocates of western autonomy want to turn the public lands, including the national forests, over to the states. But these are genuinely public lands, of great concern to millions of Americans who do not necessarily live in the states where they are located, and whose taxes have long helped support these states and nearby communities. Simply living in a western state does not mean a person cares about these lands. More than one Westerner sees the land primarily through an accountant's eyes. No necessary connection exists between existing political boundaries and concerned publics.

State governments can be as open to other interests and little focused on their public lands as are the national governments. An early study comparing state to federal salmon protection observed "the greater vulnerability of the state conservation policies to pressure from groups whose interests

may be injured by regulatory action and whose influence counts more in state capitals than it does in the larger arena of national politics.” (Gregory and Barnes 1939, p. 39, quoted in Montgomery 2003, p. 143). This is as Founding Father James Madison would have expected; smaller polities are more vulnerable to influence by well-organized factions pursuing private interests at the expense of the community as a whole.

Another strategy increasingly mentioned for forest reform is increasing local control over national forest policy via “collaborative conservation” that focuses on local solutions by local stakeholders to local environmental problems. It has been identified by many Americans as a promising solution to establishing viable environmental policies (Brick and others 2001; Kemmis 2001). Kemmis, for example, emphasizes that due to the enormous amount of publicly owned land in most Western states, local citizens feel essentially colonized by a far away power over which they have no influence, and towards which they have considerable resentment. He writes when Westerners “balance their experience of joining with old enemies to solve hard problems together against the hidebound procedures of a national government and a national democracy that no longer seem to work, they feel they are the real democrat” (Kemmis 2001, p. 226). Ideas such as Kemmis’s are not simply theoretical. The Quincy Library group, consisting of people in extractive industries and environmentalists, devised by consensus a governing plan to cover three national forests, which won endorsement by 434 members of the House of Representatives.

There is much to recommend in collaborative models. However, with respect to national forests there is a basic weakness to purely local approaches to environmental management. Many, perhaps all, national forests have a genuinely national constituency. Local control would freeze out from policy discussions many citizens with a strong interest in their well-being, in favor of some who may care a great deal less.

The political power that ended the Forest Service’s rapid liquidation of all old growth forests came from aroused citizens at the national level, particularly in cities. Local communities were often deeply tied to business as usual, even when that business threatened their long-term viability. Once issues become more complex than what can be addressed by local knowledge, many small communities are all but powerless in confrontations with ruthless large corporations, as the citizens of Libby, Montana, have learned to their sorrow (Matthews 2000; Peacock 2003). Even with Quincy, the political strength possessed by local citizens proposing alternatives to logging came from being part of a national movement.

Yet local interests are disproportionately impacted by forest policies over which they exercise little to no control. Further, in many cases local knowledge and support will be vital components in developing effective policies able to be implemented successfully in a democratic system. Collaborative arguments focus on a key part of an effective solution to forest preservation, but define themselves too narrowly because they ignore the larger context of public values. They inappropriately apply a geographical conception of citizenship to an instance where it often does not fit. These interests deserve an important seat at the table, but they do not deserve all the seats.

## The Democratic Forest Trust

Institutions are needed that are responsive to Americans who care about the environment, while circumventing interference by politicians who don’t. In the case of our national forests these institutions also need to be open to all Americans, for they are public lands. Gary Snyder’s focus on local inhabitants is politically impossible to implement in this case, and probably not altogether wise if it were, but his model of a commons remains perhaps the only viable alternative to the failures of corporate forestry or political management.

A democratic land trust suggests a practical solution to this challenge. The land trust concept offers an alternative institutional framework for managing forests that is also harmonious with the political realities of American democracy. Trusts are a time honored means by which a person or institution is charged with protecting and managing the property of another, “in trust.” They are widely used in many areas of private life, and are becoming increasingly important in private conservation efforts. Trusts have also been used by many Western states to manage their forests, primarily for the benefit of schools. However, these state trusts serve financial rather than broader public values. Their financial orientation makes them inadequate models for preserving our national forests (Souder and Fairfax 1995).

Land stewardship trusts remove land from the real estate market, enabling it to be managed — “stewarded” — on behalf of future generations (Banighan 1990, 1997). Land trusts are traditionally non-governmental, non-profit organizations created to preserve the ecological, historical, agricultural, or wilderness value of the land. Land stewardship trusts focus on preserving and fostering sustainable forestry and agricultural practices, wildlife habitat, and recreation. Because key property rights to the land are removed from the market “in perpetuity” or for an extended period, their economic value cannot be used as collateral for obtaining loans. Operating funds must come from other sources, such as fees, membership dues, and donations. A firewall is erected between the land and domination by market forces. The price system guides but cannot command. Similarly, the law enables but does not control.

In the United States, land trusts are increasingly relied upon to protect environmental values (Brewer 2003; Forbes 2001). However, the history of American land trusts is brief, usually under 25 years, and most American trusts are small. Most are also not internally democratic. These limitations give reasonable pause to anyone trying to adapt land trusts to the care and protection of our national forests.

The National Trust of England, Wales, and Northern Ireland is another matter, celebrating its centenary in 1995. The National Trust’s properties now extend to 612,000 acres (247,668 ha) (about 1,000 miles<sup>2</sup> or 2,590 km<sup>2</sup>) in the United Kingdom, including almost 600 miles (966 km) of coastline, about 18 percent of the total coastline of England, Wales, and Northern Ireland. After the Crown, the National Trust is the largest landowner in the United Kingdom. It has over 3 million members and is very popular. The National Trust’s ability to incorporate ecological as well as historical values and its consistent acquisition of new land, even in densely settled areas, is impressive evidence of the concept’s promise.

The National Trust has a substantial democratic component. Anyone can join and thereby obtain voting rights. As of 2005, The National Trust has a Council consisting of 52 members, 26 elected by its membership, another 26 appointed by outside bodies. Direct management of the National Trust is through an Executive Committee, under which are a number of decentralized Regional Committees. Far from lacking political debate, the National Trust is frequently the site of vigorous campaigns by members seeking changes in policies regarding hunting, recreational use, and similar issues (Dwyer and Hodge 1996).

Enabling legislation could be passed so that National Forest Trusts could be established with primary responsibility for governing our national forests; one trust for each forest. Membership in each Forest Trust would require only that members pay a fee covering their membership expenses in order to join. Judging from the dues of modern mass membership organizations, such expenses would not be high. However, the hurdle of having to pay to join a Trust would ensure that only people genuinely interested in the forest and its fate would usually take the time to join. Perhaps, as Hess (1993) suggested, work-trade arrangements could be made for people lacking the means to pay even these modest fees. Work would also likely commit the laborer far more strongly to the forest's well-being than simply writing a check.

Enabling legislation should make it possible for Forest Trusts to be formed only if there is substantial popular interest. Open procedures and membership, and a means for ensuring a diversity of member perspectives would be required, but little more. Like a natural ecology, human communities are too complex for one size fits all approaches. Organizational details would be up to the membership and its Governing Board. Apparently the very act of organizing a self-governing body helps to create the trust, skills, and infusion of local knowledge that enables an organization to survive (Blomquist 1992; Ostrom 1990; Tang 1992).

A Trust would be established once enough would-be members have created an organization meeting legal requirements. To prevent one group from grabbing control of a board from the beginning, once created and certified, membership opportunities should be widely publicized for a year, after which election of the first Forest Trust Governing Board would occur. The Board would take over policy management after sufficient time has passed for consultation with the Forest Service during the transition.

The number of citizens needed to create a Forest Trust should vary because national forests themselves vary in size, proximity to citizens, and public interest. Probably some formula reflecting both the number of annual visitors and the immediate population in the region would be best. Clearly different numbers should apply to Umatilla National Forest in eastern Washington and Oregon compared to Wenatchee National Forest near Seattle. In all cases, numbers should be high enough to require sustained organizing and trust building to succeed, but low enough that such efforts have a reasonable chance of success.

The potential for a large American membership is high. The National Trust has 3 million members for a much smaller national population. Even when distributed among approximately 150 national forests, each Forest Trust would probably have many tens of thousands of members, some far

more than that. Some members would be nearby residents, often involved in extractive or recreational industries using forest resources. Many more, locals and non-locals alike, would be people making personal recreational use of the forest, and some would likely simply be people concerned with its well-being.

I suggest limiting membership to one. While any small number would work, "one person—one trust" emphasizes the centrality of the democratic principle of one person one vote and guarantees that each person would join the trust about which he or she most cared. Allowing only one forest trust membership per person, combined with care, encourages members to acquire significant knowledge about the issues facing the forest. Members will probably be disproportionately local, or live nearby.

This institutional arrangement could go far to harmonize the interests of local communities and ecologically sensitive oversight of forest lands. For example, today the U.S. Forest Service opens logging opportunities to bid, a seemingly fair process. But the contracts are usually for large areas requiring many employees, used briefly in any area. In addition, bidding procedures are complicated, and the contracts offer irregular rather than sustained work in any given area. These circumstances penalize small local firms (Danks 2003).

A pilot project developed in California's Trinity County suggests the kind of alternative arrangements Democratic Forest Trusts could institute. In 1997, a group of loggers, environmentalists, local contractors, Forest Service employees, and concerned citizens met after the county's largest remaining employer, a sawmill in Hayfork, closed down. They sought to find a way to recover from the loss in jobs and the crisis the county was undergoing. Danks (2003, p. 253) wrote, "The group determined that a properly scaled, multiyear, multitask contract that addressed all the stewardship needs of a given tract could provide steady, long-season work that would improve both the biological health of the forest and the economic health of the community."

As a result of these discussions, the Forest Service developed a contract oriented to the needs of the local communities and the needs of the forest. Local businesses won the bid, only to have it withdrawn later for lack of funding. Two more contracts along similar lines are currently being put together (phone conversation with Lynn Jungwirth, Executive Director, Watershed Research and Training center, Hayfork, CA). A democratic trust with considerable local membership would prove more compatible to following through with such opportunities, to the benefit of both the forest and neighboring communities. The Menominee example of creating their own sawmill to handle cuts from their forest is an instructive example (Davis 2000).

Several possibilities for Board structure exist, and the one selected should be the choice of those joining the Trust. A board might be entirely democratically elected. Another might have a mix of elected and appointed members, such as from local university Departments of Forestry and Biology (Hess 1993). However, any less than fully elected Boards should be subject to periodic membership approval to guarantee their democratic character.

The Board would decide basic policy and select subcontracting agencies for their implementation. The U.S. Forest Service would probably subcontract its services to the Board. However, to ensure the Service's responsiveness, the Board

must be able to contract with other agencies such as state departments of forestry. The option to choose another agency would keep the Forest Service responsive to the Board's priorities. It would have to adapt to them as well as it currently adapts to Washington, DC's political environment. Existing environmental laws and other statutes would remain in force.

The trust would be responsible for raising enough money to meet its normal costs. User fees of many kinds would probably be major income sources but, unlike the U.S. Forest Service, policy decisions would be determined by citizen members, most with no personally significant financial stake in the trust's income. There are other potentially important resource sources. In many contemporary land trusts and even national forests, volunteers provide considerable assistance. Additionally, private and foundation donations and grants could fund specific projects or, most importantly, help create a forest endowment that would grow over time. Given people's love for forests, it seems probable that in time endowments could become an important source of long-term financial viability.

Unlike market-oriented models of reform or state forest trusts as they presently exist, national forests would be under no institutional incentive to maximize profits. My emphasis differs here from O'Toole's pioneering work. O'Toole wants to fund trusts from net revenues, creating a powerful incentive to respond to market values (O'Toole 1995). However, to serve public values, the trusts should be institutions of civil society, and therefore partially independent from both government and market, and able to use any mix of revenue, donations, and volunteer labor they can acquire.

Lack of access to tax monies eliminates any incentives to subsidize extractive industries or other private interests. It also prevents Congress from using financial threats to interfere with forest policies. The forests would become much freer from political intervention by parties unconcerned with their long-term well-being.

One major problem would be the cost of fire suppression. While Congress will probably be willing to supply funding for such measures because they constitute considerable pork for local districts throughout the west, in the long run such an arrangement is undesirable. One alternative is for forests to take out insurance policies (Williamson 2005). One advantage is that as the forest becomes less vulnerable to catastrophic wildfire, premiums will go down, providing an additional incentive for wise management, the opposite of current circumstances.

In addition, forest trusts will be able to learn, adapt, and resist institutional sclerosis. The trusts' internal and external polycentricity encourages openness and adaptability. Because there would be many trusts, each with responsibility for only one forest, membership would focus on the needs of particular forests. With local members, local knowledge would be as accessible as more general and abstract principles of forestry and ecosystem stewardship when determining policy options and value choices. The Internet easily allows every trust to have a website where a wide variety of information can be made accessible to members at a minimal cost, encouraging the exposure and correction of errors and dissemination of successes as they are discovered (Ostrom 1991; Polanyi 1951).

Finally, compared to the needs of the electoral cycle, rate of interest, politics of the budget, and even individual financial concerns, democratic forest trusts will have long time horizons. In the United States these more short-term factors constitute legitimate elements of our social and political environment. But if they are the dominant institutional influences on environmental decision making, we can be sure that many shortsighted decisions will be made, with bad consequences for the forests themselves.

Most Americans already support environmental values. The trusts' independent status would be buttressed by millions of motivated citizen members opposing legislative overruling of trust self-governance in favor of private interests. They will already be organized and have close ties with the rest of society, protecting forests from Congressional and corporate intervention in their affairs. Further, they will have many non-member connections, through sympathetic friends and family members.

People who use the forest will observe for themselves the impact of managerial decisions. Renewal of directors through public debate and elections, where contrasting visions compete for the allegiance of voters deeply concerned with the forest's fate, would inhibit the rise of self-serving elites and in-grown administrations. Moskowitz and O'Toole (1993) have written a suggestive discussion of how small communities and ranches can cope with today's changing rural environment (see also Best 2003; Brighton 2003). However, unlike Moskowitz and O'Toole, diZerega, (1998) suggests their proposal for a development trust should remain in the hands of the people with a personal more-than-financial interest in the region.

Attempts to extend a common detailed formula describing what worked in one situation often fail when applied to different physical and social circumstances in another. Apparently the act of organizing a self-governing body helps to create the social capital and infusion of local knowledge that enables such an organization to survive (Blomquist 1992; Ostrom 1992; Tang 1992). Blomquist's careful study of community based groundwater management in California is instructive. Blomquist emphasizes, "One of the most important conclusions of this study is that there is no formula for governing or managing groundwater basins in southern California or elsewhere." (p. 330-331) Different governing structures arose dealing with the problems facing different basins. When attempts were made by the state to import a framework that worked in one area to another, the results were unsuccessful.

## Conclusions

Environmental thinkers as different as bioregionalists and free market economists have independently arrived at the insight that the commons model, where land is governed by a small number of people personally concerned with the land itself, is superior to both traditional private and traditional government management. The model creates an institution of care that does not fit into the sterile ideological boxes currently afflicting our society. It offers a practical framework buttressed by 100 years of experience in England, suggesting that given appropriate institutional contexts, modern westerners can practice a wise and sustainable approach

to the land. We, too, can plan on a 99-year scale, like the Mountain Maidu.

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# Friends of the Inyo: Eastern Sierra Wilderness Stewardship Project

Paul McFarland  
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**Abstract**—Friends of the Inyo is a non-profit, conservation organization dedicated to preserving public lands and wildlife of the Eastern Sierra. First founded in 1986, Friends of the Inyo hired its first staff person in 2000. Today, the organization enjoys a vibrant and growing membership of 500 individuals and employs three people—Executive Director, Paul McFarland (the organization's first staff person), Wilderness Stewardship Coordinator, Jamie Anderson, and Bookkeeper, Darren Jones. Together, they carry out a diverse program of monitoring, education, and natural history interpretation on the public lands of Inyo and Mono Counties, California. Over the last five years, Friends of the Inyo has led over 500 people, from locals to folks from South Africa and Denmark, on nearly 125 publicly noticed, free natural history outings and wilderness stewardship hikes; organized numerous Clean-up Days in and around locally popular recreation areas; and published numerous interpretive brochures in order to acquaint people with the stories of resident plants, animals, and rocks. The organization has also spent considerable time working to ensure that the public land management agencies—the Inyo National Forest and Bishop Field Office of the BLM—have sufficient resources to carry out their duties.

## Stewardship Project

To combat the perfect storm brewing in the Eastern Sierra with increasing visitor demand coupled with decreasing Forest Service management capacity, Friends of the Inyo established the Eastern Sierra Wilderness Stewardship Corps in May 2005 as an ongoing program to develop projects and recruit volunteers for work in wilderness areas on the Inyo National Forest. By actively connecting individuals and groups with ecological restoration work, resource monitoring activities, and recreational/interpretive development projects, we are working to deepen the public commitment to preserving our national natural heritage while actively bringing designated wilderness areas into compliance with regulatory and legislative guidelines. The Eastern Sierra Wilderness Stewardship Corps is alive and well in the Inyo National Forest wilderness areas of California (fig. 1).

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## Problems

The Inyo National Forest, located along the eastern edge of California, is one of the most heavily visited national forests in the nation. Within a five-hour drive from four of the West's major (and growing) metropolitan areas—Los Angeles, San Francisco, Reno, and Las Vegas—the grand mountain and desert vistas, pristine mountain streams teaming with wily trout, and thousands of miles of backcountry wilderness trails wandering through the High Sierra draw more visitors each year than Glacier, Yellowstone, and Grand Canyon National Parks combined. In 2003, nearly 160,000 hikers, anglers, climbers, and equestrians camped overnight in the Inyo National Forest's John Muir Wilderness. This number excludes day users, who, to judge by the cars filling trailhead parking areas, may increase this use number by two to three times.

Unfortunately, just as more and more people head for the hills to recreate, the capacity of the Inyo National Forest is rapidly declining. For fiscal year 2005, the Inyo National Forest is poised to lose over 20 field and specialist positions due to budgetary shortfalls. To put this in perspective, only 30 fulltime Forest Service employees out of a total of 4,000 in Region 5 (California) manage the nearly 4.5 million acres of Forest Service wilderness. This increasing use coupled with decreasing federal management capacity is creating a perfect storm for designated wilderness in the Eastern Sierra. Conflicts have already erupted over perceived damage to wilderness values, and recently proposed corrective management measures have been characterized as draconian. Given the current trend of decreasing staff and increased use, these problems and the resulting polarization are bound to magnify both locally and in the broader Forest community.

## The Solution: Putting People Back on the Ground to Care for Their Land

To bridge the gap between the public who owns and loves the designated wilderness areas of the Inyo National Forest, and public land managers who are entrusted with sustainable management of these national treasures, Friends of the Inyo established the Eastern Sierra Wilderness Stewardship Corps. Monies from the National Forest Foundation—2005 Wilderness Stewardship Challenge, matched by funds from a private foundation, were used to hire a Wilderness Stewardship Coordinator to implement a cooperative program of engaging citizens and organizations in active stewardship—ecological restoration work, resource monitoring activities, and recreational/interpretive development projects—within designated wilderness areas on the Inyo National Forest (Golden Trout Wilderness, John Muir





**Figure 1**—Owens Valley Native American environmental youth volunteers—happy Friends of the Inyo (photo by Friends of the Inyo staff).

Wilderness, Inyo Mountains Wilderness, Boundary Peak Wilderness, and Ansel Adams Wilderness).

The Wilderness Stewardship Coordinator works with Inyo National Forest wilderness managers and seasonal crews from the Student Conservation Association (SCA) to identify, design, and implement stewardship projects utilizing community volunteers. By engaging and empowering visiting and local wilderness users in the active management of their public wilderness resource, the Wilderness Stewardship Corps has created a deep and lasting connection between citizens of all stripes and past times, wilderness managers, and the land we all love. It is the hope of all involved with this project that the Eastern Sierra Wilderness Stewardship Corps will become a model for other “Friends” groups around the West working to become part of the solution.

### **Wilderness Stewardship Projects Completed as of September 26, 2005**

- Winnaduma Monument Road Closure, Inyo Mountain Wilderness—10 volunteers X 7 hours = 70 hours
- Fish Creek Valley Restoration and Trail Project—7 volunteers X 54 hours = 378 hours
- Campsite and Fire Ring Inventory (removal) of 7 lake basins—10 volunteers X 7 hours = 70 hours
- Sherwin Creek/Valentine Lakes Wilderness Volunteer Patrols—5 volunteers X 10 hours = 50 hours
- Native American Youth June Lake Project—25 local youth volunteers X 3 hours = 75 hours

- Mono Lake Committee L.A. Inner City Environmental Education—15 volunteers X 6 hours = 90 hours
- Mono Lake Committee Redondo Church Group—17 volunteers X 6 hours = 102 hours
- Fern Lakes Trail and Campsite Restoration—3 volunteers X 5 hours = 15 hours
- Sherwin Creek Trail Day and Lakes Basin Inventory—3 volunteers X 4 hours = 12 hours
- Gibbs Lake and Wilderness Tour Project—3 volunteers X 4 hours = 12 hours
- Walker Lake Restoration Project—15 volunteers X 6 hours = 90 hours
- Dana Lakes and Glacier Canyon Wilderness Clean Up—6 volunteers X 7 hours = 42 hours
- Green Lakes Wilderness Restoration Project—2 volunteers X 5 hours = 10 hours

### **Total Volunteer Hours = 1,016**

#### **Wilderness Project Details**

62 campsites removed and rehabbed  
 0.5 miles of road removed  
 36 pounds of trash removed  
 9 square meters of invasive plants removed  
 12 miles of trail work completed  
 82 miles of trails surveyed, toured, and scouted  
 121 volunteers engaged  
 124 hours on-the-ground work  
 1,016 volunteer hours invested

# Socio-Ecosystems and Urban Habitats

Margarita V. Alario

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**Abstract**—The Millennium Ecosystem Assessment (MA)—a United Nations effort to assess the health of major global ecosystems—reported that over the past 50 years, humans have changed ecosystems more rapidly and extensively than in any comparable time in history. Around two thirds of the ecosystems services (anything from fresh water to air) are being degraded or used unsustainably. Since 1994, the Chicago Wilderness coalition—a public-private alliance of well over 120 organizations—has pursued a concerted policy to restore and manage the ecosystems that surround Chicago (the third largest city in the United States) in an effort to contain the impact that urban pressures may have on their health. With time, this ecological restoration project proved to be both an institutional learning and adaptation management process for protecting socio-ecosystems.

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## Introduction

Urban systems and ecosystems are perceived and studied as worlds apart. The slow but steady realization of restoring and managing socio-ecosystems increasingly renders the separation of these types of systems unworkable from both analytic and practical points of view. The ecological restoration project in the greater Chicago metropolitan area has been an instructive player in what, from the sociological perspective, represents an institutional learning and policy adapting process. This research (1) studies socio-ecosystems and the process of their ecological restoration in Chicago, (2) traces the institutional learning process of the Chicago Wilderness Coalition throughout its ecological restoration efforts, and (3) examines the precedents of the Chicago Wilderness Coalition and the lessons learned that may apply to similar socio-ecosystem restoration efforts.

## Why and What Socio-Ecosystems?

Ecological restoration consists of rebuilding threatened ecosystems where they have deteriorated or already ceased to exist. It involves recovering the basic structure and essential functions of a given ecosystem disturbed or altered by invading forces. It is furthermore conceived as a science-based

approach to environmental management, which includes removal of invasive plants, reintroduction of native flora, controlled fires, brush cutting, and many other tactics. As environmental social scientists can attest, however, this description has more to do with fiction than with science. The reality for ecological systems is that the “big structures” and “large” historical processes have introduced socio-ecological dynamics ignored by this ecological approach. Urbanization, industrialization, and nation-state formation (Tilly 1984) as well as economic, technological, and scientific developments have left “no ecosystem behind.” These large social structural changes of the nineteenth to the early twentieth century are also a good starting point to trace the transformation of today’s social ecological systems or socio-ecosystems (Cronon 1991). More to the point, as the Chicago Wilderness experience shows, these natural ecosystems have become socio-ecosystems in yet another sense; they are fields of socio-political and scientific agreement, negotiation, contestation, dissent, and conflict. All indicators point to the fact that Chicago’s ecological restorationists came well equipped to manage natural ecosystems only to be surprised by the realities of socio-ecosystems. They soon learned that notwithstanding the sound scientific and managerial parameters of ecological restoration, socio-ecosystems demanded yet another ingredient: scientific analysis had to be coupled with public input and deliberation. With time, the restoration project in Chicago has constituted itself into a telling story of institutional learning and adaptive management processes whose lessons may be of value to other socio-ecosystem restoration projects. This is good news, and constitutes the environmental sociological parameters of this case study.

Ecological restoration efforts, as well as their threatening disturbance by modernization processes, have a long history in Chicago. Yet the empirical reference of this analysis dates back to the formation of what is known as the Chicago Wilderness Coalition in 1994, a public/private coalition that introduced a coordinated and systematic effort to the projects throughout the Forest Preserves of six counties in Chicago’s greater metropolitan area. They targeted the vast system of forest preserves set up decades before that had been conceived as urban/wilderness geographic overlaps. This is one of the great legacies of the Progressive Era and a gift to this city. Already in the early 1900s, 98,000 acres (39,695 ha) had become legally protected, a number that has grown to this date to 200,000 acres (80,937 ha) of forested land. It is important to stress the fact that these preserves were not conceived as city parks, but as wild land preserves with a conservation mission. The idea was certainly ahead of its time. Only in the 1990s did a coalition of initially 34 public and private organizations begin thinking specifically about what was to be conserved, and planned restoration projects accordingly (Barnes 1996). By then, most native fauna and flora had succumbed, due to surrounding urbanization and

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to ecological succession involving mass invasions of species such as European buckthorn and garlic mustard. There was forest, but it did not much resemble the pre-settlement habitat.

The ecosystem restoration program led by the Chicago Wilderness Coalition rapidly grew into more than 50 project sites and well over 100 organizations. The coalition initially included the Illinois Department of Natural Resources, the Field Museum, Brookfield Zoo, the Nature Conservancy, Sierra Club, and the U.S. Fish and Wildlife Service, to mention only a few. Under programs such as the North Branch Prairie Project and the Volunteer Stewardship Network, sites have been restored to prairie and savanna to re-create the natural conditions of pre-settlement times, prior to 1830. The goals of the project are various: (1) to document the natural biodiversity of the region, (2) to manage and even stop continued loss of critical habitats, (3) to restore natural communities on public and private lands, (4) to educate the public about the globally rare natural resources of the region, and (5) to promote conservation for future generations in this urban area (Alario 2000a,b; Mendelson and others 1993). Yet, restoring the original ecological integrity of natural units is not a goal that seems to be accepted at face value. There were, after all, other alternatives, including maintaining the viability of those existing ecosystems. By 1996, ecosystem restoration sites had become sites of contention, which led to an imposed moratorium in various counties including Cook County where Chicago is located (see A Chronology of Significant Events). The working concept of ecosystems applied by restorationists—a unit that identifies the interaction between biotic and non-biotic communities—had fallen short in classifying all the structural units of the socio-ecosystem community, including some key social actors and dynamics of social systems.

## Socio-Ecosystems: Coupling Institutional Learning and Adaptive Management

Despite the good intentions of all involved in the Chicago Wilderness Coalition early on, the restoration project was mired by disagreements and dissent. My contention is that experts and volunteers were well prepared to restore ecosystems, but were taken by surprise by the dynamics of socio-ecosystems. It seems that working on socio-ecosystems is as much about technical intervention as it is a learning process of negotiation, deliberation, and even managerial adaptation to the “up to the minute” input. We are well advised to learn from the Chicago experience.

In the fall of 1996, after nearby residents threatened court action, all restoration activities in Cook County were halted by the Chicago City Council. Some groups, including environmentalists, were widely known to oppose restoration projects because of the extent of woodland and tree eradication that was necessary to bring back native prairie. Some who lived near restoration sites were troubled by the amount of herbicides volunteers needed to apply in order to eradicate nonnative plants. Animal advocates worried about the destruction of habitats of currently existing fauna. And finally, others opposed restoration on ecological and aesthetic

grounds because restoration would threaten the integrity of existing forests. They also feared the uncertainties with the outcome of restoration projects. After all, restoration benefits are in the future and forest depletion is immediate. Both sides represented credible ecological positions and appealed to similar feelings. Both expressed a protective attitude and a high esteem for nature. Both were concerned about sustainability, though perhaps with somewhat different understandings of what is to be sustained (Alario 2000a; Alario and Brün 2001; Freudenburg and Alario 1999).

In brief, the restoration of socio-ecosystems can be counted as the single most important lesson in the institutional learning and adaptive management processes that ensued with the growth and development of the Chicago Wilderness Coalition.

The lessons from this case study became important not just in principle, but also in practice. Indeed, the following moves of the Chicago restorationists have become a much slower program of restoration, with projects under enhanced local control. This may be exasperating for some, yet the main point stands; the institutional learning and adaptive management process about the structural components and dynamics of socio-ecosystems have left more room for decisions to change over time, even differ by locality, but proceed after the whole project was threatened with paralysis. And as the popular saying goes, “the proof is in the pudding.” After years of socio-ecological work, people can see and stroll through the restored sites enhanced by both ecological and aesthetic values. Perhaps this experience can be reproduced and perhaps this is a model that can be applied to other socio-ecosystem restoration projects. Admittedly, this is a guess that has to be tested against the realities of each project. In any case, there is room for more research to prove the extent of its applicability.

## A Chronology of Significant Events

### Phase I:

- 1962–1970: Individuals begin independent work on restoration.
- Mid-1970s: Restoration activities are loosely organized.
- 1983: Illinois Chapter of the Nature Conservancy establishes a Volunteer Stewardship Network (VSN).
- 1985: Minor controversy arises regarding deer culling on Forest Preserve lands. Restoration continues.
- 1993: (1) Meeting of Illinois Biodiversity Leaders; (2) Forest Preserve District of Cook County receives \$1.8 millions from the USDA Forest Service; (3) FPD of DuPage institutes a Natural Areas Management Plan. Initial budget is 11.6 million; and (4) 19,165 acre Mid-ewan National Tallgrass Prairie is created at former Joliet Arsenal site.
- 1994: Formation the Chicago Wilderness project with 34 public-private groups.
- 1995: VSN assumes coordination role of 5,000 volunteers.

### Phase II:

- 1996: (1) Public announcement of Chicago Wilderness partnership (\$1.3 million, FY 1997); (2) Cook County Board President imposes moratorium on restoration

projects in all Forest Preserve Districts; (3) FPD of DuPage County introduces moratorium on tree cutting; and (4) First public hearing on Cook counties restoration held in Chicago.

- 1997: (1) Moratorium partially lifted. Volunteers resumed work under supervision of District personnel; (2) Restoration resumes in all sites, following County Board approved Land Management Plan.
- 1998: Debate over restoration guidelines is re-ignited.

### Phase III:

- 1999: Northeast Illinois Planning Commission, the planning agency for the six-county metropolitan area, becomes the first metropolitan agency in the nation to do so, adopts a Biodiversity Recovery Plan, as recommended by the CWC.
- 2000–2005: CWC constitutes itself as a major environmental player in the region, made up of about 170 public/private organizations. Restoration activities continue.

## Discussion and Conclusion

In problem solving as in conflict resolution, finding a solution or decision may be the ultimate goal, but many steps precede it, and these steps could often be characterized as experimental. The idea is not new. In the 1920s, John Dewey argued for the necessity of adopting a social experimental method in matters that concern public policy, which we are wise to apply to the restoration of socio-ecosystems. He insisted that, “policies and proposals for social action be treated as working hypotheses, not as programs to be rigidly adhered to and executed” (Dewey 1927). The key to successful social experimental design is to have a clear conception of desired consequences and of available resources. Given all prior knowledge, however, Dewey concluded that policies must be flexible and responsive to observed consequences. In spite of differences in protocol between scientific experiment and public policymaking, there are two shared features: outcomes are unsure, and both are learning processes that inform us for the next set of experiments or policies (Dewey 1927). With regard to policymaking, Kai Lee (1993) has insightfully argued that to the extent to which Dewey was right on target, it is important to ensure the participation of both concerned citizens and citizens with expertise in the formulation of policies. Dewey’s observations seem to match the policy transformation undergone by the Chicago Wilderness Coalition many decades later.

Although there is a considerable time gap between Dewey’s time and ours, combining his insights and our observations may prove relevant if we wish for some form of institutional learning and adaptive management. Chicago restorationists entered the scene with the best intentions: (1) to set controlled fires and rescue the forest preserves, (2) to restore ecosystems, and more ambitiously, (3) to create a biodiversity inventory of the region and to sensitize and educate the public about this natural wealth. These are all laudable goals, no doubt, so again, what happened? Against this background, an obvious place to start is to emphasize the analytic inaccuracy and practical mistakes that are carried out by planning to manage, not socio-ecosystems, but “natural” ecosystems. This oversight is unfortunate. We cannot wish away the determining factor of social actors or the impact of social systems dynamics any more than we can wish away the laws of gravity. Any institutional learning in this regard is good news. As in the case of today’s discussion, whether for purposes of restoring or managing, any continued effort to ignore the complexities of socio-ecosystems we do at our peril and the peril of those social and ecological communities that cannot represent themselves.

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# Citizen Monitoring and Restoration: Volunteers and Community Involvement in Wilderness Stewardship

Laurie Yung

**Abstract**—Citizen monitoring and restoration is increasingly viewed as a means to involve local communities in wilderness stewardship. This paper examines research on volunteers participating in five monitoring and restoration programs in Western Montana. Volunteers reported that they gained valuable skills, felt more connected with local wilderness areas, and made an important contribution to wilderness management as a result of participation in volunteer projects. Volunteers also reported that they are more likely to participate in public involvement processes related to wilderness management because of the volunteer experience, and that they would be more informed participants. Consistent with related research, we found that volunteers tend to be more educated and more involved in their communities prior to participation, when compared with the general public. We conclude that realizing the potential of wilderness volunteer projects to build community capacity and nurture civic engagement in wilderness stewardship decisions depends on involving a broad cross-section of local communities in the development, implementation, and evaluation of volunteer projects.

## Volunteering in America

Nearly 200 years ago, Alexis de Tocqueville (1835) lauded volunteerism as the key to democracy in America. In his wake, generations of scholars have made the same argument, that volunteering is critical to civic life in the United States (Wilson and Musick 1999). Most recently, Putnam (2000), in his book *Bowling Alone*, suggests that without volunteering, civic engagement in America would decline and negatively impact democratic institutions.

Volunteering in America is a widely studied topic, with well-funded annual research on the number of volunteer hours contributed by the populace, detailed estimates of who volunteers and for what types of organizations, and the economic contribution of volunteer activities. Volunteering is defined here as free labor provided by individuals through an organization. In other words, working for free for a church, hospital, or library is considered volunteering; spontaneously helping a neighbor or picking up trash is not considered volunteering. Volunteering is planned, directed

helping behavior. According to the U.S. Department of Labor (2004), 65 million Americans (nearly 29 percent of the population) volunteered in 2004. The median number of hours these individuals spent volunteering was 52.

Researchers in social work, psychology, sociology, and the health sciences have documented the broad benefits of volunteering and how participant well-being is enhanced through volunteer work (see Thoits and Hewitt 2001). Benefits include (1) enhancing mental and physical health, (2) increasing social capital and trust in government, (3) providing opportunities for learning and education, and (4) engaging citizens in critical public policy issues.

## Conservation and Volunteerism: The Rise of Citizen Science

In the realm of conservation, many non-profit organizations have long drawn on a volunteer base. During the last decade, volunteers have been increasingly involved in an enterprise known as citizen science, or citizen environmental monitoring. Citizen science programs involve the public in the collection of field data to monitor a variety of environmental conditions.

The longest standing of such programs involves bird monitoring, with the Audubon Society Christmas Bird Count providing an example of citizen science that spans over 100 years. The Cornell Laboratory of Ornithology also engages the public in a variety of backyard and local bird monitoring programs and uses the data to understand trends in bird migration and populations nationwide (Bonney 2001/2002).

Water quality and more general watershed monitoring also increasingly involve volunteers in data collection. In fact, most states in the United States currently have statewide volunteer water quality monitoring programs, and there are more than 700 citizen watershed monitoring programs nationwide (Flemming 2003). Volunteers also monitor weather conditions, invasive species, fish populations, coastline conditions, and the status of a variety of plants and animals. Many of these programs involve schools and youth in the collection of monitoring data.

Nationwide, 26 percent of these data are utilized by the federal government, in particular the Environmental Protection Agency. Approximately 56 percent is used by state agencies, and 55 percent by local governments or community organizations (Ely and Hamingson 1998). Volunteer programs are believed to provide critical data, and to involve the public in important conservation issues. According to Ely and Hamingson (1998), the primary goal of 84 percent of citizen science programs is environmental education.

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About 67 percent of such programs are seeking to establish baseline conditions.

## Wilderness Volunteers: Proposed Outcomes and Benefits

In the wilderness arena, volunteers are increasingly important to both monitoring and restoration. Wilderness volunteers build and repair trails, monitor flora and fauna, restore riparian areas, and inventory campsites.

There is increasing interest in organizing volunteer opportunities in wilderness, and increasing pressure on wilderness managers to utilize volunteers. As with volunteerism more generally, a variety of benefits have been postulated. Wilderness managing agencies face declining budgets and a growing backlog of on-the-ground needs; volunteers can accomplish some of this work at little cost to the agency. There is an increasing concern that the American public is out of touch with wilderness and public lands; volunteer projects bring people into wilderness and may build a constituency for these lands. Finally, there is growing interest in local community and public involvement in wilderness management; volunteers who are aware of resource conditions may be better equipped to engage in management decisions.

A variety of benefits and outcomes related to wilderness volunteering have been proposed in the literature, by non-governmental organizations (NGOs), and by land managers. Wilderness volunteers are believed to:

- Develop a personal connection to the places they work, thereby becoming invested in the future of these lands.
- Gain an understanding of wilderness stewardship, and the challenges wilderness managers face.
- Learn about science and how science contributes to management (in the case of projects where monitoring is a component of volunteer work). In this sense, volunteer projects increase scientific literacy and knowledge of how science improves stewardship.
- Become more involved in public participation processes and wilderness management decisions. Because volunteers are believed to become more invested in the area, and more knowledgeable about management issues, they are presumed more likely to participate in decision-making.
- Increase the capacity of their communities to participate in public land and natural resource management. Through volunteering, citizens learn about stewardship, gain valuable monitoring and restoration skills, and make connections with other community leaders. In this manner, they build the social capacity of their communities to tackle a broad range of natural resource issues.

While these outcomes are widely touted by NGOs and other advocates of volunteering in wilderness, there has been little systematic study of volunteer outcomes for work conducted on public lands and wilderness.

Research to date on citizen science programs provides some insight into the outcomes of volunteerism in the broader conservation arena. Many such studies focus on the learning and educational outcomes of such programs (see Brossard

and others 2005). In many cases researchers are interested in whether or not participants increased their knowledge of the environment and gained a better understanding of science (Trumbell and others 2000). Several studies also examined the reliability and accuracy of data collected by volunteers (see Brandon and others 2003).

In one of the only studies in this arena related to civic engagement, Overdevest and others (2004) examine whether volunteer stream monitoring in Wisconsin increases learning, political participation, and social networks. They found an increase in political participation, personal networks, and feelings of community connectedness. Overdevest and others (2004) claim that citizen science programs have the potential to “improve community environmental and civic capacity” through building skills and social capital.

While we can extrapolate to some extent from the limited number of studies on conservation volunteers in other fields, the benefits of wilderness volunteering need to be specifically documented for a number of reasons. An understanding of actual outcomes and the conditions that foster these outcomes will help wilderness volunteer programs to better achieve their stated goals. Documentation of benefits will further invest agencies managing wilderness in such programs, and assist them in focusing their efforts. Finally, continued funding of and emphasis on volunteer programs can only be justified if at least some of the touted benefits truly exist.

## Research Project

In this study, we examined the experiences of volunteers and the outcomes of volunteer projects through onsite and mail-back surveys. We examined outcomes related to learning and knowledge building, attitudes toward science and science literacy, community involvement and volunteering behavior, and views on the effect of volunteer projects on community capacity and involvement in decision-making. In this paper, we focus on a subset of survey results related to local community involvement and how volunteer projects might influence citizen involvement in wilderness stewardship. We examine the claim that volunteering in wilderness nurtures and builds civic engagement in public lands management, and attempt to measure this potential outcome.

We partnered with four NGOs in Western Montana in order to study a range of volunteers working on a variety of projects with different organizations. We also surveyed volunteers working on a project that we directed.

The participating organizations and projects included:

- Bob Marshall Foundation: Volunteers conduct trail maintenance and construction, and campsite restoration.
- Montana Audubon: Volunteers conduct surveys of cavity nesting birds in recently burned forests.
- Great Burn Study Group: Volunteers monitor recreation, wildlife, and invasive plants, and conduct some restoration work.
- Wildlands CPR: Volunteers monitor a variety of ecological conditions on decommissioned Forest Service roads.
- Wilderness Institute: Volunteers monitor invasive plants, inventory recreation impacts, and conduct some restoration work.



All projects were conducted on National Forest lands in designated Wilderness Areas, recommended wilderness, or other wildland areas.

Surveys were developed in collaboration with each organization, and focused on the proposed outcomes and benefits described above, as well as the individual priorities of participating NGOs. Thus, five similar, but not identical, surveys were developed to allow for comparison between the groups, and to reflect the differences between the projects.

Surveys were either administered in the field at the end of each volunteer trip, or by mail at the end of the field season, depending on the nature of the project. More than 75 percent of the participating volunteers completed the survey (N = 138). Repeat volunteers did not complete the survey more than once (most projects included some repeat volunteers). All study participants were adults 18 years of age or older.

The results reported in this paper include descriptive statistics for those items common to all five surveys. Percentages cited in parentheses after survey responses indicate the percentage of survey respondents who selected that answer. Differences between the groups are not presented in this paper.

## Research Results

**Volunteer Demographics, Motivations, and Community Involvement.** We found that 73 percent of the volunteers were local community members living within a few hours of the project sites. Volunteers were very well educated, and the average age was 34. About half of the volunteers were students, and half were employed. (Only a handful were full-time parents and only 9 percent were retirees. However, there were substantial differences in retiree participation between projects, with two projects involving 17 percent and 27 percent retirees respectively and the other three involving no retirees.) Most volunteers were experienced hikers and backpackers, and roughly half had previous experience with monitoring and restoration work. Volunteers cited a number of reasons for participating in these projects, including:

- To visit that particular Wilderness or National Forest (62 percent)
- To give back to the Wilderness or National Forest (51 percent)
- To learn new skills (41 percent)
- To meet people with similar interests (28 percent)
- To help the Forest Service (20 percent)

Volunteers were very involved in their communities. More than 76 percent volunteered for other organizations, and they volunteered an average of 23 days per year (compared to the national average of 52 hours per year). Nation-wide, the majority of volunteer work is performed for religious organizations, but we found that wilderness volunteers tended to volunteer most often for conservation organizations (while also putting in time for schools and youth programs, civic groups, and religious organizations). Participants in this study volunteered for the following organizations:

- Conservation organizations (46 percent)
- Schools and youth programs (23 percent)
- Civic groups (19 percent)
- Religious organizations (16 percent)

Consistent with previous research (U.S. Department of Labor 2004), study participants cited lack of free time as the biggest barrier to volunteering.

**Project Contribution to Wilderness Stewardship.** Volunteers reported that the projects in which they participated made valuable contributions, and that such projects were important for conservation. When respondents were asked if they agreed or disagreed with the following statements on a scale of 1-5 (with 1 labeled as strongly disagree and 5 labeled as strongly agree), more than half of the volunteers reported that they agreed or strongly agreed by circling a 4 or 5. Reporting on their own experience with the volunteer project, the vast majority of respondents agreed with these statements:

- I feel more connected to \_\_\_\_ Wilderness/National Forest as a result of this trip. (89 percent)
- I made a valuable contribution to \_\_\_\_ Wilderness/National Forest. (78 percent)
- The information collected through this project will be helpful to wilderness management. (79 percent)

When answering about volunteer projects more generally, the vast majority of respondents agreed with these statements:

- Volunteer projects foster an important sense of stewardship (88 percent)
- Volunteers provide valuable information for wilderness/public land management (89 percent)
- Volunteering is critical to conservation of wilderness/National Forests (82 percent)

Volunteers felt more connected to the area where they volunteered, and believed they made a valuable contribution to the area and its future management. Furthermore, they believed that volunteer projects fostered a sense of stewardship, provided valuable information for management, and were critical to conservation. That respondents agreed with these claims at levels well over 75 percent indicates strong, widespread agreement among the volunteers about the value and benefits of such projects.

**Volunteer Involvement in Wilderness Issues and Public Land Management.** We were particularly interested in the involvement of volunteers in wilderness issues and public land management prior to their participation in the study. We also wanted to assess how participation in the volunteer project might affect their future involvement in wilderness management.

To better understand level and frequency of involvement prior to participation in the volunteer project, we adapted a scale from the Overdevest and others (2004) survey of volunteer stream monitors in Wisconsin. We asked each volunteer if they had participated in a variety of activities during the last 12 months. These activities were categorized as passive or active engagement in public land management based on the level of effort and investment required. The percentage of volunteers who reported that they had participated in the following activities during the last year is reported in parentheses.

### Passive Engagement in Public Land Management

- Talked with friends and family about wilderness or public lands issues (91 percent)



- Engaged in personal reading or research about wilderness or public lands issues (73 percent)
- Volunteered for local wilderness or conservation groups (48 percent)
- Joined (or renewed your membership in) a group focusing on wilderness or public land management (47 percent)

#### **Active Engagement in Public Land Management**

- Attended a public meeting to discuss wilderness or public land management (32 percent)
- Wrote a letter to a land management agency about wilderness or public land management (23 percent)
- Contacted a public land manager to discuss wilderness or public land management (12 percent)
- Wrote a letter to the editor of your local paper about wilderness or public land management (12 percent)

While most volunteers were not actively engaged in public land management or public involvement processes related to public lands decision-making, we suspect that reported levels of participation far exceed the general population, indicating that individuals who volunteer for wilderness are already active in wilderness and public land management issues.

Volunteers were also asked how participation in the volunteer project would affect their future involvement in wilderness stewardship. The vast majority of study participants agreed or strongly agreed with the following statements:

- As a result of this trip, I am more likely to participate in public involvement processes about wilderness/public land management (66 percent)
- I will be a more informed participant in wilderness/public land management as a result of this project (72 percent)

Volunteers believed that they would become more involved and be more informed participants as a result of volunteering. Interestingly, only 25 percent reported that their participation in the volunteer project meant that they would have an increased ability to influence decision-making.

In reporting their views on wilderness volunteering more generally, study participants agreed that volunteer projects built community capacity. More specifically, they reported that:

- Volunteer projects build community capacity to work on wilderness and public land management (81 percent)

Volunteers not only imagined they would be more involved as individuals, they also saw benefits to broader communities.

## **The Federal Agency Role in Wilderness Volunteer Projects \_\_\_\_\_**

If we are interested in how volunteer projects change community-agency relationships, then the role of federal land management agencies in volunteer projects should be examined. Wilderness volunteers are usually organized in one of two ways. One, a non-governmental organization (NGO) works with wilderness managers to determine the projects and scope of work. That NGO then recruits, trains, and supervises volunteers, ensuring the completion and

quality of the work. Alternatively, wilderness managers can develop volunteer opportunities and work directly with interested citizens. In this case, the agency trains and supervises volunteers, and they are responsible for the completion and quality of the work. In our experience, most projects involving volunteers in substantial monitoring or restoration are directed by an NGO, in close collaboration with agency staff.

In this study, we asked volunteers what the Forest Service could do to facilitate such projects. Respondents cited the following types of agency involvement as important:

- Organize more opportunities for volunteers (72 percent)
- Continue with current efforts (58 percent)
- Visit more with volunteers in the field (41 percent)
- Provide more feedback to volunteers in the field (33 percent)
- Provide rewards and incentives for volunteers (29 percent)
- Specifically thank each volunteer for their effort (21 percent)

Interestingly, while interaction with and appreciation from Forest Service staff was desirable, providing additional volunteer opportunities was far more important to respondents. When asked how important Forest Service involvement is in a project like the one in which they participated, volunteers answered an average of 8 on a scale of 1 to 10, with 10 labeled as very important. Only 1 percent of respondents thought that the Forest Service should simply stay out of the way with regard to volunteer projects.

Volunteers also expressed an understanding of how their work related to broader financial constraints within the Forest Service. More than 86 percent of the volunteers agreed or strongly agreed that, "because Forest Service budgets are declining, volunteer work is particularly important." However, 64 percent disagreed or strongly disagreed that "volunteers let the Forest Service off the hook for work that the agency should be doing." Volunteers view their work as filling an important gap in an era of declining budgets, but do not believe that volunteer projects result in an agency that is not held directly accountable for required work.

While volunteers want the Forest Service to provide additional volunteer opportunities, research and anecdotal reports indicate that many Forest Service staff resist these efforts. Grinnell (2005) identifies several reasons why Forest Service staff hesitate to take advantage of volunteer opportunities. Many required tasks are believed to be too complex for volunteers. Agency staff often have doubts about volunteers' commitment to complete the project. Agency staff are also concerned about gathering consistent and unbiased data. Furthermore, it is clear that many agency employees lack training in and time for working directly with volunteers, which requires substantial investment to ensure quality work and quality experiences for participants.

NGOs and the federal land management agencies need to work together to determine the most appropriate role for agency managers, which may differ project by project. Federal agencies also need to provide training for staff on how to work effectively with volunteers. Additionally, agency staff need to be rewarded for involving volunteers in agency work. Perhaps specific targets should be set for each National

Forest regarding volunteer involvement, so that Forests are required to invest in providing volunteer opportunities.

## **Influence of Volunteer Projects on Community Involvement in Wilderness Stewardship**

### **Self-Selecting Participants: The Challenge of Studying Volunteer Outcomes**

In this paper, we examine a subset of research results related to the influence of volunteer projects on individual and community involvement in wilderness and public land management. We ask whether or not and how volunteer projects increase civic engagement in the wilderness arena. Of all the benefits touted by advocates of wilderness volunteer programs, claims related to civic engagement are perhaps the most difficult to document, primarily because participants self-select.

Social science researchers have documented that people who volunteer share certain qualities. Volunteers self-select for participation and tend to be individuals with a greater sense of personal well-being. Volunteers are also more affluent and educated compared to the general public (Thoits and Hewitt 2001). While the study described in this paper did not measure income, it is clear that wilderness volunteers studied here are more educated and more involved in their communities and public land management, compared to the general public.

How then do we assess claims that volunteer projects nurture engaged citizens and increase community capacity? In other words, how do we isolate the influence of specific volunteer experiences on longer-term civic engagement? Since volunteers are already highly involved in their communities, how do you know what difference participation in a specific project makes? In this study, we used self-report measures requiring that volunteers assess and predict the impact of their participation on their future involvement (similar to the methods employed by Overdevest and others [2004] in their study of such outcomes). While most social science survey research relies on such self-report measures, as researchers we cannot definitively conclude that participants' beliefs that they will be more involved as a result of volunteering will actually result in increased involvement.

Research on volunteerism in general claims that volunteer characteristics such as community involvement, are enhanced by volunteering (Thoits and Hewitt 2001). Some researchers have followed volunteers over time and attempted to assess the impacts of specific volunteer experiences. However, even when volunteers are followed over time, it is difficult to determine what changes are due to general maturation versus the effect of volunteering (Wilson and Musick 1999).

On one hand, there are important claims being made about the effect of volunteering on civic engagement and democratic participation. These outcomes have important implications for wilderness volunteering. However, the measurement challenges described here cannot be ignored, and do not seem to be easily resolved.

## **Do Volunteers Represent and Engage Their Communities?**

A related dilemma exists when we consider how to involve communities in wilderness and public land management. If volunteers do not represent a cross-section of their communities, how does their participation build community capacity and increase community involvement in public land management? Research indicates that citizens who participate in natural resource issues are not usually representative of the communities impacted by management decisions (Marshall and Jones 2005). Participants tend to be wealthier, older, more male, more educated, and have a greater sense of political efficacy compared to the general population. Do these individuals engage their broader communities in natural resource management issues, thus creating a bridge between participants and the community as a whole? Community leaders may have an important impact on the overall social capital and capacity of the community as a whole. Furthermore, desires for broader participation may be unrealistic, given widespread constraints of work, family, and time. On the other hand, we should continue to critically examine claims that individual participation in volunteer projects lead to broader community outcomes.

## **Lessons From Abroad: New Models of Participatory and Community-Based Monitoring**

Internationally, we find numerous examples of citizen monitoring of protected areas. In October 2005, the journal *Biodiversity and Conservation* dedicated an entire issue to participatory, locally based, and community-based monitoring programs that span the globe. These programs involve local harvesters, hunters, tourism operators, livestock producers, and many other residents in the monitoring of a broad range of ecological indicators (see Danielsen and others 2005 for a review). In some cases, these monitoring programs are part of larger co-management projects. Moller and others (2004) claim that community monitoring programs can combine traditional ecological knowledge and traditional science in ways that build community capacity and relationships with managers. Protected areas can build on the traditional knowledge, experience, and monitoring methods of community members, while community members learn about traditional science and gain access to scientific tools and information.

To realize these benefits, volunteers must be much more than free labor. For projects to truly build community capacity and influence involvement in wilderness stewardship, volunteers must be engaged in the development, implementation, and evaluation of volunteer projects. In the case of monitoring, volunteers also need to be involved in the process of "using and interpreting the data" (Lewenstein 2004, unpublished material, on file with author). Only through this sort of volunteer engagement will we realize the goals of building community capacity and empowering communities to become more involved in management decisions.

## Conclusion

In the United States, and abroad, we see a growing movement to involve local communities in wilderness stewardship. Community members are increasingly recognized as having an important stake in wilderness management decisions, and contributing critical local knowledge to stewardship efforts. Volunteer monitoring and restoration efforts provide one important avenue for community involvement in wilderness stewardship.

The outcomes of volunteer projects depend, in large part, on the type of volunteer work, the quality of that work, and who is volunteering (Wilson and Musick 1999). For volunteer projects to realize their potential to nurture civic engagement and meaningful community involvement in wilderness stewardship, such projects need to focus on involving a greater diversity of community members, enhancing those aspects of the project that provide broader community benefits, and continually evaluating proposed outcomes.

## Acknowledgments

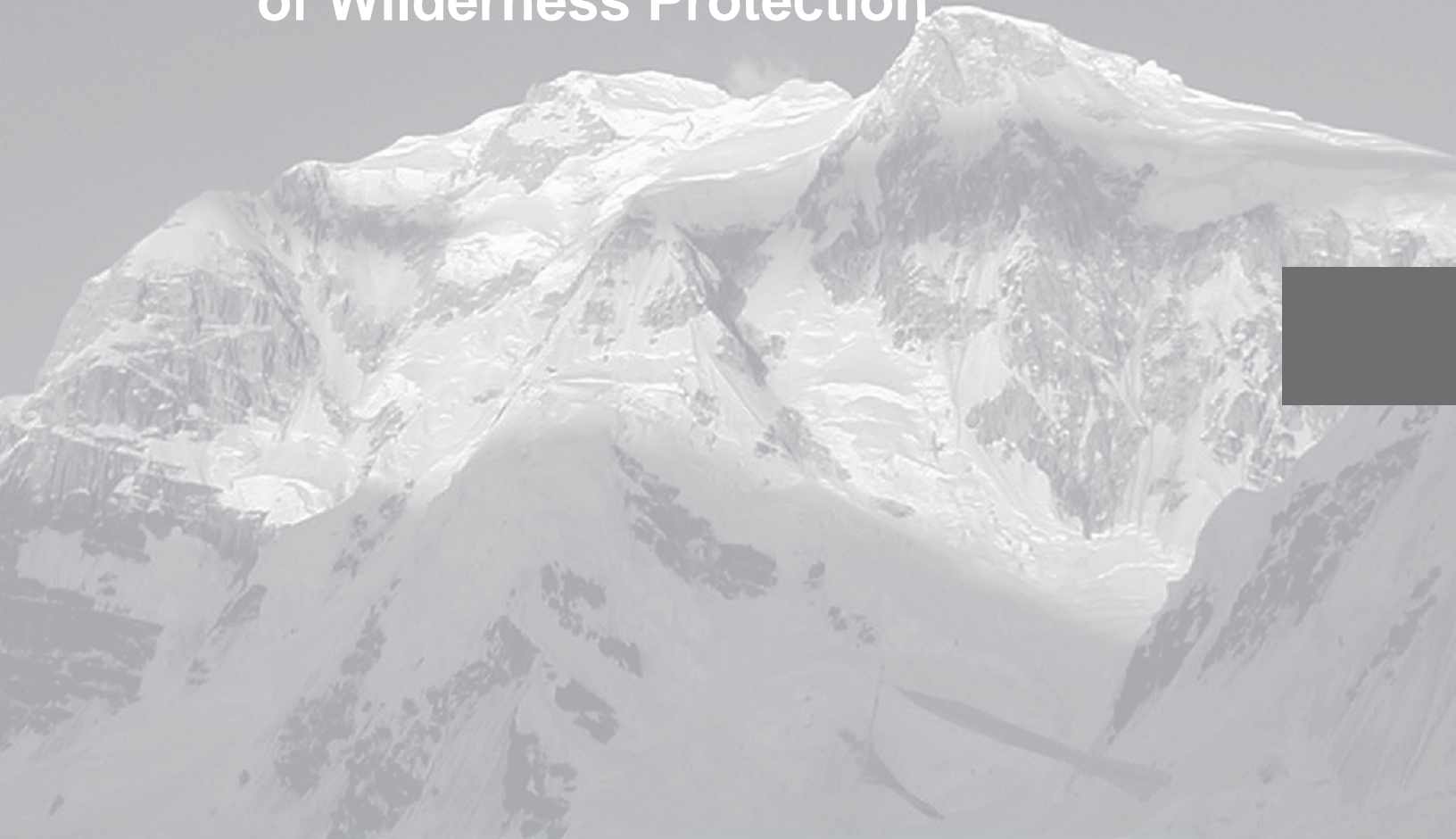
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### 3. Values to Local and Distant Society of Wilderness Protection



*Alaskans talked about the values of wilderness to society (photo by Claudia Sellier).*



# Balancing Conservation Management and Tourism Development With Wilderness Stewardship in the Kruger National Park, South Africa

F. J. (Freek) Venter

**Abstract**—The Kruger National Park (KNP) faces greatly amplified problems than was the case in the early 1900s when the KNP was established. Areas surrounding the park have experienced a human population explosion with a rapid expansion of farming areas and rural settlements. In the 1970s the KNP was fenced. Ecologically the KNP became an island and previous regional animal movements were restricted to within its boundaries. A network of management roads was established and the KNP worked to keep the poaching onslaught at bay. However, the KNP may have succeeded in conserving its animal populations, but it has also paid a heavy price in the process – a loss of wilderness qualities.

## Introduction

Protected area managers and scientists in the Kruger National Park (KNP), with its 2 million ha (4,942,108 acres) of bush-clad savannah, face greatly amplified challenges than was the case in the early 1900s when the KNP was established. The areas surrounding the KNP experienced a human population explosion during the past three decades, causing a rapid expansion of farming areas and rural settlements, and subsequently land uses that are largely conflicting with protected area management.

In the 1970s the boundary of KNP was fenced to control wildlife diseases and to protect the neighboring areas from damage-causing animals, as well as to prevent animal movement into the war-ridden Mozambique. Ecologically the KNP became an island and previous regional animal movements were restricted to within its boundaries. A network of management roads was established and artificial water was subsequently provided through boreholes and dams to supplement sources no longer available to animals.

Commercial poaching, especially for bushmeat, ivory and rhino horn, increased to such an extent that wildlife populations in many protected areas in Africa were nearly decimated. The KNP managed to keep the poaching onslaught at bay largely due to its effective and well-trained ranger contingent, extensive network of management roads and its capacity to use intelligence to track organized poachers. The

network of roads was created to be able to manage fires and also to provide access for management purposes.

To make the KNP available to the public and to help finance its conservation mandate, 16 rest camps containing approximately 5,000 beds and a well-maintained set of tourist roads have been developed. Numbers of tourists to the KNP grew to more than 1.2 million in 2004.

The KNP may have succeeded in its tourism endeavors and conserving its animal populations from the poaching onslaught, but it has also paid a price in the process. The price it paid was diminished wilderness qualities. This paper describes the process and thinking followed to regain some of those wilderness qualities.

## New Legislation and New Opportunities

Wilderness protection has recently been included in the new Protected Areas Act (Act 57 of 2003) of South Africa. This provides the first opportunity for national parks to legally protect wilderness areas within national parks. Wilderness in the act is defined as “. . . an area designated . . . for the purpose of retaining an intrinsically wild appearance and character, or capable of being restored to such and which is undeveloped and roadless, without permanent improvements or human habitation.”

The purpose of designating wilderness status to an area is described as follows in the act:

- (a) to protect and maintain the natural character of the environment, biodiversity, associated natural and cultural resources and the provision of environmental goods and services;
- (b) to provide outstanding opportunities for solitude; and
- (c) to control access which, if allowed, may only be by non-mechanized means.

The restoration option that is stated in the act presented a challenge to take a 100- to 200-year vision and consolidate wilderness in the KNP by closing down management roads, but still maintain the ability to combat the increasing poaching onslaught and maintain the integrity of the area.

## Methods

A rezoning process was initiated to consolidate existing wilderness areas in the KNP, reduce management roads to the absolute minimum, and officially proclaim wilderness areas under the new legislation. This formed part of a wider

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process whereby a generic zoning system (Conservation Development Framework) for use in all national parks has been developed (Briton and others 2004, internal report on file at SANParks, Pretoria, South Africa).

The existing Geographic Information System (GIS) infrastructure data of the KNP (including camps, roads, and concession areas) were used (MacFadyen and others 2004, internal report on file at Kruger National Park) in a Distance Analysis (ArcView 3.2a with Spatial Analyst 2.0).

Using previous zoning systems (Braack 1997, internal report on file at Kruger National Park; Venter and others 1997, internal report on file at Kruger National Park.) the KNP's management road network was revised according to the area integrity management requirements of each region or ranger section. The process included workshops with rangers of the different sections in the KNP. Roads were subsequently classified according to the level of associated disturbance and assigned an appropriate buffer distance to ensure the integrity of surrounding natural areas.

The following buffers were applied on both sides of roads:

- |                             |                   |
|-----------------------------|-------------------|
| • Tarred tourist roads      | 2 km (1.24 miles) |
| • Graveled tourist roads    | 1 km (.62 miles)  |
| • Graveled management roads | 500 m (1,640 ft)  |
| • Tourist track             | 200 m (656 ft)    |
| • Management patrol track   | 100 m (328 ft)    |

As the poaching problem is a constant one and will probably be with us forever, the aim of this exercise was to close down and rehabilitate as many roads as possible and downgrade others from annually graded firebreaks to tracks for patrol purposes only, but to still retain the necessary anti-poaching and general management maneuverability.

## Results

The fragmentation of Kruger before the exercise is considerable (MacFadyen and others 2004, internal report on file at Kruger National Park) and the consolidation process was found to significantly alter the situation:

- 59 percent of the KNP was closer than 1 km (.62 miles) from infrastructure (including rest camps, power lines, tourist roads, and management roads).
- As a result of the road system, Kruger was divided into 481 blocks.
- Patches with wilderness potential, (for example, patches further than 1 km [0.62 miles] from a road), had an average size of 5,728 ha (14,154 acres).
- 290 of these patches were smaller than 1,000 ha (2,471 acres) and only five were bigger than 10,000 ha (24,711 acres).
- During the consolidation process 1,523 km (946 miles) of management roads were earmarked for closure.
- After the consolidation process, the number of blocks decreased from 481 to 162.
- The average size of blocks increased from 5,728 (14,154 acres) to 15,200 ha (37,560 acres).
- Only five of these blocks are now smaller than 1,000 ha (2,471 acres) and 39 are bigger than 10,000 ha (24,711 acres).

## Discussion

In the past, the existing and projected future levels of ecotourism and other development was not seen to pose a real threat to the conservation goals of the park. This belief was based on the fact that less than 4 percent of the surface area of the KNP was physically disturbed by developments. The assumption was made that impacts related to such developments were limited to the immediate vicinity of the developments. The present study, however, indicates that there are indeed also significant aesthetic impacts associated with these kinds of developments.

Freitag-Ronaldson and others (2003) presented a list of tourism and management related biophysical and aesthetic impacts experienced in the KNP. Although these impacts are usually considered to be limited and localized and not presenting a real threat to the KNP ecosystem as a whole, they are the cause of a feeling that the KNP is trammelled.

A clear distinction is made in the KNP between "wilderness areas or zones" and "wilderness qualities" in an effort to overcome the problem of different perceptions of wilderness as expressed by different people. Wilderness zones refer to specific designated areas that are set aside for special protection according to the new legislation and that comply with the definition described above. Wilderness qualities refer to the experience that one will be subjected to in any zone or area in the KNP, including but not exclusive to wilderness zones. This experience will vary from one person to the next. Wilderness zones will normally offer the best quality wilderness experience, whereas rest camps and roads do so at a lesser extent but much better than developed areas outside the KNP. The following description may enlighten the different interpretations of the two terms as used in the KNP.

## Wilderness Zones

There was a time when the whole world was wilderness, according to our present definition, with a few pockets of human habitation (forming an integral part of the wilderness). Today this situation has changed and it is the other way round. Very few pockets of true wilderness areas remain in a sea of development and they are shrinking by the day as technology increases. At first it was a challenge to conquer wilderness—now it has become an obligation to protect it. A few decades ago some people that lived in the most remote areas possible would not even understand the notion of wilderness—it was part of their everyday lives.

Thus, there is a trend, especially in developed countries to set aside and legalize wilderness zones, areas deemed to have an intrinsic right to existence and conservation with no or limited disturbance by humans. In the KNP such areas are set aside for the following reasons:

- To satisfy the need of an increasing number of people wishing to experience truly pristine, unaffected wilderness where for a while they can consciously immerse themselves in a sense of remoteness and a return to basic essentials. Some measure of the need for such opportunities is the considerable sums of money many people are willing to pay to have access to such wilderness zones. The very high and growing popularity of tourism products in the KNP that offer this kind of experience is proof that it is indeed a growing need.



- To keep options open for future generations of people. Once an area has been trammelled and scarred by development, it blots out other options, or use that is wilderness dependent. The irreversibility of permanent developments means that mistakes made during the development also become largely irreversible.

Such pristine wilderness areas have therefore been included in the spectrum of zones proposed for use in South African national parks (Briton and others 2004). Whereas these “minimum-impact” zones are motivated essentially by biodiversity conservation and recreational opportunity it affords to a segment of society (especially the ‘back-to-basics’ or ‘return-to-roots’ nature lovers), the ethical/moral justification for at least some such areas should not be forgotten (bequest to future generations).

## Wilderness Qualities or Wildness

People do not visit conservation areas simply to see wildlife, which could be viewed at less cost in smaller nature reserves and zoological and botanical gardens. Although often not consciously realized, in the case of the KNP it is the intangible attributes associated with this conservation area, which attracts and appeals to so many people. These attributes include solitude, remoteness, wildness, serenity, peace, harmony, opportunity for reflection and self-appraisal, and a host of others that for convenience sake can be termed ‘wilderness qualities.’

Wilderness qualities or wildness is therefore based on human perception. The range of perceptions about wilderness is about as wide as the wide range of humans in the human race. For one person it is an incredible wilderness experience to enter the KNP on a road without fences flanking it and sleeping over in one of the restcamps. For the more experienced protected area visitor this kind of activity is far too sophisticated and they prefer to “get away from it all.”

Even within the confines of a restcamp, for example, certain wilderness qualities can be achieved by sensitive and appropriate landscaping, building material and building styles, noise management, and a variety of other means, all amplified by the proximity of undisturbed natural bush and wildlife adjoining such a camp. Some people, again, would shun relatively sophisticated camps in favor of rugged and primitive tented camps and walking trails.

Wilderness qualities are the intangible spiritual and experiential aspects associated with protection areas that are the primary attractants for people visiting the KNP, and these qualities should therefore be maximized and managed. A range of differing intensities of such wilderness qualities can be offered to satisfy the needs of different people, and this can be achieved through managing different zones in different ways to achieve differing degrees of wilderness experience.

As a national park, the KNP has a responsibility to provide for this wide range of needs as well as it possibly can. The challenge therefore lies in providing appropriate opportunities and satisfying as wide a range of public needs along this continuum of undiluted to diluted wilderness qualities.

The impacts of mass tourism on biodiversity and wilderness qualities are still not well understood in the context of the KNP, and research in this regard is seriously needed.

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# Wild Mountains, Wild Rivers: Keeping the Sacred Origins

Linda Moon Stumpff

**Abstract**—For many indigenous peoples in North America, wild mountains and rivers and other natural formations exist as physical beings formed as part of a whole by forces that interconnect people with them. This perspective frames a discussion around an idea that expresses time and space as wrapped up in the mountain. If time is within the being of place and space within the mountain, actions to remove parts of the mountain remove pieces of time, such as in the case of putting roads on Mt. Graham in Arizona, damming the Skokomish or drilling in the Arctic National Wildlife Refuge.

The task and its implications are to move at the grassroots level to begin meaningful consultation between agencies and tribes and to use discretionary authorities to resolve problems. The work indicates a need to move at the highest political levels as well, to take model grassroots solutions to the legislative arena.

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*“Shika analyeed, Nika ishyeed.” (Athabascan saying meaning, “I help you, you help me.”)*

For many Tribes in North America, sacred wild mountains, rivers and other natural formations exist as physical beings formed as part of a whole by forces that interconnect people with them. This perspective expands, and to some extent, challenges, the general view that suggests that the sacredness should be understood as a cultural construct developing along the path of linear time. Instead, the sacredness of a mountain is based on the rejection of the generally accepted concept of time as the only version of time: it extends time in motion and it moves backward, forward, and cyclically as it stays in the same place all at once. In this view, these natural features of wild landscapes are becoming original themselves and constantly emerging from the origins of being. This creates a kind of dependent origination, because both place and people are engaged. In this way, time itself resides in sacred sites, while knowledge is transmitted verbally through constructed time from the initial being. They are the seats of wisdom and the guiding principle of an indigenous land ethic of caring for the land and the waters.

These sacred places provide models for restoration practice engaging humans in action through constant renewal. This is the case with Mt. Graham in Arizona. The Apache people hold this mountain in esteem as the home of the Ga'an or Mountain Spirits. The mountain, in this respect, becomes a

holy place that should be preserved intact as an ecological and spiritual whole. Far up in the Northwest, the Salish peoples of the coastline hold the purity and force of their rivers in high regard. Polluting and damming the waters interfere with the First Salmon ceremony and other rituals that threaten their spiritual life and the sustainability and balance of the ecological systems upon which they depend. Other areas like the Arctic Wildlife Refuge exist in a similar pattern.

The reinterpretation of time into a multiplicity of times changes both theory and practice of the experience of wild places and science. It is not unscientific to view time differently in the context of wild places; anymore than chaos theory is unscientific because it challenges linear thinking. However, this approach has different effects, because the theory and practice of the wild experience is then unified with human understanding and compassion and spiritual being connected with sacred places. These ideas meet today at a nexus point where a variety of people who work in different mediums—ranging from the journal of a wilderness hiker, to the work of an anthropologist, to filmmakers or indigenous science philosophers like Greg Cajete (2000)—explore these ideas.

This alternative view of time and origins within sacred places connects restoration and action through the notions of respect and reciprocity. If time is within the mountain, actions to remove parts of the mountain thus remove pieces of time. Such is the case when multiple roads and observatories are developed on Mt. Graham in Arizona or drilling and development in the Arctic National Wildlife Refuge occurs.

This alternative view of time and origins within sacred places opens the door to an indigenous methodology (Smith 1999) for restoration based on place. If sacred places are the homes where knowledge rests, then a human responsibility for the protection of their ecosystems and knowledge is critical to ensure human understanding of wild places. Sacred places, because of limited use, become the refuges for life and for critical patterns of human understanding. If such sacred places are damaged, restoration action should follow. To prevent such damage, there is a need for better policy and legislation to protect sacred sites. When they are assaulted and damage occurs, restoration action is a responsibility to restore their original dynamic character. Such efforts need to be guided by the application of traditional knowledge about the specific place.

Physical places and wild spaces express natural laws that can be interpreted through culture, but are expressed through their physical nature at the same time. Time and knowledge are wrapped up in the mountain—in its space—and knowledge cannot be separated from the mountain. Time is simultaneously cyclical, linear, and forever in sacred places.

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Western science recognizes that Mt. Graham represents seven life zones and unique ecologies, threatened and endangered species, and old-growth forests. However, Western science cannot extract all the knowledge held by the mountain, because it is the Apache people who care for the mountain who are connected to that knowledge. Natural laws are both posed and felt through sacred places as a way of connecting cause and effect. Learning how these components work together to create and support life is both the basis of a cosmology and the practice of ecology. Data collection and empirical knowledge can be practiced and embedded in Indian cultures as well as the theories of science.

Understanding the idea of sacredness in the mountain is not only the work of poets and scientists, but also the journal of a wilderness hiker and indigenous scientist like Greg Cajete, and the building coalition of multiple Apache Tribes. As culture members might vibrate into their relationship with wilderness through vocal sound, we vibrate in wilderness in chaotic times by running, smelling, intensified exertion, and announcing ourselves in song or voice to the mountain, and reflection finally on its original nature that we act to protect. The heartbeat of the world is felt from our feet to our pounding hearts in a way that cuts across culture. From this an interactive methodology emerges guided by natural laws such as the recognition of dependent origination and spreads over diverse places.

## To Protect and Restore: The Origins of Conflict

The commitment of here, now, and always to protect sacred places like Mt. Graham often places Tribes in conflict with Federal policy-makers, especially in Congress and where private interests who seek to influence public policy for private gain interact with the process. The attempt to educate and fragment the physical space to please multiple interests contradicts the sacred wholeness of the idea of a spiritual home as expressed by traditional Apache people.

Sacred places have become conundrums for public policy. Many such places exist on public lands. Tribes and local land management officials often begin a process of meaningful consultation, but there is a lack of agency policy that has been operationalized to give agency employees a sense of security as they proceed. An Executive Order, during the Clinton administration, underlined the importance of Sacred Sites, but a lack of understanding and legislative direction creates problems that end up in muddled legal decisions from the courts. The nature of traditional knowledge and methodologies is local, but often "solutions" are imposed from far away.

## The Sky Islands of Arizona

In the early 1980s, the University of Arizona and several international partners, including the Vatican, sought a permit to build 17 telescopes on Mt. Graham. To the Apache, such development was a desecration of the mountain as a sacred place that would severely impact their centuries-long spiritual practices. The mountain, called in Apache, "Dzil

nchaa si an," was originally set within the bounds of the San Carlos Apache Reservation. But Congress responded to demands for logging and mining, and so the mountain was removed from the reservation. As Keith Basso, an anthropologist well-regarded by many Apache people and an expert considered to be a leader in his field, states the choice for the University of Arizona: "Would the University of Arizona and its associated institutions know more about the heavens or would they rather know that they have reaffirmed the religious integrity of a people who have worshipped for centuries in a sacred place beneath them" (Basso in Warshall 1997: 7). The idea that the whole mountain ridge might be sacred and needed to be preserved intact collided with the multiple interest policy process, and conflict was born.

The fact that Apache shrines do not reflect evidence of significant material construction did not help the claim. In 1988, the University spent one million dollars to get a rider attached to the Arizona-Idaho Conservation Act that would allow construction of the observatories without the application of Federal environmental and cultural resources laws. The University of Arizona continues to resist efforts to access Mt. Graham for religious purposes and has, in fact, required a permit to pray that involves extensive personal documentation and information.

Over the years, the University has continued to seek additional permits and locations, while Apache people, environmentalists, and some scientists have formed the Mt. Graham Coalition, one of the most effective networks to fight the global nature of this very effective project. Though the San Carlos Tribe has passed eight resolutions against the observatories, its promoters claim the Apaches do not really oppose the development. Long-term efforts by Apache leaders like Ola Cassador Davis, Wendsler Nosie and other tribal leaders have received national and international recognition (Warshall 1997). In fact, the Mt. Graham Coalition, including the Apache Survival Coalition, created a highly effective network of tribes, concerned citizens and environmental organizations and nonprofit organizations. In 2005, the 13th Annual Sacred Run was held beginning at Mt. Graham. This involved runners from tribes in Arizona, New Mexico, and Mexico who ran 350 miles from the top of Mt. Graham to the summit of the San Francisco peaks to bring attention to proposed developments in both sacred mountain areas. The runners did this in an effort to bring public awareness to the pollution of the earth. Wendsler Nosie, Apache Tribal Councilman, noted, "It is essential for all tribes to work together. The abuse of our people and our land is widespread and we must act in unity to stop it" (editorial in *The Apache Moccasin*, August 3, 2005, Globe, Arizona, p. 11).

Continued legal action and appeals have not produced resolution to the conflict. The heart of the controversy is America's failure to come to grips with the larger issues of a land ethic (Martine 1993). Even units of wilderness management do not encompass whole ecosystems, or even mirror biodiversity and ecosystem processes. Their boundaries are not drawn by the broad spiritual brushes that encompass physical knowledge embedded over the centuries. With sacred places, the reformation, restoration and re-creation of the relationship between humans and nature is at stake.

The idea of sacred places shapes how we view wildlands and rivers and our beliefs about time and the physical world. It places humans into the land and the rivers, while it guides our actions as they modulate in relation to natural variations. Things are never exactly the same twice, because sacred places are connected to the origins of life. Life is unpredictable, unperiodic—similar but not repeating—and sensitive to initial conditions. The conditions within sacred places are the holders of the origins and the patterns of the future. Radically changing those conditions in sacred places is to act out of time and out of respect. It is to swat the proverbial butterfly whose flapping wings are driving the change across the globe. Rather, the indigenous objective is to be involved in the creative process of life through natural and cultural unions, not dominion.

## The Northwest Waters

Attempts at dominion over the mountains were shortly followed by attempts at dominion over the waters in North America. The Skokomish River provides a parallel case of conflict over the waters. The wild flowing river poured thousands of gallons of clean mountain water into the waters of Puget Sound. It was a premier salmon fishing and salmon reproduction river and the site of rituals and cultural activities for the Skokomish people. The salmon are a food source for the Skokomish and food is given by the Creator; this makes the river and the surrounding ecosystem that support the salmon sacred. In an unprecedented policy move, the city of Tacoma developed hydroelectric dams on wild rivers in Washington State. The Skokomish was dammed in the early 1930s and Tacoma Power and Light reaped the benefits. No Federal permit was taken, none was asked for. Later, a second dam went up. The impacts to the Skokomish people and their sacred waters were ignored; sometimes salmon were not even available for the First Salmon Ceremony. Tacoma Power and Light continued to argue that the upper river was never salmon habitat, but such remonstrations are hard to swallow when one reads old fish and game records that show people being cited for catching salmon in the area or hears the stories of elder Skokomish.

Years later, the Federal Energy Regulation Commission (FERC) granted Tacoma Power and Light permission as they “relicensed” the dam that never had a license, despite clear documentation that Skokomish religious and cultural use was affected. The first great problem created by the first dam on the Skokomish was that it disrupted fishing and salmon ceremonies. The second great problem was increased flooding for the rural families and Skokomish people below. To the degree that the dams turned the water off, the sediments went up. Further, extensive logging along the river on public land increased the problem. Today, floods wipe out banks and delta habitat for salmon. The Skokomish Tribal Natural Resource Department continues to devise innovative responses, chaining logs into the river and replanting riparian areas. Despite years of lawsuits, the conflict continues. Millions of dollars in the loss of fisheries and the loss of cultural practice is amplified by the loss of safety for whole communities from flooding for the Skokomish and their rural neighbors, who can no longer even build on their property along the river in Mason County.

## Sacred Theory, Sacred Practice

If a connection of sacred mountains and rivers to chaos theory is made, there is a possibility of prediction that extends time from being. Chaos theory is used to clarify the complex behavior of a complex system like weather. As a meteorologist works on a simple computer weather model solving equations with three variables, chance in one variable in the scientific equation causes unexpected results in the outcome of the weather. So it is with the sacred mountains and waters that hold the multiple equations and models of life drawn from years of experience. Taken further, sacred mountains and waters are the origins and the reflections of what might be called The Indigenous Hypothesis: Chaos is the essence of the universe and thus our destiny is related to chaos and our ability to reciprocate and restore essential conditions while adapting to some level of change. Unpredictability, such as experienced in sacred and wild places, provokes anxiety, but it can also be a source of happiness. Through protecting sacred sites and the practice of restoration for humans and for their environment, we can become more responsible and closely aligned with our future. We can connect the relationships to create positive life conditions out of our past and present chaos. Sacred places harbor understanding through the natural laws that they pose. As members of cultural communities might vibrate with vocal sound, we all vibrate in wilderness by running, smelling, intensified exertion, and announcing ourselves in song or voice to the mountain in the practice of wilderness. We feel the heartbeat from our feet to our pounding hearts that reverberates in the heartbeat of the earth in these places of origins.

## Implications and Recommendations: Expanding the Definition of Wildness

Everything follows natural law and everything possesses the ability to understand and live with it (Cajete 2000). It is not all about the butterfly's wings; it is about where it flaps them and the direction of the vibrations. Sacred places are nexus points that change everything and change humans as well. This was the point of the Go Road controversy in Northern California, when a recreation road was proposed that would make a jagged cut through “the center of the universe,” for the Klamath peoples. Through the long process of resolution and litigation, some resolution emerged in a different form—the area was ultimately saved by wilderness legislation and associated areas were eventually protected by informed decisions of Forest Service land managers in cooperation with tribal liaisons. Yet today, these conflicts continue to play out in cases again and again. From the classic case of Mt. Graham, to the rivers of Washington State, to the Arctic National Wildlife Refuge, the pattern emerges.

As humans, we still need to recognize these sacred places. The worldview of Tribes offers a new perspective on the evolving discussion on the definition of wilderness and wildness and an expansion of the land ethic to include long-term human relationships through sacred places. The idea of wilderness from this point of view broadens the

conservation of biodiversity and whole ecosystems as inclusive within saving the sacred places as the origins of life. This view needs support through the development of meaningful consultation procedures where tribal representatives play a key role in decision-making, and agency officials have firm support and guidance for programs that protect and restore sacred places. In addition, as a new wilderness, monument, park or refuge are established under the Wilderness Act or other congressional legislation, there is considerable discretion to add specific passages that allow protection of sacred areas on these public lands.

The physical and spiritual definition of wilderness is broadened by the inclusion of sacred spaces. They teach us that if chaos is the essence of the universe and our destiny is related to chaos, there exists anxiety, satisfaction and resolution in wild places. These sacred places of our origins create a vision of what is and what can be. They hold the patterns and the gyroscopes for the balance of life and they outline for us our reciprocal responsibilities to restore and

protect the lands and waters. If the answers to conflicts are not tangled in distinctions between economics and the environment, then accepting the process of chaos and resolution can lead to a balancing of human needs that links land and water use decisions to an ethic of human and ecological rights. That balance includes respect for sacred places, those centers of the universe where changes born every day reach out to shape our shared destiny.

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# Economic Value of Ecosystem Conservation in Japan: Reduction of Starting Point Bias by Bid Effect Function

Mitsuyasu Yabe

**Abstract**—Over 18 million people visit and enjoy the view of the world's largest class caldera topography, which forms the important landscape element of National Park Aso. Aso grassland spreads and rare plants exist in the harmony of nature and human activities. This study was a Contingent Valuation (CV) survey to estimate the conservation value of Aso grassland. We hypothesized that the difference of presented bid amount and respondent's latent willingness-to-pay (WTP) effects the stated WTP estimation. In multiple discrete choice CV, we identified the bid effect function and introduced it into the estimation process. As a result, the standard error was reduced by more than 70 percent compared with the usual discrete choice CV approach, and then the serious difference between mean and median previously estimated with the logarithm of WTP was dissolved.

## Introduction

For ecosystems with valuable flora and fauna or nature conservation concerns, two types of the ecosystem can be considered. The first type of ecosystem is preserved by complete detachment from human activities. The second type of ecosystem is created with interactions of human activities, and the system and landscapes are maintained by these activities. Aso grassland, located in the southwest region of Japan, is the latter. It is spread over 128 km (80 miles) of the world's largest class caldera topography, which forms the important landscape element of National Park Aso. Fourteen thousand hectares of grassland spread to the Aso district of Kumamoto prefecture. Over 18 million people visit and enjoy the view of this magnificent landscape each year.

Aso grassland is natural, and endangered species and other domestic rare wild fauna and flora exist in harmony with human activities. For example, 1,600 out of the 2,200 kinds of higher plants that exist in Kumamoto prefecture are found in the Aso district. The valuable flora and fauna are maintained by human activities such as grazing, mowing, and open burning, which are continued as longstanding conventions.

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However, with the decline of cattle farming and the change of farming patterns, the Aso grassland is difficult to maintain. In a related development, the Ministry of Environment enacted and enforced the “Nature Revitalization Law” in order to recover the impaired natural environment. One of the cases is Aso grassland, and cooperation and support from local and surrounding communities are especially important. Thus, this study examined the conservation value of Aso grassland for the people of the local areas, using Contingent Valuation (CV) methods.

The analytical framework of CV applied in this study has the following characteristics. First, to examine elicitation effects, it used a bid effect function to determine whether the replies of the respondents had bid effects. Second, it answers the question of whether the mean or median is most appropriate since they differ largely when a logarithm was taken for willingness-to-pay (WTP). Concerning this point, this paper shows that this problem is minimized when the error term was reduced and the difference of the mean and median value becomes smaller as a result of introducing the bid effect function.

The paper is divided into five sections, including the Introduction. Section two presents an analytical model, which concerns the bid effect function and elicitation effect such as starting point effects. The third section describes the survey questionnaire and explanatory variables, which were adopted in multiple discrete choice CV. The fourth section presents the estimation results, which considered the bid effect and analyzes the implications of the estimation result; and the fifth section concludes the analysis.

## Analytical Model

### Identification of Bid Effect

The dichotomous choice CV normally presents a certain amount and asks whether respondents could “accept” or “not.” This question style is most common, however, there are some problems, such as the elicitation effect. There are two causes of elicitation effect. One is starting point effects or anchor effects and another is yea-saying bias (Bateman and others 2005; Blamey and others 1999; Boyle and Bishop 1988). Starting point effects is a bias that the responses are influenced by the presented bid. Even though respondents might feel the bid is more than their latent WTP amount, since they have no alternative option, they tend to choose “accept” the presented bid amount, or they believe that the presented bid amount is the standard amount. Further, there is “yea-saying” bias when respondents easily accept the presented bid amount. They are considered to be the causes of overestimation of WTP.

Thus, to examine the effect of the difference of presented bid amount and respondent's latent WTP on the WTP estimation result, we separate such bid effect from the error term and estimate it. First, following Yabe and others (1999), consider  $y_i^*$  as the latent willingness to pay of the  $i$  respondent and take a natural logarithm by assuming a nonnegative number, which you can express as:

$$\ln y_i^* = x_i' \beta$$

where  $x_i$  is the attribute vector that includes the constant, and  $\beta$  is coefficient vector of  $x_i$ . It assumes that the gap between the bid  $t_i$  and latent WTP, which is expressed as,  $\delta_i = \ln t_i - \ln y_i^*$  affects the estimated WTP. Also, it assumes  $\psi(0) = 0$  and  $d\psi/dt_i > 0$  for the bid effect function,  $\psi(\delta_i)$ . This assumption implies that when the bid and the latent WTP match, there is no bias by the bid; otherwise, there is a bid effect that affects positively and the stated WTP  $y_i$  become bigger (smaller) if  $\delta_i > 0$  ( $< 0$ ). Thus, the stated WTP can be expressed:

$$\ln y_i = x_i' \beta + \psi(\delta_i) + \varepsilon_i.$$

However, we assumed that the error term  $\varepsilon_i$  is independently and identically distributed (i.i.d.), which follows a normal distribution  $N(0, \sigma_i^2)$ . In the next section, we present the WTP estimation model with application of the bid coefficient.

## WTP Estimation Model

In this study, we assume that deterioration of environmental standards of Aso grassland can be prevented by bearing a certain cost. In order to appraise the influence from respondents' certainty of payments, we referred to Welsh and Poe (1998) and adopted Multiple Discrete Choice Approach. Thus, in response to the presented bid amount, the  $i$ th respondent can select one from the following options:

1. "Will pay"
2. "Probably will pay"
3. "Probably will not pay"
4. "Will not pay"
5. "Don't know"

However, the purpose of this study is the estimation of bid effect; therefore, the analysis follows the dichotomous choice model to simplify the approach. Welsh and Poe put "not sure" as the third option; however, instead of considering "not sure," which is treated 50 percent probability of WTP, this study considered it as "don't know" and put it as the fifth option. There is still some controversy over including or excluding "don't know" (Carson and others 1998; Garrod and Willis 1999; Groothuis and Whitehead 2002; Haab and McConnell 2002; Pearce 2003). Thus, we excluded the response "don't know" when the reasons were: "Aso grassland should be conserved by means of another way," "I didn't understand the question well," or "Others." However, we treated "don't know" as a negative response to payment and included them in the analysis only when the reasons were: "the amount is too expensive for me" or "I am not concerned about the conservation of Aso grassland."

Next, we define the probability that one would pay the presented bid as following. We define the probability of paying only when certain one would pay, in other words,

when one chose option 1, it is considered "yes" where they bear the cost, and others from option 2 to 5, are considered "no" where they do not bear the cost. The probability that the revealed WTP of the  $i$ th respondent,  $y_i$  is larger than the bid  $t_i$  can be expressed as:

$$\begin{aligned} \pi_i &= \Pr(t_i \leq y_i) = \Pr(\ln t_i \leq x_i' \beta + \psi(\delta_i) + \varepsilon_i) \\ &= \Pr(\ln t_i - x_i' \beta - \psi(\delta_i) \leq \varepsilon_i) \\ &= \Pr((\ln t_i - x_i' \beta - \psi(\delta_i)) / \sigma \leq z_i) \\ &= 1 - \phi((\ln t_i - x_i' \beta - \psi(\delta_i)) / \sigma) \end{aligned} \quad (1)$$

However,  $z_i = \varepsilon_i / \sigma$  is a random variable with standard normal distribution,  $\phi(\cdot)$  is standard normal distribution function. Also, the probability that the WTP amount,  $y_i$  is smaller than the bid,  $t_i$  is:

$$1 - \pi_i = \Pr(t_i > y_i) = \phi((\ln t_i - x_i' \beta - \psi(\delta_i)) / \sigma) \quad (2)$$

From this, the binary variable for when respondents select the option 1 or select the other options 2 to 5 are defined as  $d_i^1$  and  $d_i^2$ , respectively and the log likelihood function  $\ln L$  can be expressed using (1) and (2) as:

$$\ln L = \sum_{i=1} [d_i^1 \ln \pi_i + d_i^2 \ln (1 - \pi_i)] \quad (3)$$

Finally, we can calculate parameters by the maximum likelihood estimation method to arrive at our result. Furthermore, we could estimate the WTP with bid effect consideration where we separate those who would rather pay, in other words, those who select option 1 and 2 and those who would not pay by selecting option 3 to 5.

## Form of Bid Effect Function

Now we consider the form of the bid effect function. First, the linear function, which meets the assumptions, can be expressed as:

$$\psi(\delta_i) = \alpha (\ln t_i - \ln t_i x_i' \beta) \quad (4)$$

Here,  $\alpha$  is the bid effect coefficient. When (4) is substituted for (1), it can be arranged as:

$$\pi_i = \Pr(t_i \leq y_i) = 1 - \phi \left( \frac{\ln t_i - x_i' \beta}{\sigma / (1 - \alpha)} \right) \quad (5)$$

We must be careful with the denominator of this equation (5). When,  $\sigma / (1 - \alpha) = e$  neither  $\sigma$  nor  $\alpha$  are uniquely determined because the combination of  $\sigma$  and  $1 - \alpha$  that satisfies  $e$  is infinity though  $e$  can be estimated by (3). This implies that if the bid effect function were linear, the bid effect coefficient is never independently estimated from the error term despite that the bid effect coefficient was included in (5).

Thus, we assume the following bid effect function in order to estimate the bid effect coefficient. While we consider the hypothesis of the function and interpretation simplicity, the bid effect function is based on the logistic function, which is symmetry, and it resulted in the following function model:

$$\psi(\delta_i) = \alpha \left\{ [1 + \exp(-(\ln t_i - x_i' \beta))]^{-1} - 1/2 \right\} \quad (6)$$



When (6) is substituted for (3), the parameter of the explaining variable including  $\sigma$  and  $\alpha$  can be estimated by the method of maximum likelihood. Thus, the following null hypothesis and alternative hypothesis can be considered regarding the influence of bid on the estimated WTP:

$$H_0 : \alpha = 0 \quad H_a : \alpha > 0$$

Here,  $H_0$  means the bid is not affecting and  $H_a$  means bid is affecting the estimation positively. In the following, it explains the examination, which was carried out to verify this hypothesis.

The median and mean of latent WTP can be estimated as  $\exp(\bar{x}'\hat{\beta})$  and  $\exp(\bar{x}'\hat{\beta})\exp(\hat{\sigma}^2/2)$ , respectively. Here,  $\hat{\beta}$  and  $\hat{\sigma}$  are the estimated coefficient and  $\bar{x}$  is mean values of explanatory variables. Also, the confident interval is calculated according to the method proposed by Krinsky and Robb (1986) with 4,000 extractions.

## Design of Questionnaire Survey and Hypothetical Question

### Hypothetical Question

The hypothetical question given to respondents was as follows:

**Question:** In the near future, suppose that grassland could be converted to forest and grassland could be lost as grazing and open burning are discontinued in Aso region. In order to prevent that happening, we set up the 'Aso Grassland World Heritage Fund' to register and conserve the grassland in combination with the world's largest class caldera geographical features into a World Heritage Site and support a series of conservation activities. Suppose the activity cost of the 'Aso Grassland World Heritage Fund' is supported by the public contribution. Of course, the contribution is only used for registration and maintenance of Aso grassland as a World Heritage Site. Please keep in mind that the amount of this contribution will be deducted from your total allowance for other expenses. If the fund costs (\*\*\*) per household per annum, would you pay that amount of money? (Select only one.)

1. "Will pay"
2. "Probably will pay"
3. "Probably will not pay"
4. "Will not pay"
5. "Don't know"

The (\*\*\*) were replaced with one of eight amounts of money from 100 to 20,000 yen. The question to identify "Protest/No answer" followed the above question.

### The Respondents' Characteristics and Survey Method

The target samples of the survey questionnaire were chosen from the inhabitants of Kumamoto prefecture. According to the 1995 Census, there are 1,781,752 people in 594,197 households. After randomly selecting samples by telephone number, the questionnaires were sent by post, and the survey period was for a month of December 1998. There were seven patterns of survey questionnaires; however, this study

only focuses on the ones with the multiple discrete choice methods. One thousand questionnaires were sent and 418 were returned as valid responses.

### Summary of Survey Results

Let's first look at the socio economic attributes of the 418 respondents. The mean age was 59.1 years. The household income of 2 to 4 million yen (U.S. \$18,000 to 36,000) was 27.8 percent; 4 to 6 million yen was 19.4 percent; 6 to 8 million yen was 15.8 percent and so on. Also, the no response rate was 9.8 percent. The income distribution of the respondents was slightly lower than the national household income average.

Since the respondents were from Kumamoto where Aso is located, 87.5 percent of them have been to Aso. Regarding the grassland landscape of Aso region, 98.2 percent of them positively evaluated the grassland spectacle in the Aso area; they mostly responded with "very beautiful" (78.2 percent) and "beautiful" (20.1 percent). Respondents also suggested that they would visit Aso for sightseeing or a family trip within the next 5 years; 88.0 percent of them answered "definitely visit" (65.3 percent) and "probably visit" (22.7 percent).

In response to whether it is necessary to continue activities such as grazing and open burning to maintain Aso grassland and conserve rare flora and fauna, 90 percent of the respondents answered positively with "want the activities to continue over the expanded area" (31.8 percent), "want the activities to continue at the present level" (46.2 percent), and "even if the area was reduced, still want the activities to continue" (12.0 percent). Regarding purchase of the beef of cows that pastured in the Aso grassland as a support activity, the respondents answered with, "even if the price is about 20 percent higher, I may buy it" (13.2 percent), "Even if the price is about 10 percent higher, I may buy it" (40.4 percent), and "If the price is the same, I may buy instead of other beef" (29.2 percent), thus positive support was observed.

Also, they were asked, if the hypothetical amount mentioned in Contingent Valuation is implemented, what is the possibility that Aso grassland is conserved: "100 percent can be maintained" (10.3 percent), "80 to 99 percent" (27.8 percent), "60 to 79 percent" (22.5 percent), "40 to 59 percent" (26.8 percent), and "39 percent or less" (4.7 percent). From this, it appears that comparatively high trust is put in place towards the effect of a virtual fund.

### Attributes of Explanatory Variables

From the questionnaire survey, several explanatory variables were examined (table 1). After removal of samples with "Protest/No answers" and many missing variables, the total sample used for analysis was 332. The income variable (INCOME) and the log of the age variable (LAGE) were used as the social economic attributes variable. The mean income and the mean age in the sample were 5,748 thousand yen, 58.6 years old, respectively, and the mean of the logarithm of the age was 4.070. As for the income, the expected sign condition is positive.

Beauty of Aso grassland (BEAUTY) was used as the evaluation concerning the motivation of Aso conservation

**Table 1**—Variable list and expected sign.

Variables	Description	Mean	Standard deviation	Expected sign
INCOME	Income (1 million yen)	5.748	3.422	+
LAGE	Log of age	4.070	2.773	—
BEAUTY	Log of evaluation point of landscape of grassland	1.556	0.126	+
TRIP	1/0, 1 = will visit Aso in 5 years	0.765	4.124	+
ACT	1/0, 1 = conservation should be expanded	0.394	0.490	+
BEEF	1/0, 1 = would buy meat of cows fed Aso grass at more than 20 percent higher price	0.196	0.397	—
POSSIBILITY	1/0, 1 = possibility that grassland is conserved by fund is more than 70 percent	0.539	0.499	—

and the logarithm of the evaluation point was taken from “very beautiful = 5 to not beautiful at all = 1.” The possibility of visiting Aso for “sightseeing or a family trip within 5 years” was created as a dummy variable (TRIP) according to “definitely visit = 1, others = 0” and the mean was 0.765.

For the dummy variable, with regards to the activities for conservation of Aso grassland, it was defined as CONSERVATION according to “want the activities to continue to the expanded area = 1, others = 0” and the mean was 0.394. Regarding the purchase of beef of the cows that pastured in the Aso grassland as a support activity, it was defined as BEEF according to “even if the price is about 20 percent higher, I may buy it = 1 and others = 0” and the mean was 0.196.

In addition, a subjective conservation probability that in case the hypothetical measure was implemented was created as a dummy variable (POSSIBILITY), and it was defined as the possibility that Aso grassland is conserved is “more than 70 percent = 1 and less than 70 percent = 0.” These variables are expected to be positive.

## Bid Effect and Estimation Results

### When WTP Was Certainly Expressed

In multiple discrete choice CV, when respondents selected 1 it was considered as “YES” and when they selected other options, 2 to 5, it was considered as “NO,” following the discrete choice model. The result is shown in Model 1 and Model 2. Model 1 does not include the bid effect function  $\psi(\delta_i)$  in the log likelihood function of the equation (3), and it follows the usual method of estimating dichotomous choice CV. Model 2 is when bid effect was considered (table 2).

**Estimate Result of Model 1 That Does Not Consider Bid Effect.** In the estimation result, neither logarithm of age LAGE nor INCOME had any significant difference from zero at the 10 percent level. Similarly, BEAUTY of Aso grassland was not significantly different from zero at the 10 percent level. However, the possibility of visiting Aso within 5 years (TRIP), those who want the activities to continue to the expanded area (CONSERVATION), and the purchase of the 20 percent more expensive beef of cows that pastured in the Aso grassland (BEEF) showed significant differences from zero at the 10 percent, 1 percent, and 1 percent levels, respectively. Thus, we found that those with higher use possibility of the Aso grassland and those with higher conservation interests had higher WTP. Also, they are in agreement with the expected signs.

Next, the mean WTP for conservation of Aso grassland using Model 1 would estimate 3,904 yen per household per annum and the 95 percent confidence interval (CI) is 2,055 to 8,884 yen (table 3). The median WTP was 948 yen and 95 percent CI was 715 to 1,252 yen. Thus, the mean became 4.11 times of the median in Model 1. The reason is likely that the respondents were influenced by the bid amount and because the logarithm of the WTP was taken. In order to reduce these effects, we will next show the model with the bid effect consideration.

**Estimate Result of Model 2 That Considered the Bid Effect.** In Model 2, the coefficient of the bid effect  $\alpha$  was positive, and the t value was 8.353. Because a one-tailed t-test with 99.9 percent confidence was 3.291, the coefficient  $\alpha$  was significantly different from zero at the 0.1 percent level. Therefore, the null hypothesis  $H_0$  that it assumes the bid effect coefficient is zero is rejected at the 0.1 percent level.

Moreover, when the likelihood ratio test on Model 1 and Model 2 was done to give the effectiveness of the formulation in Model 2, the  $\chi^2$  test statistic became 5.958, and  $\chi^2(1) = 5.412$  at the 2 percent significance level. Thus, the null hypothesis that the formulation of Model 1 was correct was rejected at the 2 percent significance level. Therefore, it can be said that it was statistically proven that Model 2 is a preferable model as the bid effect has a positive influence when the WTP is estimated.

In addition, the coefficient of the standard error  $\hat{\sigma}$  was reduced by 70.6 percent from 1.682 of Model 1 to 0.494 of Model 2. The reason is that the part explained by the error term decreased as the error term of Model 1 was divided into the bid effect and the error term in Model 2. As a result, the mean of WTP per household of Model 2 is 1,028 yen and 95 percent CI was 799 to 1,374 yen. The median is 909 yen and CI was 715 to 1,163 yen. It is understood that the mean remained about 1.04 times the median, and the gap between the mean and median decreased greatly compared with Model 1.

By the way, the coefficients of the explanatory variables such as INCOME and LAGE both were significantly different from zero at the 10 percent level and they met the expected signs. On the other hand, BEAUTY of Aso grassland was not significant at the 10 percent level. However, TRIP, CONSERVATION, and BEEF showed significant differences from zero at the 5 percent, 1 percent, and 5 percent levels, respectively. Thus, we found that with introduction of the bid effect function, t values of other variables except BEEF also increased. Additionally, when we consider the result of  $\chi^2$  test statistics, Model 2 reveals that the explanation power of the entire estimation improved, as well.

**Table 2**—Estimated parameters (significant at 1 percent, 5 percent, and 10 percent level is indicated by \*\*\*, \*\*, and \* respectively; t-statistics in parentheses).

	Will pay		Probably pay	
	Model 1	Model 2	Model 3	Model 4
Constant	0.766 (0.185)	0.512 (0.180)	5.391** (2.137)	5.701*** (2.629)
INCOME	0.044 (0.951)	0.081 (1.963*)	0.028 (0.802)	0.037 (0.946)
LAGE	0.812 (1.214)	1.013* (1.841)	0.326 (0.808)	0.107 (0.267)
BEAUTY	0.739 (0.413)	0.309 (0.325)	1.136 (0.996)	1.412* (1.752)
TRIP	0.652* (1.961)	0.624** (2.382)	0.026 (0.106)	0.258 (0.949)
ACT	0.833*** (2.610)	0.800*** (2.815)	0.636** (2.550)	0.646*** (2.797)
BEEF	1.279*** (3.554)	0.747** (2.401)	0.806** (2.239)	0.922*** (2.987)
POSSIBILITY	0.662** (2.163)	0.652** (2.426)	0.022 (0.093)	-0.058 (-0.248)
Bid effect $\alpha$		3.683*** (8.353)		3.647*** (7.683)
Error term $\sigma$	1.682*** (8.320)	0.494*** (3.146)	1.079*** (6.242)	0.252** (1.967)
Log-likelihood	-148.300	-145.321	-96.110	-94.204

**Table 3**—Estimated willingness to pay.

	Will pay [95 percent CI] <sup>a</sup>			Probably pay [95 percent CI] <sup>a</sup>		
	Model 1 (WTP 1)	Model 2 (WTP 2)	WTP 2 WTP 1	Model 3 (WTP 3)	Model 4 (WTP 4)	WTP 4 WTP 3
Mean	3,904 [2,055 to 8,884]	1,028 [799 to 1,374]	0.26	15,875 [10,144 to 27,461]	9,633 [7,274 to 12,415]	0.61
Median	948 [715 to 1,252]	909 [715 to 1,163]	0.96	8,871 [6,867 to 11,345]	9,333 [7,096 to 12,415]	1.05
Mean						
Median	4.11	1.13		1.79	1.03	

<sup>a</sup> Confidential interval (CI) is calculated according to the method proposed by Krinsky and Robb (1986) with 4,000 extractions.

## When WTP Includes Somewhat Uncertain WTP

We also considered willingness to pay (option 1 of “will pay”) and somewhat uncertain willingness to pay (option 2 of “will probably pay”) as “YES” of the discrete choice model, and the other options, 3 to 5, as “NO.” Model 3 is when bid effect was not considered and Model 4 is when bid effect was considered.

**Estimate Result of Model 3 That Does Not Consider the Bid Effect.** In the estimation result of Model 3, none of INCOME, LAGE, BEAUTY, TRIP and POSSIBILITY had any significance at the 10 percent level. Those who want the activities to continue to the expanded area (CONSERVATION) and the purchase of the 20 percent more expensive beef of cows that pastured in the Aso grassland (BEEF) showed significant difference from zero at the 5 percent level. Also, they are in agreement with the expected signs.

Next, the mean WTP for conservation of Aso grassland using Model 3, would be 15,875 yen per household per annum and 95 percent CI is 10,144 to 27,462 yen. The median WTP is 8,871 yen and CI is 6,867 to 11,345 yen. Thus, the mean became 4.1 times and the median became 9.6 times more than those of Model 1 since we included those samples whose probability of payment is less.

**Estimate Result of Model 4 That Considered the Bid Effect.** In Model, 4 which considered the bid effect, the coefficients of the explanatory variables such as INCOME, LAGE, TRIP, and POSSIBILITY were not significant at the 10 percent level. However, BEAUTY, CONSERVATION, and BEEF were significantly different from zero at the 5 percent, 1 percent, and 1 percent level, respectively. BEAUTY was not significant even at the 10 percent level in Model 3; however, it was significant at the 5 percent level.

Next, the coefficient of the bid effect  $\alpha$  was positive, and the t value was 7.683. For a one-tailed t-test, the coefficient of  $\alpha$  had significance at the 0.1 percent level. Therefore, also in Model 4, the null hypothesis  $H_0$  that it assumes the bid effect coefficient is zero is rejected at the 0.1 percent level.

In addition, the likelihood ratio test on Model 3 and Model 4 shows that the  $\chi^2$  test statistic became 3.812, and  $\chi^2(1) = 2.706$  at the 10 percent significance level. Thus, the null hypothesis that the formulation of Model 3 was correct was rejected at the 10 percent significance level. Therefore, even when the probability of payment is less, it can be said that it was statistically proven that Model 4 is a preferable model as the bid effect has a positive influence when the WTP is estimated.

Moreover, the mean WTP would be estimated at 9,633 yen per household per annum and the median WTP was 9,333 yen. Since  $\hat{\sigma}$  is small as 0.252 in Model 4, there is not much difference as the mean is 1.03 times of the median. Also, there is not much difference in the median for Model 4, which is 1.05 times that of Model 3.

By the way, as shown in Model 3, since we included those samples whose probability of payment is less, the mean and median increased many times more. That is, compared with Model 1, the mean in Model 4 increased 9.4 times more and the median increased 10.3 times more.

## Conclusion

This study was a survey of local residents about the conservation value of Aso grassland. As we hypothesized, the difference  $\delta_i$  of the presented bid amount and the respondent's latent WTP amount effects the WTP estimation result; we considered bid effect function  $\psi(\delta_i)$  and estimated the effect of  $\delta_i$ . As a result, in the multiple discrete choice CV, when willingness to pay (option 1 “will pay”) was considered as “YES” and when both “will pay” and “probably pay” were considered as “YES,” both bid effect coefficients were estimated to be significantly different from zero at the 0.1 percent level.

Furthermore, we had the dilemma of choosing mean or median since a gap between the mean and median previously emerged when estimated with the logarithm of WTP. However, this study showed that the dilemma dissolved as the difference between them became 1.13 and 1.03 times. This is due to reduction of standard error by more than 70 percent with introduction of the bid effect function.

Also, if the conservation value of those who do not answer the question is zero yen, the average environmental value that local people pay for the contribution was 429.7 yen (= (mean WTP) 1,028.0  $\times$  (return rate) 0.418). When this amount was multiplied by 594,197 households of Kumamoto prefecture, the annual value became 255 million yen (U.S. \$2.3 million). Thus, this prefecture might be able to expend such an amount of money to conserve Aso grassland.

On the other hand, there was a problem that the time of the trial and error increased as the incidence of the error during estimation increased compared with a previously used method since we introduced the bid effect function to the estimation formula and did the maximum likelihood estimation by using TSP/GiveWin4.5.

Moreover, due to the form of the bid effect function based on the logistic function in this study, both estimations with and without this function took almost similar medians. In other words, as the estimation result depends on the form of the bid effect function, the decision of the form is something to be resolved in a future study.

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# Wilderness Values: Perspectives From Non-Economic Social Science

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**Abstract**—The concept of “values” is one of the most widely used to characterize the human dimensions of natural resources. Yet, clearly it means many different things in different disciplines and in everyday discourse. Background information regarding values from a non-economic social science perspective is provided, with an aim towards stretching the dominant economic paradigm for how value questions should be understood and to frame these questions in a way that is more suitable for what might be called, “post-utilitarian forestry.” This amounts to challenging the view that values are “fixed” and individually defined attitudes or preferences. It is suggested instead that values be seen as modes of thinking that differ among different communities, change and evolve as these different communities interact, and further, that such interaction drives the evolution of policy and management over time.

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## Non-Economic Social Values

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In public policy issues, values are too often understood to mean something very unpublic—the private preferences of individuals. For example, economists are fond of citing a definition of values attributable to Spinoza: “We desire nothing because it is good, but it is good only because we desire it” (Santayana 1896: 15, quoted in Peterson 1999: 26). This notion of values as mere tastes, wants, or desires represents the dominant way values are understood in natural resource management. Economics (and much social science) is anchored in Spinoza’s view and presumes this view is correct because it is consistent with a liberal interpretation of politics and political sovereignty (for example, “no one can know what is best for me but me”). From this perspective, the value of wilderness is little more than what the individual desires it to be. A liberal presumption of value sovereignty, whether as consumer or voter, means that all preferences (values) are merely matters of taste. In economics, we need not justify our preferences to others. Carrying this view into public policy, we need not give reasons to support our views. Values are given and cannot be improved or perfected.

An alternative to this economic perspective is suggested by Challenger (1994: 211) who states: “We would all do well . . . to quit acting as if the work of science and the work of

governing our lives can be done without conversations about values and ideals” (emphasis added). Challenger suggests that a misguided aim of modern social science and political theory has been to reduce values to a technical matter. For him, values, or more properly, valuation, is an outcome of human interaction, particularly conversation. Values are produced by interpretations we give to events and actions. Most importantly, values can be improved by the exercise of reason.

Both of these positions originate in the social sciences and take values to be subjective in the sense that values are assigned or held by human agents. It is worth noting that ecology and systems theory would likely reject both Spinoza and Challenger, or at least presume in addition, that there are objective values in aspects of systems. Science can seek to tell us what is good in natural systems, independent of human desires. For example, biodiversity is good and necessary for the maintenance of ecological systems. Accordingly, ecosystems can be scientifically classified as healthy or unhealthy based on objective criteria. Ecological views presume that value exists “out there” in a permanent condition and can be known and measured by means of science. This conception of values is outside of the scope of this paper, though it is certainly a relevant consideration in building a wilderness values framework.

The central argument in this paper is that in building a framework for wilderness valuation we are better off with Challenger than Spinoza. As we build our framework for wilderness values we should recognize that the work of governing requires conversation about values. In other words, policy debate and discussion is a valuing process just as the market is a valuing process. Recognizing valuation in this way, as a discursive process, is necessary for a greater understanding of wilderness values and to ensure their protection.

Values may be one of the most dominant topics in social science, but as we have already suggested, it has not produced unanimity in definition or conception. One of the first challenges, in fact, is to try to figure out what everyone means by values in the phrase “wilderness values.” Among the possibilities are values, benefits, desires, attitudes, meanings, preferences, services, reasons, motivations, and uses. Adding to the confusion we also find ourselves asking similarly sounding questions: How much are these “values” worth? How do we as a society order (produce, select, and distribute) these values? What good reasons can policy makers give for establishing and managing wilderness as we do? It is hard to move forward with a discussion of wilderness values if we are uncertain as to which questions we are really asking.

We see several ways we might think about the topic of wilderness values. One is to inquire about societal values

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as ideals that provide reasons for setting aside land as wilderness (for example, respect for nature, self-reliance, humility). Another is to ask about wilderness values as the possible benefits that flow from wilderness protection and their “value” to society. The latter tends to make us think in terms of benefits that accrue to society whereas the former may be thought of as affirming our basic ideals as a society. Some may see these as different sides of the same coin. However, on the front side of the coin wilderness designation is a reflection of our values as a society. These values might be anthropocentric (as a symbol of national heritage), they might be biocentric (as a statement of deep respect for all of nature) or they could be kincentric (humans and non-human forms are not separated, but part of an interrelated system). In addition, the forward-looking nature of this question (why should we create wilderness?) makes it more specific to wilderness as opposed to other kinds of nature protection. On the back side of the coin, when we try to identify and evaluate the services or benefits that accrue to society the assessment is essentially anthropocentric and typically employs economic forms of analysis. Also, by framing the question in a backward-looking way (such as, what are all of the benefits and services that come from wilderness?), we tend to identify services and benefits that are not necessarily unique to a wilderness policy. Finally, a third perspective asks: for which values should we manage wilderness? Here the question is not about designation or allocation of land to wilderness. Rather, of all the values and benefits that might flow from wilderness designation, which ones should be emphasized in management decisions (for example, recreation versus species protection or subsistence uses)? Different wilderness values may conflict with one another or, at least, may be difficult to maximize simultaneously, thus requiring decisions about which to emphasize. How do we balance (order, evaluate), for example, recreation use relative to protecting endangered species, relative to cultural heritage in management decision-making?

Finally, it is important to distinguish between values as the benefits or services (and costs) connected to wilderness (for example, clean water, human development) from valuation as the means by which society orders (in other words, produces and distributes) these goods and services. This is especially true when people talk about economic values. In the value as benefit or service sense, “economic values” refers to a class of values or benefits (for example, commercial uses of wilderness). In its valuation sense, “economic value” refers to a type of procedure or set of criteria for judging the relative worth of something within the class of values. In the latter case, for example, economic evaluative criteria might include such “values” as efficiency, whereas other evaluative criteria might center on the “values” of fairness or moral duty—values that cannot be put on the same plane as “services” because they are ideals we hold about society and self. This leads to yet another higher-order question about values: how do we “value” or order potentially competing evaluative criteria?

## Social Theories of Value

A number of different theoretical orientations exist in the social science of values. We start with a four-category

classification, which is a modification of a classification of theories suggested by Kuentzel and Freeman (1994).

### Functional Utility

Functional utility refers to systems functions and can be thought of as the “value” of some process to the integrity of a system. For example, a potato has nutritional value for human physiological functioning. For our purposes of discussing social values this doesn’t invoke any conception of a valuing agent. It isn’t a statement of ought or preference, but merely what is the function or “value” of something to a system that can be defined through a scientific description and understanding of the system (for example, wilderness). It is not the subject of social science for the most part. Philosophically, however, it would appear to have some resemblance to questions of intrinsic or inherent value.

### Social Utility

Social utility represents values from the perspective of economics and certain traditions in social psychology. Value refers to the fitness of some object for some purpose. For example, how well does wilderness serve some purpose? Values are assigned to the object by individual human subjects. In addition, there are social utility theories in social-psychology (for example, choice modeling, behavioral decision theory) and political science (rational choice theory) that, from our perspective, build on the same basic assumptions about values.

The main point to note is that value comes from the “use” one can make of something or its fitness for a purpose. In contrast to functional or inherent utility where value is linked to an objective/scientifically defined functionality, social utility emphasizes that value is closely linked to human purpose, desire, and need as perceived by the individual. To return to Spinoza, objects have value in relation to satisfying some desired end state (rewards, benefits, satisfactions).

### Social Cohesion

Social cohesion is what most sociologists think of when the term “values” comes up. This perspective originates in the sociology of Durkheim who theorized that modern society is held together by shared values that direct and constrain behavior. These are not formulated in functional relationships between objects and human desires. Rather they exist as shared beliefs or standards of appropriate behavior. For example, Rokeach defines a value as: “An enduring belief that a specific mode of conduct or end state of existence is personally or socially preferable to an opposite or converse mode of conduct or end state” (Rokeach 1973: 5).

Values are understood as beliefs that exist in a given culture and are socialized into our individual identities. As beliefs about what is good and desirable they are held as opposed to being assigned to a given object or behavior. They are “social facts” or things in themselves like attitudes, beliefs, norms and identities. But what distinguishes values from related constructs like attitudes and norms is that values do not take a specific object. Values are more generalized ideals as opposed to attitudes, which take a specific object



or action. Values exist to make order in society possible. They are the glue that holds people together in a society (in other words, we share values). Thus, values direct and constrain behavior and define what it means to be a member of a society or group. Moreover, values are often seen in a hierarchical relationship to norms, attitudes and behaviors. In other words, values influence norms and attitudes, which further influence behaviors. In this hierarchical structure values are relatively few (a few dozen) and stable, whereas there can be a great many attitudes and behaviors and these are less stable than values.

Some examples of value frameworks from the social cohesion perspective include Rokeach's (1973) 36 values divided between instrumental and terminal values. Instrumental values are concerned with modes of conduct. Terminal values concern desirable end states of existence. More widely used in environmental studies is Schwartz's 10 value dimensions (see Schwartz and Bilsky 1987). These are organized within two bipolar dimensions: self-transcendence—self-enhancement and openness—conservation. The values associated with self-transcendence are universalism and benevolence, which contrast with the values power and achievement of self-enhancement. Self-direction, stimulation, and hedonism are associated with openness and contrasted with tradition, conformity, and security associated with conservation. Some recent research shows that pro-environmental behavior (for example, recycling, energy conservation) is associated with self-transcendence (Schultz and Zelenzny 1998).

## Social Discourse

The social discourse perspective originates in the sociology of Weber and contrasts with social cohesion theories of value that emphasize the idea that we are socialized to hold certain values within a given community or culture. From the social discourse view, values do not exist as such, but are emergent features of social interaction, especially communication. Values are contested representations of social experience within a given context. In contrast to the social cohesion view, there may or may not be widespread agreement about what is valuable. Take the historical development of the idea of wilderness for example. The discourse of romantic transcendentalists Thoreau and Muir, and of ecologists such as Leopold, helped to create the value "wilderness." Wilderness is thought to be valuable today more and in different ways than it was in the mid-19th century in large part due to the efforts of these individuals to make the case for wilderness. However, in recent years others have challenged the value of wilderness, particularly as a model of land preservation for other nations (see Callicott and Nelson 1998).

In the discourse perspective, values are the momentary products or outcomes of continuous social interaction. Another way to think about this is that values are the reasons people give for taking certain courses of action. In a policy context, "wilderness values" are the reasons people express (and debate) for protecting wilderness. Values are continuously contested ideals, so what we take to be the values underlying wilderness at a given point in time will evolve as society evolves. Values toward nature, the environment, and wilderness can be studied historically by looking at the writings of Thoreau, Muir, Leopold, and the contemporary

writers about these things such as Nash, Oelschlaeger, and Callicott.

The research behind the discourse view is sparse compared to the other models of values, and what work does exist is not necessarily inspired by the discourse view. Sagoff's (1988) work distinguishing between consumer and citizen evaluations could be viewed as a discourse theory of value. Sagoff argues that people can differentiate between how they might act in accordance with their personal preferences as consumers and how they might act as citizens making policy. His example is that he prefers to buy the lowest priced gas for his car, but holds the view that society should heavily tax gas consumption.

One example that is closer to the context of concern here (wilderness) is Bengston's (see Bengston 1994; Bengston and others 1999; Xu and Bengston 1997) content analysis of media coverage of environmental issues to identify what he calls forest values. Media coverage represents public discourse, the content of which can be analyzed for the reasons various policy actors give for their positions. From analyses of these news sources, Bengston has identified four major value themes: life-support, aesthetic, moral/spiritual, and economic. His research suggests value shifts in recent decades from economic values toward the other value themes.

A third example comes from Dryzek's (1997) effort to identify the major environmental arguments dominating environmental policy making worldwide. He organizes the environmental movement into four major themes with various sub-themes: (1) globalism (survivalism and promethanism); (2) problem solving (administrative, democratic-pragmatic, and economic); (3) sustainability (sustainable development and ecological modernization); and (4) green radicalism (green romanticism and green rationalism). Environmental policy is informed by the dynamic interaction among these various discourses.

## Valuation

Having laid out these basic social science orientations, there remain a few residual issues that need to be considered in a social science of values and the task of developing a values framework for wilderness. These issues come down to drawing a clearer distinction between values and valuations as suggested earlier. There are many lists of potential values and benefits that come from wilderness and nature protection (see McCloskey 1989). These lists can and should be refined. However, following the discourse view of values, we need to recognize these will continue to evolve as society struggles with policies for the protection of wilderness.

The more critical issue is to try to understand the social mechanisms and institutions for ordering (evaluating the production and distribution of) these values. A good illustration of different modes of evaluation comes from Anderson's (1990) critique of market ethics. She begins by noting that the market is an institution or procedure for making valuations. And like any institution, it embodies norms for regulating the production, exchange, and enjoyment of goods that are sensitive to some qualitative differences among values and insensitive to others. Her main concern is how we can determine which goods are properly the subject of market transactions (and by implication market valuations)

and which are not. The task of building a wilderness values framework would seem to fit squarely within this question. It is not just a task of identifying possible goods (values or benefits) that might accrue from wilderness protection (for example, carbon sequestration, human development, or scientific knowledge), but also a question of the appropriate means by which society should order, evaluate, or decide among the production, distribution and maintenance of these various goods.

## Modes for Valuation

Anderson (1990) describes four modes for the valuation of goods and the corresponding social norms that regulate these different types of exchange. We are naturally most familiar with the use mode (which involves subordinating something to one's own ends). For markets, the norms are impersonal relations (transactions with strangers), freedom to pursue one's own advantage unrestrained by consideration of others' advantage, equating values to matters of personal taste, where goods exchanged are exclusive in consumption and rival in competition, and where dissatisfaction is expressed by exit from the market. These norms can be contrasted with three other valuation modes or sets of social norms for regulating the production, distribution, and maintenance of goods.

**Intrinsic Mode.** One alternative is what she calls the intrinsic mode. Intrinsic norms deal primarily with respect and acceptance of the object as it is, rather than for how it can be used. Here is where we would likely place ecological and aesthetic values. We can, as economists have, identify the economic value of such goods using contingent valuation and other pricing techniques. But this is nevertheless an act of subordinating their intrinsic value to an economic end. To illustrate, most people object to any attempt to measure the economic value of a human life because the question presumes that the value of a human life can be compared to the usefulness of ordinary consumer goods. Similarly, people object to questions about their willingness to pay for clean air on the grounds that they are being asked to pay to restore that which is intrinsically good, but which has been degraded by allowing people to subordinate its value to a mere economic good (Dustin 1992). That is, it only makes sense to ask the question of willingness to pay from within the use mode of exchange (see also Trainor and Norgaard 1999).

Aside from the market, what kinds of institutional mechanisms are or can be invoked to allocate intrinsic goods? Wolfe (1989) argues that early theorists of economics such as Adam Smith expected institutions associated with civil society (for example, social conventions, cultural norms and traditions, law and religion) to act as constraints on purely private approaches to regulating social transactions. Ironically, the modern age is marked by both a growing societal awareness of the intrinsic values of nature (for example, the expansion of environmental ethics as documented by Nash 1989) and the dominance of market institutions for the valuation of these goods over the institutions of civil society (Sagoff 1988).

**Personal Sentimental Mode of Exchange.** A second alternative, one not captured by any of the theories discussed

so far, might be called the personal or sentimental mode of exchange. Objects, people, and places are often loved and cherished. Whereas commodities are interchangeable, cherished goods are unique, irreplaceable, and given up only under duress. In this case the dominant norms have to deal with commitment to the relationship and expressions of identity and self. Anderson develops her ideas about this mode by discussing interpersonal relations among friends and family and the role played by goods exchanged in such relationships. Goods such as trust, loyalty, sympathy, affection, admiration, companionship, and devotion cannot be bought and sold (though she notes that people sometimes deceive themselves in the attempt). Goods such as these (exchanged in personal relationships) are guided by the spirit of gift rather than the spirit of commercial exchange. To impose market norms of exchange for these goods undermines their authenticity and value. Gifts of love and intimacy for example, "cannot genuinely be procured for oneself by paying others to produce them or by appealing to another's personal advantage to provide them" (Anderson 1990: 186).

Extending this idea to cherished places, we can recognize the value of a specific wilderness as not a result of consuming its wilderness qualities, but as a kind of gift one receives from the specific relationship with that landscape. For the first author, it is the Desolation Wilderness; no other wilderness has the personal meaning of that place. He values the Desolation not as "wilderness" per se but as the memory-filled place called Desolation Wilderness. Perhaps here is where we might ask not, what are the benefits that people take from wilderness, but rather, in what ways do people contribute something to its value?

**Public Symbols and Shared Ideals.** The third mode deals with value as public symbols and expressions of shared ideals. This is the political mode of evaluation. As Anderson (1990: 181) notes, some "values cannot be realized in private acts of use, but reside in shared public understanding of the meaning and significance of the good." As an example, Anderson describes sites of historical events as having value as part of national heritage. Preservation of these values requires constraints on use, such as zoning ordinances, to preserve the architectural integrity of the features and buildings associated with such sites.

The norms for these shared community relationships contrast sharply with the norms of the market. These norms include fraternity in place of self-interest, mutual benefit in place of exclusive use, need over want, and voice instead of exit as the expression of dissatisfaction. Fraternity is expressed through common provision of services in contrast to the separateness of parties in a commercial transaction or the special relationship between parties in personal gift relationships. Publicly provided goods are provided to all, not just to those who pay. Shared goods are necessarily realized in common activities and rights to these cannot be fully distributed in exclusive increments. When goods being distributed are not public, distribution takes place in accordance with some conception of the relative need of a citizen rather than in accordance with want. Finally, citizens participate in the allocation of goods based on voice rather than exit. For example, the appropriate determination of need is based on democratic deliberation. Anderson compares the way respect is given between market and

political relations. In market transactions, one respects the privacy of the consumer by not inquiring into the reasons for wanting something beyond a level necessary to satisfy that want. In public transactions, respect for fellow citizens is to take their reasons for advocating a particular position seriously. Public goods are produced and distributed through institutions and practices that deliberate over the shared concerns of citizens. Market mechanisms of exit do not respond to reasoned ideals any differently than from unreflective wants. The realization of shared values requires a forum for working out these understandings together.

Attempting to order these shared goods by market mechanisms tends to detract from their value. In an argument reminiscent of Olmsted's views on public parks, Anderson notes that the goods provided by public spaces are qualitatively different than if they were provided privately. Public space promotes the free and diverse association necessary for fraternity, civility, and democracy (see also Putnam 2000). As another example, with a private system of roads one would need to ask permission of each owner to visit people and places made accessible by such roads, thus creating potential restraints on the freedom of association.

There are other ways to classify and characterize modes of evaluation that might be explored. One example described by More and others (1996, 1998) distinguishes five modes of evaluation: (1) economic standards used to evaluate goods and services; (2) moral standards used to judge conduct (which can include conduct towards animals and ecosystems as well as humans); (3) aesthetic standards used to judge appreciation; (4) spiritual standards used to interpret meaning; and (5) rational standards used to judge truth. There are also various institutions that guide the ordering of values. In addition to the market and the political state, we can add common law (as distinct from legislation as a form of political deliberation), religious institutions, and various cultural traditions, ethical frameworks, etc.

A critical feature of recognizing these different modes of valuation is that the market or use mode tends to colonize all others (Anderson 1990; Wolfe 1989). Intrinsic, personal, and shared modes of evaluation constitute constraints on use. In capitalist societies we tend to value the dismantling of these constraints to "free up the market." Modernization can be understood, in part, as a process in which market norms are increasingly used to regulate more and more social interactions that previously were produced and distributed by non-market means. Anderson's scheme for organizing values

and valuations implies that not all values, benefits, goods or services should be ordered by means of market norms, nor should attempts to weigh and judge them be turned over to technical analysis. As we have suggested, an important tool for deciding about the production and distribution of these various services is vigorous, reflective public discourse. This kind of deliberation can create and improve public values and is an essential feature driving the growing movement toward collaborative decision making in natural resource planning.

## Values and Theories of Democracy

Thus far we have discussed values from the perspective of economics, psychology, and sociology. A somewhat different angle, one that helps to understand the deliberative process for evaluation, comes from political theory. As developed in this paper, political theory can be conceived as the study of certain processes for how society orders values. Or from Anderson's perspective it is the "shared" mode of valuation (ordering of values) relative to the market or the "use" mode. But what we actually see by comparing political theories of democracy is that the different political theories are somewhat aligned to the different theories of value already identified. Drawing from several sources (Benhabib 1996; Dryzek 1997; Pritchard and Sanderson 2002; Stanley 1990; Williams and Matheny 1995), table 1 presents a comparison of four political theories in terms of conceptions of the participants, the processes used for working out the ordering of goods, the outcomes of these processes, the source of values and consensus, and the form of rationality. The first two (pluralist, expert) are sometimes referred to as "liberal" models because they emphasize the autonomy of individuals and competitive interests (Stanely 1990). Expert or scientific management presumes that the wants of individuals can be identified and analyzed by technical experts (experts can perfect the market if you will). The latter two (communitarian, discursive) are sometimes referred to as forum models because they emphasize dialogue and presume that individual preferences can be improved and that shared interests can be discovered.

Values, as reflected in conceptions of participants, suggests the distinction between private values and shared values, or citizen values. Participants are understood as individual

**Table 1**—Comparison of models of democracy.

Model of Democracy	Participants	Process	Outcomes	Values/consensus	Rationality
Pluralist	Individual supplicants	Negotiation/bargaining	Welfare maximization (efficient)	Balance of interests	Instrumental
Expert	Individual supplicants	Technical/scientific	Welfare maximization (true)	Scientific understanding	Instrumental
Communitarian	Community members	Dialogue	Articulation of shared values	Discover pre-existing unity	Communicative
Discursive	Citizens	Dialogue	Civic education	Episodic agreement	Communicative

supplicants bearing wants in market and expert models. In communitarian and discursive models, participants are social beings embedded in diverse, fluid and overlapping “discursive communities” each with their own system of meaning, forms of knowledge, ways of reasoning, and modes of expression. “Community member” implies some cohesion with respect to group-defined interests, but ingroup-outgroup differences are problematic—who counts as a community member? Citizen implies greater acceptance of social differences but also a duty to a larger polity that might even include non-human nature.

Outcomes describe the result of policy analysis and the criteria of good decisions. In the case of pluralist and expert models, the outcomes are technically defined (efficient or technically correct). The communitarian view emphasizes discovery of shared values whereas the discursive view involves creating new values through civic education. In the latter case, policy issues are treated as opportunities to learn about social differences. Such differences forces participants to transform interests into appeals for wider justice (Young 1996).

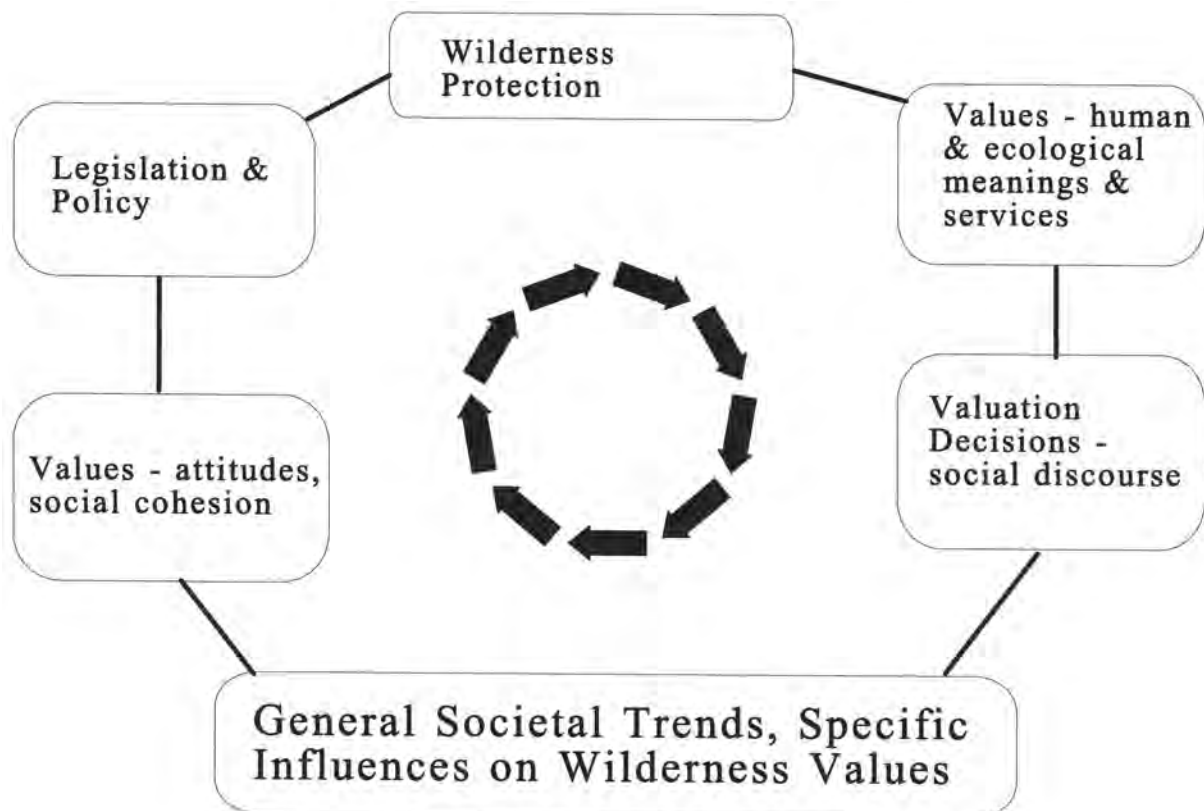
Values and the search for consensus or agreement vary from the balancing of interests and the search for scientific consensus or understanding, to the discovery of a pre-existing unity and episodic agreement. Communitarian approaches differ from what might be called purely discursive approaches in that the latter does not presume the pre-existence of social unity. It emphasizes that politics is always a struggle among differences and that the best one can hope for is episodic agreement (Benhabib 1996).

Rationality is either instrumental in the case of market and expert approaches or “communicative” in the case of the forum approaches. Forum models of democracy embody the ideal that citizens can perfect their preferences. This is a key to understanding the different approaches. Communicative dialogue involves giving reasons for our values and preferences, in contrast to instrumental rationality, which assumes that preferences are given and need only be aggregated. In communicative rationality, evaluation of the good is determined by better argument.

## Sources of Value and Value Change

To this point we have not directed much attention to the origins or forces of change in wilderness values. Many aspects of American society have changed since the passage of the Wilderness Act in 1964, yet much of the discussion of wilderness values appears to be frozen in time. Why should we expect our children to value wilderness in the same way founders of the wilderness movement did or, for that matter, the way current generations do?

Figure 1 provides a schematic way to understand how social values are modified and eventually create wilderness benefits, or human and ecological meanings and services. In discussing this model it is important to recognize we are making two kinds of distinctions too often muddled in discussions about values. First, we distinguish the values (shared ideals, attitudes, social cohesion) that give rise to



**Figure 1**—Sources of value and value change (adapted from Watson and Landres 1999).

wilderness protection from the values (human and ecological meanings and services) derived from wilderness protection. As we alluded to at the outset of this paper, values on the left side of the diagram refer to the forward looking question of what values society holds that give rise to policy and management efforts to protect wilderness. For example, American values associated with conquering and settling the frontier (for example, self-reliance, hard work, civilizing the new world) provided some impetus for wilderness protection as tokens or reminders of our heritage. These are, to some degree, shared ideals about what it means to be an American and these ideals are “affirmed” by a policy of designation and protection.

Values on the right side of the figure tend to reflect the question of what goods and services might be derived from wilderness areas. This backward looking question tends to be posed as a social and functional utility view of values. While not all values derived are necessarily use oriented, the question generally revolves around identifying all possible benefits with an emphasis that different people recognize and derive different meanings and services (Watson 2004). Meanings and services can be human (recreation, subsistence, economic, etc.) and ecological (maintaining biodiversity, protecting endangered species, avoiding habitat fragmentation effects on a specific faunal species, etc.) and they can vary from one wilderness area to the next. The issue of wilderness management comes into play as in the recognition that different combinations of values (human and ecological meanings and services) can be “produced” through management decision making and furthermore that some may compete with others as the “dominant” value.

Second, we distinguish between values as the benefits and services associated with wilderness (as just discussed) from valuations as value appraisals, which order values or assess their production and distribution in society. Within figure 1, valuation (value appraisal) is sometimes understood as assessing the benefits of some policy. Benefit assessment refers to some effort of value appraisal or valuation aimed at deciding which values society shall emphasize or realize in the management of wilderness. Assuming some values compete with others, which of the various possible values (meanings, services, and benefits) will we manage for? Should we acknowledge that some values act as constraints on other values? Should wildlife protection constrain or take precedence over recreation use? As we have argued earlier there are various theoretical modes (criteria) and institutional mechanisms that society can use to make these decisions.

Watson (2000) has offered some thoughts on why wilderness plays a different role in society today, how wilderness values will continue to change into the future and how management and policy are related to wilderness values. First of all, there are things that have changed about society that also change the way we relate to wilderness. Some of the ways our society has changed include changes in our culture, technological advances, environmental changes and diversification in the economy.

## Changes in Culture

Our society is already dominated by an urban culture, and this domination is only going to increase. Stokes (1999)

expressed the belief that population growth and urbanization are two of the four most important contributors to change in the political environment surrounding wilderness issues. Not only do we see the physical changes involved with the transition of farm and ranch lands to housing, businesses and roads, but our society has transformed to an urban culture, complete with changes in racial and ethnic mix, increasing education and income and an increasingly important dependence upon others to affect change. Wirth (1972) predicted that urbanism was going to create a feeling of inability to influence change on the part of the individual. This would precipitate the need to join with others of similar interests into organized groups to obtain ends.

Carlson and McLeod (1978) found that among farmers, those with higher education, higher income, and a shorter involvement in farming held weaker agrarian philosophies, obviously characteristics associated with an urbanizing society. A New York Times poll of 1989 found that the third most popular activity among domestic U.S. vacationers was visiting small towns. Some researchers believe that urban residents value the rural landscape more than rural residents do. If increasing urbanization leads to increasing value associated with undeveloped landscape, and undeveloped landscape is diminishing, the way to accomplish protection of undeveloped landscapes is to join others with similar interests; increased association with others interested in protecting landscapes leads to even more purist attitudes toward protection, and even stronger wilderness attitudes would be expected in the future, as they have developed in the recent past.

## Technological Advances

In John Naisbitt's (1982) book on megatrends, he projected that through the end of the past century, we would continue to feel the effects of a switch from an industrialized society to an information society. We are living more and more in an economy and a society built on information. This has driven us en masse toward redefining power and quality of life. In the computer age, we are forced to deal with conceptual space rather than physical space. Back in 1964, it was easy to understand the meaning of Bob Marshall's statement that “Certain vigorous people gain intense satisfaction in doing for themselves all the tasks essential for existence.” That fit well with the image of primitive skills needed to enjoy wilderness travel and camping and the values of society at that time. Today, that statement is more aptly applied to the skills necessary to survive our increasingly technology-oriented society. It is the person with instant access to the World Wide Web, a cellular telephone, and the most efficient computer software who has the essentials for existence in our society. The wilderness resource has become more and more of a contrast to the effects of dominant societal values. As the continuum continually extends toward the technology end, the primitive end becomes more valuable to society as a point from which to compare and understand the benefits and threats technology offers to society. While not essential to physical existence, the novelty of wilderness skills, the opportunity to deal with physical space and the need to verify knowledge about natural places make the role of wilderness today a different one from the past.

## Environmental Change

As an urbanized and educated society, we are much more aware of environmental threats and changes today than ever before. Ancient civilizations may have lived in closer harmony, but we are constantly bombarded by new information about the threats our lifestyles pose to the environment. From the time of industrialization, we have constantly become more of a threat to the environment, but now we have endless options to reduce our impacts. We have changed everything from our deodorants to our vehicle air conditioners to protect the ozone layer. Our attitudes toward beef and the fast-food restaurants that prepare it in quantity have changed due to relationships between tropical deforestation and agriculture. Activism or even passive support for environmental protection efforts, are positive character attributes of members of our society. Methods to protect the environment have become major issues of debate in modern political campaigns, and we find countries competing in the international forum to be leaders in environmental protection.

## Diversification of the Economy

The economy of a society based on information is based on a resource that is not only renewable but self-generating. This information-based economy is much less dependent on commodity extraction, and we have developed a good understanding of how natural amenities influence the local tax base and the local economy (Power 1996). In 1960, about 21 percent of non-metropolitan jobs in the United States were in the extractive industries. By 1985, that was down to only 8 percent. Power (1996) describes this transition from a set of "core" extractive industries to an expanded and diversified economy during this century. He points out that lands with wilderness qualities are a relatively scarce resource with significant alternative uses. Wilderness protection does not impoverish communities by locking up resources. Rather, it protects the economic future of communities by protecting high quality natural environments that are increasingly in demand across the nation.

Watson (2000) also suggests that some specific things have likely contributed to changes in attitudes toward wilderness. These would include things that have increased awareness about impacts caused by recreation, media coverage of natural ecological processes, increased scientific understanding of natural processes, and noticeable loss of protected natural areas.

## Awareness of Impacts Caused by Recreation

The "Leave No Trace" (LNT) program, originally developed by the U.S. Forest Service in the 1970s, has been embraced by the Bureau of Land Management, the National Park Service, the U.S. Fish and Wildlife Service, and a broad range of outdoor user groups. In addition, it is gaining support from the recreation industry and has formally organized as a nonprofit organization (Swain 1996). The LNT organization recently empowered young, enthusiastic teams of people to travel throughout the United States in Subarus packed

with Leave No Trace educational brochures and souvenir first aid kits, evidence of corporate sponsorship to support spreading the word about how you can reduce your impacts on the natural environment while hiking, rafting, and bicycling. Generally, wilderness education programs are aimed at school age children, with the hope of impressing them with the importance of taking care of the limited natural places we have. The Wilderness Impact Monster program (Hendricks 1999; Hendricks and Watson 1999), started in Oregon in association with the Eagle Cap Wilderness, has spread to many places in the United States as a method of making young and old more aware of wilderness etiquette and our responsibility to take care of the wilderness environment. These and other agency- and corporate-sponsored programs have been aimed specifically at changing some of the attitudes and values we know have changed for wilderness visitors and the public.

## Media Coverage of Natural Ecological Processes

National and regional coverage of the role of fire in natural ecosystems after the large fires of 1988 and 2000 is believed to have influenced public perceptions of the value of fire. Barraged by Smokey Bear slogans and the belief that fire is bad, the American public awoke in the 1980s to find scientists proclaiming the need for fires to correct many years of fire exclusion policies. In a study by Manfredo and others (1990), a strong relationship was found between knowledge about fire effects and support for policies that allowed some fires to burn in places where they did not pose threats to safety or property. In the Rocky Mountain West, where recent occurrences of wildland fires had dominated the media, knowledge about fire effects, and therefore support for policies to let some fires burn, was higher than in other parts of the United States.

## Increased Understanding of Natural Processes

Today, we have much greater understanding of natural processes and their importance than we did in earlier decades. The terms "biodiversity," "habitat fragmentation," and "ecosystem management" are not used and understood only by scientists or in academic circles. The way we think and talk about the landscape has been shaped by specific advances in scientific understanding about the interrelationships among parts of our environment. Rachel Carson was writing *Silent Spring* as the debate over wilderness protection was occurring. Today, we are extremely aware of the effects of toxic chemicals on our environment and human health. We are also constantly changing the way we look at wild places due to new knowledge about the effects of fish stocking on native amphibians (Matthews and Knapp 1999), the effects of non-native species on biodiversity (Asher and Harmon 1995), and the effects of recreation on natural animal populations (Gutzwiller and others 1998). Our understanding of natural processes and the effects of our behaviors on the environment continue to change rapidly.

## Loss of Protected Natural Areas

While the National Wilderness Preservation System has increased since 1985, the amount of undeveloped places has generally decreased. Scarcity naturally increases the value of natural landscapes in an urban society that is rapidly developing its unprotected places. As the landscape changes, movements to save open space, to protect greenways and to expand protected areas increase. Wetland development, offshore mineral exploration and tourism development are all proceeding at a rapid pace, contributing to the threat of depletion of unexplored, undeveloped places in the United States. A growing awareness of increasing scarcity has affected the value of natural landscapes to many people.

Some of the societal and specific influences that are going to change our relationship with wilderness in the next century include continued urbanization of our culture, increasing technology and information availability and the potential commercialization of wilderness resources and experiences.

## Continued Urbanization

As our urban centers merge together and traditional United States rural values continue to subside, a greater proportion of wilderness visitors will both grow up and continue to reside in urban situations. With urbanization comes expectations of higher incomes, higher educational attainment, and a tendency to join organizations to influence change, including protecting natural landscapes. While these visitors will have less frequent exposure to nature and less familiarity with the skills needed to deal with wilderness travel, they may find the switch from dealing with conceptual space to physical space as novel as recent past generations found the reverse situation. Recent reports of substantial social and economic benefits of wilderness experience programs on urban, economically disadvantaged youth (Russell and others 1998) only provide a glimpse of the potential value of wilderness protection to increasingly urban populations. One of the great research questions is the need to understand how increasing urbanization will influence wilderness values in the future. Speculation suggests that the more urban we become, the more valued will be the primitive landscape from which we originated.

## Technology and Information

Vice President Al Gore once said, "We are at the present time woefully unprepared to grapple with the serious ethical choices with which the new technology will confront us. The very power to bring about so much good, will also open the door to serious potential problems." While genetic cloning, new surgical techniques and medications and alternative energy sources were probably foremost in his thoughts, his concerns apply equally to the increasing effects of technology and information on wilderness. In the future, it will continue to be easier to find wilderness than it was in the past, the likelihood that one will be able to do more in-depth planning of wilderness trips while seated at the computer at home will increase, and the presence of technological devices that directly conflict with the purpose of being in wilderness will increase substantially. As this technology invades every

aspect of wilderness exploration, we will face the serious need for development of an information ethic, just as we were once in need of a land ethic. One of the reasons people go to wilderness is for the sense of discovery and uncertainty.

In a study of Desolation Wilderness users in 1997 to 1998 that asked visitors to rank 19 potential uses of recreation fees, providing access to existing information posted on the Internet/World Wide Web about the Wilderness was ranked 15th and 17th for two independent samples of campers and 18th and 19th for two independent samples of day users (Vogt and Williams 1999). This may be interpreted to mean these visitors dislike the existing information about the Wilderness, they lack Internet access or they recognize the inappropriateness of so much available information about a wild place. Much of the risk and adventure can be taken away by the availability of electronic information such as photographic images of campsites or vistas, fish stocking history of lakes and streams, and recent human visitation levels. Aldo Leopold once lamented that unknown places disappear as a dominant fact in human life. It may take society's discovery of the last uncharted place (and "posting it on the web") to understand what such discovery takes away.

## Commercialization of Wilderness Resources and Experiences

The single greatest threat to the relationship that has evolved between the American people and wilderness is the recent trend toward charging fees for access to wild places on public land. More (1999) argues that imposing fees for access to public lands may not be consistent with the interests of the general public. Instead, commonly used willingness-to-pay pricing approaches to establish fee policies pushes public policy toward the preferences of the affluent in our society. For Desolation Wilderness visitors, responses to new and additional proposed fees were associated with user perceptions that these fees would limit access for some segments of society (Watson and others 1998, unpublished report to the Eldorado National Forest, the Lake Tahoe Basin Management Unit and the Southwest Region of the U.S. Forest Service). While existing restrictions on participation in wilderness recreation (for example, trailhead quotas, limits on river float permits, etc.) have mostly been perceived as fair to all potential participants, the introduction of fees changes the function of wilderness in the lives of the American people, with the most profound effects expected on the relationships between wilderness and the American working class (More 1999).

Fees could also change the relationship between the American people and the agencies charged with managing wilderness. More (1999) is concerned that current strategies for implementing recreation fees on public lands are serving the interests of the agencies more than they are serving the public. Winter and others (1999) provide context for the importance of this concern by presenting arguments that social trust may be the most significant predictor of anticipated impacts of new fees, general attitudes toward recreation fees, and amounts people are willing to pay for recreation access. While Winter and others (1999) report that the expected impact of fees is more likely to be in the



form of reduced spontaneity than exclusion, there is no doubt that it will change the values associated with wilderness.

One of the most basic effects of charging fees for wilderness access will be the perception of commercialization, or treating the wilderness as a commodity, even by members of the public who agree in principle with charging user fees (Trainor and Norgaard 1999). And we expect substantial displacement effects due to fees (Schneider and Badruk 1999). The existence of fees at some areas, even if we develop a policy that charges for all public land access, will influence both attitudes and meanings related to wilderness. In a historical sense, valuation decisions about competing values (meanings and services) influence and change society and these changes in turn influence societal values (attitudes, social cohesion). Taken in its entirety, the model in figure 1 represents the valuation process in a long-term historical sense and is consistent with a social discourse definition of values. The model attempts to recognize that society, through social interaction and communication, creates and recreates what society takes to be social values. These "understandings" at any given moment in history become the ideals that define the society and motivate policy, give shape to the meanings and services people realize through the protection and use of wilderness, and establish the evaluative criteria society will use to judge which meanings and services should be recognized in the management of wilderness.

## Conclusions

What can we conclude from this exploration of the social bases of values? First, we must think carefully about what questions we want to ask about values. Do we want to ask a market question, policy question, or even a management question? Which modes of valuation should guide a public policy on wilderness protection? As a matter of public policy the basis of wilderness valuation needs to be linked to the quality of the arguments people express for or against protection. As Sagoff (1988) reminds us, the value one derives from wilderness as a consumer (wilderness visitor) is one thing, the value we citizens derive from it is another. In addition to expressing use values we can also acquire and express values that are deeply personal in nature that deal with our relationship to a particular wilderness area. And further, there are values that cannot be realized in private acts of use that we can also learn and express in the public sphere.

Second, there is a risk to translating too much of the value of wilderness into statements and measurements of a use value, or for that matter, any single value. The fixed, autonomous conceptions of value typical of economic, utilitarian, and resource thinking do not require citizens to transcend their own interest and seek a greater appreciation. The message from a discursive view of values is that how people evaluate options, policies or goods can be improved through reflective public discussion. Economics assumes values cannot be improved. By this measure the value of wilderness is forever confined to individual desires; it will only be good if people desire it. The discursive view leaves open the possibility that values can be created, strengthened or lost. Arguments can be presented for why society should value what is good in wilderness. This is precisely what Thoreau and Muir did and their efforts changed the way society values wilderness. It

is also important to acknowledge that the greatest value of wilderness may be the unique combination of benefits and services wilderness provides. It is this combination of values that we must define, not the individual components.

Third, because this is a policy question, we do not see the solution as one of abdicating responsibility as citizens to do the hard work of reasoning about values and turn these valuation questions over to experts or scientists to tell us what the value of wilderness is. Ultimately policy should be made by citizens, but citizens need not and should not be reduced to mere consumers. Policy formation in a democracy presupposes the possibility of value transformation through the exercise of public reason.

In any model of public choice there is always the risk of excluding some voices. The major challenge to a discourse perspective is not whether well-designed forums can make consumers act like citizens, but insuring that all of the important voices are allowed to speak. As we look around we must ask ourselves: who is not present to participate in this reasoning about wilderness values?

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# Between Wilderness and the Middle Landscape: A Rocky Road

Lisi Krall

*The spiritual effect of the wilderness runs deeper than any other encounter in nature. Great distances and vast empty spaces, impenetrable forests and mighty waves suggest the power and omniscience of the supernatural, a presence ultimate and final, somehow more real than small-scale places, closed yards with apple trees and sparrows. To those who sit by the lone sea breakers come the heartbreaking terror and the mantle of prophecy, the ecstasy of divine fear, and the sudden, awful awareness of self in space and time. (Shepard 1996a: 238)*

## Introduction

Wilderness preservation, as one branch of conservation, demonstrates a decidedly different cultural ethos than the utilitarian branch. Thus, preservation and utilitarian conservation represent different habits of thought fermenting in the cask of 19th century economic evolution. More specifically, the utilitarian branch of conservation can easily be viewed as an extension and adaptation of the agrarian habit of thought. The agrarian ethos is an attitude of the middle landscape, a place of pastoral and agrarian harmony—a place not industrialized, but not wild, where humans have been able to control nature and reach a seemingly harmonious relationship with the natural world under millennia of domestication. It found new validation and definition in the United States during the 19th and 20th centuries, specifically in the utilitarian branch of conservation.

Wilderness preservation as an ethos, on the other hand, depends on a post-agrarian society to fully develop. Preservation, as setting aside, is a distinctly 19th and early 20th century approach. If wilderness is to survive we must acknowledge that this approach is inadequate for the material conditions of the 21st century. Significant changes in society will be necessary, but we will be able to entertain them only if we understand that achieving the full potential of our humanity depends on the presence of wilderness.

## Reinventing the Middle Landscape

Day to day experience and cultural “embeddedness” of wilderness had long been vanquished in Europeans who

entered the “new” world with a long history of domestication and its attitudes. The virgin land they encountered, with its physically demanding problems, reinforced these attitudes. Nash (1967: 27, 42) tells us that, “On every frontier obtaining cleared land, the symbol of civilization, demanded tremendous effort” and explains further that, “subjugation of wilderness was the chief source of pioneer pride.”

Thomas Jefferson’s agrarian vision became the ideal for this “subjugation,” which was inherited from Europe. The United States provided fertile ground for extending the pastoral illusion of harmony. Smith (1950: 123) describes it thus: “The image of this vast and constantly growing agricultural society in the interior of the continent became one of the dominant symbols of the nineteenth-century American society—a collective representation, a poetic idea that defined the promise of American life.” The middle landscape found a fertile place to take root in 18th and early 19th century America. The agrarian ideal gave economic direction to democratic principles. The doubts held by leaders about the masses were assuaged by the possibility of people living self-sufficiently on land where reactionary tendencies could be contained and channeled. Moreover, agricultural specialization provided a niche for the United States in the emerging economic order, especially with the loss of soil fertility in Europe.

As the industrial revolution developed, the ideological predisposition for market capitalism as the natural order of society merged with the notion that wilderness needed to be tamed and formed a virulent attitude of domination over the natural world. Specifically, the framework of laissez faire capitalism created a qualitative change in the manipulation and use of the natural world. It was not simply a matter of utilizing the natural world to create use value, it was (and is) a matter of using the natural world to create exchange value. The purpose of the former is to provide useful items required for our material existence; the latter identifies profit as the primary purpose and the material existence of society as ancillary. With the imperative of profit as a goal there were (are) no limits to the utilization of the natural world as resource.

Smith (1950: 124) points out: “When the new economic and technological forces, especially the power of steam

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working through river boats and locomotives, had done their work, the garden was no longer a garden.” Nonetheless, as middle landscape disappeared, attitudes and beliefs grounded therein continued. This was partly a matter of inertia because conditions changed so rapidly that it was difficult to wrap our collective heads around the new world. More importantly, the ethos of the middle landscape was reinforced and reinvented under the force of economic growth. Self-sufficiency in agriculture found economic purpose in the fluctuations of the market economy with westward expansion and reinforced the agrarian ideal. Farmers could hold on by at least feeding themselves when market conditions were problematic for economic survival. Moreover, the ideal agrarian middle landscape, a place where man could create harmony with the natural world in the face of the necessity of using it, became an adaptive ethos as demonstrated by the rise of the utilitarian branch of conservation in the wake of 19th century market capitalism.

A natural world that initially appeared unlimited and sufficient to create an idealized society of mostly farmers changed dramatically as manufacturing eclipsed farming. The natural world began to show the strains and problems of misuse early on as the pace of expansion proceeded at warp speed. It took only 30 years to destroy the primeval forests of the Adirondacks. Very quickly it became apparent that the relationship between man and nature in the United States in the 19th century was not going to result in any pastoral dream.

Over the course of the century and with the expansion of ecological thinking, it became clear that unfettered capitalism would be untenable without intervention to protect watersheds and renewable resources and apply restraint in the cause of ecological balance. The attitudes of Gifford Pinchot, the first head of the United States Forest Service, clearly reflected this realization. Callicott (1998: 341) portrays Pinchot’s views in this way: He “formulated a novel conservation philosophy that reflected the general tenets of the Progressive era in American history. Notoriously, the country’s vast biological capital had been plundered and squandered for the benefit, not of all its citizens, but for the profit of a few.”

Pinchot believed that development required an adaptive economic system and a sustained natural resource base, but he didn’t fully appreciate the distinction between the utilization of resources for purposes of creating use value and the use of resources for the purpose of creating exchange value. He also didn’t understand that the plundering of the resources by a few was the result of a much larger dynamic. In his call for government intervention, his conservation was an example of Karl Polanyi’s “Great Transformation” applied to the land; that is, the formulation of necessary institutional responses to unfettered capitalism. This was a response to maintain the conditions of production amidst the tremendous forces of economic expansion (O’Connor 1996).

This utilitarian branch of conservation, which placed great faith in the ability and right of humankind to manage the natural world, was not opposed to the purpose of producing profit. However, it recognized that biophysical limits imposed by the natural world could not be ignored. Deforestation, soil erosion, watershed protection, and reclamation were all

problems in the United States in the latter 19th and early 20th centuries that demanded management.

Ecological understanding and the realization that man could negatively impact the natural world in a way that would undercut his ability to utilize it emerged. For example, George Perkins Marsh (1965) in his book “*Man and Nature*,” enumerated the history of environmental disasters created by civilization.

The arid West, with its need for reclamation, also tapped into and extended utilitarian conservation attitudes. John Wesley Powell was cut from the same instrumental mold as Pinchot. He recognized the necessity of reclamation, had appreciation for the complexity of water allocation, and believed in man’s engineering and scientific abilities. Powell was mindful of the necessary institutional arrangements, particularly in the arid West, to enable “progress” to continue its undaunted course.

Thus, ecological awareness resulted in a response that became institutionalized in the United States Forest Service, the Bureau of Reclamation, and other government agencies. These institutions tempered the excesses of expansion with ecological insight that informed management practices and are analogous to New Deal legislation that extended workers’ rights and provided a necessary social safety net. The policies were not revolutionary, but simply created and transformed social institutions to respond to ecological problems. In the mid 20th century these utilitarian attitudes were extended as the Clean Water Act, the Clean Air Act, and other legislation to protect ecological health.

While utilitarian conservation clearly reflected an agrarian ethos, wilderness preservation was a post-industrial, post-agrarian ethos. It ran in contradiction to the utilitarian inclination of the agrarian ideal and the Pinchot variety of the conservation movement.

## Wilderness Preservation: A Different Ethos

The 19th century was a watershed in the development and maturation of the market economy. The pace of change was dramatic. As the world became increasingly manmade and responsive to the imperative to create exchange value, wilderness disappeared. The duality between civilization and wilderness that had emerged with settled agriculture vanished rapidly. Although the agrarian ideal, extended to utilitarian conservation, helped create a sense of harmony between man and nature during the 19th century, the loss of wilderness evoked a distinctively different response. Wilderness preservation was not amenable to the ethos of the middle landscape.

Subjugation was not the only attitude toward the natural world to emerge in the face of an unsettled continent. Nash (1967: 67, 16) points out that eventually the unique presence of wilderness in the United States became a source of national pride distinguishing us from Europe. “If wilderness was the medium in which God spoke most clearly then America had a distinct moral advantage over Europe.” Moreover, Judeo-Christianity had an alternative tradition of seeing wilderness as “a sanctuary from a sinful and persecuting

society.” Even so, a distinctive wilderness ethos arose out of the unique conditions in the United States at the time.

The frenzied encroachment of civilization on the natural world was a preoccupation of the likes of Henry David Thoreau, John Muir, and Aldo Leopold, who underwent ecological epiphanies. Worster (1992: 66) tells us: “Thoreau confronted an ecological system that was being radically remade by the invading species of civilized man.” Worster (1973: 197) also points out that Muir referred to those who wanted to dam Hetch Hetchy as “temple destroyers, devotees of ravaging commercialism.” Leopold (1966: 254) clearly identified this force: “Man’s invention of tools has enabled him to make changes of unprecedented violence, rapidity, and scope.” He connects these changes directly to the economy and to the processes of economic globalization: “For the first time in the history of the human species, two changes are now impending. One is the exhaustion of wilderness in the more habitable portions of the globe. The other is the world-wide hybridization of cultures through modern transport and industrialization” (Leopold 1966: 254). Thus, a preservation sensibility emerged in the United States in the 19th century because wilderness was still present but was rapidly disappearing in the face of economic expansion. The tapping of fossil fuels as a source of energy had fueled the industrial revolution and under the organization of the market economy the result was a fundamental alteration in the material dynamic of civilization.

This is not to say that growth and ecological insensitivity and disaster cannot be embodied in other forms of economic organization. Centrally planned economies can direct production and consumption, with or without attention to ecological problems. In the case of a market economy, however, growth is part of the logic and internal dynamic of the system and does not depend on government planning.

The nature of work itself changed under the forces of the industrial revolution and private enterprise. The production of exchange value for the purpose of profit led to a degradation of work and class conflict emerged as a reality of economic life. The day-to-day interaction of the working class with nature was increasingly adulterated as workers were alienated from the product of their labor and the creative experience of work. Increasingly work was rationalized for the sake of greater control over the production process. Moreover, the living conditions created by the market economy were similarly altered. People moved out of the middle landscape and into urban enclaves, where most wage labor took place. These were places of poverty, disease, lack of sanitation, and pollution.

Given these conditions, it is not surprising that nature in its pure form, unadulterated by the imperatives of profit and wage labor, was increasingly looked upon as a palliative for the travails of economic life. An appreciation for the soothing effect of nature arose out of these harsh conditions. Leopold (1966: 264-265) discerned the meaning of nature to the worker: “To the laborer in the sweat of his labor, the raw stuff on his anvil is an adversary to be conquered. So was wilderness an adversary to the pioneer. But to the laborer in repose, able for the moment to cast a philosophical eye on his world, that same raw stuff is something to be loved and cherished because it gives definition and meaning to his life.”

Nature as palliative was introduced to the working class in ways that were consistent with 19th century economic arrangements. Absentee owners were not at liberty to make the workplace less alienating; rather they concentrated their energies on the creation of escape valves like urban parks. Talbot (1998: 328) points out that the bourgeoisie created “parks and sylvan ‘model’ towns and villages where the myth of romanticized nature could be played out...[where the] ‘facts of production’ that entail alienation from nature are concealed by romantic mystification of nature, which banishes any imaginary opportunity for an unalienating relation to nature to the realm of leisure, so that the alienating relation to nature implicit in capitalist production remains unchallenged.” Thus, interjection of nature as leisure into the sphere of consumption does not question or threaten the relationship of production to society or the purpose of that production.

Class structure was a significant ingredient in the emergence of wilderness sensibilities, though it obviously did not manifest itself with the working class. The plain and simple reality was that workers could not access wilderness and didn’t have much opportunity for philosophy and contemplation. It was the upper classes, with the means and time to opt out of work and the ability to access wilderness and contemplate their relationship to nature, who pushed for preservation. Not until the post-World War II era, when a middle class with automobile transportation emerged, did contact with wilderness extend beyond the upper classes to the middle classes.

Since access to wilderness was not available to the working class, the preservation branch of conservation was accused of being an elitist indulgence. Callicott (1998: 341) observed that in the tradition of John Muir “some of the human satisfactions that nature affords are morally superior to others” and this “may only reflect aristocratic biases and class privilege.” It is primarily the privileged who are able to indulge in wilderness and who impute the value of it on those who haven’t the same luxury. Thus, critics of wilderness preservation claim it is “undemocratic and un-American.”

It is not surprising that today developing nations accuse the United States environmental movement, which calls for preservation, of indulging their middle class sensibilities. They have a point. Legitimate class dimensions of wilderness preservation as an elitist indulgence, complicate but should not discount the need for wilderness preservation.

During the latter 19th and early 20th centuries, the upper classes had the freedom both in terms of time and lack of economic constraints to indulge their curiosities about the natural world. They could engage both intellectually and physically with wild nature. This unique position of privilege, in addition to the rapid pace of economic development and its encroachment on unadulterated nature, nurtured the preservation ethic. Preservation began first with national parks. Yellowstone National Park, established in 1872, was followed in the 1880s by the Forever Wild designation in the Adirondack Park and the establishment of Yosemite National Park in 1890. Later, in the designation of primitive areas and eventually in the Wilderness Act of 1964 and the Endangered Species Act of 1973, this attitude of preservation, as setting aside, was more broadly institutionalized.

This ethic of setting aside was reflected in the language of the Wilderness Act of 1964: "In order to assure that an increasing population, accompanied by expanding settlement and growing mechanization, does not occupy and modify all areas with the United States and its possessions, leaving no lands designated for preservation and protection in their natural condition (Wilderness Act 1964)." The presumption that setting aside is an adequate counter force to the growth dynamic of the economy becomes more problematic by the latter 20th century. Before the ink from the Wilderness Act was barely dry, wilderness had become increasingly fragile and scarce as encroaching civilization pushed up against it. And presently preservation, as setting aside, is increasingly threatened in the face of increased gas and oil exploration and development in the Arctic National Wildlife Refuge, the Rocky Mountain Front Range, and the Greater Yellowstone Ecosystem.

The act of setting aside wilderness areas, without questioning the underlying growth dynamic in our society allowed 19<sup>th</sup> and 20<sup>th</sup> century preservationists to have their cake and eat it too. Since more wild lands were still available, proponents could respond to the immediate assault on wilderness while avoiding the underlying long-term dynamic of the market economy. Leopold (1966: 265), in a prescient moment, makes a "plea for the preservation of some tag-ends of wilderness, as museum pieces, for the edification of those who may one day wish to see, feel, or study the origins of their cultural inheritance." But that is precisely what preservation had done. One could advocate for wilderness and not question the wisdom of challenging "modern transport and industrialization."

Thus, institutionalized wilderness preservation gave us the sense that the act of setting aside wilderness was sufficient to guarantee its survival. But it must now be viewed as an incomplete and inadequate response to wilderness preservation given the changing material conditions of the 21<sup>st</sup> century. Preserving wilderness on the one hand and partaking in unending economic growth are incommensurable.

The proponents of wilderness, because of their class position, did not question the prerogatives of property owners to create exchange value nor the conditions and dynamics of accumulation. Preservation of wilderness in the 21<sup>st</sup> century, forces us to directly confront economic reform. The will to alter our economic institutions hinges on the value we attach to wilderness, which is difficult to evaluate in economic terms because it is not a commodity bought and sold nor is it something utilized by all who value it. The preservation ethos uncovers an underlying anxiety and sensibility, a troublesome awareness about the irrevocable changes we're making.

## The Imperative of Post-Industrial Society: Wilderness Preservation

If wilderness preservation is a desirable goal for post-industrial society, we must move beyond post-industrial attitudes in our attempt to save wilderness. We are confronted with vast poverty and famine in the world due in part to

environmental degradation where pollution is inadequately controlled and production has not been in tune with biophysical limits. We confront a world where it is impossible to extend first world standards of living to the third world. We confront a world where renewable resources are often harvested in an unsustainable manner threatening fisheries, aquifers, and forests. We are confronted by a world of mass extinction and disregard for non-human forms of life. We side-step the problem of global climate change with little idea of what it means and great inertia to act to mitigate it. In short, we confront a post-industrial world where we have failed to manage our post-industrial problems. Loss of wilderness should be placed first on this list.

The problem with wilderness preservation is a unique one. Most of our post-industrial environmental problems can be framed as a problem pertaining to the "conditions of production" (O'Connor 1996). Maintaining conditions of production is essential for the functioning of our present economy. If, for the sake of production and profit, social and environmental conditions are severely impaired, these deficiencies will lead to economic crisis. But wilderness and its preservation lie outside the purview of such a framework because we can't make the argument that lack of wilderness threatens the conditions of production and economic growth. The extinction of wilderness simply does not present the same threat to a market economy as global climate change might.

While the solution for many environmental problems in the neoclassical economic paradigm is to place a price tag on them, we know that for a host of environmental amenities, like wilderness, there is simply no way to assess their value. We are left at the mercy and inadequacy of cost/benefit analysis and computations of "existence value." The value of wilderness simply lies outside the domain of economics and to try to put it into an efficiency framework will always be inadequate (Ackerman and Heinzerling 2004).

In order to speak to the necessity of preservation of wilderness, which will require questioning and altering our present economic institutions, we must look outside the purview of economics. We must expand the discourse to philosophical/spiritual discussions and categories, based on a more complete and fundamental understanding of human ecology and sustainability, and our obligation to future generations. Ontologically, wilderness exists as the absence of the hand of man, which varies over the course of our history depending on the state of culture and technological development. Therefore, wilderness comes to exist for us in a variety of ways. Rolston (1998: 370) tells us "any real wilderness needs to be evaluated on the basis of degree... Early hunter/gatherers with transmittable culture were not much different in their ecological effects from predators and wild omnivores among whom they moved." Foreman (1998: 403) reminds us that, "vast tracts uninhabited by humans was a familiar concept to many primal cultures." Thus, even for hunters and gatherers there was the perception of an essence, which we call wilderness.

With the transition to settled agriculture the relationship to the natural world and to wilderness changed dramatically. People lived in a world mostly of their making fostering a duality that had not been present for pre-agricultural people. Shepard (1996b: 193) states: "The virtual collapse of hunting

and gathering, the central activity of the ancient culture, would surely have affected the very heart of human existence. The great mystery of domestication is therefore not so much how men achieved control of plants and animals, but how human consciousness was reorganized when cynegetic life was shattered—that is, the mental, social, and ecological complex based on hunting.”

Jaynes (2000) wrote about the ‘bicameral mind’ leaving us to ponder the plasticity of the brain and the ways in which consciousness is organized and influenced by civilization. It isn’t clear what consciousness was to early hunters and gatherers but what is clear from the work of both Jaynes and Shepard is that civilization/culture influenced consciousness and our perception of self and our place in the world. The plasticity inherent in the human brain is tapped in different ways by different forms of social organization bringing forth different potentialities and possibilities and different pathologies. Shepard (1996c: 164-165) speculates that, “Changes in thought, in perceptions of the outer and inner world, and in premises and assumptions about reality probably occurred...” with the move from hunting and gathering. He elaborates on how the shift to domestication influences “the quality of attention, the significance of place...and the theme of duality...and the subtler influences...on the ways people saw themselves and the land...”

The gestalt of sedentary life, different from that of hunters and gathers, has surrounded us for millennia. But for a long stretch of human history, sedentary life and its technological advances did not threaten the existence of wilderness, which was bounded by sedentary life but nonetheless still “out there.” While we might argue about whether the duality we’ve created is good or bad for human development and existence, as long as wilderness exists we are presented with a material world that brings meaning to that discussion. Even in that duality, wilderness provides the possibility of a path to more completely explore our humanity as a point of reference, a way to reflect more fully on the interface between civilization/ biology/nature, and a way to understand our “prehistoric unconscious...for the creation of a new history” (Shepard 1998: 17). Whereas the duality between civilization and wilderness marked the transition to domestication, the hallmark of post-industrial society may very well be the end of wilderness and with it the end of that duality, not out of reconciliation and understanding and reconnection, but because of extermination.

Although in this post-industrial society we must manipulate the material world in order to live, it is important that we understand the complex and profound relationship our humanity shares with the natural world. “The source of our genetic material has been passed onto us not only through our parents and generations of humans, but from archaic ancestors: primate mammalian, reptilian, amphibian, ichthyian, and down to bacterial forebears of like on earth” (Shepard 1998: 19). Historical materialism might well have expanded under the weight of the knowledge of our genome when Marx would have been forced to consider seriously our prehistory.

Mumford (1966: 36) also spoke to the importance of our pre-history. “Man’s own nature has been constantly fed and formed by the complex activities and interchanges and self-transformations that go on within all organisms; and neither his nature nor his culture can be abstracted from

the great diversity of habitats he has explored...Man’s life would be profoundly different if mammals and plants had not evolved together, if trees and grasses had not taken possession of the surface of the earth, if flowering plants and plumed birds, tumbling clouds and vivid sunsets, towering mountains, boundless oceans, starry skies had not captivated his imagination and awakened his mind.” Shepard (1998: 143) echoes and extends Mumford’s inclination: “Wildness, pushed to the perimeters of human settlement during most of the ten millennia since the Pleistocene, has now begun to disappear from the earth, taking the world’s otherness of free plants and animals with it. The loss is usually spoken of in terms of ecosystem or beauty of the world, but for humans, spiritually and psychologically, the true loss is internal. It is our own otherness within.” Clearly, both Mumford and Shepard identify a profound connection of humans to the natural world. It is not only through manipulation of the natural world in production that our nature is fed and nourished, but through the many subtle forms of connection that are a part of our human condition, experience, and consciousness.

We can “mind” nature and its interface with culture in a multitude of ways. While domestication, manipulation, and dominance of the natural world are one interface, observation, mimicry, reverence, and fostering connectedness are others. Abrahms (1996: 262) points out: “The human mind is not some otherly essence that comes to house itself in our physiology. Rather it is instilled and provoked by the sensorial field itself induced by the tensions and participations between the human body and the animate earth...By acknowledging such links between the inner, psychological world and the perpetual terrain that surrounds us, we begin to turn inside-out, loosening the psyche from its confinement within a strictly human sphere, freeing sentience to return to the sensible world that contains it. Intelligence is no longer ours alone but it is a property of the earth...” We are not preordained to completely supplant the natural world with human artifacts nor is this something desirable. The plasticity and intentionality of culture and the human mind allow for other outcomes.

Sahlins (1972) in his seminal work “Stone Age Economics” aptly demonstrated that material security is always a relative matter. Sahlins labeled the hunter or gatherer “uneconomic man” because his wants are few and his resources are plenty. Nonetheless, I do recognize that it is important to be freed from fears of material want and discomfort; since without freedom from these, full exploration and development of our humanity is impossible. Despite the possibility that capitalism presents for us freedom from material want, the vast majority of humans on this planet live in absolute or relative deprivation. But even if we are somehow able to redistribute the benefits of capitalistic society to free those impoverished from material want and discomfort, under present economic arrangements we would do so at the cost of wilderness, leaving the full potential of our humanity inchoate.

It is ironic and contradictory that the unique circumstances of 19<sup>th</sup> century capitalism nurtured a wilderness ethos at the same time it threatened the existence of wilderness. To say that a wilderness preservation ethos emerges out of post-industrial, post-agrarian society, is not to say that economic growth fosters wilderness preservation. Czech



(2000) makes this argument as the “fighting fire fallacy.” He explains, “One may fallaciously argue that the cause of a disastrous fire can be traced to the lack of a promptly employed backfire, without acknowledging that the backfire would have never been needed were it not for the original fire. Neither economic growth nor anything else would be necessary to protect wilderness, were it not for the threat to wilderness originally posed by economic growth” (Czech 2000: 194). For a short time in our history, setting aside was a viable option for wilderness preservation but we have now come to a point where this is no longer true. In order for preservation to mean anything it must now challenge our existing economic wisdom.

Post-industrial society has offered many opportunities for enriching humanity. At this point in our history our humanity might be as well served by looking back. I am not advocating a return to the world of the noble savage. Rather, I believe, the question of wilderness is about how we construct post-industrial society with a mind to all that makes us human. Almost 30 years ago, Mishan (1977: 29) commented: “Even if it would be said of economic growth that it expands unambiguously the options open to the consumer, it would not follow that men should be regarded as being better off. For one thing these options refer only to the amounts and varieties of goods available to the average person in his capacity of consumer. In other roles... the individual may not be faced with more options as a result of continuing economic growth.”

With its bent for unlimited economic growth, post-industrial society has failed to improve our lives in many ways. It offers increasing crowds, reduced space, more of life spent negotiating the complexity of too many and too much, and greater demands to resolve problems that are often removed from our day-to-day lives. It offers us more possibilities for reflection but less time to reflect. And for most women and many men, it demands the endless and frustrating imperative of multitasking. In the name of economic freedom, at any given moment numerous possibilities for consumption are available. But a higher standard of living is traded for alienating work. Thoreau's words (Thoreau 1982: 263), “The mass of men lead lives of quiet desperation,” are a reminder of getting what we wished for. Clearly, life in post-industrial society is a mixed bag, even for those of us with the good fortune of having been born privileged, by world standards.

Wilderness preservation is an ethical matter involving our obligation to future generations. But it is not a necessary condition for maintaining the material conditions of our society. The Nobel laureate Robert Solow (1991:181) provides us with an interesting discussion of sustainability, which bears on the issue of wilderness preservation. He tells us that “it [sustainability] is an obligation to conduct ourselves so that we leave to the future the option or the capacity to be as well off as we are...There is no specific object that the goal of sustainability, the obligation of sustainability, requires us to leave untouched.” Solow then speaks directly to the issue of wilderness and states: “What about wilderness or unspoiled nature? I think we ought, in our policy choices, to embody our desire for unspoiled nature as a component of well-being. But we have to recognize that different amenities really are, to some extent, substitutable for one another, and we should be as inclusive as possible in our calculations.” I would argue that what Solow treats

as an amenity is something essential for the full exploration of our humanity. In the case of wilderness, there is no substitute. It is not fungible, therefore, according to Solow's criteria for sustainability, we are, in fact, required to leave future generations something specific, that is, wilderness. Otherwise, we cannot guarantee that their lives will be as fulfilled as ours.

With the threat to wilderness imminent, we stand in the shadow of its sublimity and wisdom and contemplate whether we have traded “the good life” for deeper alienation. We are called on to move beyond our present ideology and deadlock. The agrarian ethos can no longer provide the blueprint for our relationship to the natural world. The wilderness ethos is a more appropriate attitude for the 21st century, but in its 19th century cloak, it is rendered impotent. Setting aside wilderness while the engines of progress and profit move us to ever increasing domestication is simply oxymoronic. We must persist in our efforts to set aside wilderness, but we must also develop an economy that does not threaten its continuity.

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# Wilderness Discount on Livestock Compensation Costs for Imperiled Gray Wolf *Canis lupus*

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**Abstract**—There is evidence that Wilderness reduces costs for livestock depredations caused by the endangered and threatened gray wolf (*Canis lupus*) in the northern Rockies and upper Midwest, U.S.A. From 1995 to 2004, direct costs for compensation in the northern Rockies came to only 47 to 78 percent of losses anticipated at wolf reintroduction and projected from non-wilderness habitat. Compensation was lowest in the wilderness-rich, central Idaho recovery area (\$69/wolf/year), more than doubling in greater Yellowstone (\$160/wolf/year) where private ranches commingle with extensive grazing leases on public land. Per capita compensation in northern Minnesota and Michigan was 5 percent to 14 percent of costs in wilderness-deficient northern Wisconsin (\$163/wolf/year). Globally, compensation for carnivore depredations tends to be higher where wild lands are scarce, but husbandry practices and grazing subsidies confound the discount in some regions. Nevertheless, a wilderness discount reduces some costs of (and may mitigate cultural resistance to) conservation programs aimed at restoring large predators.

Predation on domestic livestock often thwarts coexistence between people and large carnivores (Espuno and others 2004; Ogada and others 2003). Those enduring losses from predators tend to retaliate, with resultant non-targeted killing acting as temporary appeasement (Mishra and others 2003) rather than long-term prevention (Linnell and others 1999; Musiani and others 2005; Stahl and others 2001). Local communities sometimes become reluctant to support extant carnivore populations, much less recovery programs to increase predator range and numbers (Breitenmoser 1998; Ericsson and Heberlein 2003; Lohr and others 1994).

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Resistance to carnivores is linked with rural pastoralist and farming occupations where economic risk from lost livestock is greatest (Andersone and Ozolinš 2004; Meadow and others 2005; Skogen and Krangle 2003; Williams and others 2002). Domestic livestock may form up to 87 percent of diet in certain gray wolf *Canis lupus* populations (Álvares 2004), so isolating carnivores from economic damage contributes to resolutions to the depredation problem (Treves and Karanth 2002). Wild lands present one opportunity to accomplish this objective.

Wilderness improves conservation prospects for wide-ranging carnivores (Breitenmoser 1998; Kerley and others 2002). When carnivores with large area requirements become isolated by habitat loss and fragmentation (Kramer-Schadt and others 2004), certain species come to rely on remote lands for meeting key habitat needs (Hendee and Mattson 2002; Noss and others 1996). In exceptional cases wilderness may serve as the last refuge for entire groups of predators (Mittermeir and others 2003). For yet other species, wild lands act to reduce the competition between wildlife and human interests (Wright and Garrett 2000).

Modest attention has been levied at various ecological roles wild lands play in fostering wildlife and biodiversity conservation (for example, Crist and others 2005; Hendee and Mattson 2002). In contrast, here we analyze the costs of compensating livestock losses across certain wilderness gradients in order to evaluate a cultural dimension of supporting imperiled species. We compare unit costs of livestock depredations by gray wolf: (1) within the northern Rockies, U.S.A., (2) within the upper Midwest, U.S.A., and (3) between these two North American regions and other selected global sites and carnivore species. Extent of wild lands was examined as a factor that might influence geographic variation in the per capita compensation cost for these large carnivores.

## Geographic and Cultural Contexts for Wolf Predation on Livestock

By “wilderness” we refer to large, undisturbed natural areas with relatively low human population densities. For example, the northern Rockies constitute one of 24 global wilderness

ecoregions distinguished by large minimum size (greater than 10,000 km<sup>2</sup> or 3,861 square miles), low human density (less than 5 people/km<sup>2</sup>), and extensive natural habitat—at least 70 percent of historical extent (Mittermeier and others 2003). Wolf populations have increased and expanded their range within both study areas examined here (for example, fig. 1).

## Northern Rockies

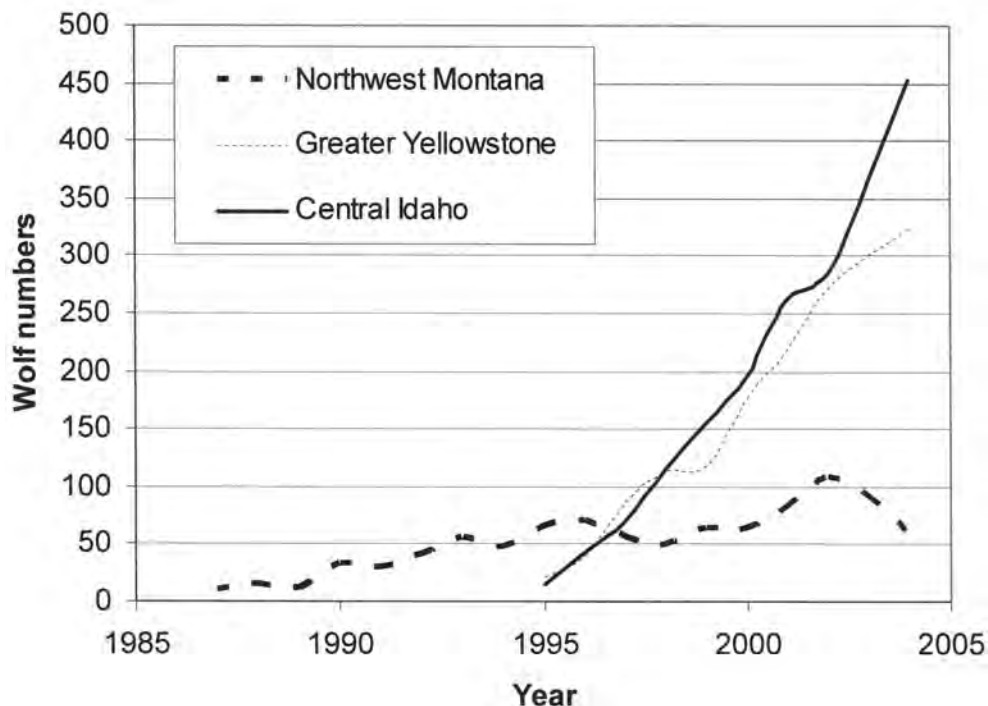
Wolves include populations that are both naturally colonized (northwest Montana: endangered status under the Endangered Species Act [ESA]) and deliberately reintroduced (elsewhere: non-essential experimental 10-j status under the ESA) (Bangs and others 1998). Wolves now inhabit primarily forested montane habitat in the Rockies. Extensive public land holdings (including wilderness) and abundant native ungulate prey (for example, elk *Cervus elaphus*, deer *Odocoileus hemionus* and *O. virginianus*, bison *Bison bison*, moose *Alces alces*) factored strongly into selecting this region for reintroduction (U.S. Fish and Wildlife Service 1994).

**Greater Yellowstone.** Land ownership in the 14.5 million ha (35,830,281 acres) greater Yellowstone recovery area is mostly federal public (60 percent) versus about one-third private (31 percent). In the center is the 1.4 million ha (3,459,475 acres) Yellowstone National Park, with 192,000 ha (474,442 acres) of other national park lands nearby, plus a complex of six national forests (Gallatin, Custer, Shoshone, Bridger-Teton, Targhee, Caribou). These national forests contain 12 federally designated wilderness areas totaling 3.75 million ha (9,266,452 acres).

As of 2004, 280 active commercial cattle and 74 active commercial sheep allotments were permitted in these six national forests. From June through October approximately 146,000 cattle/calves and 265,000 sheep graze on 14 percent to more than 70 percent of land area, totaling approximately 1.6 million ha (3,953,686 acres) (U.S. Fish and Wildlife Service 1994). Grazing allotments occur both within and outside designated wilderness areas. Although many wolves remain inside livestock-free Yellowstone National Park, some of these packs dispersed and additional packs were established outside the park where they prey on livestock (Bangs and others 1998).

**Central Idaho.** In a 10-county recovery area of 9.2 million ha (22,733,695 acres) land ownership is mostly federal public (67 percent). The recovery area contains 5.4 million contiguous hectares (13,343,691 contiguous acres) in nine national forests (Bitterroot, Boise, Challis, Clearwater, Nez Perce, Payette, Sawtooth, Salmon, and Panhandle). In or near these national forests, several wilderness areas and inventoried roadless areas cover almost 3.8 million ha (9,390,005 acres).

On the order of 385,000 cattle and more than 100,000 sheep are present during spring in this recovery area (U.S. Fish and Wildlife Service 1994). In summer, some 43,000 cattle and nearly all Idaho sheep are moved to 1.75 million ha (4,324,344 acres) of public land grazing allotments on primarily those national forests without extensive federal wilderness. Some sheep and cattle from outside the state are also moved to summer grazing allotments. Over half of wolf packs in central Idaho have livestock in and near their territories (Bangs and others 1998).



**Figure 1**—Gray wolf populations increased in three recovery areas, northern Rockies, U.S.A., 1995–2004.

**Northwest Montana**—This recovery area contains Glacier National Park (628,000 ha or 1,551,822 acres) plus 1.1 million ha (2,718,151 acres) of designated wilderness. Three contiguous wilderness areas (Great Bear, Bob Marshall, and Scapegoat) total 925,000 ha (2,285,725 acres). As in both central Idaho and Greater Yellowstone, sheep and cattle are grazed on grazing allotments inside both national forest and wilderness boundaries. Extensive private land holdings are also prevalent, however, especially between the Idaho border and Glacier National Park.

## Upper Midwest

Gray wolves occupy mixed hardwood-conifer forest and forest/agricultural edge in Minnesota (ESA status: were threatened), central and northern Wisconsin and the upper peninsula (UP) of Michigan (ESA status: were endangered in both states). Relative to the northern Rockies, this region is more highly managed, in mixed ownership (Mladenoff and others 1999), heavily roaded (Saunders and others 2002), and less than 20 percent of land cover is in undeveloped native condition (Radeloff and others 2005).

**Minnesota.** A 7.8 million ha (19,274,220 acres) core range is inhabited by some 3,020 (90 percent confidence interval: 2,301–3,708) gray wolves in northern reaches of the state. Minnesota contains about 4.8 million ha (11,861,058 acres) of public land, including 2.2 million ha (5,436,318 acres) of national forest, 440,000 ha (1,087,264 acres) of designated wilderness, 25,000 ha (61,776 acres) of inventoried roadless area, and 57,000 ha (140,850 acres) of national park lands. Much of this public land base is contiguous, especially in northeastern Minnesota where Boundary Waters Canoe Area Wilderness adjoins several large state forests. Some 10,000 to 15,000 farms occur mostly on southern and western edges of the wolf range (Fritts 1982). At least 90 percent of farms have some livestock. From May to October livestock graze free in open pastures and woodlands.

**Wisconsin.** About 425 wolves occupy northern parts of the state. Like Minnesota, wolf range contains a mixture of publicly and privately owned forests, agricultural areas, and rural housing (Treves and others 2004). However, at only 2.5 million ha (6,177,635 acres), total public land area is less than in Minnesota. Beef cattle and other livestock operations in Wisconsin are often situated in forest pastures or adjacent to forested lands, thereby predisposing livestock to risk of wolf predation. In general, favorable wolf habitat in Wisconsin is smaller and more fragmented than in Michigan and Minnesota (Mladenoff and others 1999).

**Michigan.** Some 360 wolves have recolonized all northern counties except Keweenaw in the UP. High prey and low road and human densities create more than 29,000 km<sup>2</sup> (11,197 square miles) of suitable habitat in the UP (Mladenoff and others 1995). Compared to Wisconsin, livestock operations in northern Michigan are sparse and the proportion of wild land is high. More than 70 percent of the UP where wolves occur is in public ownership; these holdings tend to form large blocks of consolidated habitat with little intermingling with farms.

## Structure of Compensation Programs

### Northern Rockies

In 1987, Defenders of Wildlife initiated the first privately funded livestock compensation program to reimburse owners for losses while also protecting wolves. Compensation follows a complaint verified by U.S. Department of Agriculture (USDA)—Animal and Plant Health Inspection Service (APHIS)—Wildlife Services (WS)—or other officials who determine whether wolves killed or maimed one or more domestic animals. A depredation event consists of one or more individual livestock taken on the same date in the same location, and generally believed to have resulted from the same wolf or wolf pack. In general, verification includes either observing wounded animals or remains of animals killed. This compensation pays 100 percent of current market value for adult livestock, or the projected market value of livestock below marketable age for confirmed losses (up to \$2,000 per animal). The fund pays 50 percent of the value for probable losses.

### Upper Midwest

Wolf depredation claims in Minnesota are handled by either a Department of Natural Resources Conservation officer or county extension educator and a county extension agent determines the market value for the livestock lost. In Wisconsin, USDA-WS professionals conduct and verify depredation investigations. Investigations in Michigan are verified jointly by a conservation officer and district wildlife biologist in the Michigan Department of Natural Resources (MIDNR).

Once a loss is verified as wolf caused, the economic value of the loss is determined and a compensation payment is made within a reasonable time period. All compensation programs typically follow the same pattern: notification—verification—compensation. Verified depredations in the three states are compensated at fair market value for livestock animals.

In Minnesota, the state's Department of Agriculture reimburses livestock owners for verified confirmed wolf attacks. Wisconsin Department of Natural Resources administers payments for missing, probable and confirmed losses. These payments are generated from the endangered resources voluntary payments fund and a percentage of endangered resources license payments. In Michigan, the Michigan Department of Agriculture pays for confirmed and probable livestock losses for the livestock's current market value at the time it was killed. A supplemental fund administered by the International Wolf Center in Minnesota is used to increase the compensation payment to the full market value. The Wisconsin compensation program offers compensation payments for missing, confirmed and probable losses of hunting dogs, pets, and livestock guarding dogs, but these animals are not compensated by the programs administered in Minnesota and Michigan.

## Analytical Approach and Sources of Data

### Unit costs

Total reimbursed costs for livestock depredation vary as a function of wolf population size (Haney and others 2005), so we employed unit cost for comparing relative costs within and between regions. Unit cost was based on total compensation for all verified claims for all lost livestock prorated over the number of wolves counted within a particular region (U.S. Fish and Wildlife Service and others 2005). Unit cost was expressed in per capita terms, that is, in dollars per wolf per year. Costs for depredation events were assigned by depredation date rather than payment date.

For regions outside the northern Rockies, we took annual compensation payments attributed to wolves and divided them by the corresponding estimated wolf population size. Global regions from which we could find data for both variables included Israel (Gilady 2000), Spain (Blanco 2001), and Italy (Ciucci 2000).

Accuracy of wolf population counts varies across most regions: Minnesota's estimates for wolves are an order of magnitude less precise than those in Wisconsin and Michigan. Across the northern Rockies, wolf numbers are also estimated although the counts are typically reported with greater putative accuracy than in the upper Midwest.

### Realized and Projected Compensation Costs

Projected costs in the northern Rockies were computed by prorating costs over average and maximum rates of wolf depredation anticipated in the original environmental impact statement (under Alternative 4—deliberate reintroduction) calculated prior to reintroduction (U.S. Fish and Wildlife Service 1994). These projected rates were expressed as number of cattle and sheep killed as a function of wolf population size (per 100 wolves).

For national forests surrounding greater Yellowstone, projected rates were an average of 8 (1 to 13 range) cattle and 68 sheep (38 to 110 range) per 100 wolves per year (U.S. Fish and Wildlife Service 1994). For central Idaho, projected rates were an average of 8 (1 to 17 range) cattle and 40 sheep (32 to 92 range) per 100 wolves per year (U.S. Fish and Wildlife Service 1994). Importantly, these projected rates were derived from North American regions adjacent to but containing less wild land habitat than found in the northern Rockies.

For the northern Rockies as a whole, average and maximum (upper range) rates were combined to obtain total livestock expected to be lost to wolves each year. Projected costs were then computed by multiplying number of livestock by the relevant fair market values for individual sheep and cattle, then summed over the three recovery areas. Despite few livestock other than sheep and cattle killed by wolves (table 1), realized costs in our analyses nevertheless included compensation for all domestic animals.

### Wild Land Extent

For each state, we used total area (in hectares) and proportion (in percent) of the land base in public ownership (federal, state, local, and tribal governments). Likewise, we used national forest area, inventoried roadless area (<http://roadless.fs.fed.us/>), national park area, and designated wilderness area (<http://www.wilderness.net/index.cfm>) to compare unit costs. Finally, we used various combinations of the more restricted land designations (national park, inventoried roadless, and designated wilderness) to compare unit costs across regions.

## Patterns in Compensation Costs

### Northern Rockies

From 1995 to 2004, Defenders of Wildlife paid \$470,187.55 in verified claims for 1,884 livestock lost to 442 events of wolf depredation across all three northern Rockies recovery areas (table 1). Costs translated to a region-wide average of \$108.41 per wolf per year. The greatest total cost for verified claims was in greater Yellowstone (56.7 percent), followed by central Idaho (28.6 percent) and northwest Montana (14.7 percent). After adjustments for wolf population size, unit costs were lowest in central Idaho (\$68.72/wolf/year), higher in northwest Montana (\$97.37/wolf/year), and peaked in greater Yellowstone (\$159.72/wolf/year).

Wilderness extent strongly influenced unit cost in the northern Rockies. Costs were inversely and monotonically related to the amount of public land, national forest, inventoried roadless area, designated wilderness, national park plus national forest area, and national park plus inventoried roadless area (table 2; fig. 2). Also, costs were lowest in the state (Idaho) with the greatest proportion of land in public ownership.

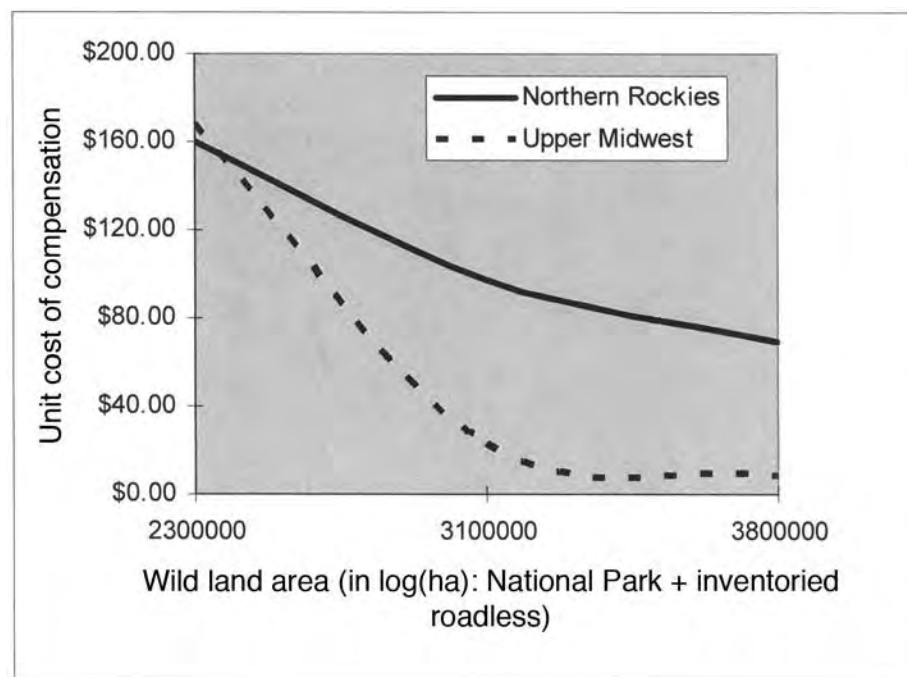
**Table 1**—Types and numbers of livestock and other domestic animals for which verified claims of depredation by gray wolf *Canis lupus* were recorded 1995–2004, northern Rockies, U.S.A. (Defenders of Wildlife).

Region	Cattle	Sheep	Guard and herding dogs	Horses, donkeys, and mules	Llamas	Goats	Total number of livestock and other animals	Total payments
Central Idaho	120	553	4	0	0	0	677	\$134,552.30
Northwest Montana	91	140	1	1	7	0	240	\$69,227.31
Greater Yellowstone	224	703	20	8	0	12	967	\$266,407.94
<b>Total</b>	<b>435</b>	<b>1,396</b>	<b>25</b>	<b>9</b>	<b>7</b>	<b>12</b>	<b>1,884</b>	<b>\$470,187.55</b>

**Table 2**—Unit costs of wolf depredation on domestic livestock in the United States decline with increasing wilderness area and other selected proxies for extent of wild lands (monotonic relationships between cost and wildland extent in **bold**; threshold relationships with underline).

Region	Long-term unit cost(s) <sup>a</sup>	Public land	Public land area	National forest area	National forest inventoried roadless area	National park area	Designated wilderness	National park plus national forest area	National park plus inventoried roadless area	National park plus designated wilderness
		Percent				ha.				
Wisconsin	\$168.03	17.8	<u>2,504,772</u>	<u>818,682</u>	27,923	<b>29,421</b>	<u>17,987</u>	<u>848,103</u>	<b>57,344</b>	<u>47,408</u>
Minnesota	\$22.71	23.5	<u>4,846,130</u>	<u>2,212,345</u>	25,091	<b>57,304</b>	<u>439,876</u>	<u>2,269,648</u>	<b>82,394</b>	<u>497,180</u>
Michigan	\$7.91	28.1	<u>4,140,720</u>	<u>1,981,066</u>	6,475	<b>255,803</b>	<u>37,832</u>	<u>2,236,869</u>	<b>262,278</b>	<u>293,635</u>
Greater Yellowstone	\$159.72	55.9	<b>14,069,682</b>	<b>3,926,924</b>	<b>1,318,067</b>	1,024,518	<b>1,259,076</b>	<b>4,951,442</b>	<b>2,342,585</b>	2,283,594
Northwest Montana	\$97.37	37.5	<b>14,127,674</b>	<b>7,731,268</b>	<b>2,588,785</b>	494,245	<b>1,393,354</b>	<b>8,225,512</b>	<b>3,083,029</b>	1,887,598
Central Idaho	\$68.72	70.4	<b>15,081,886</b>	<b>8,770,869</b>	<b>3,772,495</b>	40,145	<b>1,621,061</b>	<b>8,811,014</b>	<b>3,812,640</b>	1,661,206

<sup>a</sup> Per wolf per year; based on yearly unit costs weighted by the annual wolf population size and computed over 10 (Greater Yellowstone, Northwest Montana, Central Idaho), 9 (Michigan, Wisconsin), and 4 years (Minnesota).

**Figure 2**—Unit costs of compensating for livestock lost to wolves were related to wild land extent by both monotonic and threshold functions.

## Upper Midwest

Between 1996 and 2004, three upper Midwest states paid at least \$902,483.41 in claims for livestock and other domestic animals lost to wolf depredation. In Michigan, \$15,566.00 in total compensation was paid out between 1998 and 2004. A total of \$380,518.18 was paid out in Wisconsin between 1996 and 2004. In Minnesota, \$506,399.23 in total claims went for lost livestock between 1996 and 2003. Over the period 1996 to 2004, compensation costs for the upper Midwest as a whole came to an average of \$43.47/wolf/year.

Adjusted for wolf population size, unit costs were lowest in Michigan (\$7.91/wolf/year), with higher unit costs in Minnesota (\$22.71/wolf/year; 90 percent confidence interval: \$17.39—\$28.11). Unit costs in Wisconsin were \$168.03/wolf/year, higher even than in greater Yellowstone, the most expensive recovery area in the northern Rockies (table 2). Some portion of this great difference in per capita costs is likely to have stemmed from the more generous criteria used in Wisconsin's compensation program versus the other two upper Midwest states.



Regional differences in unit cost were nevertheless robust to influences from other variables. Unit costs for compensation varied annually. However, this source of variation was substantially less than that attributed to region, so is not treated here. Also, unit cost was not particularly sensitive to variation in wolf population size. For example, a more than 1,000 individual range in the estimate of Minnesota wolf population leads to only an \$11 dollar range in unit cost.

As in the northern Rockies, compensation varied as a function of wild land extent. Unit costs in all three upper Midwest states were inversely monotonic when contrasted with national park area, and with national park plus inventoried roadless area (table 2). Unit costs were very high in Wisconsin, the state with the smallest proportion of public land, least total public land area, least national forest area, least designated wilderness, least national park plus national forest area, and least national park and designated wilderness area combined.

In general, functions between unit cost and wilderness extent were more complex in upper Midwest states (table 2). A monotonic decrease of unit cost with increasing wilderness was not evident for all wild land proxies from this region. Nevertheless, national park plus inventoried roadless area displayed a consistent inverse relationship with unit costs within each of the North American regions studied here. In addition, a threshold relationship (fig. 2) better described the function of unit costs with several wilderness proxies in the upper Midwest (table 2).

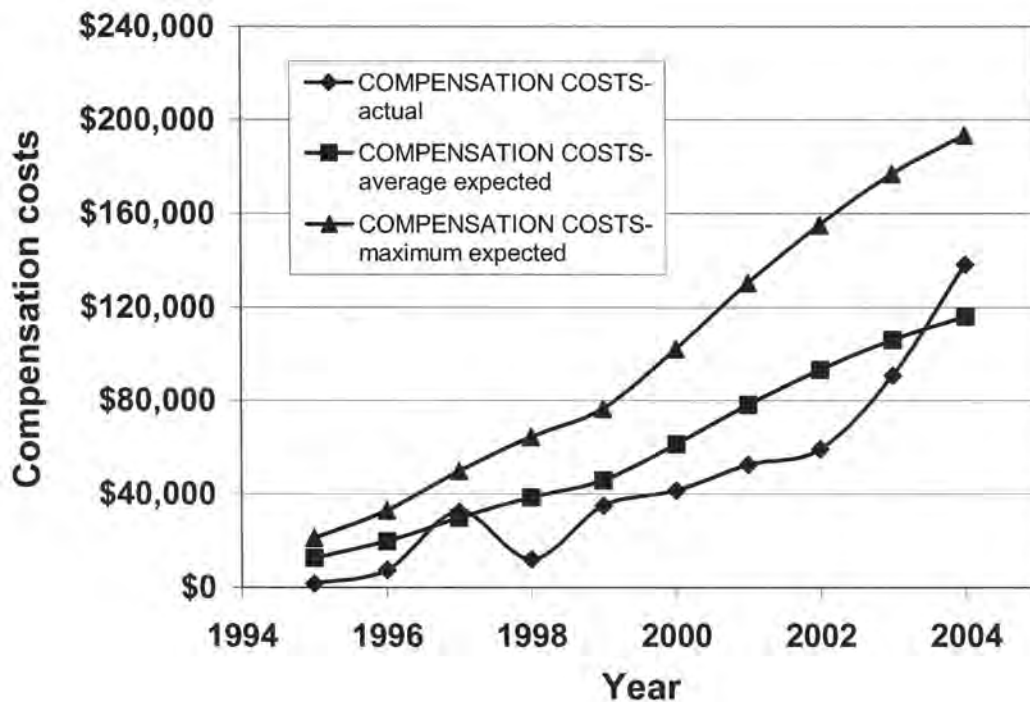
## Cost Savings Over Original Projections

Average projected costs for compensated livestock lost to wolves in the northern Rockies ranged from a low of approximately \$12,700.00 in 1995 to a high of \$115,850.00 in 2004. Maximum projected costs ranged from a low of around \$21,200.00 in 1995 to a high of \$193,270.00 in 2004. Realized compensation costs ranged from a low of only \$1,630.00 in 1995 to a high of \$138,162.87 in 2004. Realized costs for compensation usually but not always increased monotonically year over year, roughly in line with the annual wolf population size for the northern Rockies as a whole.

During the first decade of wolf recovery (fig. 1), realized costs never exceeded maximum projected costs (fig. 3). In only two out of ten years (1997 and 2004) did realized costs exceed average projected costs. Cumulative costs for compensation over the entire decade thus came to only 47 percent and 78 percent of maximum and average projections, respectively (table 3).

## Contrasts With Other Regions and Species

Compared to certain global regions where uninhabited habitat for carnivores is scarce, North American compensation in the range of \$40 to \$170 per wolf per year is a relative bargain. Compensation for livestock lost to a small population of wolves (*C. l. pallipes*) in the Golan of Israel came to at



**Figure 3**—Realized costs (1995–2004) for verified depredations caused by gray wolf on domestic livestock, northern Rockies, U.S.A., trended lower than projections of compensation made prior to reintroduction.

**Table 3**—Cumulative depredations and compensation costs attributed to wolf depredations in the northern Rockies, 1995–2004.

Region	Realized	Average projected <sup>a</sup>	Maximum projected <sup>a</sup>
Central Idaho			
Sheep	553	783 (71%)	1,801 (31%)
Cattle	120	157 (76%)	333 (36%)
Greater Yellowstone			
Sheep	703	1,134 (62%)	1,835 (38%)
Cattle	224	133 (168%)	217 (103%)
Total costs	\$470,187.55	\$600,665.63 (78%)	\$1,002,084.67 (47%)

<sup>a</sup> Percentages in parentheses indicate the ratio of realized to projected depredations and compensation as estimated by rates used in the environmental impact statement prior to wolf reintroduction.

least \$1,400.00 per wolf per year (Gilady 2000). In Spain, the cost of compensation varied, ranging from \$330 to \$500 per wolf per year (Blanco 2001). In certain localized landscapes, however, per capita costs in Spain climb to as much as \$1,375 per wolf per year. In Italy, where wolves number 400 to 600 animals, \$2 million in annual compensation (Ciucci 2000) translates to per capita costs of \$3,300–\$5,000 per wolf per year.

Similarly, compensation for wolf depredation in North America is inexpensive compared to certain other predator species and regions. Costs of wild dog (*Lycaon pictus*) depredation were \$389 per dog per year where wild prey occurred at low densities outside protected areas in Kenya (Woodroffe and others 2005), rising to \$1,042 per dog per year on some private ranchlands in South Africa (Swarner 2004). Per capita costs for lion (*Panthera leo*) depredation on livestock adjacent to a national park in Kenya came to \$290 per lion per year (Patterson and others 2004).

## Wilderness and Carnivore Conservation

### Wilderness as Wolf Habitat

Vast wilderness meets the viability needs of carnivores having large-area requirements (Kerley and others 2002; Noss and others 1996). Wolves avoid heavy traffic (Theuerkauf and others 2003) and high road densities (Mladenoff and others 1999; Thurber and others 1994; Whittington and others 2005), thereby increasing survival absent this human contact (Mech and others 1988; Wydeven and others 2001).

Native prey also contributes to wolf survival in protected areas (Apollonio and others 2004). Where human-caused mortality is low, prey abundance accounts for as much as 70 percent of wolf population size (Fuller 1989). By affording native ungulates usually selected by carnivores (Merrigi and Lovari 1996; Polisar and others 2003), wild lands reduce predation pressure on domestic livestock (Sidorovich and others 2003; Woodroffe and others 2005). Both North American regions studied here offer abundant ungulate prey to wolves, thereby lowering the risk of livestock depredations (table 3).

A discount is distinct from attributes normally described for wild landscapes. If coexistence with carnivores is achieved via reduced depredation costs on wild lands (Conforti and de

Azevedo 2003), it broadens the vision for optimal conservation landscapes for large carnivores. For example, the discount could inform spatially explicit models used to assess feasibility for wolf restoration (Carroll and others 2003; Mladenoff and Sickley 1998; Ratti and others 2004). Such modeling would improve evaluation of whether protected areas merely achieve minimum area thresholds (Haney and others 2000; Landry and others 2001). Indeed, a discount can be used to identify landscapes where carnivores are 'cheapest' to recover (Woodroffe and others 2005). If compensation is constrained, the discount might be used to link affordability with viability in order to identify recovery sites for achieving a suitable meta-population at least cost (Lindsey and others 2005c). Such interdisciplinary applications will greatly improve effectiveness of carnivore conservation efforts (Clark and others 1996; Musiani and Pacquet 2004).

The discount we describe here is compromised if compensation enables inefficient and subsidized livestock husbandry (Bulte and Rondeau 2005). The wilderness discount was also conspicuous where topography, ecosystem type, and livestock practices were broadly similar. Differences in husbandry practices and subsidized grazing may confound a discount because proximity to buildings, herd size, livestock breed, degree of shepherding, and means of livestock carcass disposal all greatly influence local carnivore depredations (Espuno and others 2004; Fritts 1982; Mech and others 2000; Odden and others 2002).

Negligent husbandry practices may actually eliminate the discount; compensation within certain agricultural areas of Spain was one-tenth of that in preserved lands due to lax shepherding (Blanco 2001). Subsidized grazing may explain the doubling in per capita compensation for wolf depredations observed between the two North American regions studied here. The large Rockies wilderness should have had compensation outlays well below those paid in the more developed upper Midwest. But livestock in the Rockies have free rein in very remote settings, in close proximity to wild ungulate herds normally targeted by wolves. We believe per capita costs for wolf depredation in the upper Midwest were also comparatively low because farms there are smaller, livestock do not roam far unattended, and wild prey (forest-inhabiting deer) and domestic livestock may be more spatially segregated (for example, see Treves and others 2004).

In summary, several unique attributes of wilderness enhance wolf conservation. Some of these are biophysical in

nature, others are socioeconomic in origin and consequence. Wolf packs (and presumably their economic impacts) appear to be localized at the wild land interface in the broader northern Rockies region. Yet wolves were once more common in prairies well outside the montane wilderness they currently occupy (Riley and others 2004). These observations thus reinforce a wilderness-associated rather than wilderness-dependent habitat affinity for this carnivore (Hendee and Mattson 2002).

## Costing Wolf Recovery

**Compensation: Direct and Indirect Costs.** Direct costs of livestock losses from carnivore depredation are straightforward to derive, a prime motive in limiting our analyses to this category of direct costs. Unit cost provides a convenient metric for comparing cost effectiveness among sites (Lindsey and others 2005c), across years and regions, and between different predator species.

Importantly, due to unsubmitted claims, low rates of carcass detection (Oakleaf and others 2003), and other factors, expenses we report here may underestimate total direct costs. Conversely, Fritts (1982) found that wolf-livestock depredations are exaggerated, kills by other carnivores (especially coyote *Canis latrans*) misattributed to wolves, and non-existent missing animals (especially calves, lambs) falsely blamed on wolves. Under closer scrutiny, wolves may account for only 20–50 percent of depredations for which they are held liable (Zimen and Boitani 1979). Such biases would tend to inflate estimation of these direct costs.

Compensation includes several indirect outlays, including expenditures to verify, pay, and archive claims. For the two North American regions studied here, at least one to three full-time equivalent agency and non-profit staffers are required to administer a compensation trust and the accompanying claims process. Such indirect costs are likely to be non-trivial. A comprehensive estimate of all costs linked to compensation programs for wolves seems a ripe topic for analysis, as has been recently completed for wild dogs in Africa (Lindsey and others 2005c).

Few studies combined all expenditures to estimate total cost of maintaining carnivore populations from the perspective of livestock depredations (Main and others 1999). In Wisconsin, wolf control doubles expenditures for direct compensation (Treves and others 2002). Between 1979 and 1989, realized direct costs for livestock losses in Minnesota were about one-third the cost of controlling problem wolves, or about one-fourth the total cost estimated for that state's compensation program (Mech 1999). This translates to annual unit cost of \$71 per wolf realized in the core wilderness range compared to \$197/wolf/year projected in more agricultural areas into which wolves were forecasted to expand.

Due to regional differences in wolf management, and in breeds and value of livestock taken, this ratio is unreliable for figuring program costs elsewhere. Mech's projections for Minnesota overestimated true expenditures in the direct cost category: \$75,000 to \$182,000 per year was anticipated for the period 1999 to 2005 whereas costs really came to \$53,000 to \$84,000 per year. Direct unit costs in Minnesota actually declined on a per capita basis from a high of \$29.29/wolf/year in 1998 to just \$17.83/wolf/year in 2003. Our study

nevertheless confirms and extends the wilderness effect on per capita livestock compensation anticipated by Mech (1999).

**Other Recovery Program Costs.** Livestock compensation is only part of the expenditures needed to recover endangered carnivores. Other costs that we did not treat are nevertheless linked to livestock depredations: translocation or lethal control of wolves (Mech 1999), repellents to reduce livestock losses (Musiani and others 2003; Shivik and others 2003), aversive conditioning of wolves (Schultz and others 2005), and so on. Livestock operators may incur extra costs for vigilance, and to prepare and submit claims. In central Europe, shepherding is eight times more expensive than direct losses (Promberger and Mertens 2001). Once such costs are synthesized, a fuller comparison to benefits will produce robust estimates for gauging net economic impact of carnivore presence (Duffield 1992; Lindsey and others 2005a).

## Compensation Discount as a Wilderness Amenity

Either benefit creation or cost reduction can improve social acceptance of carnivores (Lindsey and others 2005b). But is a decrease in predator compensation costs a novel category of economic benefits derived from wilderness? We briefly review types of wilderness benefits (Morton 1999) to understand if direct or indirect benefits are obtained. We did not consider the non-use category (Krutilla 1967; Loomis and White 1996), as neither compensation nor wolf recovery costs are off-site in nature.

Direct uses include recreation that generates market activity via direct expenditures and multiplier effects in the regional economy (Lutz and others 2000; Rudzitis and Johnson 2000); education; and scientific research (Loomis and Richardson 2001). Direct use benefits include earnings from recreational expenditures and consumer surplus of recreationists, as well as the harder to quantify benefits derived from education, and scientific research. Wilderness and other protected areas supply amenity values to nearby residents through open space and scenic views, at times with faster economic growth, greater diversification, and lower unemployment (see Duffy-Deno 1998; Rasker and Hackman 1996). Amenity values in turn foster real estate premiums adjacent to protected lands (McConnell and Walls 2005). A wilderness discount for compensation does not seem to qualify as a direct use benefit.

Indirect uses of wilderness include ecosystem services that facilitate human production of goods and services (Balmford and others 2002). Hydrological and nutrient cycles, soil formation, erosion control, pollination, habitat for fish and game, food and water for livestock, and climate regulation are a few examples. We believe that lower compensation costs are an ecosystem service—essentially, native prey on wild lands buffer economic loss of livestock to carnivore predation. In the northern Rockies, this benefit manifests despite extensive use of subsidized grazing on public lands. Given how challenging it remains to describe and quantify ecosystem values generally (National Research Council 2004), it is hardly surprising that this novel wilderness discount has heretofore escaped attention.

Wilderness in the northern Rockies supplies a variety of benefits to regional economies (Rasker and Hackman 1996). Our results show wilderness also reduces economic costs incurred by society due to carnivore presence. We conclude that this benefit provides strong additional incentive to conserve both large predators and wilderness habitats.

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# Arctic and Wilderness Travel—Hosts and Guests: The Territory of Nunavut, Canada

Wilfred E. Richard

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**Abstract**—The semi-autonomous Territory of Nunavut in Arctic Canada requires a policy that induces economic diversification and equity for the Inuit population. Though mining continues as the primary economic activity, a focus on preserving Inuit wilderness skills would support cultural continuity and diversification of the Nunavut economy. Traditional Inuit life ways draw no line between culture and the environment. Guiding travelers in the Arctic provides a modest income and cultural integrity. Learning stewardship from northern peoples, we can restore our environment that technological culture has so compromised. To ensure continuity of all life on this planet, the developed world can learn from the cultural ways of peoples who have remained as one with the land. In the Arctic, travelers are guests, de facto students; and the Inuit, as hosts, are our teachers.

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## Introduction

My purpose in this paper is to argue that the economy of the North and wilderness travel have positive implications for both hosts (Inuit) and guests (travelers). This is a case-based study of one set of links: the Inuit of the Canadian Arctic Territory of Nunavut and those of us who visit that territory primarily from America and Europe. There is a potential for reciprocity: traditional hosts have become increasingly reliant on nations represented by guests for the material goods of agricultural and industrial societies; guests from the progressive world have lost much of our spiritual bearings connecting us to the land. As a hunting and gathering culture, to ensure their survival, the Inuit have for millennia remained effective stewards of the land.

As a dedicated arctic traveler, I utilize field experience, analysis, and reflection with an orientation to the costs and benefits of travel and tourism. Nunavut, in Inuktitut, the language of the Inuit (“the people”), means “our land.” Nunavut (fig. 1) was created on April 1, 1999, as the Inuit homeland of Canada’s northern-most people.

Nunavut is 777,660 mi<sup>2</sup> (2,014,230 km<sup>2</sup>) constituting 20 percent of Canada. By comparison, Greenland—considered part of North America by geologists and geographers—at 50 times the size of Denmark, is substantially larger at 2,175,613 km<sup>2</sup> / 840,004 mi<sup>2</sup>. Alaska, with 700,140,613 km<sup>2</sup> / 656,424 mi<sup>2</sup>, constitutes the smallest jurisdiction of these

three geopolitical entities that constitute the Arctic region of the Western Hemisphere. Each now has what is termed “home rule,” and has adopted a policy to promote tourism as a source of economic gain while sporadically regulating its absorption into village life ways.

Arctic tourism is specifically wilderness travel—wilderness being a well known but casually used term. Precision requires definition of wilderness because how wilderness is defined determines government policy, implementation, and land use. Wilderness has been defined within the context of ecology, wildlife biology, conservation, land use, travel and tourism, and by the individual traveler.

My thoughts follow two streams. One stream is the concept of wilderness: How is wilderness specified, or otherwise characterized by regulatory authorities where a governing entity defines wilderness by statute and associated rule making? The other stream, composed of “hosts” and “guests,” represents a relationship of reciprocity. This latter stream is “re-creation” or spiritual empowerment of travelers in Arctic lands. And I prefer the term “traveler” to “tourist.” To me, a tourist is one who follows the crowd whereas a traveler does not move about—particularly those visitors to the Arctic—in large groups. Turk (2005: 179) employs the Russian word *puteshestvenik* as a more descriptive synonym for the concept of traveler as “a wandering storyteller, one who carries the news, links cultures, and transfers technology.”

Stephen L. J. Smith (2000: 350), tourism and recreation consultant at the University of Waterloo, Canada, notes that American Transcendentalists of 19th century America re-constructed the wilderness as “a source of sublime inspiration and an antidote to the spiritual illness of civilization.” Remarking on contemporary life, Thomas Urquhart (2004), Executive Director of the Maine Audubon Society, describes our metaphysical search, which, literally, extends from a weekend excursion to a lifelong search. Dismissing the terms “sacred,” “mystical,” “religious,” and “spiritual” to characterize this search, he settles on the phrase: “sense of wonder,” that is, the state in which we are born and which we have genetically inherited from our hunter/gatherer ancestors. I use the word “spiritual,” both as noun and adjective, to represent that “sense of wonder” that I experience when being in the Arctic with those who live close to the land. The terms “hosts” and “guests” are borrowed from Smith (1989). These two streams conjoin to realize a flow of synergy where both hosts and guests benefit.

Four national parks have been established in Nunavut and designated—at least in part—as wilderness under the Nunavut Land Claims Agreement of April 1, 1999. Given the limited seasonal nature of northern travel, an Arctic economy cannot be built on tourism and wilderness travel alone. The most important natural resource-based activity—economically in the Arctic in a post-fur/Hudson Bay era—is mining minerals from coal to oil to uranium, and now diamonds. The

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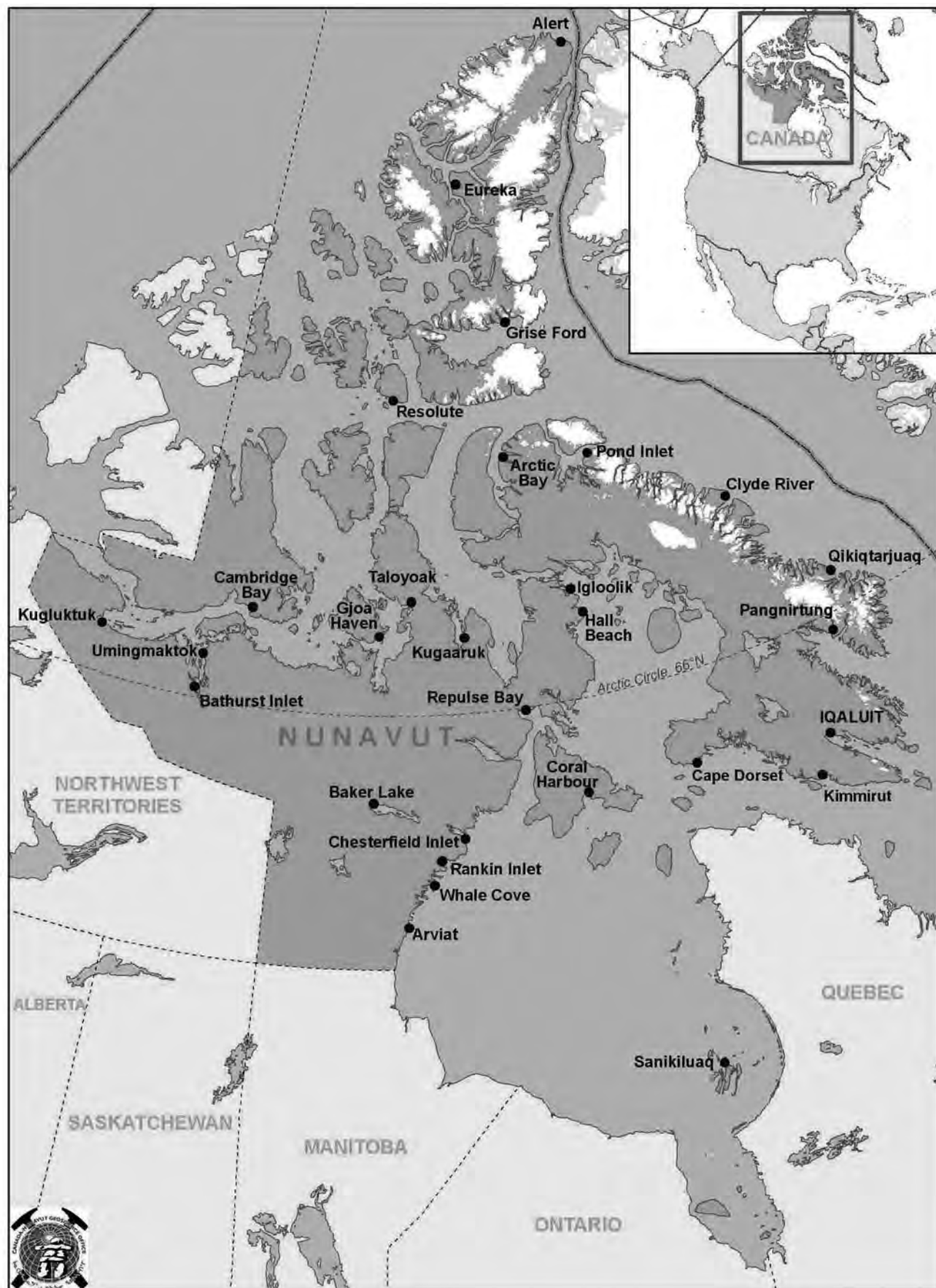


Figure 1—Map: Canadian Territory of Nunavut (courtesy of Canada-Nunavut Geoscience Office, Iqaluit, Nunavut, Canada).

hunter/gatherer economy of the Inuit endures a great deal of stress as a subsistence economy is being displaced by a market economy. Consequently, the Inuit people experience an on-going interaction—of disconnect—between the culture of the “traditional” and that of the “introduced.”

## Defining Wilderness

The *Oxford English Dictionary* (OED) presents three definitions of wilderness: uncultivated land; a land uninhabited except by wild animals; and, a piece of land in a large garden or park planted with trees laid out in the form of a maze. Geographer I. G. Simmons (1993) traces the etymology of the word *wilderness* to the Old English as *wil(d)-deorness*, “the place of the wild deer.” Environmental historian, William Cronon (1983), writes that colonial Europeans believed that New England was founded upon an “untouched” *wilderness*, the land given exclusively by God even though “American Indians” had been burning off the land for thousands of years to enhance the population of deer. One would be hard pressed to find a space—anywhere—where human beings have not manipulated the land; Antarctica may be an exception. Cronon (1995) writes that culture creates *wilderness*. Thoreau, Emerson, and other American Transcendentalists (Melville, Alcott, Hawthorne) perceived *wilderness* as a place to celebrate unspoiled nature, the revelation of the Divine.

Smith, in the *Dictionary of Concepts in Recreation and Leisure Studies* (2000: 349), suggests two criteria for wilderness, “an unspoiled environment” and “social value ... whether society values wilderness as good or bad [and] ...” *Wilderness* is:

1. A large tract of land that retains its natural primeval quality that is free of observable human impact. 2. Such a tract of land officially designated as “wilderness” by a public agency.

Smith’s definition constitutes the *realpolitik* of *wilderness*, because today government sets the standards for wilderness use. Nature writer David Oates in *Paradise Wild* (2003) in a chapter entitled “Wilderness” cites the U.S. Wilderness Act of 1964 as the “gold standard” of *wilderness*—at least in North America. Landscape historian Kent C. Ryden (2001: 9) writes of the downside of defining wilderness:

[I]f we set aside and venerate particular pieces of the landscape as “wilderness,” then we implicitly write off the rest of the landscape as irrevocably cultural, surrendered to human influence, not worth focusing environmental energies on.

Oates (2003: 26) writes of the Act that “[wilderness is an area] untrammelled by man, where man himself is a visitor who does not remain. The operating assumption, a kind of formula, is that ‘wilderness equals no people.’ ” Oates (2003: 37) draws from the dry language of the 1964 Act the psychological and/or aesthetic implications that humans experience in the wilderness without the insulating cocoon of 21st century technology and social amenities:

[H]umans do, habitually and nearly universally, experience a ‘something’ when in the forceful presence of nature....I don’t know what that something is. But, I’ll call it the wild.

Cronon (1995: 89) concurs; the *wild*, “... dwells everywhere within and around us.” To summarize, *wilderness* represents a unity of the positions advocated by Oates and Smith. It

incorporates Oates’s concept of the *wild* that resides individually within us as Urquhart’s “sense of wonder” which drives us to seek an expression of the wild on lands where nature holds dominion. Smith presents us with the reality of the state’s legal delineation of land as *wilderness* with all the attendant ecological, economic, social and political implications.

## The Arctic Wilderness

Point Barrow, the northernmost point in Alaska, is located at slightly over 71°16’ North. By comparison, Ellesmere Island, in the Canadian Queen Elizabeth Islands (now the Inuit Territory of Nunavut), extends to 83°10’; Greenland extends to 83°40’. An immense Arctic territory lies north and east of Alaska in North America. However, its population density implies the emptiness of wilderness. Table 1 enumerates the human density of northern lands, circumscribed either by natural boundaries (usually water) or political boundaries (artificial). The farther north one travels, the larger are the units of land on which people organize to sustain their culture, thus realizing an inverse relationship between latitude and population: the greater the latitude, the smaller the population—as well as a diminution of the carrying capacity of the land.

Decreased density is not surprising as the solar-dependent biological carrying capacity of the land decreases with increase in latitude. For example, population density in Maine, New Brunswick, and Newfoundland are counted in terms of “tens of people” per land unit, in Labrador “tenths of people,” in Nunavut and Greenland “hundredths of people.” It is with these data in mind and actually walking these lands, one develops a sense of the immensity of these lands and the implications for human culture—and for *wilderness*. The political jurisdictions in table 1, with the exception of Alaska, are those areas I frequent. As an observation, I offer that there is an apparent correlation between population density and degree of wilderness.

**Table 1**—Selected areas and population density (sources: Statistics Canada; U.S. Bureau of the Census; Goode’s World Atlas).

Place	Area	Population	Density
	km <sup>2</sup> / m <sup>2</sup>	2000/1	km <sup>2</sup> / m <sup>2</sup>
Maine	91,652	1,305,728 <sup>a</sup>	14.24
	35,387	36.90	
New Brunswick	73,439	729,498	9.93
	28,355	25.73	
Newfoundland	108,860	458,066	4.21
	42,031	10.90	
Labrador	296,861	27,864	0.09
	114,618	0.24	
Greenland	2,175,610	59,300	0.03
	840,004	0.07	
Nunavut	1,994,000	26,745	0.01
	777,660	0.03	
Alaska	1,700,140	648,818 <sup>a</sup>	0.38
	656,424	0.99	

<sup>a</sup> U.S. Bureau of the Census (2003 estimate).

Looking beyond population and ecology, how can we geographically or climatically categorize, in the Arctic, a *wilderness* that may exist only on ice and then for only part of the year as large expanses of ice, known popularly as the *floe edge* or *fast ice*. Fast ice, defined by the Ice Service of Environment Canada (2001/2002: 13) is: Sea ice which forms and remains fast along the coast where it is attached to the shore, between shoals or grounded icebergs. Fast ice may be formed in situ from the freezing of seawater, or by the freezing of pack ice to the shore. It may extend a few meters or several hundred kilometers from the coast, and it may be more than one year old (second year or multi-year fast ice).

Wilderness travelers, too, observe the return of life to the floe edge as polar bears, seals, and narwhales migrate. The Government of Nunavut designates these land-fast ice zones with the same status as parks and conservation areas (Nunavut Land Claims Agreement (May 25, 1993) (Article 26 Outer Fast Ice Zone—East Baffin Coast, 144–145). Does *wilderness* need to be vegetated? Are deserts *wilderness*? Are Arctic deserts *wilderness*, bearing in mind that the Canadian Arctic Island of Ellesmere receives less precipitation than does the Sahara Desert? Is *wilderness* determined by geography or by ecology? Simmons (1993: 161) suggests at least a historical criterion of “vegetation” for the condition of *wilderness*—or, in the absence of vegetation, “...the term desert was favored.” Environmental philosopher Andrew Light (1995: 28) writes of the classical use of the term *wilderness* “as applied [only] to green spaces.” Is the Arctic, then, essentially a desert biome, *wilderness*?

The Nunavut Land Claims Agreement (May 25, 1993) establishing the Territory of Nunavut does define the term *wilderness* in Article 8 Parks, Part 1: Definitions, as “... extensive areas which are good representations of each natural history themes [sic.] of the Park and which will be maintained in a wilderness state” (p. 71). Three of four Canadian national parks identified in the Agreement now exist in Nunavut. I discuss these three parks under “Wilderness travel.”

## Arctic Wilderness: Travel and “Re-Creation”

One would be hard pressed to define the Inuit Territory of Nunavut with a population registering in hundredths of an inhabitant per kilometer or mile as not wilderness. Oates concludes (2003: 21) that “it’s hard to separate ‘culture’ from ‘nature’” because it is humanity’s adaptation to the environment that constitutes culture, the skills and associated language of a people in a given place. This statement has particular relevance to the Inuit of the Arctic where it is literally impossible for their culture to survive if the Inuit are not out on the land employing knowledge and skills refined over the millennia. The recently released Inuit film, *Atanarjuat: The Fast Runner* (2000), dramatically portrays Nunavut, where nature and culture are spiritually joined, thus avoiding the Western dualism of humans versus nature.

One needs to look beyond our urbanized, technologically dependent economy and fissiparous society to find a place such as the Arctic, with a tradition of hunter/gatherer living on the land as hunter/gatherer. Hugh Brody (2000) writes of these places, while with the Canadian Department of Indian

and Northern Affairs in the 1970s, in the Inuit settlement of Pond Inlet of northern Baffin Island. Brody, an anthropologist fluent in Inuktitut, writes of how our species has functioned for 200,000 to 400,000 years as hunter/gatherers as we wandered the Earth. He writes that in northern places he has found a correlation of “the wild” with hunter/gatherer societies that have lived close to the wilderness of nature for immeasurable generations. It is here with some distant level of subliminal cognition that guests to these northern lands connect with the culture of the hosts.

If we strike a mean of 300,000 years of hunter/gatherer existence on the Earth with 30 years represented per generation, we realize 10,000 generations as hunter/gatherer with nature versus the settled lives of urban dwellers apart from nature for about 6,000 years (200 generations). For a period of up to 4,000 years (McGhee 1996) 133 generations of Inuit and their ancestors have survived in the harsh Arctic as very effective hunters. Canadian archaeologist Robert McGhee (2005: 35) recently concluded that the Inuit, like other “... Farmers, fishers, and other commercial harvesters,” have realized the advantages of ‘monocropping,’ that is focused hunting, particularly on sea mammals and caribou.

Today’s Inuit have inherited a vast knowledge—wisdom—of living with nature. Diamond (2005) believes that the Inuit are the best hunters to have ever lived in the North. In point of fact, they prevailed over both the Dorset culture and the Norse Vikings. Brody (2000: 247-248) remarks that:

With a...mixture of information and shamanism, hunter-gatherers signal and accept that their world is not in their control. They prosper by knowing, not by controlling ... They understand the world and make critical decisions about it without trusting to dichotomies of either rationality or ethics. By escaping mere facts, they discover the most important facts of all.

The life ways of 10,000 generations of ancestry can guide us in our urban life ways to give rise, for example, to the need for a vacation through which we relive our ancestry by gathering sensual experiences where nature is omnipotent, as in mountains or on Arctic lands. A vacation breaks one’s daily routine for recreation, for renewal of health, for refreshment of strength and spirit. Hyphenating the word recreation as re-creation conveys the essence of that concept. One particular form of re-creation that most effectively captures a spiritual *joie de vivre* is wilderness travel in places where our kind has not obliterated the dynamics of nature.

*Wilderness* and culture can conjoin through a heartfelt “sense of place,” for example, on the coast of Maine, in the Torngat Mountains of Labrador, in the outports of Newfoundland, and in the Inuit villages of Nunavut and Greenland. Here, nature is less touched by technology, less subject to the temporal whims of humans. Time in the wilderness, as a re-creation experience, engenders a restorative use of the senses, opening us to a fleeting connection with our hunter/gatherer ancestors.

The term *wilderness* is also a word with spiritual content. Graburn (1989: 26) pursues the point of spirituality in *Tourism: The Sacred Journey*:

[H]olidays (holy sacred days are now celebrated by traveling away from home) are what makes “life worth living” as though ordinary life is not life or at least not the kind of life worth living...we celebrate with TGIF (Thank God It’s

Friday) [as we move from the profane to the sacred time of weekend—or of vacation].

This condition of alienation, of spiritual malaise, raises the question of why is it that Arctic travel is so attractive—particularly to those travelers who continue to return. We of Euro-American society seek the integrative wholeness of the wilderness experience through re-creational activity. Many of us would remain there except for the “bread question” of making a living. For Oates (2003) and Brody (2000: 292) the attractiveness of Canadian Arctic villages, such as Pond Inlet and Arctic Bay, serve as a counterbalance to outside influences that fragment culture:

The [culture of the] hunter-gatherer mind is humanity’s most sophisticated combination of detailed knowledge and intuition. It is where direct experience and metaphor unite in a joint concern to know and use the truth ... [as opposed to our] ... specialized, intense development of specific systems of intellectual order, with many kinds of analytical category and exacting uses of deductive reasoning.

Visitors to Arctic settlements are likely to experience visual discord as northern communities are caught with the presence of Euro-American cultural influences such as Pizza Huts and Subways, TVs and ATVs, cell phones and computers. But there are laudatory examples of cultural conjoining. A friend, Meeka Kilabuk (fig. 2), former fishing camp operator and a member of the team that crafted the Nunavut Land Claims Agreement, works on Saturday afternoons as a DJ on her own program out of Iqaluit (WWW.CKIQ.CA). She speaks of the value of traditional knowledge and life ways. The Inuit recognize this need to retain their culture as demonstrated in the video *Inuit Qaujimajatuqangit/Inuit Traditional Knowledge* produced by the Government of Nunavut (2003). This video sends the message that when the Inuit engage in Western practices, as they must, there is the felt need



**Figure 2**—Meeka Kilabuk, Arctic Symposium, Bates College, Lewiston, Maine (photo by author).

to incorporate Inuit culture. For example, posters in public places exhort all to “eat country food” [seal, caribou, fish] instead of imported processed foods [tonics, candy, potato chips] high in sugar, fat, and salt.

A related activity is the reviving of bone and stone carving of traditional Inuit motifs that are quality controlled through co-ops and the awarding of a quality control label on each object sold. Fine art printing and weaving have followed, with outlets in major Canadian cities.

## Economy and Cultural Change

Three primary economic activities—hunter/gatherer, mining, tourism (with crafts trade and wilderness travel)—co-exist as subsistence and market economies for the aboriginal people of Nunavut. Hunter/gatherer constitutes the traditional subsistence economy of the Arctic, with its products (meat, bone, hide) used within the village. Hunter/gatherer Inuit culture thrives on ring seal, the linchpin of a subsistence economy, for food, fuel, clothing, tools, weapons, and material to use in komatek and kayak construction.

### Mining

Surface and subsurface natural resource extraction on the Canadian Shield stretches over about half of Canada. As an extractive activity, inevitably mines play out or become uneconomical as with the lead/zinc/silver mines in Nanisivik, now closed after 22 years of operation. Still operating after 24 years is the Polaris site (N 75°30' in the High Arctic), which is the world’s northernmost mine producing zinc, lead, and calcium. Changes in market demand and new technologies may reduce, if not eliminate, the need for a given commodity and, hence, jobs for local workers. Exploration continues. Again, to reference Diamond (2005: 379):

[T]he essence of mining is to exploit resources that do not renew themselves with time, and hence to deplete those resources. Since [for example], gold in the ground doesn’t breed more gold.

Commercial mining in the Arctic of recent origin—particularly diamond mining—is perhaps the equivalent of three human generations. Conversely, human culture in the Arctic from the Paleoeskimoos through the Dorset, and the Thule (now referenced as Inuit) has existed at least 4,000 years (McGhee 1996; Schledermann 1996). Diamonds may be forever; mines are not.

Mining activity and its infrastructure continue to expand in the north, as the increasing world population—tripling in the last 65 years—demands more minerals and energy. Many cultures have been drawn, through the global economy, into the Western paradigm of expansion and consumption. As readily accessible mineral concentrations are exhausted, extractive activities must locate in demanding, harsh locations, such as the Arctic. The quest for mineral deposits moves ever farther north into the upper reaches of Ellesmere Island at about 82 degrees north. Indeed, when one proceeds north on First Air (airline of the Canadian north), a seat mate is quite likely to be a geologist conducting a mineral exploration or a miner returning from time off with family.

To service the Nanisivik mine in northern Baffin, transportation infrastructure (port facilities, an airport and scheduled



transportation services) were built and so far continue to be maintained. This same infrastructure supports travel, unrelated to mining, to northern Baffin. In light of a looming shutdown of the mine, residents in Iqaluit and in Pond Inlet voice their anxiety as to whether First Air would continue to fly to Nanisivik, Pond Inlet, or Arctic Bay when the mine at Nanisivik plays out. However, those of us wanting a wilderness experience have a reprieve. A new mine with a very large concentration of high-grade iron ore, is being opened just south of Pond Inlet in Mary River by the Baffinland Iron Mines Corporation of Toronto, Canada (see [www.baffinland.com/project](http://www.baffinland.com/project)). The Nunavut Land Claims Agreement (Article 25 Resource Royalty Sharing, Part 1: Inuit Right to Royalty) requires annually that 50 percent of the first \$2,000,000 of resource royalties and 5 percent of any additional royalty paid to the Government of Canada shall be deposited in the Inuit Heritage Trust.

Though mining provides a continuation for an important income stream and transportation accessibility, it does not guarantee continuity of Inuit culture and community. The extent of Inuit employment by mining companies is unknown, though I suspect that indigenous employment is more likely associated with the harbor and airport in Pond Inlet.

The *modus operandi* of the global economy is rapid, short-term economic gain with accountability only to stockholders' demands and does not assure continuation of a community or a culture, especially in a harsh and high investment environment. In the long run, royalties as a percentage of generated revenue could be rather limited, particularly for administering a territory that accounts for one-fifth the territory of Canada, the world's second largest nation state.

## Tourism

**Crafts.** Crafts originate from local materials, animals (seals, polar bears, caribou), soapstone, and fossil bones. As northern peoples have become increasingly dependent upon products from the south, new or enhanced sources of income are essential for this exchange of goods, such as gasoline and heating oil, building materials, snowmobiles, and ATVs. Arts and crafts, such as the carving of an Inuit family portrayed in figure 3, generate income from travelers as well as from retail outlets in Canada, Seattle, New York and Europe. Each Inuit village may specialize in a particular medium: Pond Inlet and Clyde River with carvings from narwhal ivory, Cape Dorset and Kimmirut with carvings from soapstone, Pangnirtung with tapestries, and Iqaluit with prints. Several of these crafts are not indigenous but have been introduced to Nunavut for purposes of employment and income. Introduced crafts include large carvings, weaving, printmaking, and design of ceremonial masks. Admiring and collecting crafts provide an entrée to a culture by presenting a way to think about and to appreciate the creativity of another people. Travelers from a mass production economy treasure these exquisite pieces in which the Inuit culture and the spirit of Arctic have been united.

A major marketing problem, however, is that the U.S. Marine Mammal Protection Act [MMPA] of 1972 forbids the importation of all animal products made from marine mammals. For example, Aaju Peter of Iqaluit (fig. 4), who employs six or seven native women to fashion clothing from fur, cannot sell her products in the United States. Ironically,



Figure 3—Carving: “Inuit Family” (photo by author).

70 percent of all other Canadian furs made available to the market are sold to the U.S. Aaju Peter, who received her law degree in 2005, hopes to have the next word.

Outsiders' perceptions of sealing have been, historically, created by the visual media. Coverage of the annual seal hunt on the ice of the Gulf of St. Lawrence was justified a few decades ago as a condemnation of brutal commercial sealing because of the highly marketable pure white coats of newborn seals. The animal is clubbed to death and skinned en situ with only the pelt taken. Subsequently, the U.S. Congress added seals to the 1972 MMPA, which made the importation of seal products—along with that of whale, walrus, and polar bear products—into the U.S. illegal. Then in 1983, the European Community [EC] followed suit but with a focused boycott directed only to preventing “the industrial-scale killing of harp and hooded seals” (Wenzel 2000: 186). Geographically, the EC closure was directed specifically at the Gulf of St. Lawrence, not at all Canadian waters, nor was it directed at the mainstay of the Inuit—the ring seal. Thus, clothing designers, such as Aaju Peter, travel to Paris to market fur creations that are largely made from ring seal.

The Inuit depend upon sealing primarily for subsistence and only secondarily for market trade. Sealing is not just for the pelt but for the whole animal. Harvesting is done one animal at a time, by rifle or spear, as an Inuk hunter waits patiently, much like a polar bear, at a breathing hole in the ice that a seal keeps open. The seal is to the Inuit what all of our meat and leather-bearing animals, as well as many fruits and vegetables, are to us. Raw seal meat is a significant source of vitamin C. The Inuit feed themselves and their dogs with the complete carcass of the animal and then process the pelts for clothing and for a myriad of other applications, such as bone for carvings. Not a whisker goes unused. The people of the north live on a land with little in terms of resources for the market economy. In the Arctic, agriculture is impossible, and manufacturing is little in



**Figure 4**—Aaju Peter in her exquisitely handcrafted sealskins - Devon Island, Nunavut (photo by author).

evidence. As Mortensen (2001: 343) speaks of Greenland, traditional hunters have become “dependent on high-technology hunting tools and other aids, almost all of which must be imported.” And, “It is through the sale of sealskins that the hunter gets most of his cash profits [which remain in the market economy]. This is no different from Nunavut.

Unfortunately for the Inuit, the MMPA applies broad-brush strokes, by including all marine mammal species. Traditionally, animals taken in the hunt as subsistence activity is more than a Milton Friedman-type methodical externalization of non-market social and economic factors. Rather, according to Wenzel (2000: 181):

[S]ubsistence is about reciprocal relationships that include shared social responsibility as much as they do kilograms of meat, in which all community members contribute their knowledge of animals and the environment, energy in hunting and processing food, and equipment and/or money as they are available.

The dominant American model of an economic system largely negates or excludes a social function that the Inuit

traditional system gives at least equal value. Therefore, this imported “theory of value” is deficient in satisfying the traditional cultural needs of the Inuit.

As an Inuit government spokesperson states in the video, *Waiting at the Edge, Protecting Our Traditions* (no date), “The population of our people is only 27,000—probably a smaller number than the population of registered lobbyists in the greater Washington, DC, area. How can we contend with the big government in Washington and with the lobbyists who worked to ban sealing?” Inuit artists, from a marketing perspective, are in a bind because the U.S. is Canada’s largest trading partner and the primary source of non-resident travelers.

**Wilderness Travel.** Visits to the Canadian Arctic for pleasure began a decade ago with the establishment of a system of national parks in Nunavut and creation of the Inuit-owned First Air. Scheduled air service has made a northern wilderness experience accessible for guest populations. Tourism, that is wilderness travel, in Nunavut is strongly encouraged by the Nunavut Land Claims Agreement (Article 8: Parks, Part 2: National Parks and Part 3: Territorial Parks. Identified for establishment and management in the early 1990s are the national park of Auyuittuq (“the land that never melts”); Ellesmere; and, a “National Park—North Baffin,” which was opened in 2003 as Sirmilik (“place of glaciers”). A fourth park (not covered here) was only identified in 2005. Each park contains a “predominant proportion” of Zone II—Wilderness defined as “...extensive areas which are good representations of each natural history themes of the Park and which will be maintained in a wilderness state.”

- Ellesmere National Park (North 81°40’), with ice shelves, Lake Hazen—the largest freshwater lake north of 80 degrees latitude—the northernmost Inuit settlement at Grise Fiord and Fort Conger—the jumping off point for Polar expeditions;
- Auyuittuq National Park (North 66°40’), with Thor Peak (almost a mile high) has the highest uninterrupted cliff face in the world; the Arctic Circle crosses through the Park; and, the great variety and concentration of arctic flora; and
- Sirmilik National Park (North 73°20’), located on Bylot Island, is the third largest of Canada’s national parks.

Wilderness travel at these northern latitudes on the land/ice with Inuit guides often tests one’s mental and physical fortitude: ascending over loose rock of glacial moraines; crossing the floe edge on a komatek; traversing swollen, cold glacial streams while precariously balancing a pack; or, slogging through a mix of cold and snow—even in summer. “Being” on this land is not figurative; this wilderness challenges one’s attention to each moment, to one’s surroundings, to one’s every footfall.

## Merging Two Economic Systems: Traditional and Market-Oriented

Brody (2000: 27) concludes that the Inuit have been effectively moved from life on the land into settlement life that creates “a



reliance upon wage employment (and therefore the creation of unemployment).” To enhance Inuit employment in the traditional practices of hunting and gathering, the Nunavut Land Claims Agreement (1993: 146), Article 17: (Purposes of Inuit Owned lands. Part 1: General) states that:

The primary purpose of Inuit Owned Lands shall be to provide Inuit with rights in land that promote economic self-sufficiency of Inuit through time, in a manner consistent with Inuit social and cultural needs and aspirations (emphasis added).

Article 5: (Wildlife. Part 7: Special Features of Inuit Harvesting) directs oversight for harvesting to each community’s Hunters and Trappers Organization [HTO]. An associated system of subsidies from both federal and territorial governments ensures a continuation of hunting and gathering activities oriented to “social and cultural needs.” This system of local HTOs bridges traditional subsistence hunting with involvement in the traveler-based market economy, both activities are predicated upon the application of traditional knowledge. The Nunavut Land Claims Agreement provides for federal monies (Article 37: Implementation of Agreement) to be directed to economic opportunities, training, and park establishment and management.

An overview of Nunavut demonstrates that mining provides benefits since it brings in hard currency and supports transportation networks to serve mining operations and makes it possible for travelers to visit the North. This opportunity for wilderness travel on ice, water and land attracts visitors. Most visitors purchase crafts as mementos of Arctic travel. The people of Nunavut are now filmmakers. Receiving international recognition, *Atanarjuat: The Fast Runner*, uses cinematography to communicate a traditional myth. Figure 5 is an image of Pakak Innuksuk, a lead actor in *The Fast Runner*—the “good” brother killed in the film and an Inuit guide whom I had the pleasure of meeting as a guide in the Canadian High Arctic. Canadian archaeologist Robert McGhee (2005) would give a “thumbs up” sign of approval to the Inuit telling their own story instead of the interpretive chronicling by anthropologists, explorers, and adventurers from the outside world.

## Conclusions

Reciprocity between the Inuit as hosts and wilderness travelers as guests has developed. Guides “live” (practice) traditional skills on the land and receive financial compensation for this activity. Travelers are absorbed in a re-creation experience of the Arctic that requires being sensually “present” on and with the land. The expression of reciprocity is more in the inclusive community sense of friend than in the sense of the exclusive economic reciprocity of the market. Anthropologist Marshall Sahlins (1972) describes a “theory of reciprocity” in which there may not be balanced compensation but there is mutual helpfulness.

Through language, we ultimately understand the meaning of *wilderness*. Culture by definition is ethnocentric. Thus, for example, the names of many indigenous groupings translate to “the people” as is the case with the Inuit. As well, there is the universal practice of projecting one’s own

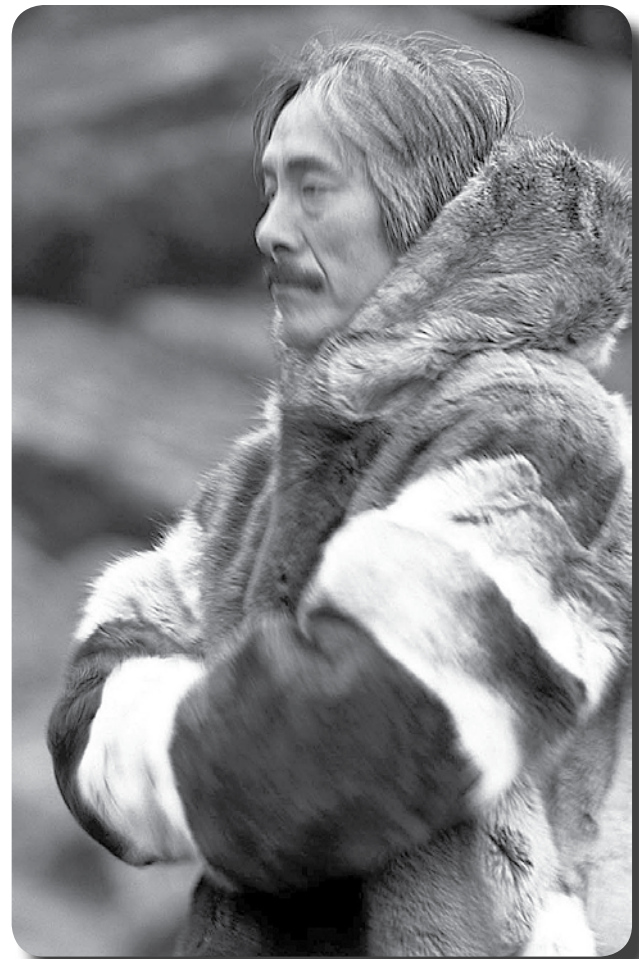


Figure 5—Actor and guide Pakak Innuksuk (photo by author).

cultural conceptualizations, primarily through language, onto another place—that of the host. However, our idea of *wilderness* (and, it is just that, “ours”) derives much of its meaning from Disney, television nature programming and academia. For example, *wilderness* with its tradition of greenery and munching ungulates is one such limited perception. *Wilderness* can also be a world of whiteness and ice. Indeed, *wilderness* is not only a Western concept, but it is an elusive concept, as I think this paper demonstrates.

*Landscape*, itself, is a concept originating in our Western culture. Meeka Kilabuk, my Inuk friend, queried my repeated use and meaning of “Arctic landscape.” She points out that “We”, the Inuit, talk simply of the land so why not talk of *land*. The term *landscape* derives from an early 17th century European genre of painting and then was later employed to describe landscape gardening. Quite literally the term means to “shape the land.” As a hunter/gatherer culture—with neither agriculture nor permanent settlement—the Inuit do very little shaping of the land. They are *on* the land, *of* the land. My conclusions now summarize what they as “hosts” and we as “guests” can offer each other through our contact in the land of the north.



## Hosts

There is need for an enlightened Territorial—and Federal—policy that promotes economic diversification and equity where one economic activity can complement another, such as the fit of mining, craft industry and wilderness travel. Market promotion of Inuit wilderness skills and an integration of those skills with wilderness travel are key to success. Cultural continuity and subsistence are assured only through traditional Inuit life ways that draw no line between culture and environment. Guiding wilderness travelers in the Arctic is a means of providing a modest income, with dignity, for the few Inuit people.

Essentially the introduced economic activities in Nunavut—mining, wilderness-travel, and crafts—complement one another. As demand for natural resources grows, those resources located in the far corners of the planet have gained in importance. Wilderness is a resource, too—and increasingly so. Canadian tourism authority and Professor of Geography Geoffrey Wall (2000: 627) writes, “The value ascribed to wilderness has increased over time as its supply has been reduced and more people have come to live in cities.” Wilderness travel is non-extractive, and wilderness travelers do not dominate the land. Rather, they seek communion with the land to sense what the land holds.

Trade in arts and crafts and wilderness travel would not be possible, despite the wealth of artisans, without the transportation infrastructure. The irony is that transportation is possible through the economies associated with mining. Infusions of income into Inuit villages are most definitely welcome, but this transfer of profits cannot promise that Inuit cultural practices will endure. It is likely that little income, as I have suggested, can be generated at the local level in terms of wages. Any economic activity gives a few Inuit a solid reason to continue to practice their traditional ways on the land and to retain a rich culture.

Even a seasonal wilderness travel market can help promise a continued flow of employment and income that flows directly into the hands of local villages. Films could be a valuable export, as the content speaks of the unity of land and culture. The primary resource demanded by the cinema is talent and training, which makes this industry labor intensive. Wilderness travel is more likely to accomplish a continuance of native life in the Arctic through paying compensation to Inuit for their skills guiding guests from the south.

## Guests

A group of us were traveling together in June 2003 on the ice out of western Baffin Bay, somewhat to the south of the entrance to the Northwest Passage. Our party consisted of Dave Reid, owner/operator of Polar Sea Adventures, two Inuit guides from Pond Inlet, our cook from Ontario, and six wilderness travelers—including a writer/photographer from the United Kingdom, two cinematographers from Germany, a cinematographer from Canada, and myself as a geographer/photographer from the United States. When our conversation turned to Arctic tourism, the general conclusion is that the High Arctic will never be a place for mass tourism because of factors such as distance, cost, weather, discomfort, and a lack of social amenities expected by lower

latitude visitors. Rather, it is a place for the occasional, well-motivated traveler, the Russian *puteshestvenik* or wandering storyteller. The carrying capacity of the Arctic is not only low in biomass production and in its ability to sustain an indigenous human population but also limited in its ability to accommodate large numbers of tourists without compromising the psychological value of the northern experience. The wilderness of the Arctic resuscitates the wild within us. Wilderness—and by inference, the wild—is not necessarily a function of density—human population, trees, or deer. It is more a matter of a culture or a human cultural presence that rests easily on the land, its spiritual connection.

By being exposed to other cultures we learn about our own, essentially, the paradigm of anthropology. We of the “developed world” have much to learn from the indigenous “fourth world,” an aboriginal cultural enclave in an otherwise developed first world nation. Now, as we become more aware of the need for stewardship for planet Earth, we need to consciously sustain alternative social models rather than our own culture of “one size fits all” which is predicated upon unlimited resources.

Perhaps those of us who desire to travel outside of the usual geographical parameters are in the tails of the norm curve. The fortunate few of us who travel to the Arctic are immersed in the monumental proportions of the Arctic—glaciers and icebergs, mountains and endless plains—unimpeded by the works of humans. The exhilaration of a brief Arctic experience is re-creative in the profound stimulation of one’s senses. The intense Arctic light, magnified by the horizon-to-horizon whiteness of ice and snow, is the essence of spirit, of life. This light is life itself.

Most of my fellow Arctic travelers remain eager to return to this land of light and solitude, reviving us. We become sensually conscious of our surroundings and subsequently more adaptable to change and catastrophe—to adapt to survive. The genes of our hunter/gatherer ancestors call out to us “vacation,” that is, to at least temporarily vacate our urban or suburban habitat. Harkening to the words of Thoreau (1988), we are called to return to a place where culture and land are once more as one. In a sense, we have come full circle as we Euro-Americans once again become hunter/gatherers but not of flesh and root but to resurrect the wilderness experiences of our not far-removed ancestors.

There is significance for all of us in the value of near pristine lands and of the re-creative value of travel on these lands. It is increasingly critical for our species to recognize that other models for living exist. To borrow from the field of geology, we of the developed world are caught in a “Homogocene” of consumerism made manifest through a world of “stuff.” The Inuit, as well as other cultures that have maintained spiritual connection with the land, may very well carry the knowledge and wisdom that the developed world desperately needs to cope with inevitable change. The premise of Western man’s hierarchical dominion over nature needs to be tempered by the knowledge that we are subject to the same rules of survival as are all other species. That knowledge only comes from knowing the land, knowing our place on the land, and by “being” on the land. As geologists say, “truth is on the ground.”

Life without fully experiencing the full range of the senses is not life. How many of us are actually cognizant of light and that it means life. Arctic travelers return to the developed

world with the value of the experience. The wilderness experience is a rejuvenation of the creature of nature that we are. Otherwise we simply exist as fragmented beings within this complex, urbanized world. There is value in the bedrock existence of wilderness, particularly the re-creativity of the wilderness experience in the Earth's polar regions.

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# Managing Recreational Experiences in Arctic National Parks: A Process for Identifying Indicators

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**Abstract**—Despite low use densities and a largely absent development footprint, parks in arctic environments are confronted with questions similar to more heavily used protected areas. Many of these questions concern the character of experiences visitors seek and for which agencies attempt to provide opportunities. These experiences, like others, have a variety of dimensions, such as solitude, adventure, naturalness, scenery, and so on. Understanding these experiences and ensuring that visitors have an opportunity to experience them are major challenges for stewardship organizations, given the character and remoteness of the setting. This paper describes a three-phase project to discover the dimensionality of experiences among visitors to Canada's Auyuittuq National Park and develop indicators that managers could use to assess if such desired experiences were being achieved. In Phase I, the project used qualitative interviews to identify the dimensionality of experiences and in Phase II quantitative methods to assess their importance to visitors as well as to link experiences to various setting attributes. Phase III involved a workshop involving managers, scientists, and tourism officials to identify potential indicators of each desired dimension of the visitor experience. The process used here ensured that research was policy relevant and may serve as a model for other park and protected area stewards faced with similar challenges.

## Introduction

Arctic recreational experiences are like no other: remote, wild and untrammled landscapes, isolated from the conveniences of towns and emergency services, unusual and unforgiving environments with few visitors or inhabitants, wildlife that exists nowhere else, and an indigenous population that

retains its long-standing and passionate connections to the land and sea. The opportunities for challenge, adventure, reflection, solitude, and appreciating nature in spectacular settings are of the highest quality. While the circumpolar north is largely composed of nature-dominated landscapes, it is confronted with a variety of significant, complex and potentially contentious management issues not the least of which is preservation of the unique experience opportunities found there.

Many protected areas in these arctic environments are large in scale and receive few visitors. Typical of those protected areas are Canadian national parks located in the eastern Arctic territory of Nunavut (Sirmilik, Quttinirpaaq, Auyuittuq, and Ukkusiksalik) (fig. 1). These parks are very large (encompassing in total about 100,000 km<sup>2</sup>/38,610 mi<sup>2</sup>), remote, and receive only a total of several hundred recreational visits per year. Recreationists experiencing these Arctic parks are confronted with logistical challenges (expensive and time consuming travel) and risk and safety issues (remoteness dictates a high level of self-rescue capability) in the pursuit of wildland opportunities provided by the parks. Despite the low use densities and visitation, park managers are confronted with questions similar to those in more highly visited settings located in less remote environments:

- What experiences do visitors seek?
- What experiences do visitors actually construct on site?
- What experiences should be provided and managed?
- How is success judged in terms of providing opportunities for certain experiences?
- How do seemingly necessary, but sometimes incremental changes in facilities, regulations and enforcement policy, and information adversely impact or enhance these opportunities?
- How would managers know if visitors are attaining desired experiences?

Such questions are at the heart of stewardship issues in national parks; understanding experiences and if visitors are attaining them represents a continuing challenge in situations where little information about these questions exists.

The purpose of this paper is to describe a collaborative three-phase research project, using Auyuittuq National Park (ANP) as an exemplar, initiated to identify indicators

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Figure 1—Location of Auyuittuq and Quttinirpaaq National Parks in Nunavut, Canada.

of (managerially) desired dimensions of recreational experiences occurring in an Arctic national park. The paper provides an overview of the three phases and describes the rationale and processes linking each of the phases designed to build a foundation for identification of the indicators needed for stewardship. The paper first briefly reviews some of the previous research that informed this project. We then turn to consecutive discussions of each of the three phases with the goal of providing the reader with a summary of the logic flow, methods, and results used in each phase of the research. Since our emphasis in this paper is on the process used to identify indicators, methods and results are only briefly explained and presented. The reader is referred to Lachapelle and others (2004, 2005) and McCool and Lachapelle (2005) for detailed information.

## Previous Research

A long line of research has attempted to identify the character and dimensionality of recreational experiences occurring in wilderness and similar backcountry settings (for example, Brown and Haas 1980; Roggenbuck and Driver 2000). In many settings, researchers find that solitude, escape, freedom, adventure, challenge, learning about and appreciating nature and scenery, and strengthening inter-group ties are important dimensions of wilderness experiences (see for example, Dear and others 2005).

Borrie and Birtzell (2001) have summarized this research as involving four distinctive but evolving themes that include satisfaction-based approaches, benefits-based approaches, experience-based approaches, and meaning-based approaches. While each theme makes several assumptions

about cause-effect relationships, each uses somewhat differing theoretical constructs, and employs varying methodologies, the results have strongly indicated that (1) wilderness recreation experiences are multi-dimensional yet difficult to precisely measure; (2) a variety of biophysical, social and managerial setting attributes are important in facilitating or hindering attainment of experiences, but this relationship is probabilistic rather than deterministic; (3) distinct tradeoffs occur when making managerial choices between providing opportunities for experiences and managing for natural conditions, although these tradeoffs often may be unclear in the short run; (4) experiences are subjective and to some extent unpredictable, but may be identified and accounted for in decision-making; and (5) monitoring of visitor experiences (in some way) is essential when cause-effect relationships (between setting attributes and experience dimensions) are unclear, but selecting necessary indicators for monitoring is necessary for situation specific management.

This latter point is particularly important in arctic environments, where little is known about the dimensionality of wilderness recreation experiences. Because of the fragile nature of the biological setting, openness of the landscape, and low use densities of visitors, even incremental changes in facilities, regulations/policies or use density may lead to more dramatic impacts to the experiences visitors undergo. These experiences also occur within a context of various uses and values, including the presence of indigenous people who engage in subsistence activities inside park boundaries, scientific research, business activity (for example, aircraft overflights), and occasionally military defense operations. Such a diversity of uses means that arctic environments contain a variety of meanings and values socially constructed by each of the significant groups who are using, visiting or valuing them (Williams 2002). Given the fragile nature of these experiences, developing management indicators and protocols is essential to protect them from irreversible harm.

Understanding these meanings (which is fundamental to developing indicators useful to management), including the dimensionality of wilderness landscape interactions (or stated otherwise, experiences), requires that scientists not begin with a predetermined model of these dimensions, but rather with creating an understanding of the meanings that form the basis for these interactions (Patterson and others 1998). Thus, to start with the question "What is the character of the wilderness recreation experience in the Arctic?" assumes that (1) all user groups are having a wilderness experience, and that (2) the dimensionality of the experience has been previously defined. The first assumption is highly questionable in that certain visitors or local indigenous people may or may not define their interactions with the landscape as occurring in "wilderness." Similarly, many recreationists may be visiting arctic environments for reasons other than enjoying a "wilderness" experience. The second assumption presumes that recreational experiences in wilderness settings can be completely, and universally, specified, and that all visitors to wilderness are seeking a "wilderness" experience. Patterson and others (1998) argue that research on park visitor experiences should not be based on such *a priori* assumptions. Such an approach has important implications for management, in that *a priori* assumptions

about the dimensionality of an experience is biased and may lead decision-makers to focus on insignificant dimensions.

Rather, such research should conduct exploratory interviews into the meanings people construct around their landscape interactions, recognizing that such meanings are deeply personal, vary from one group to another and from one context to another. However, empirical data collection has little practical utility if not coupled with methods of implementing the findings. Identifying indicators of experiences and incorporating those indicators into a formal management regime is one such way of enhancing the benefits of research.

Previous work by Glaspell (2002, unpublished Ph.D. dissertation, The University of Montana, entitled, "Minding the meaning of wilderness: investigating the tensions and complexities inherent in wilderness visitors' experience narratives") and Glaspell and others (2003) in Gates of the Arctic National Park in Alaska followed this generalized approach to understanding experiences and how those experiences are affected by various setting attributes. They first identified the dimensionality of recreational experiences through in-depth, semi-structured interviews with visitors, following their Gates experience. That phase identified a number of potential dimensions of the experience as well as factors—or setting attributes—that may have hindered or facilitated those dimensions. This information was then used in the second phase to develop a quantitative mail-return survey (Glaspell and others 2003) methodology of other visitors. The purpose of that survey was to further refine the dimensionality of Gates experiences and to quantify the relationship between elements of the experience and factors affecting those experiences. This resulted in five dimensions, which they labeled as follows: (1) A Taste of the Gates, (2) Freedom from Rules and Regulations, (3) Challenge of Access, (4) Untrammelled Wildlife, and (5) Risk and Uncertainty. Their analysis showed that a variety of setting attributes influenced achievement of these dimensions. For example, the Taste of the Gates dimension was influenced by management interaction—a general factor comprised of a variety of items measuring who and what visitors interacted about with park personnel. This particular study, with objectives of understanding the dimensionality of arctic experiences and how various setting attributes or factors influence those dimensions, informed the current study. The Gates of the Arctic methodology was particularly important, as this was the first study of visitor experiences to be conducted in a protected area in the Canadian Arctic.

## Methods

Three phases were involved in this research: Phase I, a qualitative-interpretive research method to identify dimensions of how visitors interact with the park landscape; Phase II, a survey of visitors to assess the importance of the dimensions identified in Phase I and to establish what setting attributes might facilitate or hinder those experiences; and Phase III, development of indicators to assist management in monitoring and sustaining desired recreational experiences and settings.

Phase I data collection involved both telephone and in-person interviews in the field. In 2003, visitors were sampled by

telephone or in person. All interviews were tape-recorded and transcribed verbatim. Analysis of each interview was guided by an interpretive perspective. That is, rather than using a “content analysis” approach where occurrences of words or phrases were counted, an attempt was made to understand the meaning and significance of words, sentences and ideas from the participant’s point of view. The software program QSR NVivo Ver. 1.2 was used to facilitate the analysis of the interviews. Multiple stages of coding led to a final coding scheme that was used as a framework to summarize and represent the data. Results are summarized by Lachapelle and others (2004).

A major focus of Phase II of the research was to identify the importance of the various dimensions of a recreational experience in the park. While Phase I had identified the potential dimensionality of visitor experiences, the relative importance of these could only be determined by a quantitative approach. Phase II involved visitors to ANP completing a questionnaire during the deregistration component of their visit, which occurred shortly after their exit from the park. This phase sampled visitors during the summer 2004 season (July 1 to September 30). Respondents were asked to complete an onsite questionnaire along with their deregistration forms.

The methodology in Phases I and II involved six major steps:

*Step 1* (Phase I) involved identifying (“mapping”) the dimensions of how people interact with arctic landscapes. This step, presented in depth in our previous report (Lachapelle and others 2004), identified 11 experience dimensions and is shown in table 1 with representative “themes” or comments made by respondents.

In *Step 2*, we initially developed 45 individual statements designed to measure the importance of each of the 11 dimensions. We developed several statements for each dimension in order to eventually compile a scale measuring the importance of each of the dimensions. The statements were placed within the questionnaire.

In *Step 3*, similar to Glaspell and others (2003), respondents scored the importance of each of the statements on a 4-point scale from “Strongly Agree” to “Strongly Disagree.” Respondents could also indicate that the item was “Not Applicable.”

In *Step 4*, we conducted a principal components analysis followed by an orthogonal Varimax rotation to identify the underlying dimensionality of the experience statements included in the survey. In statistical terminology, we reduced the data to a set of underlying components, not all of which were the same as we identified in *Step 1*. Each of the components represents an empirically refined dimension of experiences achieved by the sampled population.

*Step 5* then involved creating scales, comprised of the appropriate statements from the questionnaire, for each of the dimensions identified from the principal components analysis. The resulting scale scores then demonstrate the importance of each of the experience dimensions.

In *Step 6*, we examined the relationship between individual experience dimensions and preferences for setting attributes.

Phase III of the project involved a workshop to develop a framework to identify indicators for future monitoring of visitor experiences. The workshop was approximately 2

**Table 1**—Major dimensions of the visitor experience at Auyuittuq National Park (source: Lachapelle and others 2004). The experience dimensions are listed in alphabetical order and are not intended to imply relationships or significance.

Experience dimension	Examples of this dimension
Adventure/challenge	<ul style="list-style-type: none"> <li>Personal growth/physical capability</li> <li>Negotiating river crossings/existing with polar bears</li> </ul>
Arctic setting	<ul style="list-style-type: none"> <li>Scale and quality of landscape</li> <li>Uniqueness of location</li> <li>Isolation</li> <li>Unusual light</li> </ul>
Culture	<ul style="list-style-type: none"> <li>Interaction in communities</li> <li>Local control over management</li> </ul>
Freedom	<ul style="list-style-type: none"> <li>Number of rules and regulations</li> <li>Hiking or camping restrictions</li> <li>Flexibility to change plans</li> </ul>
Humility/spirituality	<ul style="list-style-type: none"> <li>Connection to nature/reflection</li> <li>Recognizing forces of nature</li> </ul>
Learning	<ul style="list-style-type: none"> <li>About local culture</li> <li>About personal abilities</li> <li>About nature</li> <li>About backpacking/outdoor skills</li> </ul>
Naturalness	<ul style="list-style-type: none"> <li>Concerns of ecological impacts</li> <li>Lack of infrastructure</li> </ul>
Remoteness	<ul style="list-style-type: none"> <li>Need for self-reliance</li> <li>Hazards of inaccessibility</li> <li>Expectation of rescue</li> </ul>
Risk/Safety	<ul style="list-style-type: none"> <li>Issues of polar bears and river crossings</li> <li>Use of facilities/technology (sat. phones, SSB)</li> </ul>
Scenery	<ul style="list-style-type: none"> <li>Extensive landscape</li> <li>Wildlife viewing</li> <li>Scale of mountains</li> </ul>
Wildness	<ul style="list-style-type: none"> <li>Hostile/extreme environment</li> <li>No human presence</li> </ul>

days in length and involved 22 park managers, scientists, and others working interactively to identify appropriate indicators and tentative monitoring protocols. The data from Phases I and II were used to inform the selection of several potential indicators by workshop participants (see McCool and Lachapelle 2005 for description of the workshop).

## Results

In Phase I, a total of 33 interviews representing 76 visitors were conducted during the 2003 field season. While the majority of visitors interviewed were Canadian, other nationalities were also represented.

The data shows great diversity among visitors to ANP regarding their expectations, experiences, and meanings (table 1). Adventure, challenge, freedom, humility/spirituality, and learning emerged as dimensions of their experience. Whenever possible, the words of respondents were used to describe the dimensions of the experience (including the excerpted text below in quotation marks). Cultural issues and interacting with Inuit were described by some visitors as a major dimension of the trip. Visitors described the sense



of remoteness as part of the “allure” of coming to the park with the related dimension of risk and safety. While the degree of risk and safety described by visitors was variable, in general, individuals wanted to experience some aspect of risk while knowing that certain safety options (for example, radios, shelters) were available. Issues associated with polar bear encounters were a significant part of the experience for many visitors. Many visitors felt it “kept me on the edge” or felt “scared” of the “unknown” because hiking in polar bear country was a new experience. River crossings were described by many visitors as an experience involving great risk. Yet, the river crossings were also portrayed as an integral part of the experience leading to challenge and personal growth. There was great difference in the perception of encountering other parties by visitors with some feeling “reassured” by meeting other people, and others stating it was their “greatest fear.” Visitors also viewed the infrastructure in the park both positively and negatively. Most of the visitors felt that traditional Inuit activities should be able to occur both outside and within the park since the area “is their land.” In particular, many visitors felt that either knowing about or seeing hunting taking place in and around the park enhanced their experience and most felt that hunting was an integral part of life for Inuit and should therefore continue to be permitted.

Phase II involved visitors completing a questionnaire during the “deregistration” process, a requirement that all visitors return to the park visitor center to report at the end of their visit. More details on the methods and procedures are provided by Lachapelle and others (2005). A total of 121 visitors entered ANP during the summer; 84 (61.8 percent) were sampled. The vast majority of respondents in this phase were Canadian (88 percent); there were a few Americans (8.4 percent). The average age was 42 years. However, about 26 percent were 29 and younger. Males accounted for a slightly higher (57 percent) proportion than females (43 percent). Respondents were relatively well educated, with a substantial proportion (over 20 percent) holding advanced degrees. Most respondents had relatively little backpacking experience. About half of the respondents reported 10 or fewer previous backpacking trips in their lifetime. Finally, the vast majority (91.5 percent) of respondents were on their first visit to the park.

The average length of stay in the park was about 7 nights, but with substantial variation. Examining this figure suggests three groupings of lengths-of-stay: short, averaging about 2 nights; medium, averaging around 6 nights; and long, averaging about 14 nights. The average group size was 4.9 people, but there was substantial variability. Average group size varied significantly depending on length of stay and between commercial and independent groups, with commercial groups being larger. People on commercially guided trips averaged 9.8 nights, while private groups averaged 6.1 nights. Respondents participating in commercial groups tended to be older. People on longer trips generally saw more people, which is a natural consequence of being in the park longer. However, very few people encountered larger groups (eight or more members), although those that did were on shorter trips. This simply may be an artifact of the small sample size and a small, highly variable population.

To identify the importance of the experience dimensions, the 45 items measuring the 11 dimensions uncovered in

Phase I were subjected to a principal components analysis followed by an orthogonal (Varimax) rotation. An orthogonal rotation was selected over an oblique rotation because the dimensions were considered independent (for example, orthogonal rotations lead to easier interpretation of their content and meaning). The analysis identifies the components based on their contribution to the proportion of variance explained—thus the first few components explain a larger proportion of the variance than the latter components. The latter components are also more difficult to interpret. Twelve components were initially identified, but for simplification, we included only six as the basis for further analysis. We have also labeled each of the components with a name that is descriptive of the statements that load the highest on each component. The six components identified were named (1) freedom/serenity, (2) challenge/adventure, (3) arctic experience, (4) naturalness, (5) learning/appreciation, and (6) humility/spirituality. These components and relevant statistical data are shown in table 2.

For each of these six dimensions, a simple additive scale that identified the importance of the dimensions was constructed. Each scale was comprised of the questionnaire statements loading most heavily on the component and was computed by summing the questionnaire scores of the items and dividing by the number of statements on the scale. Thus, the resulting scale scores are shown on the original scale of “Strongly Agree” to “Strongly Disagree.” Table 2 shows the mean scores of respondents for each of the dimensions. More detailed descriptions of the statistical procedures are shown in Lachapelle and others (2005).

Overall, freedom/serenity received the highest total score, with four other dimensions only slightly lower. Spirituality was rated somewhat below these five and also had a significantly higher variability suggesting that respondents disagree on the importance of this dimension. The scores shown in this table then represent, on an overall basis, the importance of the six dimensions, and provide a basis for developing indicators to monitor. We note that the ratio of visitor sample size to number of items on the questionnaire was small, suggesting that additional data collection would be helpful to confirm these results; such collection was conducted in 2005 and 2006, but no results were available for this paper. Monitoring would help management assess whether visitors in the future are achieving these dimensions of an experience.

One question we addressed was: How might the importance of experiential dimensions vary, according to two variables (commercial-independent and length of stay) that are relevant to managers, in terms of specific management

**Table 2**—Importance of first six components (dimensions) of the experience (on a score of 1 to 4, with 4 being the highest), Auyuittuq National Park.

Dimension	Mean	Standard deviation
Serenity/freedom	3.38	0.56
Challenge/adventure	3.22	.83
Arctic experience	3.16	.69
Naturalness	3.16	.65
Learning/appreciation	3.14	.63
Spirituality	2.49	1.05



strategies? In tables 3 and 4, we report the mean scores for the experience dimensions by group type and length of stay. Visitors in different group types demonstrated similar average scores except for learning/appreciating nature and humility/spirituality. Visitors in commercial groups averaged slightly higher scores on the former and lower scores on the latter. Visitors staying longer averaged higher scores on most of the dimensions. Much of this difference occurred between visitors with very short visits and visitors with medium to longer visits. This data demonstrated relevancy to park managers, as it suggests that there are some dimensions that are important to all visitors, and others that are important to specific types of visitors.

Phase III of the project involved a 2-day workshop, which included managers, scientists, and local tourism officials. The workshop objective was to identify indicators using the data collected from Phases I and II, the manager's experience, and Parks Canada directives and policy.

Data from Phases I and II of the project, including that linking site attributes and attitudes toward management policy were presented to inform participants of the scientifically based data that would help inform the selection of indicators. In addition, recent Parks Canada initiatives (for example, Third Minister's Roundtable on Parks Canada, held February 20–23, 2005, Ottawa, Canada) for managing for "memorable experiences," social science research in other parks, and the conceptual background on indicators and their function, was presented. Following these presentations, Parks Canada managers made a decision that the six experiential dimensions presented in this paper would become

the dimensions for which they would manage recreational opportunities in the park.

The workshop then considered indicators for three aspects of managing recreation for the six dimensions: (1) attributes that facilitate or hinder attainment of experiences (for example, encounters at campsites); (2) outcomes or the experience itself (for example, attainment of solitude); and (3) threats (trends and driving forces that may influence on-site conditions, for example, aircraft overflights). Small group exercises were designed to interpret the data, identify potential indicators and draft monitoring protocols.

The workshop process first involved identifying a large range of potential indicators, then evaluating them using such criteria as quantifiability, reliability, feasibility, efficiency, relevancy, and appropriate scale (see, for example, Merigliano [1990] and National Park Service [1997] for criteria for judging potential indicators). This process reduced the range of potential indicators, resulting in a much smaller set, as shown in table 5. As a result of these discussions, the humility/spirituality dimension was recast as a humility/connection with nature dimension.

## Conclusions

The research reported here clearly demonstrates the multi-dimensionality of landscape interactions and meanings for those who visit Auyuittuq National Park. For recreationists, the experience is one that is triggered by the unique, spectacular and remote landscapes of the park, and is also characterized by adventure, freedom, naturalness, and

**Table 3**—Mean importance of different experience dimensions by type of group, Auyuittuq National Park, 2004<sup>a</sup>.

Experience dimension	Independent ( <i>n</i> = 56)	Commercial ( <i>n</i> = 21)	T-Test significance <sup>b</sup>
Serenity/freedom	3.38	3.37	>0.05
Arctic experience	3.15	3.16	>.05
Challenge/adventure	3.14	3.45	<.05
Naturalness	3.09	3.30	<.05
Learning/appreciation	3.05	3.33	<.05
Spirituality	2.63	2.14	<.05

<sup>a</sup>Measured on a 4-point scale, where 4 is the highest score.

<sup>b</sup>Significance is computed using a two-independent sample T-Test, corrected for finite population.

**Table 4**—Mean importance of different experience dimensions by length of stay, Auyuittuq National Park, 2004<sup>a</sup>.

Experience dimension	Short ( <i>n</i> = 25)	Medium ( <i>n</i> = 35)	Long ( <i>n</i> = 17)	Significance <sup>b</sup>
Serenity/freedom	3.25	3.48	3.32	0.282
Arctic experience	2.80	3.31	3.27	.009
Challenge/adventure	2.85	3.35	3.43	.030
Naturalness	3.30	3.03	3.19	.279
Learning/appreciation	2.84	3.29	3.30	.012
Spirituality	2.18	2.75	2.39	.109

<sup>a</sup>Measured on a 4 point scale, where 4 is the highest score.

<sup>b</sup>Significance is computed using Analysis of Variance. Column shows the significance level of the computed F statistics.

**Table 5**—Examples of indicators of various dimensions of arctic recreational experiences identified at workshop.

Experience dimensions	Example indicators/measures
Arctic experience	Encounters with others, physical developments, quality of pre-trip information, visitor perceptions of experience—including interacting with Inuit, sighting Arctic-specific wildlife, sense of isolation and others
Challenge/adventure	Encounters with others, self-report of amount of physical and emotional challenge experienced
Freedom/serenity	Self-report on how much freedom was experienced and feelings of constraints by park rules and regulations
Naturalness	Quality of pre-trip information, physical developments, evidence of visitor impacts along trails
Learning/appreciation	Opportunities to learn about Inuit cultural ties to the park, opportunities to learn about the natural history of the park, length of stay in neighboring communities
Humility/connection with nature	Summative scale of survey items dealing with realization of place in nature/humility, visitor responses to specific items on a questionnaire dealing with this dimension

wildness—dimensions often identified by visitors studied in other wilderness research. It is clear from the results that the park serves as a setting for recreational experiences not found in many other environments in the world. In that sense, these experiences may themselves be somewhat fragile and thus onsite factors, such as the presence of developed infrastructure, particularly park warden cabins, bridges, and emergency shelters and caches, must be carefully considered. The level of visitation, while not a major concern at this time, is also a factor that must be continually monitored.

While Phase II of the research confirmed in part the dimensions identified in Phase I, several slightly different dimensions were uncovered. The research shows that visitors to Auyuittuq National Park value it for its ability to facilitate learning and appreciating nature, adventure and challenge, freedom and serenity, spirituality and naturalness. Also important is the notion of an “arctic experience,” a dimension that was uncovered in previous research in the Gates of the Arctic National Park in Alaska (Glaspell and others 2003). While many of the dimensions uncovered here are similar to recreationists’ experiences in other wildernesses and backcountry settings, this particular dimension is unique to arctic environments. Parks Canada has now committed to an ongoing visitor experience research and monitoring program, in a sense a Phase IV of the research. This research and monitoring is designed to identify any changes in experiences sought and to assess whether the opportunities afforded for these experiences are changing.

A strong point of this project was the logic flow (mapping the dimensions, measuring them, developing indicators) of the three-phase approach and consequent linkage directly to the information needs and managerial regime of the administering agency. The output of the research—indicators—was identified at the beginning of this three-phased project, and all research and activity was designed to achieve that goal. We found that this logic flow provided for a comprehensive and holistic approach toward understanding the various dimensions of recreational experiences, focused research and management effort on salient dimensions of wilderness, and was efficient in terms of providing needed information to park management personnel.

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# Advocating for Antarctic Wilderness: Short-term Visits and Human Values

Patrick T. Maher

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**Abstract**—This research examined the nature of experience for visitors to the Ross Sea Region (RSR) of Antarctica. By monitoring visitors before, during, and after their onsite visit, using a mixed methodology approach, several interesting themes have arisen. In terms of advocacy, are we preaching to the converted? Is advocacy the awareness or the action? How do we adequately measure such aspects? Do we mean action or intent? Are we looking for action in an Antarctic sense or more generally? While presenting the visitor situation in the RSR and the context of this study, these questions are a few posed and discussed within related literature.

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## Introduction

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Tourism and leisure in remote locations is sometimes seen as a valuable commodity, not only in terms of economic benefits, but also due to the expectation that these visitors become advocates for that environment or setting. One area where this is particularly noted is Antarctica; experience and learning are on offer as tour operators “show [Antarctica] to people who go on to be advocates for protecting Antarctica” (Rodney Russ, as quoted by Janes 2003: D3).

Exploratory findings indicate that perhaps the case is not as one might hypothesize. One feature of the experience, seems to be highly weighted towards personal growth, a reflection on home, and a “Gee, if I can get to Antarctica, then I can do anything” mentality. Although in complete awe of Antarctica’s landscape and wildlife, visitor advocacy appears to be towards Antarctica just being there, and not necessarily being closed off for preservation. Finally, an appreciation for the past (exploration) and the present (science) seems to evolve. With the majority of research into visitation emphasizing the impact on the environment, host societies and/or the economy, a better understanding of the subtleties of the experience and its impact on the visitor plays an increasingly critical role for sound management.

## Antarctica: The Ross Sea Region

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Antarctica and the surrounding ocean cover millions of km<sup>2</sup>, the continent alone is 14 million km<sup>2</sup> (5,405,430 miles<sup>2</sup>)

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In: Watson, Alan; Sproull, Janet; Dean, Liese, comps. 2007. Science and stewardship to protect and sustain wilderness values: eighth World Wilderness Congress symposium: September 30–October 6, 2005; Anchorage, AK. Proceedings RMRS-P-49. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

or the size of the United States and Mexico combined (Cessford 1997). As described in numerous sources, Antarctica is a continent of superlatives: the coldest, the windiest, the highest, and the most remote continent, but also surrounded by the stormiest ocean.

To conduct research on this type of geographical scale would have been far beyond the boundaries of this project, so the work was contained within the Ross Sea Region (RSR). The standard physical boundaries for the RSR, as defined by Huston and Waterhouse (2002), are shown in figure 1. This is essentially a section of a pie from the South Pole to 60°S, bounded by approximately 150°E and 150°W. The region is historically claimed by New Zealand as the Ross Dependency, and is the “far side” of the continent from the Antarctic Peninsula that continues south from South America. In the past, eight expeditions were active in the region during the Heroic Era of exploration (1895–1917), leaving behind huts and a legacy of the “race” to the South Pole. Today the national programs of Italy, New Zealand, and the United States share responsibility for organizing and conducting the majority of science activities in the region.

## Visitors

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The working definition used in this research was to define visitors as those who come into physical contact with the continent (inclusive of Ross Island), but also whose primary activity and purpose is simply “being there,” in other words, experiencing the continent or understanding the work that occurs. These visitors may be visiting for their own leisure motivations, as is the case with commercial tourists, or visiting for the greater society, as is the case with media and government officials.

Technically, everyone in Antarctica is a visitor, as there is no indigenous population. However, visitors are typically equated with tourists, “visitors who are not affiliated in an official capacity with an established National Antarctic program. They include both fare-paying passengers...and private expedition members and adventurers aboard seaborne vessels or aircraft” (Enzenbacher 1993: 142). Different organizations and researchers define the term “tourist” according to their own criteria and agenda, and even among the recognized tourist population aboard ships, Zehnders (1990) prefers to call their company’s passengers “travelers” because of their philosophical values and sophistication.

As on the Antarctic Peninsula, the main source of visitors to the RSR is through commercial tourism. A total of 13,263 ship borne tourists landed in Antarctica during the 2002/2003 season (IAATO 2006). The difference in numbers between the Ross Sea Region and the Antarctic Peninsula is dramatic and illustrated by the fact that of these 13,263 ship borne tourists, only 314 traveled to the Ross Sea Region

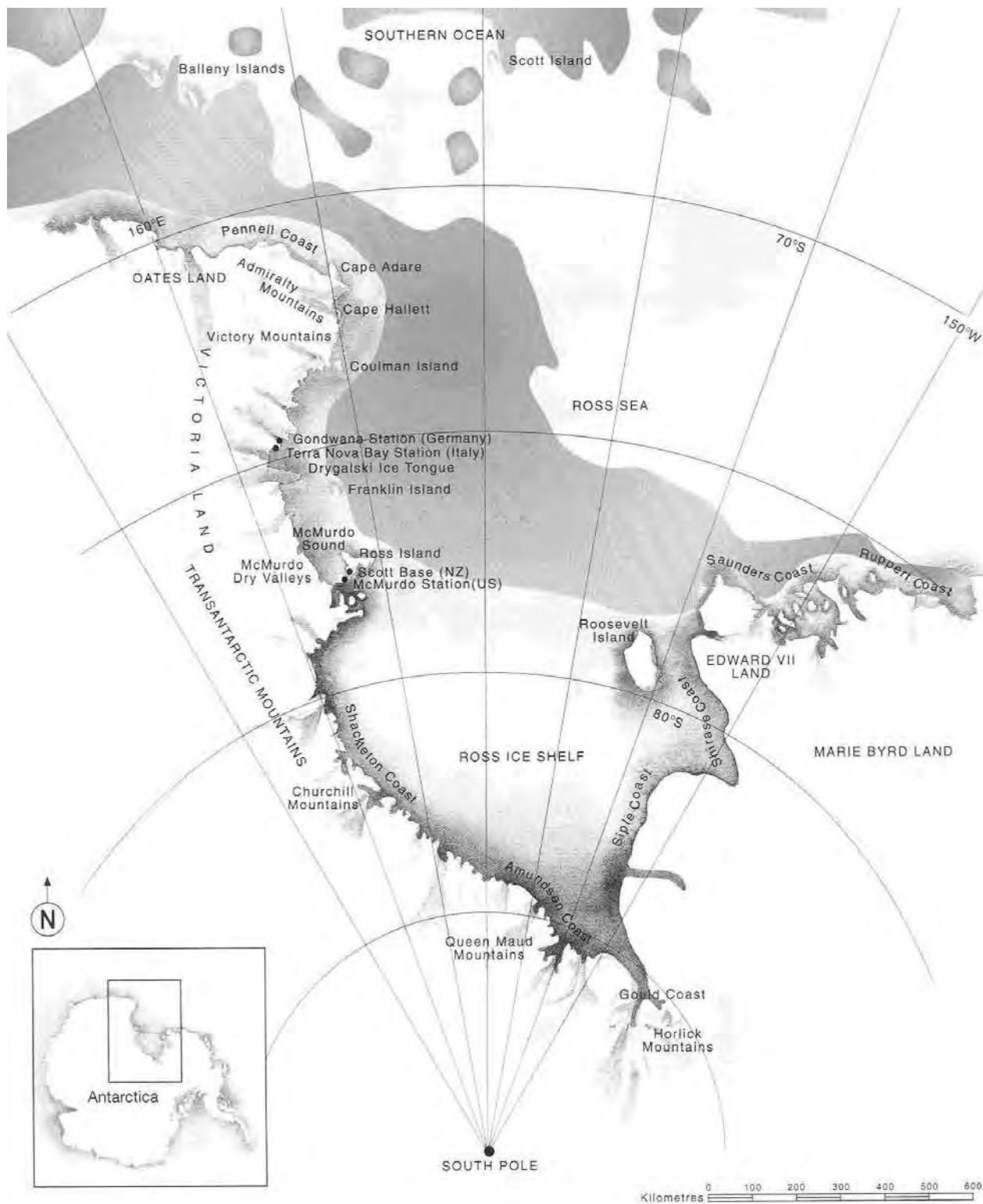


Figure 1—The Ross Sea Region (source: Huston & Waterhouse 2002: 2).

(IAATO 2006). In the RSR, “non-tourist” visitors arrive in small numbers through the artists, writers, media, and education programs offered by the national Antarctic programs of New Zealand and the United States. There are also invited, influential guests and an even smaller number of yachts and adventurers who visit the RSR on occasion. A profile of visitors who participated in the initial anticipation survey of this research is as follows:

- Total visitors, 87, spread proportionally among four groups, dependent on actual starting size; in other words, where one company had 250 participants, and another had only 20, their relative numbers in the total is proportional.
- Mean age, 54, spread between 21 and 75.
- Slightly more female respondents.
- Very well educated—82 percent had completed tertiary degrees, with 43 percent having a graduate degree.
- Varied occupations, but many professionals or retired.
- Mean income NZ \$116,447—spread predominantly by group based on facts such as retired professionals tended to travel with the commercial tour operators, while students were with the educational provider.
- Some visitors were very well traveled, others with no experience in cold or remote regions—for one it was the first time they had ever been “overseas.”
- Little previous Antarctic experience.
- Fifty-one percent from New Zealand—skewed because of the two NZ specific programs involved.
- Seventy-two percent stayed more than 21 days—based largely on the logistics of the travel to and from the RSR.

Using the term “visitor” to include those traveling to the RSR for the purposes of education or work and for reasons not related to Antarctic science or logistics was considered appropriate following past discussion (see Bauer 2001; Enzenbacher 1993; Maher and others 2003). The term “visitor,” as is used here, excludes all personnel carrying out nationally sponsored scientific research, or those providing logistical support for such research. It also excludes those individuals on over-flights, a group typically deemed to be tourists, but who never touch down on the continent and, as such, have an undefined impact on the physical environment.

This research has chosen to use the term “visitor,” as the overarching purpose of the project was examining experience and the potential of benefits arising from such experience. As expanded upon by Davis (1995: 3), “the use of the word ‘visitor’ rather than ‘tourist’ reflects [a] distinction... although tourists are included under the heading of visitors [in some definitions], the term ‘tourist’ is common in Antarctic literature. It is rejected here because it carries with it the economic implications of the tourist industry instead of the considerations of conservation.” The real concern for Davis (1995: 47) is “to ensure that visitors, tour operators, and staff understand and respect [Antarctica’s] wilderness values.” Using the arguments of Davis (1995) to further justify use of the term “visitor,” is done so because it is potentially more appropriate to place this work alongside research regarding wilderness management than the “business” of tourism.

## Study Approach: Theory and Methodology

In reviewing Antarctic tourism literature, Mason and Legg (1999: 81) noted several topic areas that need to be addressed, one of these being “the quality of the tourist experience.” This need is also echoed in the writing of other Antarctic tourism researchers (see Davis 1995; Tracey 2001), yet examination of experience has still been limited. Hemmings and Roura (2003) recently stated that tourism is becoming a blurry subject and thus the experience is becoming further diversified, but still, what is this experience? Primarily, studies that have given attention to tourists’ experiences in Antarctica have reported their experience as summary motivations, image or satisfaction while already onsite; either at the beginning and/or end of the tourist’s voyage (see Bauer 2001; Cessford and Dingwall 1996).

Previous studies have also been primarily focused on issues relating to visitor management or documentation (Davis 1995; Enzenbacher 1995; Tracey 2001), with only two of these having empirically examined the social psychological side of the tourist, as somewhat of a tangent to their primary research (see Davis 1995; Enzenbacher 1995). Regardless of how many studies have examined parts of the experience, none have fully conceptualized visitors’ responses in combination with how they envisioned the trip or behaved while there, and thus have done little to touch upon the visitor’s advocacy, or potential advocacy, despite the wide-ranging anecdotal discussion on such subjects.

With experience painted in a “broad” brush stroke, Tracey’s (2001: 380) work sums up the situation:

The visitor must form a primary consideration in any system. Tourists represent an important group of the global public for whose good the resource is being managed, and, in the absence of direct mechanisms for public consultation in ATS matters, the rights and interests of tourism users should be taken into account. Ignoring the desires of tourists when developing a system could lead to provisions that are unrealistic or unworkable, and to a greater potential for non-compliance. Visitors also influence decision makers. A good understanding of the visitor experience and visitor motivations can provide an indication of demand, and help forecasting change.

The links between studying wilderness and wilderness values in Antarctica are also well documented (see Cessford 1997; Dingwall 1997; Summerson and Riddle 2000). Elaborating on the messages of early wilderness writers, McDonough and Braungart (2002: 34) believe “wild spaces are sacred, and even infrequent pilgrimages to see them can inspire a sense of wonder and a reverence for life.” Amy (2002: 167) continues by saying that “extreme landscape is able to flush out memories and then activate them within us to the point of letting them influence our experiences.” Figure 2 is a picture literally worth a thousand words, as much discussion of this life-changing experience has been expressed as shown by the cartoon.

Previous studies of the leisure and tourism experience have argued that the experience should not be considered as one-dimensional, but a multi-phase entity. Specifically,



**Figure 2**—The visitors' experience? (Source: New Zealand Antarctic Society 2003.) (Printed with permission; Bizarro by Dan Piraro © 1997.)

that experience 'onsite' interacts with many pre-visit (anticipation) and post-visit (recollection) factors. Potentially advancing the work of Driver and Tocher (1979) as well as Clawson and Knetsch (1966), Beedie and Hudson's (2003) model of adventure tourism in mountain locations conceptualized 'extraordinary experience.' Although not empirically tested, this model describes a continuum of recreational experience based on how mountains may act as a 'special place away from home' with a series of transitions. Aspects

of this model include the taking in of an urban 'frame,' which would include worrying, preparation and assessing the risk, and leaving with a mountain 'frame' filled with celebration, reflection, relaxation, and consolidation.

Arnould and Price (1993) also use the terminology "extraordinary experience" to describe a newness of perception and process gained from recreational experiences. In defining extraordinary experience, Arnould and Price (1993) advocate that the experience gained by a participant



must be triggered by unusual events and does not necessarily have to imply superior levels of effort. Abrahams (1986) recognizes that experiences, no matter how extraordinary, are in fact made up of a number of ordinary acts, and perhaps through the discipline of anthropology needs to look at the way they coexist.

While several authors have presented a five-phase model (Arnould and Price 1993; Clawson and Knetsch 1966; Fridgen 1984), a three-phase model has been alluded to by Bauer (2001). Bauer's (2001) model is in an Antarctic context, incorporating travel to and from the site with the onsite phase. Three phases would be congruent with Beedie and Hudson's (2003) model and as Driver and Tocher's (1979) research involves a continuum, any number of phases could be present.

A three-part methodology was thus used to examine a cycle of experience, comparing groups of visitors through this cycle, and analyzing change or transition as a result (see Maher 2004, 2005a). This research examined particular phases of the experience: (1) anticipation of the visit, (2) onsite during the visit, and (3) upon return home after the visit. Using the definition of visitor presented earlier, those included in the research were commercial tourists, as well as media, artists and writers, distinguished government and industry leaders, and those visiting through educational programs. Four organizations (two ship-based tour operators, one national Antarctic Program, and one tertiary education provider) assisted with their visitors' voluntary participation and with a number of data gathering methods during the 2002/2003 season. Methods included: (1) self-administered surveys sent to the respondent's home (up to 3 months in advance of the trip); (2) writing personal narratives or journals while on the trip (regardless of trip length: 4 to 28 days); (3) in-depth interviews held directly before and/or after the trip when possible; and (4) email-surveys post-visit (2 to 3 months after). In the 2003/2004 season, supplemental data were also collected, which included a familiarization trip to New Zealand's Scott Base and subsequent participant observation, and informal interviews held there.

## Values—Before, During, and After

While the preceding sections have outlined the context and approaches used in this research, discussion of values will now focus on the research results. Keeping in mind the visitors and the RSR, what significant data have been uncovered? What do visitors have to say with regards to their experience and the possibility for advocacy?

To complete the baseline picture of visitors it is important to note that in terms of conservation or environmental membership, attributes typically linked to advocacy, 76 percent of respondents had no such membership prior to their visit.

Motivations for undertaking the visit were highly focused on such aspects as the scenery, remoteness, and wildlife, but also on the opportunities for education, dreams, and adventure. Mood appears to ebb and flow throughout the experience, but is generally positive. Any negative comments, dealing with misery or frustration are always clarified as relating to uncomfortable airforce plane seats or the numerous days at sea.

In relation to visitation, 72 percent of respondents believed it both harms and supports the continent, with 64 percent of these believing that the support for Antarctica outweighs any negative impacts.

*Increasing people's awareness through personal experience is an effective way to promote knowledge and enhance people's conservation values.*

*If personnel (tourists) are adequately educated prior and during their trip to Antarctica (re: conservation, how to act around wildlife etc), tourism can be very beneficial and promotes important issues, (re: Antarctica and conservation).*

*The more people who experience the Antarctic, the more people will appreciate its uniqueness and will want to ensure it remains as unspoiled as possible.*

Throughout the anticipation surveys, there is a noticeable critical awareness of issues related to the RSR and Antarctica, in general. This is likely a result of the fact that going to this location has been a life-long dream in many cases, and so visitors' reading and research has been extensive.

Once in the RSR, it appears that the experience is always a whirlwind of thoughts and emotions. These are the experiences that the operators and organizations design them to be, and the ones that statements about advocacy are thus based on.

*Arriving in Antarctica, I am jumping up and down with excitement.*

*My first impression of Antarctica—wonder, awe. So much beauty and so clear—a magic day. Unbelievable.*

*... unforgettable. ... could spend the rest of my life trying to reproduce that feeling. The vastness was astonishing. ... I had an immediate feeling of elation and delight.*

*It has been a wonderful 4 weeks. Experiences that are not captured on film and will be hard to describe.*

*On reflection, I can honestly say that my 17 days there have been perhaps the most enjoyable of my life. ... I think if the experience has changed me in any way it has given me a more "just do it" attitude...*

*I think of the Antarctic Explorers who braved the coldest, windiest place on earth for months at a time, without the relief of a warm room, or even dry clothes, at the end of the day.*

*... It was wonderful to have participated—most of all to push the boundaries of our comfort zone. Yes it was scary on several occasions. As a learning experience this one must be rated ten out of ten.*

*Overall though, I have felt pretty humble over the past few days as I realize just how lucky I am to be here and see this continent... Now that I am here, I want to see everything...*

*Antarctica strikes me as not much different than anywhere we live. It's up to you to get out and experience it.*

*... It was a fantastic trip, packed with memorable moments - the trip of a lifetime and probably a life-changing event for me.*

*The trip has been the fulfilment of a long and dearly held dream. ... The reality was all I had hoped for and much much more.*

These types of quotes again represent the positive mood of the respondents, but they also continue to reveal a critical awareness of the issues: (1) what the media does or does not show; (2) how the RSR is one place in Antarctica and the whole vast continent cannot be seen as uniform; (3) how the national science programs interact with tourists; and (4) how science and tourism has blurry lines.

All respondents in the recollection phase (53) indicated they had or would share their experiences. This ranged from showing photos to friends and family, speaking engagements, and for some, curriculum development and conferences (94 percent had their expectations at least met, more likely far exceeded).

For the level of membership in conservation and environmental groups, 77 percent of those who had been a member were no more active now, and 86 percent of those who had not been a member were still not a member. In terms of visitation and its effects, 58 percent of visitors thought visitation both supported and harmed the environment, with only 6 percent believing it solely harmed. Of those who thought both, upon clarification 81 percent felt that the benefits still outweighed the impacts.

Are they now an ambassador for the Antarctic? Eighty percent believed they were able to be given such a label as a result of the visit, however, there was very little intention to change behavior (both generally and Antarctic related) due to the trip. In conclusion, most visitors were still quite critical and passionate of how important their experience has been or where the need for the public to discover the Antarctic hands-on, fits with science and preservation.

*It has already given me a new lease on life, sparked some ideas for new dreams. The long-term benefits to me personally are incalculable.*

*I have many new experiences to draw on over the rest of my life for inspiration in my art. The time out from normal life has allowed me to be more continuously creative.*

*The whole experience was just one huge fabulous perfect reward for the rest of my life. I'll be able to cast my mind back to a thousand tiny incidents and smile and feel completely happy.*

*A bit tired and emotional. The whole experience. . . seems surreal.*

*Feel like this visit is a unique chunk out of/not part of my usual life—a little unreal/bizarre. . . Scale of the place. . .*

## Conclusions

In examining the conceptualization of visitor experience in the RSR, this research has not only addressed a research gap, but is also laying important groundwork for future projects. A hierarchical analysis of experience should, upon further analysis, provide indication as to whether benefits could exist as a result of a visit. In much of the literature on ecotourism and Antarctic tourism, the terms “ambassadorship” or “conservation benefit” are used to justify such tourism and are anecdotally viewed to be empirical results of a visit.

Orams (1997) states that educational psychology points toward the difficulties in changing human behavior especially

in such a short time frame as an Antarctic visit (sometimes as short as 4 days). However, Suedfeld (1987) states that even a short exposure can provide change following an “extreme experience.” The “extreme experience” is usually confined to traumatic events inserted into an everyday environment, but there is reason to believe that extreme and unusual environments can have the same effects (Suedfeld 1987). The RSR is perhaps as far removed and different from most people’s everyday life as is possible.

As the final stage of an experience, continued recollection could also be that first step towards ambassadorship (see Maher 2005b). This process of recollection, perhaps leading to ambassadorship, is best described in experiential education literature: (1) Step one is the concrete experience, whereby an individual has done something, such as completing a task; (2) Step two is when the individual reflects on what has occurred; (3) Step three is where an individual generalizes or thinks about the possibility of a number of outcomes from the experience; and finally (4) Step four is testing those outcomes (Kolb 1984.) As discussed by Sugerman and others (2000), any change resulting from experiences requires various stratified review and reflection. In an article on auto-ethnography as a research tool, Straker (2004: 57) reflects on her Antarctic journeys, “my journeys to Antarctica have been an adventure, not just because of its special nature but because of the reflections and dreams it has stimulated. It heightens emotions, widens horizons, and even sitting here writing about the place I feel a glow, a tingling in the cheeks, and inner smile.”

The concept of “ambassadorship” is the product of many Antarctic writers and tour operators (see Kershaw 1998; Thomas 1994). A benefit of tourism is “the promotion of environmental conservation deriving from the tourists’ enhanced appreciation of conservation values and regional conservation needs” (Dingwall 1995: 90). Tour operators go to the Antarctic because they love the place, they love to share it, and they know that it has to be looked after (Wikander 2002). According to Antarctica New Zealand’s (1998) preparation video, “Antarctica is the last great wilderness and the world’s most pristine environment. . . all who visit have a responsibility to help keep it this way . . . wilderness/aesthetic values” and as stated by Landau (2002: 35), this is consistent with the philosophy of Antarctic tourism pioneer Lars-Eric Lindblad, “you can’t protect what you don’t know.”

According to the International Association of Antarctica Tour Operators (IAATO), they are “creating ambassadors to the last great continent” (Denise Landau, personal communication, 4/29/2004) and these are the type of benefits discussed by Marsh (2000), who mentions IAATO’s claim to creating a “corps” of ambassadors. Interestingly, Bauer (1997: 183) contends, “tourists themselves do not see themselves as ambassadors, but that other groups, in particular tour operators, like to attach this label to them, perhaps to justify their own actions.” This quote is directly in opposition to some of Bauer’s earlier arguments (see Bauer and Diggins 1994), and the data found in this research.

In the end, perhaps it is best summed up as:

We can only hope that the Antarctic will remain a continent with no political barriers; a place where the ordinary individual still has the right to see and experience; where all people, be they tourists, sailors or administrators, in comprehending

the magnitude of the Antarctic, will continue to safeguard its wilderness (Poncet and others 1992: no page number).

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# Studying Boat-Based Bear Viewing: Methodological Challenges and Solutions

Sarah Elmeligi

**Abstract**—Wildlife viewing, a growing industry throughout North America, holds much potential for increased revenue and public awareness regarding species conservation. In Alaska and British Columbia, grizzly bear (*Ursus arctos*) viewing is becoming more popular, attracting tourists from around the world. Viewing is typically done from a land-based observation platform that forces tourists into a centralized location. Studies addressing the impacts of tourism on grizzly bear population fitness have based data collection from similar platforms or towers that overlook the entire viewing area. In larger study areas, this may not be possible. In the K'tzim-a-deen Valley, all viewing is done from boats, thus changing the dynamics of tourism. The impacts of boat-based tourism are likely different than those of land-based tourism; therefore, this research attempted to quantify the former so that the two can be compared. Data collection that focused on grizzly bear behavior was accomplished from a small boat. With this new methodological approach different challenges arose that required innovative solutions in the field. This paper outlines a new boat-based methodology and its associated challenges, for studying the impacts of boat-based viewing on grizzly bears.

## Introduction

In parts of southern Alaska and western British Columbia, grizzly bear (*Ursus arctos*) viewing is an increasing form of tourism (Nevin and others 2001). Wildlife viewing can impact grizzly bears in the short-term at the individual level, and in the long-term at the population level, as impacts become cumulative (Green and Geise 2004). Potential short-term impacts resulting from increased human presence in grizzly bear habitat include habituation of individuals (Government of British Columbia 1993; Nevin and others 2001; Swenson 1999), habitat displacement (Gibeau and others 2002; Nevin and Gilbert 2005; Olson and others 1997), and adjustments in behavioral patterns (Klinka and Reimchen 2002; Naves and others 2001; Reimchen 1998; Smith 2002). Regardless of what the exact impacts and their intensities are in a particular area, population reproductive rates can be negatively impacted over the long-term (Smith 2002).

Visual effects such as habitat displacement or a decrease in foraging rate are relatively easy to record (Gauthier 1993),

and results are usually extrapolated to the population level for management implications (Chi and Gilbert 1999; Dyck and Baydack 2004). Using focal animal sampling, scan sampling, or a combination of the two (Altmann 1974) time budgets that compare a bear's behavior with and without disturbance can be created to quantify behavioral alterations (Chi and Gilbert 1999; Himmer 1996; Nevin and Gilbert 2005; Olson and others 1997; Smith 2002; Smith and Partridge 2004). Because no significant differences between the results of scan and focal animal sampling have been found (Nevin and Gilbert 2005), the approach chosen will depend upon the specific attributes of a location, species distribution, and duration of behaviors.

Previous studies addressing the impacts of tourism viewing on grizzly bear behavior have used a viewing platform or research tower for data collection (Fagen and Fagen 1994; Nevin and Gilbert 2005; Olson and Gilbert 1994; Olson and others 1997). Unlike land based viewing, tourists in boats can easily follow bears up or down stream; bears cannot, therefore, moderate their interactions with humans. Studies investigating water based viewing have focused on the K'tzim-a-deen Grizzly Bear Sanctuary (hereafter K'tzim-a-deen Sanctuary) and have not found a significant impact of boat tourism on grizzly bear behavior (Himmer 1996; Pitts 2001). Although the Sanctuary itself falls under the jurisdiction of British Columbia's Ministry of the Environment (MOE), the inlet outside of Sanctuary boundaries is unprotected, and facing increasing levels of tourism. Since negotiations are currently underway to extend the boundary, research was required to investigate potential impacts of tourism along the inlet's shores.

Due to the size and topography of the research area, this study used a small boat for data collection. The use of a mobile research station substantially altered the methodological approach, resulting in several unique challenges as yet unexplored in the literature. The purpose of this manuscript is to discuss these challenges and resulting solutions that were put into place during the 2005 field season. The research conducted is unique and innovative in that it is the first study in Canada to assess the potential impacts of unregulated water-based wildlife viewing activities on grizzly bears outside of protected area boundaries.

## Methods

### Study Area

The K'tzim-a-deen River valley is approximately 376 km<sup>2</sup> (145 square miles), located 45 km (28 miles) northeast of Prince Rupert, British Columbia, Canada (longitude: 129-56-8, latitude 54-36-28). The K'tzim-a-deen Sanctuary, co-managed between MOE and the Tsimshian First Nations,

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covers 445 km<sup>2</sup> (172 square miles) (Government of British Columbia 1993). This area has been designated a class “A” provincial park with the primary purpose of protecting grizzly bears and their habitat; all human use takes secondary priority (Government of British Columbia 1994). The sanctuary itself is located at the end of a 25 km (16 miles) long inlet and is only accessible by boat, floatplane, or helicopter (Government of British Columbia 1993). This study focused on the inlet, which meanders and undulates to the estuary, and is on average approximately 700 m (766 yards) wide.

The K'tzim-a-deen Sanctuary is home to an estimated 50 individual grizzly bears (MacHutchon and others 1992) that move down to the valley bottom to forage on Lyngbye's sedge (*Carex lyngbyei*) and skunk cabbage (*Lynsichiton americanum*) from mid-April to early-July (MacHutchon and others 1992). The high protein content and abundance of this vegetation makes this area critical grizzly bear habitat (Government of British Columbia 1993).

Due to the concentration of grizzlies along the inlet and estuary and their high degree of visibility, this time of year is also ideal for wildlife viewing activities (Government of British Columbia 1993). Since 1987, two principal operators have been conducting viewing tours within the K'tzim-a-deen Sanctuary's boundaries, but there are an additional three operators conducting tours in the inlet. Although tourism to the K'tzim-a-deen Sanctuary has increased by 42 percent since 1995 (Jamie Hahn, K'tzim-a-deen Area Supervisor, MOE, personal communication, September 2004), no data currently exist for areas beyond the boundary. With Prince Rupert being designated a port of call for cruise ships (bringing 94,206 passengers from May 2005 to September 2005), and the increased media coverage regarding wildlife viewing in BC, day trips from Prince Rupert to the K'tzim-a-deen inlet are becoming more popular.

## Methodological Approach

Data collection, which coincided with peak tourist season, took place from May 7 to July 31, 2005 and focused on the actions and reactions of grizzly bears. For the months of May and June, data were collected nearly everyday, and always on days when cruise ships docked in Prince Rupert. By mid-July, tourism decreased substantially as did the number of bears frequenting the inlet. For these reasons, data were only collected for the first 2 weeks and the last week of July. The day was divided into three data collection segments: morning (0730 hrs–1130 hrs), afternoon (1200 hrs–1700 hrs), and evening (1800 hrs–2200 hrs), two of which were investigated each day. Research was always conducted during the afternoon timeframe, as that was when tour boats were most likely to be active in the area. Morning and evening data collection times were alternated every 2 days to ensure that a roughly equal amount of data were gathered from each of these timeframes. Control data were collected when no boats were in the inlet, typically during the early evening.

**Boat-Based Research.** Due to its meandering shape and length of over 20 km (12 miles), there is no one location that provides a complete view of the K'tzim-a-deen Inlet. Foraging areas frequented by grizzly bears are interspersed along the entire length of the inlet. At most, a researcher could

view three of these areas at one time, but there are over ten regularly used foraging areas. Therefore, using a land-based observation platform that would limit the researcher's view of the area would drastically affect sample size. In addition, the logistics required for research tower construction in a rugged rainforest where no other land-based structures exist were prohibitive. The purpose of this research was to investigate interactions between tourist vessels and bears, thus it was imperative to have the same mobility as tourists who often followed bears from one foraging area to another. For these reasons, data were collected from a 4.2 m (14 ft) aluminum skiff with a 4-stroke engine (fig. 1).

**Bear Behavior.** Focal animal sampling, recording the time of behavioral transitions and the behavior before and after (Altmann 1974), was used for data collection. All observations were made with a pair of 8x36 Bushnell Image Stabilizing binoculars. At the start of each data collection session, the researchers cruised the inlet until a bear was spotted. Data collection commenced as soon as the researchers could distinguish the bear's activity (~600 m [656 yards] away), and continued until 30 to 45 minutes after the bear became unobservable; this ensured that the bear had left the foraging area and was not merely hidden. In the event that a bear commenced traveling along the shores of the inlet, the research vessel attempted to follow it while maintaining a maximum distance that did not compromise data collection.

For each bear observation a variety of information regarding weather, wind, temperature, inlet section, and bear identification was recorded. Although previous literature has used urination pattern, and direct observation of genitals to distinguish sex (Klinka and Reimchen 2002; Nevin and Gilbert 2005), this approach was rarely viable in the K'tzim-a-deen. Instead, bear sex was mainly determined based on relations to conspecifics during the mating season, and the presence of cubs. If sex was uncertain, it was clearly marked as such. For females with cubs, the number of cubs and their ages were recorded, even though all behavioral observations were based upon the female's activity. Bear age, whether subadult or mature adult, was determined based on the presence of cubs (mature female), or size. Bears that were traveling solo, and estimated to be larger than 250 kg (551 lbs) were classified as adult, and bears that were smaller but alone were classified as subadult (fig. 2) (Klinka and Reimchen 2002). Individual identification of bears was attempted based on prominent markings, reproductive status, and scarring. All bears were recorded with a Canon digital video camera with 100x zoom to assist with individual recognition. In addition, a detailed description of each bear, including diagrams, was included in field notes. Bear behavior was assigned based on generated behavior codes (table 1), which were independent of each other (that is a bear could only be classified as doing one behavior). Bear distance from the researcher, and distance to cover was measured using a Bushnell alignment adjusting range finder, which was most efficient at distances of less than 400 m (437 yards). Bearing from the researcher to the bear was taken with a standard compass.

**Boat and Tourist Behavior.** For all boats involved in data collection, the vessel name, approximate boat size, and style was recorded on the data sheet. Boat and tourist behavior were classified in a similar way as bear behavior





**Figure 1**—Data was typically collected approximately 300-400m from shore with the use of image stabilizing binoculars (photo by Kim McLean).



**Figure 2**—Cataloging and identifying individual bears was done at closer distance (<50m). This subadult was observed in the Khutzeymateen estuary in mid-June 2005 (photo by Sarah Elmeligi).



**Table 1**—Behavior codes for bear behavior.

Course	Fine	Description
00 Unobservable		Known to be present but not visible
1 locomotion <sup>a</sup>	10 stop	Cease movement
	11 walking	Normal gait
	12 running	Gallop or sprint
	13 slow run	Trot or jog
	14 standing	On all four feet
	15 sitting	On haunches
	16 lying down	Prostrate
	17 swimming	Note direction on data sheet
2 vigilance	21 watch	Passive scan of area
	23 stare	Focus on one point, ears forward
	24 head shake	Lateral head movement in medial plane
	25 standing investigative	On hind legs
3 foraging	31 herbivory	Grazing herbaceous forage
	32 carnivory	Foraging on non-herbaceous species
	33 intertidal	Foraging in intertidal area
	34 unknown	Foraging on unknown food source
4 social	42 social, non-agonistic	Amicable physical contact
	44 non-aggressive vocalization	Towards person or bear
	45 female attention	Female waiting for/going to/looking at cubs
99 other	Specify in comments section	

<sup>a</sup> Adapted from Fagen and Fagen (1994) and Nevin and Gilbert (2005).

(table 2). Although no similar codes in the literature have attempted to quantify boat behavior in such detail, other works have identified important factors to consider such as the navigation and speed of the vessel (Lusseau and Higgam 2004), and the distance of the vessel to the animal (Galicia and Baldassarre 1997; Rodgers and Schwikert 2002). Noise level of both the boats and the tourists within them were also accounted for. The range finder was used to determine the distance between the research boat and the tourist boat and a standard compass used to determine bearing. Through statistical analysis, this information will be combined with the bear behavior data to determine threshold distances of disturbance. UTM coordinates for the research vessel were also recorded using a GPS unit.

**Community Involvement.** For ecotourism projects to be sustainable, involving the local community in their creation and management is essential (Drake 1991; Woodley 1993). Without the support of local communities and indigenous groups, tourism development ventures may be met with opposition (Woodley 1993). With the support of all stakeholders involved (local communities, MOE, tour operators), this research aims to make realistic management suggestions that take a variety of attitudes and values into consideration. By sharing a field camp with the two Tsimshian Sanctuary rangers, researchers could provide continual project updates, and the rangers could share their vast knowledge of the area and its bears. Also, through the hiring of two Tsimshian liaisons, one from Metlakatla and the other from Lax Kw'Alaams, this project created a direct link between researchers and the Tsimshian First Nation. Both liaisons were responsible for organizing and creating a formal presentation for their respective communities. These efforts ensured that all interested members from the two different communities could be involved.

Before entering the field, UNBC researchers met with all tour operators to discuss the objectives of the project. This allowed for any initial concerns regarding the researchers' presence in the inlet to be addressed. Throughout the field season regular, informal, one-on-one meetings with all tour operators served as a forum for information sharing. Upon project completion, a final stakeholders meeting will take place and the full report outlining study results and management suggestions will be presented.

## Methodological Challenges and Solutions

### Bear Observation Challenges

**1. Learning the Best Technique of Approach.** Depending on the water current, wind direction, and topography of a particular foraging area, the angle and speed of approach that would elicit the least disruptive reaction from a bear varied. Although a thorough knowledge of tide heights and times, and shoreline topography was critical, learning which approaches scared bears away and which allowed successful data collection was mostly acquired through trial and error. For example, if a bear was aware of the research vessel's approach, it was more likely to stay than if it was suddenly surprised by the vessel's proximity. Since most data were collected with the boat motor off, researchers had to consider in which direction the vessel would move and how quickly, particularly since restarting the motor to reposition the boat could elicit a reaction from the bear being observed.

**2. Individual Variation in Levels of Habituation.** Habituation of grizzly bears to disturbance has been shown

**Table 2**—Behavior codes for boat and tourists behaviors.

Course	Fine	Description
7 speed <sup>a</sup>	70 no movement	Engine off, drift with current
	71 idle	Engine on, drift with current
	72 slow movement	Not directed towards bear
	73 medium movement	Not directed towards bear
	74 fast movement	Not directed towards bear
8 approach	81 slow movement	Directed towards bear
	82 medium movement	Directed towards bear
	83 fast movement	Directed towards bear
9 noise level <sup>b</sup>	90 none	No audible noise
	91 boat	Boat motor is only audible noise
	92 people—quiet	Tourists communicate- not audible
	93 people—noisy	Tourists communicate- audible
	94 boat—noisy	Boat-created sound, in addition to motor
	95 aircraft	Aircraft flies overhead- note type and length of time
10 tourists	100 nothing	Have not seen bear—no movement
	101 little overt movement	Sitting, photography
	102 standing	Standing still, photography
	103 moving on boat	Movement within boat
	104 calling	Loud communication toward bear
	105 change vessels	Specify time and type on data sheet

<sup>a</sup> Boat speed: slow movement < 5 km/hour (3 miles/hour), medium movement 6–15 km/hour (4–9 miles/hour), fast movement >15 km/hour (9 miles/hour)

<sup>b</sup> Noise level as perceived by researcher.

to impact individual behavioral responses (Olson and Gilbert 1994; Olson and others 1997); acknowledging this inherent individual variation can lend robustness to analysis and increase confidence in subsequent conclusions. All bears were classified as tolerant or non-tolerant, and this classification was included in their general description on data sheets. Bears who allowed boats to come within 200 m (219 yards) without displaying any flight or overt vigilance behaviors

were recorded as tolerant (fig. 3); all others were non-tolerant. For example, one tolerant adult female would not even raise her head from foraging until boats were within 200 m (219 yards) from shore, whereas one subadult would completely cease foraging and stare at approaching vessels that were over 700 m (766 yards) away.

Data collection typically commenced at ~600 m (656 yards) away, at which point the researcher could either turn the



**Figure 3**—This adult female is well known within the Khutzeymateen for being very tolerant of boat traffic (photo by Sarah Elmeligi).

boat motor off and let the current carry the vessel closer, or slowly maneuver the boat to a distance of ~400 m (437 yards). As soon as a bear started staring at the boat any approach would cease, thus allowing data collection of non-tolerant bears or bears whose tolerance levels were unknown.

**3. Limited Visibility of Foraging Area.** The forests of the K'tzim-a-deen Valley are very thick with vegetation and the landscape itself is very rugged. The combination of shorelines littered with forest debris and a naturally undulating topography meant that bears could easily become hidden during observation. This became particularly challenging by July when the vegetation along the shoreline had grown to such heights that it easily concealed an adult bear. On these occasions, the research vessel would have to be maneuvered to a position where the bear once again became visible. If no such vantage point could be found, the bear's behavior would be classified as "known to be present but unobservable," and the researcher would wait for a minimum of 30 minutes to see if the bear would re-emerge.

## Logistical Challenges

**1. Data Could Not Be Collected Solo.** Although researchers had a marine VHF radio at all times, being in the boat alone on a continual basis was a safety concern. During times of high winds or strong currents, the research vessel would need constant adjustment for safety purposes and to maintain a good viewing angle. Even during times of calm waters, watching and recording activities of the bear and boat simultaneously was impossible. On several occasions, a scan sampling approach to data collection was attempted. Scans were conducted at 30 second intervals, alternating between the bear and the tourist vessel, thus a subject's behavior was only recorded once every 60 seconds. Using scan sampling prohibited observation of more than one tourist vessel, and was not conducive to the observation of finer detailed behaviors. Using this methodology meant that a researcher could turn her head and the bear could be gone without ever knowing the events that led to its departure. Once a field assistant was hired, this concern was alleviated as one researcher could observe the bear while the other observed the tourist vessel and controlled the research boat.

**2. Boat Completely Exposed.** The boat used in data collection had no cover, therefore researchers were continually exposed to the elements, whether extreme sunshine and heat or continuous rain and cold. Although this did not impact data collection, it did impact field researcher morale. On sunny days there was a risk of over-exposure to heat, and during extended periods of rain, binoculars got foggy impeding their usefulness. Although there was an umbrella on-board, it was difficult to hold an umbrella, binoculars, and data sheets simultaneously. Constructing a temporary, but durable cover over the boat would alleviate this concern.

**3. Rough Waters.** On several occasions the waters of the inlet became rough enough that safety took precedence over data collection. The larger challenge arose, however, when the water was rough, but not enough to impede safety. Watching a bear through a bouncing pair of binoculars proved to

be challenging. Positioning the boat closer to shore, where the waters were not as rough, alleviated this concern but distance could still be impacted by the bear's tolerance level. Image stabilizing binoculars were a must in this situation. On occasion, data collection sessions were canceled or postponed.

**4. Researcher Can Only Be In One Place at a Time.** On several occasions there was a boat and/or a bear in a section of the inlet not visible to the researcher. Through VHF marine radio communication with tour operators and the sanctuary guardians, bear sightings were often shared between parties. Watching boat behavior was another way to locate bears as tourist vessels typically changed speed and direction once a bear was spotted. With a maximum speed of ~6 knots, however, the research vessel could take up to 30 minutes to reach an area by which time the bear may have retreated into the forest. A faster boat that was still equally quiet would have been more efficient.

While collecting control data, researchers would position themselves in areas of the inlet that provided the greatest unobstructed views. If no bears appeared within 45 to 60 minutes, the researchers would relocate to another area. This way, the majority of the study area could be viewed during one sampling session.

**5. Open Communication With All Users, Particularly Tour Operators.** Researchers were sharing the area with tour operators who in most cases have been conducting business in the K'tzim-a-deen Valley for more than ten years. Through regular non-formal communication with operators, researchers could not only locate more bears, but also gain a higher degree of understanding regarding general bear activity in the whole area.

Building a strong relationship with the tour operators began before entering the field. It was extremely important that all tour operators understood the project's objective was to observe the bears, not to critique their individual businesses. Since any subsequent management plans will attempt to account for all stakeholders' needs and values, it was particularly important that tour operators felt they could approach researchers with their concerns. Throughout the field season, researchers had to remain approachable and diplomatic.

## Conclusions

As bear viewing becomes more popular in North America, the means by which tourists engage in this activity will become more diverse. Research programs that investigate the impacts of tourism must become equally diverse in their methodological approaches. Using a boat for data collection presented an array of unique challenges that not only impacted how data on bear behavior was collected, but also the logistics of research practices. The approach presented here proved successful in the K'tzim-a-deen Valley, and could easily be modified to suit other locations where boat-based viewing is present. Most importantly, when investigating an industry that is continually evolving, researchers must create methodologies that are flexible without compromising the validity of the data.

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# Tourism in Rural Alaska

Katrina Church-Chmielowski

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**Abstract**—Tourism in rural Alaska is an education curriculum with worldwide relevance. Students have started small businesses, obtained employment in the tourism industry and gotten in touch with their people.

The Developing Alaska Rural Tourism collaborative project has resulted in student scholarships, workshops on website development, marketing, small business development, and customer service. Project results include community profile updates and, regionally, a business inventory, market research, website, branding and a marketing plan. All topics relate to the Copper River Basin's current economy, culture and heritage. Students learn about local natural and cultural resources, and are empowered to use and/or conserve them.

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## Developing a Curriculum

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*Tourism in Rural Alaska* is a comprehensive community education curriculum. It serves as a course curriculum, as a resource book and it is the name of an introductory tourism course. It covers many topics from geology to business development to customer service. In this paper, I will explain how Prince William Sound Community College, Copper Basin Campus (PWSCC-CBC), has used this curriculum. I will also describe some of the dynamics of tourism in rural Alaska and how this curriculum and course address various tourism issues in the Copper River Basin.

The Copper River Basin in Alaska is immense (fig. 1). It covers 23,000 square miles (59,570 km<sup>2</sup>). Population is scarce at approximately 3,200 residents according to the latest census. Twenty percent of those residents are Alaska Native. There are 34 communities located in the Copper River Basin, and all but two lie below the federal poverty level. The region is also home to the largest national park unit in the United States, the Wrangell-St. Elias National Park and Preserve (WRST). WRST was created by the Alaska National Interest Lands Conservation Act of 1980. Containing 13.2 million acres (5,341,850 ha), it is over six times the size of Yellowstone National Park. Within WRST boundaries lies the largest federally designated wilderness unit in the system at 9.7 million acres (3,925,451 ha). There are several communities that lie within the boundaries of WRST.

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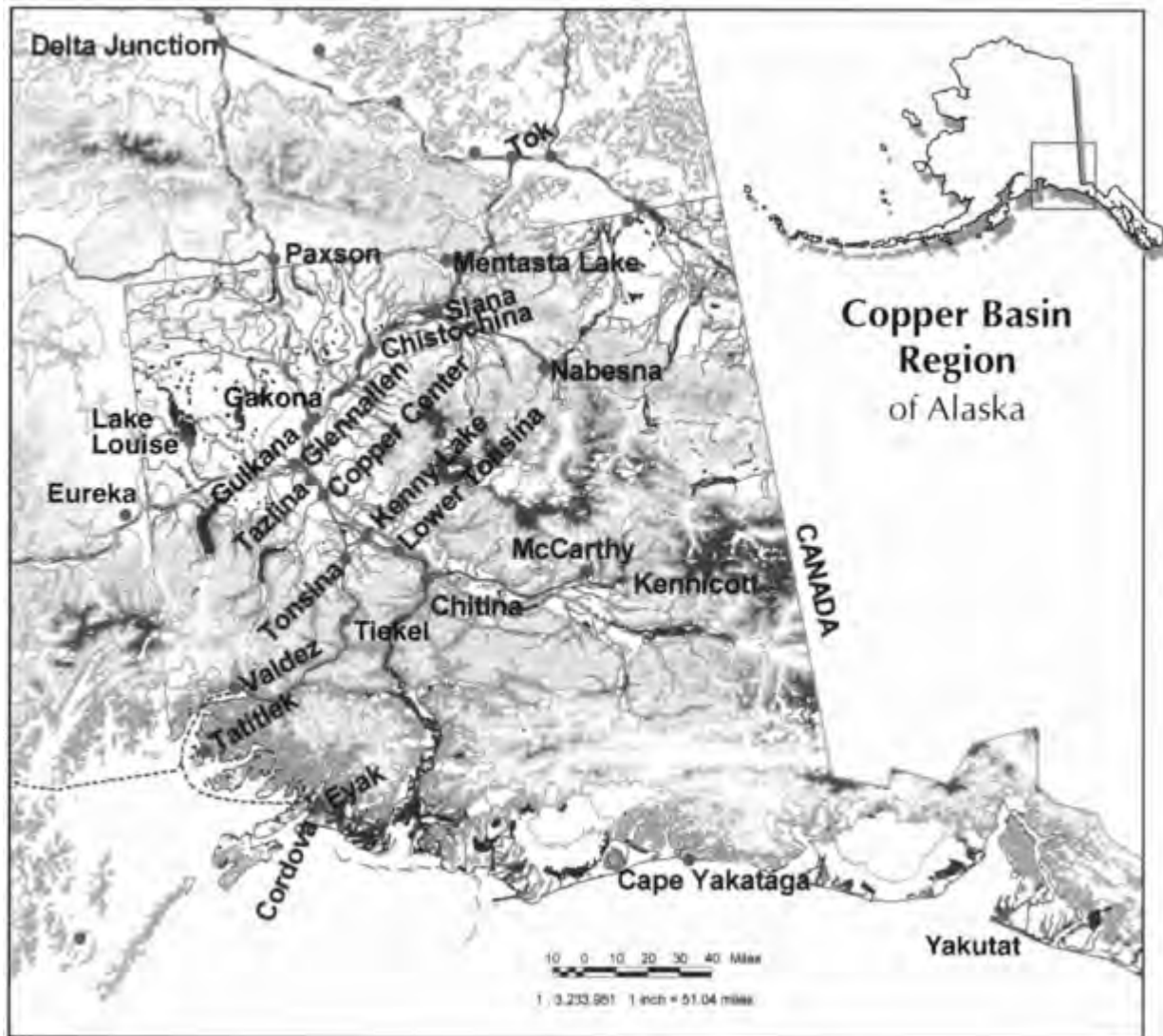
The local indigenous people are Ahtna Athabaskan Indians. They are traditional hunters and gatherers. Evidence has been found to indicate at least 8,000 years of hunting and gathering in the region. Subsistence is a way of life practiced yet today, although there is a cash economy. There has been a very short time of western contact in the Copper River Basin. The 1898 gold rush miners had the first real western settlement impact on the region. What is essential to understand is that the Ahtna people are integrally tied to the land, and the land to them, as are all rural Alaska Natives.

Travel and tourism are the third largest private sector employers in Alaska, and fourth overall. The induced effect of tourism makes its economic contribution \$1.85 billion a year (Sacks 2004). Public lands, both national and state, are abundant and serve as tourism destinations. Most of the public lands are in rural areas, although some are in more urban areas. Currently, 64 percent of Alaska is owned or managed by federal agencies. The State of Alaska owns 24.9 percent, the Alaska Native groups own 10.3 percent and other private land ownership is less than 1 percent (Bureau of Land Management 2004). These percentages will change when all of the land is patented to the owners. Congressional legislation allotted both the State of Alaska and Native entities certain acreages in the state. These lands have been selected, along with additional lands that create a buffer in case some selections are not granted, but not all of the land has been patented. The U.S. Bureau of Land Management (BLM) is charged with completing conveyance of patents by 2009.

Tourism is very big business in Alaska. Tourism's economic contribution was 37,650 full-time jobs in 2002, or 13.1 percent of the total employment in Alaska (Sacks 2004). The economic contribution of tourism in Alaska was \$1.5 billion in 2002, up 28 percent from 1998 (Sacks 2004). Tourism-related spending by and on behalf of visitors in Alaska was \$2.4 billion in 2002 (Sacks 2004).

The Alaska Native culture and rural tourism markets account for nearly half of all current visitors. This market is economically important because the visitors contribute more dollars in state per person per trip than other visitors do (Christensen and others 2003). Interest, not demographics or the type of traveler, distinguishes the visitor market (Christensen and others 2003). The market is centered on two combined interests: nature/wildlife and Native culture (Christensen and others 2003). This is very important because Alaska's rural communities have all of these assets in varying degrees.

Considering the impact of and opportunities for tourism in the Copper River Basin, the CEO of the local Native Corporation, Ahtna, Incorporated, approached PWSCC-CBC to teach local Natives about the tourism industry. They also wanted local Natives afforded the opportunity to learn how to start small businesses. The corporation was not interested



**Figure 1**—Map of Copper Basin Region of Alaska. The map is laid out on a North/South grid, with the top of the figure north, bottom south.

in tourism enterprises at the time, but wished to teach the local Native population of possible opportunities. Exposure to such opportunities can include field trips, as seen in figure 2. Local Natives are historically under-represented in the tourism industry.

The first edition of *Tourism in Rural Alaska* was produced as a partnership between PWSCC-CBC, Ahtna, Inc., and the National Park Foundation. The fully revised and expanded second edition was funded by the U.S. Department of Agriculture.

The curriculum is a comprehensive tourism resource. The curriculum outlines how to teach a Tourism in Rural Alaska course tailored to meet the needs of the host community or agency. It explains how to start a small business or enhance an existing one. Identifying community resources that tourism businesses may use is detailed. Listed also are local to international resource contacts for businesses and employees.

The Tourism in Rural Alaska course is an introductory tourism course. The information and format of the book are readily adaptable to various regions statewide and internationally. It is written so that anyone can offer the course, even with no background in teaching or tourism. The writing style is basic and explicit. The target audience often has a high dropout rate from school. Accordingly, the curriculum strives to accommodate all types of learning styles using maps, videos, incorporating field trips and more. The full course runs as three college credits.

We frequently offer topic specific workshops that are generally half a credit or one credit. As place-based students, many with children, students often find it difficult to attend full semester courses. Subsistence hunting and fishing can also affect course participation. Another reason for short workshops is that students often have to travel great distances, sometimes 70 miles (113 km) or more one way, to attend courses on campus. Recent video conferencing technology is





**Figure 2**—Tourism in Rural Alaska Native Guide Training students in Kennicott, Alaska, standing on tailings of Kennecott Copper Mine, with the Kennicott Glacier moraine and the Chugach Mountains behind them (photo by Katrina Church-Chmielowski).

changing that somewhat, but not all communities have the technology. PWSCC-CBC closes at  $-50$  degrees Fahrenheit ( $-46$  Celsius), but classes still run at  $-49$  degrees Fahrenheit ( $-45$  Celsius). Traveling at such cold temperatures can be dangerous even for short distances.

The curriculum is an important resource. Preparing students to answer all visitor questions is not feasible. One solution is to use the curriculum as a resource so that the student knows where to go to find the information needed. The Tourism Business Contacts, Good Reading and Course Examples and Materials chapters are used to augment the text. Each topic addressed has resources listed. There is no one source of tourism information in the state; the curriculum is the most comprehensive listing available. The flexibility of the curriculum also makes it a great resource. Subjects can be added, deleted or expanded upon, and tailored to meet anyone's needs.

## Evaluation and Feedback

Tourism in Rural Alaska courses have had many different and positive region-wide impacts. Some students of the course have started their own businesses, while others have obtained positions in the tourism industry. There are students who now have business plans ready to start new businesses. Several students already had their own businesses, which the course enhanced. A few examples of this include some students updating their business websites, some completely revamping their brochures and some developing marketing strategies for their businesses. A major success was when one student became excited about tourism again and decided to stay in business after taking the course. Students are using knowledge gained from the course to directly affect Copper River Basin tourism daily (fig. 3).

Student feedback is important for this type of course. It sets the tone for the course, but also contributes to following

courses. There were some very positive statements from students, such as, "This class has renewed my interest and enthusiasm for tourism." "I found the material and information very accurate and learnable." Several comments ran along the lines of, "The class and material presented was far more complete than what I had expected. I will be digesting it for a very long time to come." "The availability and opportunity for everyone to accomplish their [tourism] goals is a cornerstone of this course." "Great class, would do it over again." "It gave very much needed new knowledge on a changing market in a changing world."

One of the recent Tourism in Rural Alaska students approached PWSCC-CBC to help create a Native Guide (Interpretation) Training course using the curriculum and course as its basis. Collaborating with several local villages and Native entities, a committee formed and was able to support a Tourism in Rural Alaska course focusing on Native Guide Training. The basic goal of the course was to teach Native students principles of interpretation. There are currently no local Natives working as interpreters in the Copper River Basin. By learning these skills, students of the course would have a better chance of obtaining employment in the tourism industry. It would also give students a way to identify and use their many talents. For villages interested in tourism enterprises, they want to hire students who have completed the course. By interpreting local topics, it can bring the students back to their ancestral land. "Paying Natives to be Native" is another goal. Each Native has compelling stories, and visitors are thirsting for such stories. There is no one better qualified to tell them. It offers Native guides a great opportunity to share part of their lives and stories with others (fig. 4).

The pilot class was an intensive three-credit course. It was 10 days long, with an overnight field trip to Chitina, McCarthy and Kennicott to cap the course. There were several day trips to local businesses and to meet with an Alaska Travel Industry Association familiarization tour. We





**Figure 3**—Tourism in Rural Alaska students listening to speaker (photo by Dawn Caynor).



**Figure 4**—Tourism in Rural Alaska Native Guide Training student interpreting to class at Ahtna Historical Village site in front of traditional sezel (sweat lodge) (photo by Katrina Church-Chmielowski).

also visited a local walking trail, the Chamber of Commerce Visitor's Center, the Wrangell-St. Elias National Park and Preserve Visitor's Center, the local museum and the Ahtna Historical Village site. These were important visits, as few students had ever been to the sites. Several students had no idea that the sites existed, although some are no more than two miles from their homes.

Again, there were many positive outcomes from the course. In just ten days of class, the students were offered more than four employment opportunities. This depicts how important this type of course is, and how excited employers are to find qualified local people. Some feedback from the

class includes, "This class has helped me to realize the things that I know that would be of interest to other people." "The class benefited me by teaching me about my cultural background and Native history." This portrays an indirect outcome of the course. Being non-Native, as an instructor I did not feel comfortable, nor did the committee, with me teaching Native history and culture. I did not teach it, and recommended that the students talk to the elders to learn the cultural background and Native history. The students, however, gleaned the information from the assignments and other topics, all of which are tied to Native history and culture. You cannot teach any subject about Alaska without including the human connection.

Other comments ranged from, "There are a lot of things that I wouldn't have even bothered to glance at, basically," to "there were a lot of things I didn't know about in our own area." "I just feel like I've barely scratched the surface about all there is to learn about." Probably most dramatic is, "It got me in touch with my people."

## The Future

Students of the courses and businesses face several challenges when considering tourism in the Copper River Basin. One major challenge is that there is no single name for the region. There are several that it is known as, such as the Copper Valley, the Copper River Valley, the Copper Basin, the Copper River Basin and East Alaska. There is a serious lack of infrastructure in the region. It is also an immense area with many diverse interests and needs, that sometimes conflict. There is also a part of the population that does not embrace tourism.

Assets and opportunities do exist, however. One of those is the very fact that we are an immense area with many diverse interests and needs. Because of this, there are opportunities in some communities that may not be in others. The Copper River Basin has incredible natural and cultural resources. Other businesses and entities, such as the Alaska Travel Industry Association and the National Park Service, are marketing the region. This promotion can help raise awareness of the region's assets. There are innumerable opportunities for locals to become involved in tourism. Entrepreneurs can explore fulfilling the tourism needs that are not currently being met.

One of the ways that PWSCC-CBC is addressing tourism challenges is through education and the Tourism in Rural Alaska course. Another important collaboration that PWSCC-CBC is involved with is the Developing Alaska Rural Tourism (DART) project. This is a joint project between the State of Alaska Office of Tourism, Prince William Sound Community College, Copper Basin Campus, Copper Valley Chamber of Commerce and the Copper Valley Development Association. The duration is 18 months, ending in June 2006. The goal of the project is to help local businesses and entrepreneurs interested in the tourism industry address some of the challenges that they face and take advantage of assets and opportunities.

The project began in January 2005 with the funding of ten scholarships for students to take the Tourism in Rural Alaska course. This led to some very exciting results, as detailed previously. Those results are helping fund ten more Tourism in Rural Alaska scholarships for a class starting in January 2006. The project also supported the recent Native Guide Training class. Other courses in the works include a website development class, which will produce ten free websites designed for new local tourism businesses. Several targeted workshops are planned, including more marketing strategies, risk management, interpretation and more

small business development. Customer service training was completed, and more is planned. These are all topics that students and local business owners have asked for courses on. PWSCC-CBC strives to accommodate as many requests for instruction that we possibly can.

Students updated community profiles from the State of Alaska, and the next group of students will complete more. These are very important because the profiles are on the State of Alaska website, but are often incorrect or are lacking information altogether. Updated community profiles should help visitors discover a true listing of resources in the Copper River Basin.

Regionally, a business inventory was developed, which was not available before. The directory will help promote the businesses and identify opportunities for new businesses. A regional website is planned to help promote the region. Regional market research was conducted on the statewide level, and the project partners produced a local visitor's survey to complement the research. Market research has never been done specifically on the region. It should produce much needed information. A regional branding workshop was held to help distinguish factors that could be used to identify the region. More branding workshops are planned to further the process.

Overall, the outcomes of the Tourism in Rural Alaska courses and curriculum are far reaching. All of the topics addressed in the curriculum relate to the Copper River Basin's current economy, culture and heritage. By using the curriculum, we educate people about local natural and cultural resources, and empower them to use and/or conserve them. We help local businesses and entrepreneurs in the tourism industry address some of the challenges they face and take advantage of assets and opportunities.

The curriculum and course apply worldwide and are successful due to their flexibility and commonalities with other regions. They are being used from Australia to Delaware by universities, businesses, NGOs, government and tribal entities, as well as individuals. Students have used the curriculum and course to start small businesses, obtain employment in the tourism industry and get in touch with their people. Very different goals were achieved using *Tourism in Rural Alaska* as a basis. Many more are sure to be achieved.

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# Special Offer—7 Days Fly and Drive Antarctica: The Role of Wilderness Protection in Deciding Whether (Semi) Permanent Tourist Facilities in Antarctica Should be Prohibited

Kees Bastmeijer

**Abstract**—Antarctica is often described as one of the world's last wildernesses. Since 1990, tourism to this wilderness is developing rapidly. In a period of 15 years, the number of tourists that make landings in Antarctica has increased from 2,500 (1990/91) to more than 23,000 (2004/05). The diversity of tourist activities is also increasing. The 1991 Protocol on Environmental Protection to the Antarctic Treaty explicitly provides Antarctica's "wilderness values" legal status, but do wilderness values indeed play a role in the current international debate on Antarctic tourism management? This contribution focuses on one of the main elements of this debate: the question whether the establishment of new (semi) permanent facilities for tourism in Antarctica should be prohibited. After analyzing this debate and the issue of wilderness protection in Antarctic management more broadly, the author concludes that this question shows a parallel with the Antarctic mining debate in the 1980s and that the issue touches upon a more fundamental policy question: should Antarctica be preserved as a 'wilderness' with as limited evidence of human presence as possible or should Antarctica be managed as an 'international park' in which various values and functions are balanced, for instance through a spatial planning system?

## Introduction

Many people may consider the 'special offer' in the title of this paper unrealistic, however, tourism to wilderness areas is growing worldwide and Antarctica has also become a popular tourist destination. The number of tourists that make landings in Antarctica has increased from 2,500 in 1990-91 (Bastmeijer and Roura 2004) to more than 23,000 in 2004-05 (IAATO 2005). While for many decades Antarctic tourism has primarily been ship-based, since the 2003-04 season the so-called *Fly-Sail* or *Fly-Cruise* operations have started; tourists are taken to the Antarctic Peninsula by aircraft (thereby avoiding the 'Drake Passage' by ship), where they make excursions on yachts or cruising vessels (see for example, [www.antarcticaxxi.com](http://www.antarcticaxxi.com)).

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In the near future, such air-based tourism may easily be combined with snowmobile or hovercraft excursions, having 'bed & breakfast' in (semi)permanent camping facilities and/or research stations. In fact, camping in Antarctica is already taking place, and during the last Antarctic season, 43 tourists were offered facilities at a research station of Uruguay (IAATO 2004).

The use of motorized vehicles by tour operators is also in development. During the 2004-05 season one company trial tested a hovercraft in Antarctica and plans to use it as an alternative landing craft during the 2005-06 season (IAATO 2004).

These fast developments in Antarctic tourism raise various management questions. Questions relating to the safety of tourists, questions relating to the interaction between science and tourism, and questions relating to direct, indirect or cumulative effects on ecosystems. Since 1990, a number of these issues have received attention within the Antarctic Treaty System (ATS) and particularly the last few years, tourism management has constituted one of the most important agenda items of the Antarctic Treaty Consultative Meetings (ATCM), the annual meeting of the 28 states that manage Antarctica collectively.

This paper does not address all these tourism management issues but focuses on the question whether the establishment of new (semi)permanent facilities for tourism in Antarctica should be prohibited. In finding an answer to this question, the issue of wilderness protection in Antarctica receives special attention. For the purpose of this contribution, permanent facilities are facilities that would be established in Antarctica with the intention to last or remain there for a relatively long period of time, such as hotels, visitor centers or airstrips. Semipermanent facilities are those facilities that are established in Antarctica with the intention to remain there for a month or a season, such as summer season camping sites.

## Antarctic Wilderness

'Wilderness' has been defined from different perspectives. Aplet, Thomson and Wilbert (2000: p. 90) explain that the term wilderness "has been thought of both as a real place and as an experience." In respect of Antarctica, Codling (1998; 2001) has published valuable publications in order to provide more clarity on the term wilderness in the Antarctic context.

She formulates a wilderness definition based on physical characteristics: “[A]ny part of the Antarctic in which neither permanent habitation nor any other permanent evidence of present or past human presence is visible” (Codling 1998: p. 2). Although this definition is in agreement with wilderness literature concerning other parts of the world, one might debate the need of including the term ‘permanent.’ On the one hand, the use of this term in this definition is important to ensure that a wilderness does not immediately ‘lose’ its wilderness status because of temporary human activity in that area. On the other hand, its use should not give us the impression that the wilderness values of Antarctica can only be affected by activities that result in permanent evidence of human presence. In my view, temporary activities such as the use of helicopters may also affect the wilderness value of an area, although this ‘impact’ will be temporary.

Keys (1999: p. 6) also reflects on the possibility of such temporary impacts (‘disturbance’) in his description of Antarctic wilderness values:

Antarctic wilderness values include those of remoteness, few or no people, an absence of human made objects, traces, sounds and smells, and untraveled or infrequently traveled terrain. This implies remoteness from permanent or semipermanent habitation (not merely an absence of it), an absence of related human artifacts, (e.g. tracking) and disturbance and an absence of motorised transport.

Based on the wilderness literature and particularly this quotation from Keys, for the purpose of this contribution, ‘wilderness’ is defined as a relatively big natural area, free from human-made objects, artifacts and disturbance. The term ‘disturbance’ in this definition may, for instance, include the use of motorized transport and a high number of visitors (cumulative impacts), but does not refer to the influence of the global processes, such as the deposition of heavy metals and climate change. This definition implies the definition of “wilderness values” or ‘wilderness qualities’ as those values or qualities that qualify and characterize a natural area as a ‘wilderness’ or a ‘wilderness area.’

In view of this definition, the present author agrees with Codling and Keys that most of the Antarctic must be considered wilderness with the exception of, in particular, the areas where research stations are located (Codling 2001; Keys 1999).

## Status of Wilderness Values Under the Antarctic Treaty System

During the first half of the 20<sup>th</sup> century, seven states (Argentina, Australia, Chile, France, New Zealand, Norway and the United Kingdom) claimed parts of the continent, but the legitimacy of these claims was disputed. In 1959, the seven claimant states and five other states involved in Antarctic research (conducted during the International Geophysical Year of 1957/58) signed the Antarctic Treaty, which entered into force in 1961. A central element of the Treaty is the ‘agreement to disagree’ of Article IV regarding the legitimacy of the sovereignty claims: The positions of all states in respect of the legal status of Antarctica are reserved

and the Contracting Parties agree to manage Antarctica collectively. Since 1961, other states succeeded in showing a substantial scientific interest in Antarctica, and today 28 ‘Consultative Parties’ are involved in the Antarctic decision-making process, which is based on consensus.

Since the Treaty was promulgated, several other conventions and more than 200 recommendations have been adopted. This set of instruments for the international governance of the Antarctic is often referred to as the Antarctic Treaty System (ATS) (Elliott 1994; Stokke and Vidas 1996). With the adoption of the Protocol on Environmental Protection to the Antarctic Treaty in 1991 (hereinafter the Protocol), the protection of the Antarctic environment forms—parallel to safeguarding peace and ensuring the freedom of scientific research—the third pillar of the ATS. The Protocol that entered into force on 15 January 1998, establishes a comprehensive system of obligations and prohibitions, addressing most types of activities in the region south of 60 degrees South latitude (Bastmeijer 2003a; Blay 1992; Dingwall 1998).

Although the Antarctic Treaty itself does not refer to the need to protect Antarctica as a ‘wilderness,’ Codling (1998) notes that during the 1980s the need to protect the Antarctic wilderness received attention in various documents of the Scientific Committee on Antarctic Research (SCAR) and the World Conservation Union (IUCN). The concept of wilderness protection was also included in various provisions of the Convention on the Regulation of Antarctic Mineral Resource Activities (CRAMRA), which was finalized in June 1988. “In relation to Antarctic mineral resource activities, should they occur, the Parties acknowledge the special responsibility of the Antarctic Treaty Consultative Parties for the protection of the environment and the need to: ... d. respect Antarctica’s scientific value and aesthetic and wilderness qualities...” (Article 2, paragraph 3; see also the preamble and Article 4, paragraph 2). However, it was that same concept of wilderness protection that was one of the arguments of those lobbying for a total ban on mining in Antarctica and for the rejection of CRAMRA. In the late 1980s, international NGOs advocated the establishment of an ‘Antarctic World Park’ (Heijnsbergen 1983; Rothwell 1990), which excluded the possibility of commercial mining: “World Park Antarctica calls for the protection forever of our last great wilderness continent from all environmentally destructive human activities, including all mining activities” (Goldsworthy 1987: p. 90).

In 1989, it became clear that CRAMRA would not enter into force. Australia and France—soon joined by other countries (for example, Belgium, India, and New Zealand) (Blay 1992)—decided not to sign and ratify CRAMRA. Wilderness protection constituted one of the arguments for Australia not to sign and ratify CRAMRA (Redgwell 1994). “Antarctica should be preserved in a near pristine state while still being available for scientific research as envisaged under the Antarctic Treaty” (Brown 1990: p. 97).

The World Park concept, CRAMRA and various recommendations adopted in respect of the protection of the Antarctic environment (for example, Recommendation XV-1) were important sources of inspiration for the negotiations of the Protocol in 1990 and 1991. This may explain why the concept of protecting wilderness values is explicitly included in the

Protocol. Article 3(1) of the Protocol provides an overview of all values that must be respected when planning and conducting human activities in the Antarctic. This provision explicitly includes ‘wilderness values’:

The protection of the Antarctic environment and dependent and associated ecosystems and the intrinsic value of Antarctica, including its wilderness and aesthetic values and its values as an area for the conduct of scientific research, in particular research essential to understanding the global environment, shall be fundamental considerations in the planning and conduct of all activities in the Antarctic Treaty area.

Given the general formulation of Article 3 and the title of this provision, (Environmental Principles), it is to be assumed that the values identified in this provision, including wilderness values, must be taken into account when implementing the other provisions of the Protocol. For instance, wilderness values should be taken into account when making Environmental Impact Assessments (EIAs) for proposed Antarctic activities (Bastmeijer 2003b). The Protocol also contains various other provisions that are relevant for the issue of wilderness protection, although the term ‘wilderness’ is not explicitly used in these provisions. For instance, with the adoption of Article 2 of the Protocol, the Contracting Parties agreed to designate Antarctica as, “. . . a natural reserve, devoted to peace and science.”

## The Role of Wilderness Protection in the International Antarctic Tourism Debate

### Should (Semi)permanent Facilities be Prohibited?

The question whether the establishment of (semi)permanent facilities for tourism in Antarctica is desirable is certainly not ‘new’; already during the negotiations of the Protocol in 1990, this issue received attention: “Consideration was also given to the convenience of carrying out tourist activities by maritime means. This would avoid the proliferation of terrestrial support infrastructure in Antarctica” (Working Group II Report 1990).

Shortly after the Protocol was signed, Recommendation XVI-13 was adopted (Final Report of the XVI<sup>th</sup> ATCM, 1991: p.131–132), which states that “an informal meeting of the Parties be convened with a view to making proposals to the XVII<sup>th</sup> Consultative Meeting on the question of a comprehensive regulation of tourist and non-governmental activities in Antarctica . . .” In the Recommendation a number of issues are listed that require attention, including the “. . . number of tourist carrying capacity, permanent infrastructure for tourists, concentration/dispersal of tourist activities and access to unexplored areas.” For many years, none of these issues was seriously discussed; however, since 2004 there appears to be a greater willingness among the consultative parties to start a debate on more fundamental tourism management issues, including the question whether (semi) permanent facilities for tourism should be prohibited.

## Summary of the International Debate Since 2004

The issue of (semi)permanent facilities for tourism in Antarctica was put on the agenda of the Antarctic Treaty Meeting of Experts on Antarctic Tourism in Norway (March 2004) by New Zealand. At that meeting, New Zealand proposed to prohibit the establishment of such facilities. The proposal was subject to a comprehensive debate, and in the discussions the link with the obligation to protect wilderness values under the Protocol received special attention. The report of the meeting states that the view was expressed that “designation of Antarctica as a ‘natural reserve’ and the obligation to protect ‘wilderness values’ in the Protocol are additional arguments for supporting New Zealand’s proposal and allowed States to uphold a policy distinguishing between scientific and tourist activities in regard to the establishment of permanent facilities” (ATME Report 2004). However, consensus on this issue was not reached. New Zealand decided not to submit the paper at the XXVII<sup>th</sup> ATCM (Cape Town, May/June 2004), probably because the discussions in Norway had shown that the scope of the proposal was to be defined more precisely.

At the XXVIII<sup>th</sup> ATCM in Stockholm (2005), the Consultative Parties continued the discussion on the basis of two information papers (ASOC 2005; Germany 2005) and two working papers (New Zealand 2005; Australia 2005). All these papers advocated the prohibition of (semi)permanent facilities for tourism in Antarctica (see Final Report XXVIII<sup>th</sup> ATCM). An analysis of these papers identifies the following arguments in favor of such a prohibition or other types of regulatory measures.

The establishment of (semi)permanent facilities for tourism:

- Are inconsistent with the designation of Antarctica as a ‘natural reserve, devoted to peace and science’ in Article 2 of the Protocol and the environmental principles of Article 3 of the Protocol, including the obligation to protect Antarctica’s wilderness values (Australia, Germany, New Zealand).
- Will “inadmissibly erode and restrict the research privilege,” laid down in the Antarctic Treaty and the Protocol (Germany (quotation), New Zealand, ASOC).
- May cause difficult and sensitive discussions between states and other stakeholders on legal issues (sovereignty, jurisdiction and private ownership) and these discussions may “severely test the ATS framework” (Australia, New Zealand [quotation], ASOC).

In view of these arguments and the fast developments in Antarctic tourism, some of the papers also stressed that measures should be taken before it is too late. Furthermore, the Australian paper also refers to the responsibility of the ATS in relation to the tourism industry. The paper proposes a policy approach that would acknowledge and build on the commitment of tourism operators to maintain a sustainable and socially responsible industry. In view of the various arguments, New Zealand suggested the adoption of a further instrument that would ensure Antarctica is in principle and

in practice off limits to such development and the Australian paper included a concrete proposal for a measure (an instrument that becomes legally binding after the formal approval by all Consultative Parties) on this issue: "Parties shall not authorize the development of any new permanent or semipermanent infrastructure for the conduct or support of tourism or other non-government activities in Antarctica."

Compared to the discussions in Norway (Expert Meeting) and South Africa (ATCM), the issue was discussed in Stockholm much more thoroughly and a large part of the Consultative Parties participated in this debate. During the discussions, various parties supported one or more of the arguments listed above (for example, France, the Netherlands, Norway). However, there were also parties that were not convinced of the need to adopt the proposed measure.

- Some questioned the inconsistency of (semi)permanent facilities with the provisions of the Protocol (for example, the United States, the United Kingdom, Argentina, Sweden).
- Others questioned the hierarchy between science and tourism (for example Spain), or stressed that, given the fact that governments share the coastal areas of Antarctica with the tourist industry, this industry should not be discriminated against elsewhere in Antarctica (Argentina).
- The International Association of Antarctic Tour Operators (IAATO) questioned the need to take action, because the development of serious proposals for such facilities was considered unlikely. IAATO also argued that there are already structural facilities in Antarctica to support tourism and suggested that tourism may help consultative parties in funding the cost of scientific research and logistic activities.
- Some parties "believed that these activities could be controlled through existing instruments such as Environmental Impact Assessment procedures" (Final Report XXVIII ATCM, paragraph 172).
- Various parties questioned the unclear scope of the proposed measure, particularly because terms such as '(semi)permanent,' 'facility,' or 'infrastructure' may be the subject of different interpretations.

These arguments also prevented the meeting from reaching consensus on a proposal to adopt a non-legally binding instrument (a resolution) on this issue.

Nonetheless, the discussions made it clear there is consensus among the consultative parties that it is an important policy issue that requires further consideration: "Delegates agreed that they shared concerns about the undesirable possible consequences of the development of such permanent and semipermanent infrastructure. . . It was acknowledged that tourism was not a prohibited activity in Antarctica, but that land-based tourism involving permanent infrastructure in the Antarctic needed to be addressed" (Final Report XXVIII ATCM, paragraphs 169 and 171). The draft Final Report of the meeting stated "there was strong support" for the approach that parties "voluntarily decline to authorize any applications to construct permanent land-based infrastructure to support tourism," although various delegations noted "under their current domestic laws it was difficult to prohibit" such facilities (Final Report XXVIII ATCM, paragraph 173).

Consequently, the meeting agreed to "re-visit this matter at ATCM XXIX" (to be held in Edinburgh, June 2006) (Final Report XXVIII ATCM, paragraph 174).

## The Protocol and Self-Regulation by IAATO

For assessing the need of management measures by the ATCM regarding (semi)permanent tourist facilities, an important question is whether the private sector itself might be able to address the issue. Most of the tour operators active in the Antarctic cooperate under the umbrella of the International Association of Antarctic Tour Operators ([www.iaato.org](http://www.iaato.org); Spletstoeser 2000). IAATO recently included the following new element in its bylaws (IAATO bylaws, Art. II, Section E): "Members of IAATO subscribe to the principle that their planned activities will have no more than a minor or transitory impact on the Antarctic environment."

This initiative is one of the examples of a management measure taken by the industry that goes beyond the obligations of the Protocol and illustrates, at least to a certain degree, the proactive approach by the IAATO member organizations. However, it may be questioned whether this bylaw revision adequately addresses the issue. For instance, the terminology "no more than a minor or transitory impact" derives from Annex I of the Protocol and establishes the threshold for the most comprehensive level of Environmental Impact Assessment, the Comprehensive Environmental Evaluation (CEE). In practice, such CEEs are only produced for major projects, such as the establishment of new research stations. It could therefore be argued that the bylaws do not block or prevent floating hotels, or facilities on land that may easily be removed (for example, facilities for camping during the summer season). Furthermore, the question is whether wilderness values are taken into account when making the assessment of the level of impact in an EIA process. If this is not the case, one could argue that a permanent hotel in an area with low biodiversity and scientific values will not cause a more than minor or transitory impact. This approach is not unlikely in view of the EIA-practice in which wilderness values receive very little attention (Bastmeijer 2005). An additional reason why the bylaws do not address the issue is the risk of 'free riders.' Tour operators that really want to go forward with their plans to establish permanent facilities for tourism in Antarctica may not become an IAATO member or may end their membership. Such examples already exist within the sector of ship-based tourism (for example, the *Marco Polo*).

## Hotels in Antarctica: A Realistic Option?

Nature-based tourism is growing worldwide and remote areas are becoming increasingly popular (Eagles 2003). The developments in Antarctic tourism illustrate this trend. As discussed in the introduction of this contribution, the numbers as well as the diversity of activities are rapidly increasing. Probably because of the growing competition—tour operators are continuously developing their products by adding new (exciting) elements. For instance, the web site, Big Animals Expeditions, (<http://www.biganimals.com/newsletters/spring05/page1.html>) announced that the company will



use the hovercraft in the season 2005-2006 to facilitate scuba diving activities: "We will conduct ice landing and scuba diving exploration on mainland Antarctica remote islands and icebergs. Our ship will be equipped with a Hovercraft that can safely and efficiently transport all our gear and us over difficult terrain to selected diving locations." The company makes clear that its clients will certainly visit the wilderness in its purest form: "We are going to a part of Antarctica the fabled explorers never reached. There are no historical huts from the Edmonson or Ross expeditions. No footsteps of Shackleton to follow. Not even a National Geographic TV crew has been there. There's no one to follow. Our free spirit and sense of adventure will lead us."

This search for new products also relates to forms of transport to the Antarctic. It is clear that quite a number of people are reluctant to book a cruise to the Antarctic because they do not want to take the risk of experiencing sea illness for two or more days. Furthermore, flying to Antarctica enables shorter trips. Therefore, with the 'fly-sail' operations that were started two years ago, Antarctic tourism has expanded to a new segment of tourists.

These developments may well stimulate the development of plans for (semi)permanent tourist facilities. For instance, tour operators may find it interesting to combine their conventional cruising with activities ashore. There are already tour operators that offer camping options and in the future a tour operator may wish to further develop such activities. Tour operators may also wish to start snowmobile excursions, similar to the Arctic, and storage of the snowmobiles in small buildings would be efficient. At an international workshop on Antarctic tourism, held in New Zealand on 23 June 2000, Maj De Poorter stressed the "slippery slope risk"—slowly and step by step, Antarctic tourism (like other human activities) is developing and without a timely management response, (semi)permanent facilities in Antarctica are likely to be established.

Although this "slippery slope risk" may indeed be the most likely scenario, there is also the possibility of sudden and more substantive developments. Businesses with a substantial investment capacity may develop ambitious plans, for example to establish a hotel in Antarctica.

An interesting example was described in various Australian newspaper articles and reports in 1989. One of the articles states that a 'super salesman' from Sydney—a management director of a firm of cold-climate architects—was "trying to flog the seeming impossible idea, a 200 million \$US tourist center to be built in Australia's pristine Antarctic—and believe it or not, he could do it!" This project (Project Oasis) related to a three-capsule resort, planned near the Australian station Davis, including "a visitor centre, a hospital, research facilities and hovercraft to get around" (The Mercury, May 2 1989, p. 5). A 2,800 m (2 mile) long runway should enable Boeings 747 to land. The capsules "would be built in Sydney, floated to the Antarctic and slid across the ice into position" (New Scientist, May 20 1989, p. 4), a strategy that shows that the term 'land-based' facility, which is often used in the international discussion, is not necessarily covering all permanent facilities. According to the newspapers, the businessman expected "the total cost to be recouped 'very easily' within 15 years" (The Mercury, May 2 1989, p. 5).

This project was debated in the Australian Parliament and was therefore certainly not just a wild idea from a

businessman to attract media attention. The Australian government decided not to support this plan and had sufficient instruments to prevent Project Oasis from being conducted.

## Conclusion: Should Antarctica be Preserved as a Wilderness Area?

Worldwide it is recognized that the relationship between tourism and the protection of natural areas is a complex one. On the one hand tourism can contribute to the protection of a natural area; tourism may play an important role in awareness raising and may provide financial means for taking necessary management measures. Tourism may also provide a natural area an economic value, which can be crucial for preventing more devastating activities, such as mining and, in certain parts of the world, logging. On the other hand, tourism may cause serious problems in natural areas, such as the introduction of diseases or non-native species of plants and animals, disturbance of animals, the disposal of waste or loss of wilderness. Tourist activities in Antarctica have also been recognized as "human activities that offer both threats and benefits to Antarctic conservation" (Phillips 1990: p. 98).

Probably because of this complex relationship and the environmental management measures adopted by the industry (through IAATO), for many years the ATCM has been reluctant to take legally binding measures in addition to the Protocol; however, the fast developments in Antarctic tourism explain why the call for such additional measures within the ATS has become much stronger. In comparison to the discussions in the 1990s, over the past few years more fundamental management issues have been debated, including the question whether the establishment of any new (semi)permanent facilities for tourism in Antarctica should be prohibited.

This question touches upon the meaning of Antarctica's designation as a nature reserve, devoted to peace and science (Article 2 of the Protocol). However, it is not so much a legal question but primarily a policy question. In the view of the present author, this question is of a similar character as the question on the acceptability of mineral resource exploitation that was discussed during the 1980s. Shortly after the decision of Australia and France not to sign and ratify CRAMRA, a representative of World Wildlife Fund stated:

As well as being amazingly beautiful, with spectacular land and ice formations, the Antarctic is the only part of the world that has never been permanently inhabited by people. When you consider the devastation that human beings have inflicted over almost all of the rest of the planet, from polluted rivers and seas to degraded forests, from overcrowded cities to the loss of topsoil, then the fact that there remains a continent almost as large as South America which so far is very little affected by human activities, is important to us emotionally and spiritually, as well as scientifically (Phillips 1990: p. 97).

This understanding could also be the most fundamental argument for the ATCM to adopt a tourism policy that prevents the establishment of (semi)permanent facilities for



tourism in Antarctica. This policy would make it possible for people to experience 'The Ice,' but ensure that ships will be the only visitor centers and hotels in the Antarctic.

The international debate on this issue will most likely be continued at the next ATCM, to be held in Edinburgh, June 12–23, 2006.

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## 4. Establishing Priorities and Developing Policies for Wilderness Protection



*Mount McKinley, visible from Anchorage, represents one of the wildest places on earth (photo by Claudia Sellier).*



# Land Claims as a Mechanism for Wilderness Protection in the Canadian Arctic

Vicki Sahanatien

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**Abstract**—Northern land claims agreements support establishing national parks and wilderness protection but are not prescriptive on wilderness management or what wilderness values should be protected. Parks Canada does not have strong wilderness policy or guidelines, which hampers development of management plans for northern national parks and progress on legislation of wilderness. The Mackenzie Valley Pipeline Inquiry, an important time in Canadian history, can provide the bases for Parks Canada to work with beneficiaries of land claims to protect wilderness.

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Canada's arctic region is vast and qualifies as wilderness by any metric it is compared against. The aboriginal people of the Canadian Arctic, through land claims agreements, are taking control of land use planning and decision-making and are setting aside large areas as wilderness national parks. This paper will set the Canadian context by looking back at a pivotal time in Canadian history, describe wilderness protection efforts in three northern land claim areas, and evaluate Parks Canada's progress in wilderness zoning and declaration in three northern national parks.

In 1977, a momentous report was submitted to the Prime Minister of Canada. This report was based on 3 years of research in the Canadian western arctic. The report of the Mackenzie Valley Pipeline Inquiry summarized Justice Thomas Berger's findings and recommendations on how the Canadian government should proceed on the question of natural resources (oil and gas) development in the Mackenzie River Valley and Delta, and the Beaufort Sea. This question was of enormous economic importance to Canada and to the many Canadian and American companies that wished to be involved in extracting the rich supply of arctic natural resources.

A book was also published the same year as the Berger report; the book's title nicely summarizes its central message, *Northern Frontier, Northern Homeland* (Berger 1988). The book and report have been referred to so regularly in land claim circles that they have come to be known in Canada as the Berger Report. The research methods used during the inquiry became the new standard for consultations with aboriginal peoples. The Berger Report set many of the principles for subsequent land claim discussions and

negotiations, and it brought to the forefront the importance of wilderness protection in the north.

Previous to the Berger Report, land use decisions for Canada's northern territories occurred in Ottawa, the capital city, or in boardrooms of major corporations. Consultation with the people whose lives would be affected by the decisions was not a requirement. During the Mackenzie Valley Pipeline Inquiry, Justice Berger traveled to every community in the valley. He met directly with the people and took the time to listen to the people in their languages (there were seven), in their community gathering places, offices, homes and camps. Berger found and described a complicated inter-connectedness of environment—culture—wildlife—economics—wildlands. The findings of the inquiry revealed to Canadians, and the world, a new view and understanding of the Canadian north, aboriginal people, and their relationships with the land.

Berger's recommendations were radical at the time but accepted by the Prime Minister.

1. Moratorium on resource development, in particular, oil and gas development in the Mackenzie Valley and Delta region, so that #2 could proceed.

2. Land claims be settled and be comprehensive, to include all aspects of natural and cultural resources management, self government, cooperative management bodies, social institutions, land selection, decision making processes, responsibilities and power sharing.

3. During the land claim negotiations, the rights and political authority of aboriginal people be recognized.

4. Wilderness parks to be established to protect land and wildlife and aboriginal people's harvesting activities and their cultures.

The first northern land claim agreement was completed in 1984 when the *Western Arctic Claim, the Inuvialuit Final Agreement* came into being. The agreement established the Northern Yukon National Park, the first wilderness national park in the arctic (fig. 1) now known as Ivvavik National Park (Sections 12(6) and 12(7)). Other national parks existed in the arctic at that time but they were not recognized by legislation or by any other means as wilderness parks.

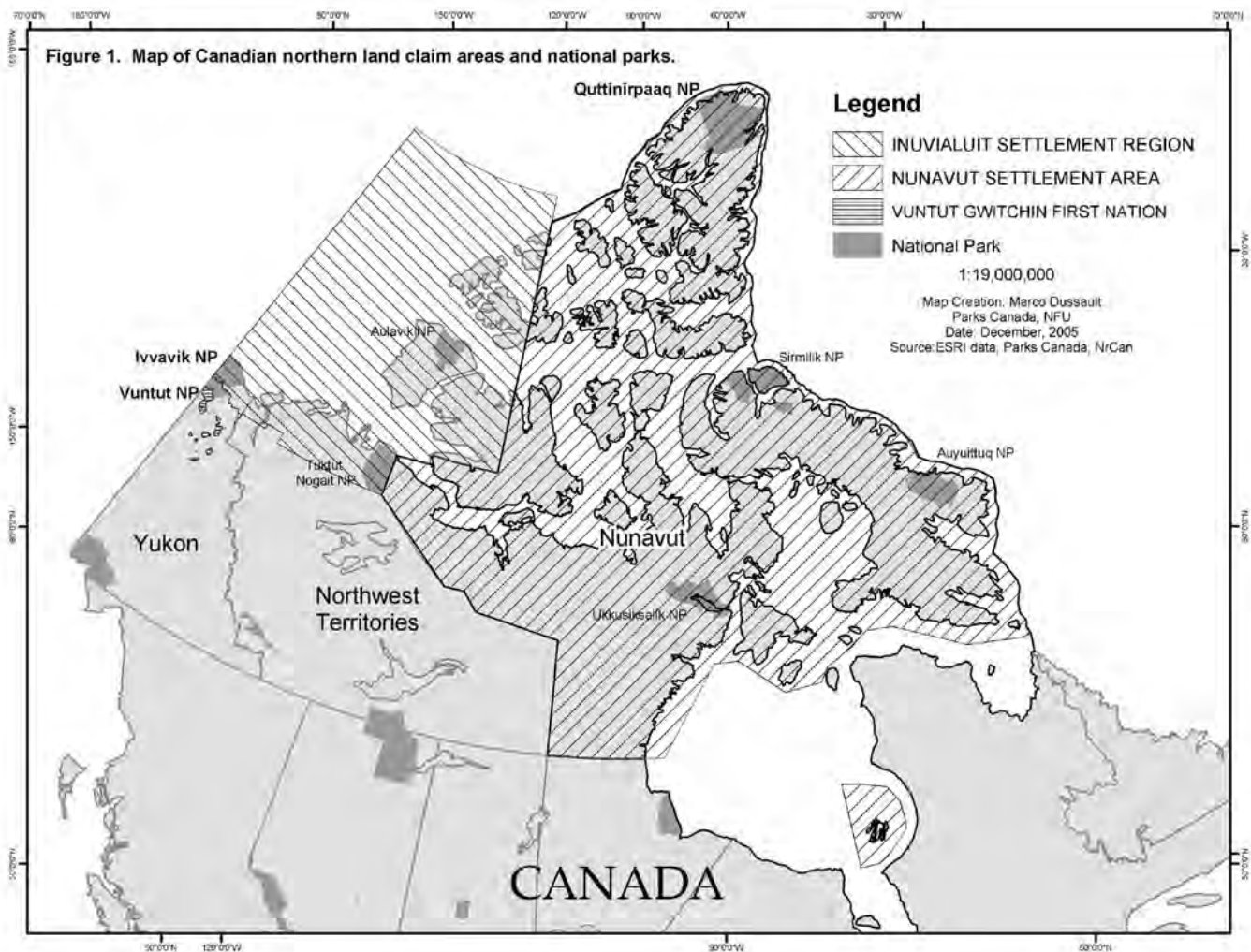
In 1993, the *Nunavut Land Claims Agreement* was completed. This agreement established two national parks and set the stage for additional national parks. Section 8.2.8 of the agreement states that national parks will be managed as predominantly wilderness. There are four national parks in Nunavut Territory but only Quttinirpaaq National Park will be discussed in this paper.

In the same year, 1993, the *Vuntut Gwichin First Nation Final Agreement* was completed. Vuntut National Park came into being with this land claim agreement but wilderness was not mentioned nor direction provided regarding the park management regime. I will come back to this fact.

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In: Watson, Alan; Sproull, Janet; Dean, Liese, comps. 2007. Science and stewardship to protect and sustain wilderness values: eighth World Wilderness Congress symposium: September 30–October 6, 2005; Anchorage, AK. Proceedings RMRS-P-49. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.



**Figure 1**—In 1987, Ivvavik was the first wilderness national park in Arctic Canada established to protect wilderness.

The challenge presented by the land claims agreements that make wilderness a prime mandate for national parks is that the agreements do not elaborate on what wilderness characteristics are important, nor is there guidance on wilderness management priorities. Aboriginal people and cooperative management groups do not have a history of wilderness management so there is little experience on which to draw.

Unfortunately, at this time, the Federal Government agency responsible for managing Canadian national parks, Parks Canada, has not developed sufficient policy or direction to enable it to respond to these same questions. This is particularly so for the northern national parks and has been reflected in the park management planning process.

How does Parks Canada include wilderness in its management of national parks? There are two ways:

1. **Wilderness Zoning** is a land use zoning description (Zone 2 Wilderness) that is described in the park management plan. The zoning plan can only be altered after a management plan amendment and public consultation. The direction provided by policy on this zone is: no motorized access by park visitors and provision of limited infrastructure within this zone by Parks Canada (Parks Canada 1994).

2. **Wilderness Declaration** is the enhanced protection step in which the legal description of areas of Zone 2 are included in the *Canada National Parks Act*. Declared wilderness areas can only be altered by an amendment to the *Canada National Parks Act* (2000) and after public consultation. There has been no policy direction developed for managing declared wilderness areas.

The decision on how to deal with wilderness within each national park is taken during management plan development.

Management plans are developed with planning teams and presented to the public for discussion and feedback. In land claim areas, the plans are developed collaboratively with aboriginal people. Aboriginal people are on the planning teams and the cooperative management committees that approve and recommend plans (fig. 2). Management plans are required to take direction from land claims agreements.

Ivvavik, Quttinirpaaq and Vuntut National Parks all have new management plans (Parks Canada 2004; Parks Canada 2005a, b). Wilderness declaration was agreed on for only one of these national parks—Vuntut—even though its land claim agreement is silent on wilderness. The Vuntut Gwichin agreed that wilderness would provide enhanced protection to their land and the wildlife. All of Vuntut is





**Figure 2**—Inuit Knowledge Project Elders committee meeting, Qikiqtarjuak, Nunavut, Canada (photo courtesy of Parks Canada).

zoned wilderness and 75 percent of the park will be declared wilderness. So what happened to Ivvavik and Quttinirpaaq in light of the land claim for each park specifically stating that wilderness is important?

Parks Canada, during the planning processes for Ivvavik and Quttinirpaaq, presented Wilderness Declaration as an option—an option without any clear benefits, only restrictions on human use. There was no public discussion on the benefits for managing and protecting park ecological and cultural resources and no linkage of wilderness to ecological integrity, the primary mandate for national parks. Why did this happen?

Parks Canada has put very little thought into wilderness policy and management guidelines. There is not a single issues paper that explores function, importance, values protected by wilderness, what to monitor, or how wilderness enhances ecological integrity. The existing Parks Canada references to wilderness are very few: one section in the Canada National Parks Act, a few paragraphs in the zoning system description, and a Wilderness Declaration Plan that is a procedural document that emphasizes survey requirements and documentation.

The policy void has created a situation where planners and their planning teams have not been able to move aboriginal cooperative management partners past the negative connotations of wilderness declaration: restrictions on access, development, and potential foreclosure on future opportunities. In the Quttinirpaaq instance, while everyone was in favor of zoning 90 percent of the park as wilderness, the Joint Park

Management Committee was not convinced that wilderness declaration had merit. In the Ivvavik case, all were in favor of zoning 98 percent of the park as wilderness but did not see the added value of wilderness designation under the national park act when the land claim stated that the park was a wilderness park.

The challenge of wilderness and arctic national parks is just beginning. There are five more parks waiting for new park management plans in the Canadian arctic, more national parks yet to be established, and new lands claims being ratified (fig. 3). It is extremely important that Parks Canada develop wilderness policy and guidelines that are appropriate to the northern environment and the land claims context (fig. 4). Canada needs an approach to wilderness management that includes northern aboriginal people's cosmology, language, cultural integrity, and ecological integrity. I would suggest revisiting Berger's ideas, as he took his advice from the elders of 30 years ago.

My proposal for a wilderness park is specifically designed to benefit the native people by protecting their renewable resources and by preserving land in its natural states, thus ensuring the physical basis for their way of life. . . . The point I am making here is that the preservation of wilderness and its wildlife can be justified on the grounds of its importance to the native people. But the preservation of wilderness can also be justified because it is there, an Arctic ecosystem, in which life forms are limited in number, and where, if we exterminate them, we impoverish the frontier, our knowledge of the frontier, and the variety and beauty of the earth's creatures (Berger 1988: 76–77).





**Figure 3**—Quttinirpaaq National Park, Nunavut, Canada (photo courtesy of Parks Canada).



**Figure 4**—Arctic char drying at camp, Wager Bay, Nunavut, Canada (photo courtesy of Parks Canada).

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# Prospects for Natural World Heritage Sites in the Northwest Pacific Region

Jim Thorsell

*The nation behaves well if it treats the natural resources as assets which it must turn over to the next generation increased and not impaired in value.*

~ Theodore Roosevelt

Alaska, northern British Columbia (BC), and the western portion of the Yukon Territory have extensive areas of wildlands that are matched by protected area systems covering some 20 percent of the land area of the region. One of the most outstanding of these is the Kluane/Wrangell-St. Elias/Glacier Bay/Tatshenshini-Alsek Park complex that is shared by all three jurisdictions. This entire 10 million-ha (24,710,538-acre) area is a transboundary World Heritage site, in fact the largest such internationally designated site on the planet. With its informal abbreviated name of the “St. Elias Mountain Parks,” it is the only existing World Heritage site in the region.

The St. Elias Parks site presented an interesting use of the World Heritage Convention in that it was extended twice after the original inscription in 1979 to assist in countering threats of a proposed open pit copper mine in BC, upstream from Glacier Bay National Park. When the United States nominated Glacier Bay in 1992, the approval of this mine would have put Canada in a difficult position in terms of Article 6 of the Convention. This article states that, “Each State Party to this Convention undertakes not to take any deliberate measures which might damage directly or indirectly the cultural and natural heritage...situated on the territory of other State Parties to this Convention.” When Glacier Bay was inscribed as an addition to the St. Elias Parks complex, the proposed mine was not allowed and the BC government created the Tatshenshini-Alsek Park, which was then also added to the site 2 years later.

Recognizing the international importance of other natural areas in the northwest Pacific region, the governments of both countries have identified seven protected areas for inclusion on the Tentative List of Properties that they intend to nominate for World Heritage status in the future. In Canada, these are: the Gwaii Haanas National Park Reserve in BC’s Queen Charlotte Islands and the Ivvavik/Vuntut/Herschel Island Park complex on the Yukon/Alaska border. In the United States, sites on the Tentative List submitted to the United Nations Educational, Scientific and Cultural Organization’s

(UNESCO) World Heritage Centre by the Department of Interior are: the Aleutian Islands Unit, the Arctic National Wildlife Refuge, Denali National Park, Gates of the Arctic and Katmai National Parks.

Inclusion of the Arctic National Wildlife Refuge, which is adjacent to the Ivvavik/Vuntut/Herschel Island Park complex in the Yukon, on the Tentative List of the USA is of particular interest in light of the current controversy regarding the prospects for petroleum exploration in the area and in light of the precedent set using the Convention in the case of the proposed mine in the Tatshenshini. Article 6 would again be raised, this time with the threat coming from the United States side.

Should the proposal to open the Arctic National Wildlife Refuge in Alaska to oil and gas exploration be approved, and should these activities be considered potentially detrimental to the migratory caribou and other natural values in the adjacent Ivvavik/Vuntut/Herschel Island Park complex in the Yukon, the USA would be in potential violation of Article 6 of the Convention. For the country that initiated the Convention and was the first to sign it, such a charge would be discouraging to the entire global heritage community.

I therefore suggest that if approval is given for development in the Arctic National Wildlife Refuge, Parks Canada (as the lead agency for the Convention in Canada) should act to immediately submit a “mixed” natural and cultural nomination of the Ivvavik/Vuntut/Herschel Island Park complex to both the World Heritage List and to the List of World Heritage in Danger. Such emergency nominations are allowed (with conditions) under section III.H of the “Operational Guidelines for the Implementation of the World Heritage Convention” (Feb., 2005). Should either of the Advisory Bodies to the Convention, the World Conservation Union (IUCN), and the International Council on Monuments and Sites (ICOMOS), conclude that the nomination would “... unquestionably meet the criteria for inscription...and face serious and specific dangers from natural events or human activities,” the World Heritage Committee could include the nomination for consideration at its next session in July of 2008.

IUCN should also make contact with the International Council on Mining and Metals noting their agreed policy on mining in protected areas, as the two main leaseholders in the area would include Chevron-Texaco and British Petroleum.

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# Wilderness and the Paradox of Individual Freedom

Randy J. Tanner

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**Abstract**—Wilderness, whether designated as such or not, is often portrayed as the embodiment of freedom. The type of freedom to be enjoyed, though, is not clear. Freedom in wilderness may be constructed negatively—individuals freely experience wilderness without societal constraints; or, freedom may be constructed positively—individuals freely experience the fundamental purposes of wilderness as defined by society. The latter construction of freedom inevitably results in a “wilderness morality” that defines—often in a hierarchical manner—the acceptable purposes and uses of wilderness. Philosophers, in a general context, have long contended that these two constructions of freedom are both irreconcilable and at odds with one another. Through an examination of subsistence in Alaska and South Africa it is apparent that while conflict related to wilderness stewardship is ostensibly the result of competing interests, these competing interests are fundamentally rooted in divergent constructions of individual freedom. As a result, conflicting perceptions of wilderness and its purposes may be resolved, or at a minimum more thoroughly understood, if governing policies clearly identify what it means to be “free” in wilderness.

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## Introduction

Edward Abbey (2000) often said we can have wilderness without freedom, but we cannot have freedom without wilderness. For Abbey, freedom was not a necessary element of wilderness, rather wilderness was a precursor for freedom—in fact, it perhaps defined freedom. Abbey’s remarks reflect an insidious paradox that I argue gives rise to many (if not most) contemporary wilderness-based conflicts. The wilderness movement, which began in the mid-19<sup>th</sup> century with Thoreau and Muir and gained momentum through Leopold, Marshall, Carhartt, and others, was rooted in a brand of freedom characterized by the absence of human control. This freedom was transcendental in that it was a means to an end rather than an end itself—it allowed humans to transcend humanity through wilderness. In the mid-20<sup>th</sup> century, though, wilderness enthusiasts argued that if the opportunity for this transcendence was to remain, lawmakers would have to intervene and create a statutory framework by which wilderness would be managed. This framework, actualized through the United State’s Wilderness Act, was in many ways incommensurate with the absence of human control and authority. The paradox that I will discuss, then,

is that in order to preserve wilderness as an artifact of freedom from human control and authority (in other words, a product of negative freedom), we have adopted a socially constructed doctrine that defines the way in which freedom may be appropriately experienced in wilderness (in other words, a product of positive freedom); and, while freedom is a defining quality of wilderness, it is rarely realized in its purest form.

The argument that wilderness is socially constructed is by no means novel (Cronon 1995), but the consequence of this paradox, I argue, which has not been explored in depth is that wilderness enthusiasts who enjoy wilderness—whether designated or *de facto*—for its freedom-based values are left with a sense of confusion. On one hand, wilderness is to be the embodiment of a landscape set apart from human hands, but on the other, societies have adopted legal frameworks and an ethic that confines the wilderness experience. For those whose philosophy of freedom is consistent with these frameworks and ethic, the paradox does not exist. For others, though, the wilderness movement has perhaps been an evolution of contradictions. In this paper, I argue that indigenous peoples, particularly those that are dependent on wilderness for subsistence, provide one such constituent. I begin the paper by first describing two forms of freedom—positive and negative. I then discuss how the wilderness movement has embraced both forms, but that each form is diametrically opposed to one another and, consequently, how neither form in their purest constructions can be experienced in wilderness. I illustrate these points through the lens of subsistence in wilderness, particularly in the context of rural Alaska and South Africa. Next, I claim that if freedom cannot be experienced in either of its purest forms, we are left only to construct a “legitimate breed of freedom” in wilderness. And, despite the difficulty of operationalizing this idea, a potentially useful framework may be utilized in order to understand the concept of legitimacy. Freedom, I conclude, will always be a defining characteristic of wilderness, but if it is to be a freedom harmonious with the human condition, it must be grounded in legitimacy rather than anarchy or indoctrination.

## Two Constructions of Individual Freedom in Wilderness

Freedom, like many philosophical concepts, is often characterized in terms of a dualism. There is *negative freedom*—the quality of being free from constraints external to the individual—and there is *positive freedom*—the quality of being free to pursue one’s fundamental purpose in life (some of the most influential work on this topic include: Arendt 2000; Berlin 2002; Fromm 1994; and Hayek 1944). While the philosophical debate concerning these two constructions

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is widely varied, one consistent conclusion is that these two forms, in their purest interpretations, are diametrically opposed and irreconcilable (Berlin 2002). Consequently, when concepts such as wilderness are defined by the quality of freedom, they are inherently laden with conflict. In this section, I offer a brief introduction to how freedom is constructed (both positively and negatively) in wilderness and how each—in their purest forms—constitute the basis for many (if not most) wilderness-based conflicts.

**Positive Freedom in Wilderness.** Freedom, defined positively, is acting in such a way as to take control of one's life and realize one's fundamental purpose in life (Berlin 2002). Freedom is more than a means to an end—it is an end with intrinsic value. Positive freedom, in contrast with negative freedom, is characterized as *true* freedom in that there exists a single species or natural form of freedom (Strauss 1953). As Strauss, one of the preeminent positive freedom thinkers of the twentieth century claims, individuals are often unable to understand this true freedom and, consequently, the institutionalization of freedom should be left to the “wise men” (Strauss 1953). In other words, because of the inherent (and natural) irrationality of individuals, it cannot be assumed that freedom will be correctly understood by everyone. As a result, rather than leaving the individual with the task of defining for themselves what freedom is, this task is most appropriately left to those with the capacity to understand it (for example, political leaders, philosophers, religious leaders, academics, etc.). The doctrine of positive freedom encourages the individual to pursue their self-actualization or self-realization, but doing so is dependent on making the “right choices” in life.

Contemporary policies rooted in positive freedom range from social security, welfare, and economic development initiatives to age restrictions for the purchase of alcohol and tobacco. In each of these examples, a system of policies that is a reflection of what society (or in many cases societal elites) has judged as right or morally desirable is imposed upon a society. Designated wilderness areas are, perhaps, another example of the manifestation of positive freedom thought. Within these areas, there is a “right” and “wrong” way to experience them. As defined by the United States Wilderness Act:

A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value (Wilderness Act, Section 2. (c)).

The realization of this wilderness experience requires the imposition of a set of values (for example, “Leave no Trace

principles,” the prohibition of motorized and mechanized travel, etc.), the goal of which is to restrict the actions of wilderness enthusiasts—which includes managers, activists, visitors, and all who have an interest in wilderness—such that they realize the *true* wilderness experience (for example, solitude, primitiveness, etc.) and that the experience is available to others. For those that believe in these principles, any deviation from this construct is a direct attack on and a dilution of wilderness (Frome 2005). Consequently, wilderness-based education has historically focused on the task of conditioning would-be visitors to the “appropriate” way to behave in wilderness and making them aware of the benefits associated with doing so (Frome 1997). The result of this mentality is a suite of restrictions and the imposition of an ethic that prescribes a regime and management direction leaving little room for multiple use in comparison with many other public lands. Some of the obvious examples of such restrictions include prohibition of motorized vehicles (for example, snowmobiles, ATVs), mechanized transportation (including mountain bikes), climbing anchors, the adoption of minimum tool requirements for managers (for example, the use of crosscut saws instead of chainsaws), and the implementation of boat launch restrictions, group size limits, user fees, and permits for camping (primarily in National Park wildernesses). Some of the more subtle impositions manifest in the use of technology (for example, GPS, cameras, etc.), inholding access, the creation of safety-based infrastructure, laws and regulations related to the Endangered Species Act, and wildlife manipulation (for example, fish stocking or poisoning). This suite of ethics, regulations, policies, and laws have coalesced into the prescription of a positive doctrine that has perhaps been the key to preserving the relatively natural state of wilderness, but acknowledging that “wilderness” is one of the most heavily restricted land classifications, it would be difficult to claim that they have entirely preserved their wildness in terms of freedom *from* external control.

**Negative Freedom in Wilderness.** While a convincing case can be made that wilderness is nothing more than the embodiment of socially constructed values, where freedom translates to the opportunity to realize those values, negative freedom or the state of being free from external control (for example, imposed values, laws, regulations, etc.) has historically been a dominant theme in wilderness. Negative freedom thinkers such as Hayek and Berlin conclude that the subscription to positive freedom values inherently leads to totalitarianism, whereby society is coerced into adopting the value structure of an elite group (Berlin 2002; Hayek 1944). This “false” freedom, in turn, enslaves society with the “illusion of choice”—society is led to believe in the existence of self-determination, but in reality, their livelihood exists within the bounds of a pre-defined and acceptable direction (Berlin 2002; Hayek 1944; Schmookler 1993).

In its purest form, negative freedom is tantamount to anarchy or the complete absence of governmental control and coercion. In the American West, the romantic myth of the self-reliant pioneer driven only by free will and self-determination—the embodiment of anarchy—served as an inspiration for much of the modern wilderness movement (Cole 1996; Landres and others 2005; Nash 2001). Early wilderness thinkers, including the framers of the Wilderness Act, sought a retreat to that state by constructing wilderness



as a place to escape modern society, its lifestyle, its excesses, its technology, and ultimately its control. Freedom in wilderness, from this perspective, evolved to what the Wilderness Act termed “untrammeled.” More specifically, a wilderness is untrammeled if it “is essentially unhindered and free from modern human control or manipulation” (Landres and others 2005). Most scholars have taken this to refer primarily to ecological processes and systems inside wilderness, but the hands of human control extend well beyond ecology. By seeking to escape the regimentation of society through wilderness and an untrammeled ecological system, society has perhaps been forced to adopt a trammeling regimentation of management practices, laws, and regulations that predetermine acceptable social values within wilderness. We may think of negative freedom, then, to have substantially contributed to the birth of the wilderness movement, but if the myth was to be preserved, a positive doctrine had to be adopted.

The transition of individual freedom in wilderness from a negative to positive construction marks the point at which wilderness became a socially constructed entity and the character of freedom in wilderness changed in a fundamental way. If contemporary wilderness-based conflicts are any indication, though, this transition was not unequivocally accepted. In fact, it may be argued that many (if not most) conflicts concerning wilderness are rooted in divergent views of individual freedom. One issue which serves as an interesting reflection of the paradox of individual freedom in wilderness is subsistence among indigenous constituencies.

## Subsistence in Wilderness: An Example of Freedom-based Conflict

Since the very idea of wilderness was conceived, subsistence has been a contentious issue in terms of its appropriateness within wilderness. On one hand, many wilderness enthusiasts feel that subsistence among communities situated in and around wilderness facilitates the depletion of protected resources and threatens its very character (Redford and Sanderson 2000; Terborgh 1999, 2000; van Schaik and others 1997). Others, however, argue that communities—as both constituents and components of the wilderness landscape—are dependent upon the resources that wilderness provides and that subsistence, which occurred in wilderness before they were ever established or thought of as such, is in fact instrumental to the preservation of a ‘wilderness’ character.

Fundamentally, the question of subsistence is a question of freedom—does subsistence undermine the *freedom to* realize the purposes of wilderness, or is it the manifestation of a community’s self-determination and a reflection of *freedom from* illegitimate constraints? In this section, I approach this question by first defining “subsistence.” I then discuss two regions in the world—Alaska and South Africa—where subsistence has historically been and continues to be a conflictual issue in wilderness. I conclude the section by discussing differences and similarities between the two regions and how each provides insight into the notion of individual freedom in wilderness. Both areas, I argue, demonstrate that freedom cannot be realized in purely positive or negative terms; consequently, what is

necessary is a legitimate breed of freedom for subsistence.

Formal definitions (in other words, those definitions codified in law or policies) for subsistence vary widely throughout the world, but *subsistence* may generally be defined as customary or traditional use of natural resources for personal or family consumption (see for example, ANILCA, U.S. P.L. 96-487 section 803(a)). Such use is typically for basic needs such as food, shelter, and clothing, but may also include the collection of resources used for tools, crafts, and trade. In addition to being defined in terms of what the resources are used for, subsistence has also been defined in terms of its impact on resources. South Africa National Parks, for instance, has defined *resource use*—a broader term, but one that includes subsistence—as “uses or impacts on the scenery, soils, water and nutrient cycles, habitats, flora and fauna, and the balance between trophic levels, in ecosystems” (South Africa National Parks 2002). While the concept can be defined generically, the nature of subsistence around the globe is highly dependent on the regional context. For example, in Alaska, subsistence may involve hunting and fishing, whereas in South Africa, the most popular subsistence activities in wilderness are collection of firewood, grass for thatching, and medicinal plants (Jones and Murphree 2004; Norris 2002; Twine and others 2003). Despite the difference in contextual circumstances, subsistence in both regions has been challenged on the basis of its appropriateness within wilderness.

**Subsistence in Alaskan Wilderness.** Unlike most designated Wilderness Areas in the Lower 48 States (with the notable exception of Wilderness Areas near Native American reservations in the West), communities situated in or around Wilderness Areas in Alaska have an established and necessary, subsistence-based link with wilderness. While hunting, fishing, and the collection of both timber and non-timber forest products are widely permitted throughout the United States’ National Wilderness Preservation System, subsistence in designated Alaskan Wilderness Areas is a frequently debated issue, due to its prevalence and the complicated nature of regulatory guidelines. For example, while motorized transportation in wilderness is strictly prohibited by the Wilderness Act, a provision in the Alaska National Interest Lands Conservation Act (ANILCA), which governs nearly all designated wilderness in Alaska, provides for the utilization of specific types of motorized transportation (for example, airplanes, helicopters, snowmobiles, and motorboats) when engaging in subsistence activities. And, while protecting the subsistence-based livelihoods of rural residents is a recognized purpose of ANILCA, so is the protection of “Wilderness resource values” such as the opportunity for solitude and primitive, unconfined experiences (Sec. 101(a), U.S. P.L. 96-487).

Beyond the qualms that many wilderness enthusiasts have for any type of motorized transportation in designated wilderness, the provision is also seen as controversial in that it is intended to sanction “customary and traditional” subsistence. Defining “customary and traditional” has been problematic, though. While, most wilderness enthusiasts approve of sustainable subsistence in wilderness, many question the appropriateness of motorized transportation for subsistence purposes claiming that many modes of motorized transport commonly employed (for example, snowmobiles) do not constitute “traditional” modes and were not widely or

“customarily” enjoyed at the time ANILCA was promulgated. In effect, they call for more primitive methods of transportation (for example, dogsleds) that ostensibly permit continued subsistence use and are more consistent with the wilderness ethic.

Somewhat surprisingly, within wilderness advocacy circles, the issue of resource depletion is rarely an element of arguments against subsistence activities in Alaskan wilderness (including those that involve motorized transportation). The primary argument against motorized transportation for subsistence in wilderness appears to be based on the negative impact it may have on the social dimensions of wilderness character—specifically the untrammelled, primeval environment and solitude that an area offers (Wood 2004). Subsistence in Alaskan wilderness, then, is primarily a social issue, and one that I argue is best understood in terms of individual freedom. Rural Alaskans utilizing wilderness for subsistence purposes want to enjoy freedom and independence from external constraints that may often impose restrictions on the way in which subsistence is practiced. Collins and Collins (2005: 15), for instance, state that:

The subsistence life flows with the seasons and the harvest varies yearly, but the goals remain the same: to live in the wilderness as independently as possible, touching the land lightly while preserving a way of life that has grown increasingly rare.

While most wilderness advocates approve—in principal—that subsistence is consistent with preserving wilderness character, the question becomes what constitutes “touching the land lightly.” Interestingly, this question is often not one based on resource impacts, but rather the impacts on the social dimensions of wilderness character. Snowmobiles, for instance, create very little biophysical impacts if used in a reasonable way, but they may create substantial social impacts within the boundaries of a wilderness area (Wilderness Watch 2005; Wood 2004).

**Subsistence in South African Wilderness.** Wilderness in South Africa provides a noticeably different context than Alaska, but a similar conclusion. As with indigenous communities in Alaska, there is a long history of resource dependency in South Africa (Child 2004; South Africa National Parks 2002). However, unlike Alaska, indigenous communities situated near parks and areas zoned as wilderness in South Africa enjoy very few opportunities for subsistence in those areas. While there is an increasing tendency to allow for the sustainable harvest of some plants, hunting and fishing is rarely permitted. Another important contextual difference is that while subsistence appears to pose a relatively small threat to biological diversity and resource depletion in Alaska—due in large part, perhaps, to a relatively sparse population—populations near protected areas in South Africa may number in the millions (for example, Kruger National Park), and managers fear that if subsistence were to be permitted, wilderness resources may be quickly depleted (South Africa National Parks 2002). As with Alaskan Wilderness Areas, legislation—such as South Africa’s new Protected Areas Act—specifically sanctions the sustainable utilization of natural resources. Consequently, protected area managers in South Africa are now faced with the important question of determining how that provision is to be implemented and to what extent such utilization will

occur in areas that are either formally zoned as or are *de facto* wilderness.

While the essence of subsistence in both Alaska and South Africa is different, the conclusion is very similar. Subsistence users argue that they have a moral, rational, conventional, and pragmatic right to utilize resources within wilderness, but some wilderness enthusiasts argue that managing agencies have a *duty* to protect the areas from any infringement of character. At the risk of becoming overly reductionist, much of the debate may be understood in terms of a conflict between a negative and positive freedom philosophy of subsistence in wilderness. Contributing to the conflict is the irreconcilability of the two philosophies in their purest forms—the freedom from external constraints required for unfettered subsistence in wilderness cannot exist alongside the socially constructed ethic that governs much of the wilderness in Alaska and South Africa. The severity of this conclusion, though, depends on the extremity of one’s position on the issue of subsistence. Admittedly, few call for unfettered access to and use of wilderness for subsistence purpose. On the other hand, perhaps more call for substantial restrictions and prohibition of subsistence activities within wilderness. Consequently, while the adoption of a purely negative freedom philosophy seems unlikely, it is plausible that in many contexts, a positive doctrine may be adopted such that subsistence is prohibited or severely restricted. In democratic societies, though, policies and management actions are found along a spectrum of freedom, and the question becomes not whether a purely positive or negative doctrine should be adopted, but rather how a legitimate breed of freedom is to be constructed.

## Legitimacy and Individual Freedom and Wilderness

Freedom, perhaps unlike any other idea, inspires passion to the extent that men and women will spend their lives pursuing its realization and they will fight and die for it without ever knowing it in its purest form—dogmatically, they defend and advance ideals that can never be entirely realized. The paradox of individual freedom in wilderness, then, is that while wilderness (both designated and *de facto*) has come to serve as the exemplar of individual freedom in our “natural world,” pure freedom—either positive or negative—in wilderness is an illusion. For instance, in terms of subsistence in wilderness, if we accept the arguments of Malthus and Hardin, negative freedom for individuals in wilderness would likely lead to the irreversible destruction of wilderness. On the other hand, a purely positive construction of individual freedom in wilderness, where top-down constraints are imposed by elite idealists, will inevitably result in social injustice and resentment from marginalized collections of society.

Norton, in *Toward Unity Among Environmentalists* recognized this dilemma. “Freedom,” he argues, “has always been understood as occurring within constraints” (Norton 1991: 252). In general, wilderness enthusiasts recognize this and few argue for either anarchy in or draconian management of wilderness. As Norton and others posit, the difficulty is deciding which activities and what practices should be limited or restricted (Norton 1991; Payne 1995; Thiele 1995). Some



argue that such decisions should be based on sound science, whereas others place a heavy emphasis on social justice or phenomenology. Decisions based solely on one dimension, though, are likely to be inappropriate (Wilshusen and others 2002). Consequently, decision-making—and as a result freedom—is multi-dimensional and context specific (Berlin 2002; Norton 1991; Wilshusen and others 2002). Recognizing this, I argue that evaluation of individual freedom in wilderness must be framed in terms of legitimacy, which “is a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, and beliefs” (Suchman 1995). Environmental scholars have frequently referred to the notion of legitimacy in policy- and decision-making, but few have operationalized or even defined what it means for an action to be legitimate. However, if the purest forms of freedom are widely held as illegitimate in wilderness, we are left only to define a legitimate breed of freedom that will fall somewhere on a spectrum whose endpoints are characterized in terms of positive and negative freedom.

Operationalizing the notion of legitimacy such that it is useful to managers and decision-makers is perhaps a daunting task. However, it is possible to formulate a basic framework that might serve as a guide. Perhaps the first thing to understand about legitimacy is that there are two types: procedural and substantive (Barnard 2001). Procedural legitimacy refers to the appropriateness of the policy or decision-making *process* (for example, inclusiveness, democratic, etc.), whereas substantive legitimacy refers to the appropriateness of a policy's or decision's *implications* for a constituency (Barnard 2001). Recognizing this difference when evaluating the legitimacy of a policy is imperative, since constituencies may often feel that a policy is procedurally illegitimate (for example, constituencies were not involved in the decision-making process), but may agree in principle with the substance of a policy and its implications. Is it possible, for instance, that indigenous communities might approve of and agree with wilderness preservation efforts but condemn such policies on the grounds of procedural illegitimacy? If so, it seems equally possible that managing agencies might fail to identify the source of illegitimacy and incorrectly offer substantive solutions (for example, policy change or status quo) for procedural problems. In many areas around the world where indigenous communities perceive resource use policies in wilderness as illegitimate, we have yet to determine whether subsistence based conflicts are

rooted in substance or process—are the *implications* of a subsistence policy undesirable or is the *process* by which the policy is constructed and implemented?

Operationalizing legitimacy in terms of substance or process, though, reveals only part of the story. Notable scholars such as Weber, Habermas, Rawls, and more recently Barnard have contributed to an understanding of legitimacy by identifying a number of its indicators. While there is wide debate concerning definition and interpretation, there appears to be four main indicators, both in terms of substance and process, that may be employed to evaluate the legitimacy of a policy (table 1).

The purpose of these four points is not to necessarily produce policy, rather they serve as focal points around which policy and management decisions may be evaluated. The assumption is that if a policy or decision is morally, conventionally, rationally, and pragmatically sound, then it is legitimate and desirable.

Subsistence in wilderness provides a useful example to illustrate the utility of the four indicators and how different parties may construct the legitimacy of subsistence in different ways. In Alaska, where subsistence is permitted within wilderness areas, related policies and management efforts—in terms of both procedure and substance—are, for the most part, likely to be construed by rural Alaskans as both morally and conventionally sound. If rural Alaskans are to call into question the legitimacy of subsistence management and policy, it is likely to be framed in terms of rationality and pragmatism. Current policies prohibiting all-terrain vehicle access for subsistence purposes, which may consequently require the employment of more primitive modes (especially during the summer months when snowmobiles cannot be utilized), may not be perceived as rational by rural Alaskans. Furthermore, such restrictive policies may prevent rural Alaskans from harvesting, fishing, or hunting at the levels possible if allowed to use ATVs and, as a result, such policies may not satisfy the pragmatic interests of rural Alaskans. Activists, on the other hand, may view the process and substance of subsistence management and policies as rationally and pragmatically legitimate, but may call into question the moral and conventional legitimacy. For instance, activists may perceive the use of snowmobiles and aircraft for subsistence as morally illegitimate in the face of a moral responsibility to preserve wilderness character. And, some may also question the conventional legitimacy of ANILCA

**Table 1**—Four main indicators used to evaluate the legitimacy of a policy.

• Moral:	Procedural—Is the policy process just and appropriate within the context of management and constituency norms and values?
	Substantive—Are the implications of the policy just and appropriate within the context of a constituency's norms and values?
• Conventional:	Procedural—Does the policy process violate any procedural laws, regulations, policies, or customs?
	Substantive—Does the substance or any implications of a policy violate any procedural laws, regulations, policies, or customs?
• Rational:	Procedural—Is the policy process feasible or logically sound? Does it make sense within the context of what management and constituencies view as rational?
	Substantive—Are the actions that a policy calls for feasible or logically sound? Does it make sense within the context of what management and constituencies view as rational?
• Pragmatic:	Procedural—Will the process meet the interests of management and constituencies?
	Substantive—Will the implications of the policy meet the interests of management and constituencies?

and related judicial decisions that, in effect, usurped the Wilderness Act's prohibition of motorized transportation.

In South Africa, indigenous communities are permitted very little access to many wilderness areas for subsistence purposes. And, as a result, it is conceivable that they perceive current policies as illegitimate for each dimension (though this has not been shown). Historical dislocation and exclusion from national parks (for instance, disenfranchised indigenous peoples) and the prevention of subsistence constituted a moral violation of indigenous rights. Furthermore, the new Protected Areas Act in South Africa provides for resource utilization by indigenous communities and any subsequent prohibition of subsistence by indigenous communities may be perceived as conventionally illegitimate. Rationally speaking, wildernesses and protected areas are perceived as having abundant resources for subsistence based utilization and communities situated along the perimeter in resource-scarce landscapes envision utilization of park resources as a rational solution to scarcity. Similarly, wilderness resources have the potential to meet the pragmatic interests of communities in a way that the landscapes outside of the park within which they live cannot.

Many activists and managers recognize the social injustices of conservation under the apartheid regime and are actively working to redress past wrongdoings. However, for the same reasons evident in Alaska, some feel that the prohibition of subsistence in wilderness areas is a moral responsibility aimed at preserving the character of wilderness. Furthermore, given the large populations situated outside many wildernesses in South Africa, allowing subsistence within such areas is perceived by many as irrational since such use, they argue, would inevitably result in irreversible resource degradation. Crafting and implementing a legitimate policy, then, will require a comprehensive understanding of legitimacy in terms of the four indicators described above. Of particular importance are the different ways in which these indicators are perceived by various wilderness enthusiasts. It is unlikely, for instance, that moral illegitimacies will be resolved with rational, conventional, or pragmatic solutions. Operationalizing legitimacy is not an easy or straightforward task, but doing so will likely contribute to fewer conflicts and, at a minimum, a more thorough understanding of the nature of wilderness-based conflicts.

## The Implications of Freedom and Legitimacy for Wilderness Management and Stewardship

In *Nature and Freedom: A Heideggerian Critique of Biocentric and Sociocentric Environmentalism*, Thiele advocates a Heideggerian construction of freedom where freedom is the release of that which is the "other," that is, disclosing the world in a way that preserves its characteristic difference (Thiele 1995). Freedom, then, is the "letting be" of what is" (Heidegger 1956: 333-334). In terms of wilderness, this freedom translates to humans exercising restraint in letting wilderness be what it is—in essence, preserving its character. And, while Thiele proposes that this construction goes a long way to solving the irreconcilability of positive and negative constructions of freedom, we are left to wonder who will define what wilderness "is"; will it be those whose

livelihoods are dependent upon wilderness, activists calling for centralized protectionism, or entrepreneurs who see wilderness as an important extractive resource?

As I've argued above, I believe that our contemporary conceptualization of wilderness and pure forms of freedom are incommensurate and that freedom may only be experienced through the lens of legitimacy. Too often, wilderness conflicts are understood as simply zero-sum events characterized by extreme positions, which I have argued are best understood in terms of positive and negative freedom. By conceptualizing freedom in terms of legitimacy, wilderness enthusiasts look to the process and substance of wilderness policy in terms of its moral, rational, conventional, and pragmatic consequences rather than the degree to which it satisfies particular interests or doctrines. Granted, these consequences may or may not satisfy certain held interests, but by understanding wilderness conflicts in terms of these four indicators of legitimacy, wilderness enthusiasts may identify the inhibitors of a desired policy and more effectively construct potential resolutions. For instance, in southern Africa there is a high demand for medicinal plant harvest in wilderness. In response, managers have proposed the creation of nurseries immediately outside the wilderness where medicinal plants would be grown and provided to surrounding communities. Provided there was enough supply to meet the demand, this would seem to solve the problem and, from the perspective of managers and decision-makers, would seem to be a legitimate resolution. Anecdotal evidence suggests, though, that surrounding communities would likely consider this policy illegitimate, since they feel that plants harvested in a nursery do not possess the spiritual quality of those found in wilderness. Consequently, what seems to be a rational and conventional solution is in fact illegitimate, since it does not meet the pragmatic interests of communities and is counter to their morality.

The value, then, of understanding wilderness-based conflicts in terms of freedom and legitimacy is that the fundamental human value of freedom may be operationalized such that potential resolutions may be evaluated through a framework that defines the boundaries of a set of acceptable and desirable resolutions. Also, framing wilderness-based conflict in terms of legitimacy may prevent the application of misguided resolutions (for example, attempting to solve moral problems with rational answers) through the identification of the elemental components of conflict.

## Conclusion

The challenging part of wilderness management is that we seem to operate in the gray matter lying between the purest forms of positive and negative freedom. We want to be free from societal constraints, but we need to be heavily constrained in order to do so. Many wilderness enthusiasts claim that they are free from coercion in designated wilderness; granted, I am one of them. But, it would seem that we often fail to recognize that the benevolent dictator is a despot to some. Wilderness enthusiasts will ardently defend the notion that an unconfined freedom can be experienced in wilderness, and for many this may be true. However, when the quality of freedom is incorporated into the wilderness discourse, it sends a mixed message to those whose idea of

freedom is different than the positively constructed version of the so-called purists. It is perhaps true that if wilderness offers an escape from the façade of society and we are to have wilderness in a “natural” state, we cannot escape the regulatory and structural frameworks that reflect societal values. However, in doing so, we must also call into question the legitimacy of those values and governance structures if the character of wilderness is to indeed be preserved.

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# NatureLinks: Protected Areas, Wilderness, and Landscape Connectivity in South Australia, Australia

Adrian Stokes  
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**Abstract**—The South Australian Government has recognized that, despite an extensive protected area system (26 percent of the State), Statewide ecological goals will not be achieved on protected areas alone. The NatureLinks model promotes protected areas acting as “ecological cores” in landscapes managed with conservation objectives. To implement this model, partnerships with other landholders to develop goals and implement actions are essential. This paper discusses the setting of protected area goals and actions that are nested in broader landscape goals, using areas of high wilderness quality as examples. In fragmented landscapes where protected areas are surrounded by agricultural land and numerous neighbors, challenges arise when balancing wilderness management with acting as a “good neighbor”; the example of fire management is discussed. In a large reserve of very high wilderness quality in which mining is permitted, mining has now been excluded from 503,000 ha/1,242,940 acres; this area can now be managed as a core, and partnerships with mining companies enable broader landscape goals to be pursued. The compatibility of wilderness quality and Aboriginal traditional use is discussed; cooperative management with Aboriginal people enables the continued use of the Unnamed Conservation Park by traditional owners in a manner consistent with their traditions and the protection of biodiversity and wilderness quality.

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## Introduction

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Large areas of South Australia have very high wilderness quality according to the assessment undertaken by Lesslie and Maslen (1995). This assessment emphasizes the extent to which locations are remote from, and undisturbed by, the influence of modern technological society. Areas of high wilderness quality are particularly extensive in the western regions of the State where there is little history of pastoralism or vegetation clearance for agriculture, and large areas are held under Aboriginal freehold.

In the southern, temperate regions of South Australia, less than 30 percent of the native vegetation that was present 200 years ago remains (State of the Environment Report 2003). The remnant vegetation occurs as fragments in an agricultural matrix. Regional landscapes vary greatly in the extent of cover and connectivity and the integrity of ecologi-

cal function, and some large remnants in these regions score highly in Lesslie and Maslen’s (1995) wilderness quality rating.

South Australia has an extensive protected area system—26 percent of the State’s land area (approximately 26 million ha/64,247,400 acres) is in protected areas. Areas of high wilderness quality are protected in nine Wilderness Protection Areas (WPAs) totaling 683,000 ha/1,687,730 acres declared under the *Wilderness Protection Act 1992*. WPAs provide the highest level of protection of reserves under South Australian legislation. Many other areas of high wilderness quality are protected in National Parks, Conservation Parks and Regional Reserves declared under the *National Parks and Wildlife Act 1972*. Regional Reserves, which are established to protect biodiversity while permitting utilization of the natural resources of an area, cover 10 percent of the State and comprise 39 percent of the terrestrial protected area system. In addition, 311,200 ha/768,992 acres (5.2 percent) of the State’s coastal waters are contained in marine protected areas, mostly established under the *National Parks and Wildlife Act 1972* and *Fisheries Act 1982*. The South Australian Department for Environment and Heritage (DEH) is responsible for the establishment and management of the majority of protected areas in the State.

The South Australian Government recognizes that even a protected area system of this extent will not achieve the objectives of conserving and restoring South Australia’s ecological systems. Protected areas play a critical role in providing core conservation management areas, but partnerships with other landholders are essential if Statewide conservation objectives are to be achieved.

This paper outlines the South Australian Government’s approach to achieving Statewide conservation objectives through a landscape approach to biodiversity conservation, and explains the role of protected areas, and specifically areas of high wilderness quality, in this approach.

## NatureLinks

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To provide a framework for planning and achieving ecological restoration at landscape scales, the South Australian Government has developed *NatureLinks: Implementing the WildCountry philosophy in South Australia* (DEH 2003). This builds on the landscape scale *WildCountry* model promoted by The Wilderness Society in South Australia (Mackey and others, in press). *WildCountry* is itself modeled on the North American Wildlands Project (Noss 1992).

By acknowledging that landscape scale ecological outcomes require landscape scale conservation management,

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*NatureLinks* provides a model for integrating activities across tenures and taking account of society's social, cultural and economic aspirations in working towards ecological outcomes.

The goal of *NatureLinks* is:

To enable South Australian species and ecosystems to survive, evolve and adapt to environmental change (DEH 2003).

This is to be achieved via an objective of:

Connected habitat across South Australia, comprising a comprehensive system of core protected areas buffered and linked by lands managed for conservation objectives (DEH 2003).

This model enshrines the role of protected areas as ecological cores in landscapes managed with conservation objectives.

*NatureLinks* provides a scientific framework: it synthesizes key principles and findings from landscape ecology and restoration ecology to establish six "*NatureLinks* Principles." These principles are being integrated into State and regional biodiversity planning processes and are intended to underpin biodiversity conservation projects undertaken in South Australia. The six principles are (DEH 2003):

1. Biodiversity conservation activities should be planned at a landscape scale. Landscape connectivity is critical to maintaining viable populations and enabling ongoing adaptation of species and ecosystems. Individual projects may be small in scale but should form part of a bigger picture.

2. Habitat restoration should be undertaken at large spatial scales. Habitat restoration, including re-establishment of native vegetation where it has been lost, is a key component of ecological restoration and needs to be undertaken at appropriate scales that consider population viability and landscape connectivity.

3. Species in fragmented landscapes should be managed as metapopulations. Populations must be sufficiently large and contain enough genetic variability to resist local inbreeding or extinction due to chance events such as flood or fire, and to enable ongoing adaptation. Many habitat remnants in fragmented landscapes may not be able to support viable populations. It is therefore necessary to consider viability at scales broader than individual remnants and to manage species as metapopulations—that is, systems of subpopulations linked by the exchange of individuals and/or genes. Landscape connectivity is a key attribute to consider in metapopulation management.

4. An "ecological community" approach to biodiversity conservation should be encouraged. An ecological community is a characteristic suite of interacting species that are adapted to particular physical, chemical and biotic conditions. Projects that focus on management and restoration of ecological communities, including threatened ecological communities, deliver positive conservation outcomes for many of the constituent species and thereby represent good cost efficiency. An ecological community approach should also ensure that managers consider the ecological processes and interactions that are necessary for ongoing function and adaptation.

5. Ecological restoration should be planned over long time scales. Recovery of the most degraded ecological systems will take a very long time and expectations of short-term

outcomes must be realistic. Although short-term projects should be encouraged, they should be planned in the context of larger scale, longer-term ecological objectives.

6. Biodiversity conservation activities should be underpinned by sound ecological knowledge. Activities should be based on an understanding of the ecological systems being managed or restored. Our understanding is far from perfect, therefore, projects should be planned and implemented in an adaptive management framework according to best available knowledge and current "best practice" standards.

## Climate Change

The *NatureLinks* model promotes large-scale connectivity and ecological management to maximize the evolutionary capacity of species and ecosystems to adapt to environmental change. This approach will also underpin South Australia's strategy for managing the impacts of climate change on biodiversity and protected areas will play a key role as "ecological cores" in this strategy.

Ecosystem resilience is another key concept driving South Australia's measures to mitigate climate change impacts on biodiversity. By managing or excluding threatening processes, we may improve the capacity of ecosystems to respond autonomously to stresses such as climate change. Maintaining the ecological integrity of large areas of high wilderness quality through the exclusion of threatening processes is considered an important component of the State's approach to biodiversity conservation. Such "single use" areas provide valuable cores for larger scale objectives of managing for resilience and evolutionary capacity.

## Development of a Protected Area Strategy

The South Australian Government is committed to achieving a comprehensive, adequate, and representative terrestrial protected area system. Targets include a minimum 15 percent protection of each of the State's 17 terrestrial bioregions and 80 percent of all environmental associations represented in the protected area system (DEH 2004a).

Recent planning for achieving a CAR Reserve System is increasing the focus on the role of protected areas as "ecological cores" in achieving Statewide and landscape scale ecological goals. This informs the process of identifying priority locations and opportunities for new protected areas, and also drives the development of protected area management goals that are nested within broader landscape goals and management initiatives.

The Government is also committed to the establishment of a South Australian Representative System of Marine Protected Areas (SARMPA) (DEH 2004b). Nineteen new marine parks, to complement existing marine protected areas, are to be established by 2010. The new marine parks will be zoned for multiple-use. Zones will range from "restricted access" and "sanctuary" areas to protect and conserve biologically significant habitats in a pristine condition, through to "general managed use" areas to provide for ecologically sustainable use of marine resources. Collectively, they will form a network to protect and conserve representative examples of the State's eight marine bioregions (DEH 2004b).

This focus on a landscape approach to protected area management dictates that we must work with other land managers in both development of goals and implementation of actions. These goals and actions vary greatly according to the landscape in which a reserve is set; terrestrial reserves that are located in an extensively cleared agricultural landscape will have different goals and confront different challenges to those located in continuous, intact vegetation. The following case study provides examples of these differing circumstances.

## The East Meets West Project

A number of large-scale projects are being developed under the *NatureLinks* model. A critical challenge being addressed in these projects is setting conservation management regimes on reserves and wilderness areas and working with adjacent landholders to develop complementary management without compromising economic, social or cultural aspirations.

The East meets West project aims to ensure the survival and ongoing adaptation of species and ecosystems in the fragmented landscape in the agricultural zone of Eyre Peninsula and the continuous vegetation that runs to the north of Eyre Peninsula through the Great Victoria Desert into Western Australia (fig. 1). The project area covers many millions of hectares.

This paper uses East meets West as a case study, and focuses on management, planning and key partnerships associated with several areas of high wilderness quality within the project area.

**Hincks and Hambidge WPAs.** On the central Eyre Peninsula approximately 30 percent native vegetation remains, including two large remnants protected as Hincks and Hambidge Wilderness Protection Areas (66,934 ha/165,398 acres and 38,087 ha/94,115 acres respectively; fig. 1). Several other protected areas exist in the region including Bascombe Well Conservation Park (32,141 ha/79,422 acres), Kulliparu Conservation Reserve (13,567 ha/33,525 acres) and several Heritage Agreements (private land protected by a covenant under the *Native Vegetation Act 1991*). A large amount of native vegetation on private land provides some degree of linkage and buffering to these protected areas. The matrix in which this vegetation is set is predominantly agricultural land used for cropping/grazing enterprises. Protected areas in the region provide core areas that are managed with biodiversity conservation as the primary objective; surrounding areas are managed primarily for primary production with management activities contributing to landscape ecological objectives.

Within the remnant vegetation, threats to biodiversity include introduced plants and animals (including the European Red Fox *Vulpes vulpes* and European Rabbit *Oryctolagus cuniculus*). Effective management of these requires partnerships with landholders. The State Government is involved in two major community-based initiatives that encourage and support land managers to participate in integrated landscape-scale management of pests in central Eyre Peninsula. These West Coast and Eastern Integrated Pest Management programs involve more than 400 landholders, with activities occurring on and off reserves.

In addition to managing threats to existing vegetation, opportunities are sought to improve cover and connectivity through strategic reestablishment of native vegetation for buffers and linkages.

Under the *Wilderness Protection Act 1992* and the statutory Wilderness Code of Management (DEH 2004c), WPAs should be managed “to maximize the naturalness and remoteness, in other words, the wilderness quality, of wilderness areas.” For WPAs such as Hincks and Hambidge that are surrounded by agricultural land and numerous neighbors, this provides a number of challenges, perhaps most exemplified by the issue of fire management.

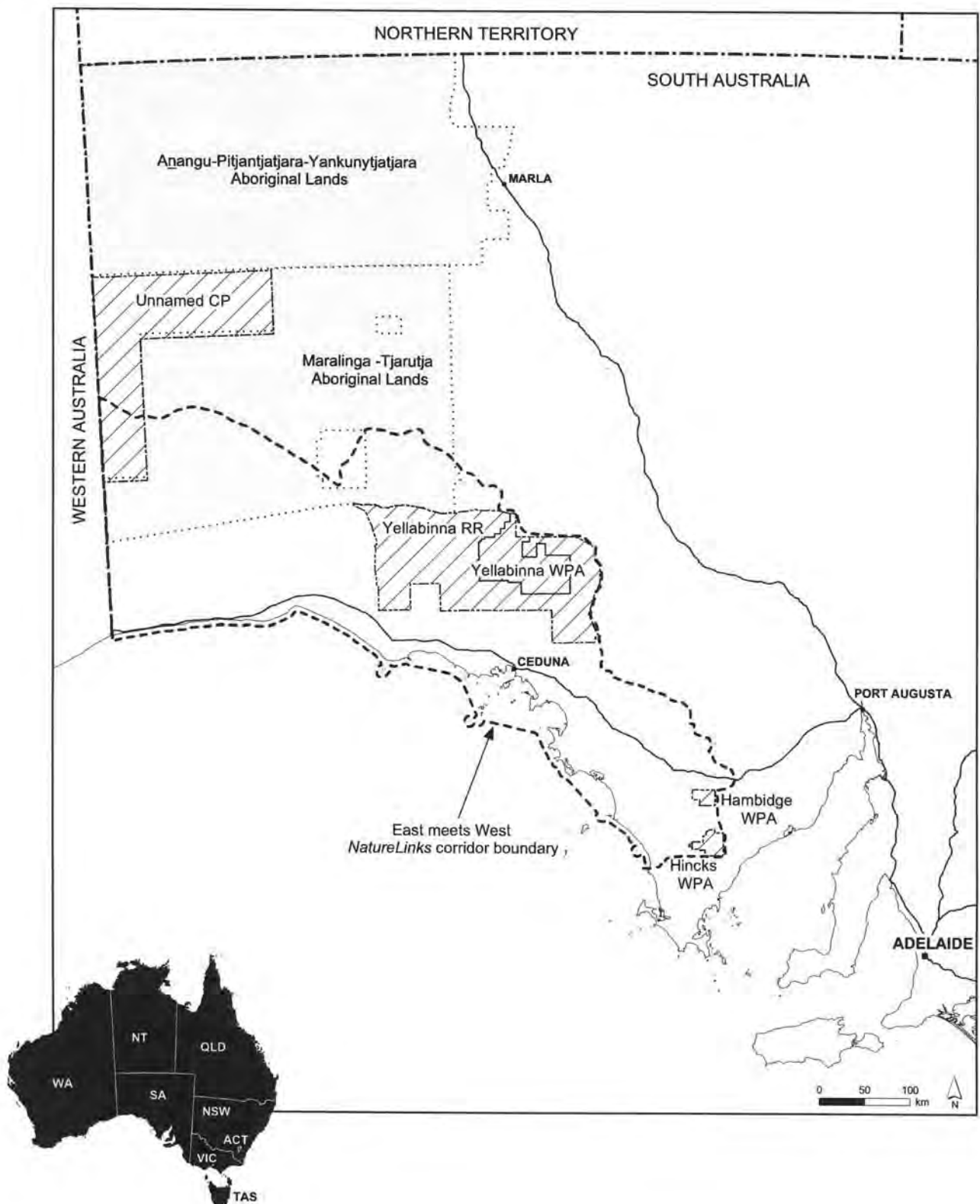
Wildfires on Eyre Peninsula can be large in scale and extremely destructive. An extensive and intense wildfire in 2004 caused loss of life and widespread destruction of property on lower Eyre Peninsula. In 2001, a single fire burnt 75 percent of Hambidge WPA over a 9-day period. DEH has responsibility under the *Country Fires Act 1989* to minimize the risk to life and property arising from fires on protected areas. To achieve this, fire suppression and prevention activities will at times be necessary. On WPAs, the methods used will be, wherever possible, those which have the least long-term impact on wilderness quality (DEH 2004c).

From an ecological perspective, fire is an inherent process in the ecosystems of Eyre Peninsula (and most of Australia) and species have evolved differently in terms of their response to fire. For many plant species fire is required for recruitment, whereas in many other species fire can kill adults and seeds and result in local extirpation. Fauna species have also evolved differently; for example, many species prefer habitat structure and composition associated with recently burnt areas whereas many others require “long unburnt” habitat. As a general rule of thumb, a mosaic of ages since fire is desirable to promote habitat and species diversity. Achieving this and other specific ecological objectives (such as protection of known sites containing threatened species) on protected areas, including WPAs, may require deliberately lit (“prescribed”) fire. Although such active management may appear to compromise pure perceptions of wilderness quality, it may be necessary to ensure that these reserves are managed with realistic ecological objectives.

Fire management in Hincks and Hambidge WPAs requires balancing these issues: protecting life and property, actively promoting habitat and species diversity, and protecting wilderness quality. The relationship of protected area managers with the local community and the Country Fire Service is critical to achieving this balance; a shared understanding of the objectives of all stakeholders and a clear awareness of operational procedures and responsibilities is essential.

**Yellabinna WPA.** North of Eyre Peninsula lie the Yellabinna dunefield and the Great Victoria Desert, comprising several million hectares of uncleared vegetation extending into Western Australia (fig. 1). Much of this vegetation is of very high wilderness quality (Lesslie and Maslen 1995).

Until recently, the Yellabinna Regional Reserve (RR) covered some 2 million ha/5 million acres of the Yellabinna dunefield. This “multiple use” reserve located in high quality wilderness is available for exploration, prospecting and mining under the *National Parks and Wildlife Act 1972* and State mining legislation.



**Figure 1**—The East Meets West project boundary and key locations in the region. Key: CP—Conservation Park; WPA—Wilderness Protection Area; RR—Regional Reserve. Inset map of Australia showing States (South Australia—SA; Western Australia—WA; Queensland—QLD; New South Wales—NSW; Victoria—Vic; Tasmania—Tas) and Territories (Northern Territory—NT and Australian Capital Territory—ACT).



Assessment of the Yellabinna region determined that there was an “extremely large area” of wilderness within the Yellabinna RR that met the criteria of the *Wilderness Protection Act 1992* (Wilderness Advisory Committee 2004). This assessment was balanced against the high geological prospectivity of the region, and an area of 503,000 ha/1,242,940 acres was delineated and gazetted in 2005 as the Yellabinna Wilderness Protection Area in which exploration and mining will not be permitted.

The new Yellabinna WPA is almost fully bounded by the remaining portion of the Yellabinna RR and an additional 3 million hectares/7,413,161 acres of contiguous reserves in which mining is permitted (fig. 1). This provides opportunities to establish large-scale ecological objectives with the WPA forming the core and the multiple use reserves a buffer. Partnerships with mining companies will develop exploration and mining practices that minimize impacts on ecological values outside of the core areas.

Fire management is less complex in Yellabinna WPA. Although individual fires may burn large areas, they are considered unlikely to burn a high percentage of the reserve and the region contains a mosaic of fire ages (Wilderness Advisory Committee 2004). Furthermore, there are few properties and assets near to the WPA, therefore threats to life and property are unlikely. Consequently, fire suppression activities and prescribed burning will rarely be contemplated.

The few access tracks in the Yellabinna region have long been favored recreational destinations for the small communities in the far west of South Australia. Yellabinna WPA management will involve working with the community to determine how to offer a quality visitor experience while maintaining the wilderness quality of the WPA.

**Unnamed Conservation Park.** North of Yellabinna, in the Great Victoria Desert in western South Australia, are the Maralinga-Tjarutja and Anangu-Pitjantjatjara-Yankunytjatjara Aboriginal Lands (fig. 1). The local Anangu people have occupied these lands for at least 39,000 years and still maintain strong cultural and spiritual connections with this country.

According to the definition of wilderness quality as “the extent to which locations are remote from, and undisturbed by, the influence of modern technological society,” this area is of very high wilderness quality. The region includes the Unnamed Conservation Park (CP), a 2.1 million ha/5.2 million acre reserve of extreme remoteness and naturalness (fig. 1).

Traditional aboriginal land management practices are important factors influencing many species and ecosystems in the far northwest of South Australia. An example of this is the use and management of fire. Traditional patch burning by the Anangu people resulted in frequent small fires that created a tight mosaic of vegetation ages since fire, creating a heterogeneous landscape in which very large fires were rare (Morelli 1992). The sizes of the mosaic patches are believed to have been typically between a few tens of hectares and a few thousand hectares (Robinson and others 2003). A changed lifestyle for the Anangu since contact with non-Aboriginal Australians means that patch burning is no longer widespread, the fine mosaic is being lost, and there is widespread build up of fuel and the potential for consequent massive catastrophic fires that may burn up to several hundred thousand hectares in a single event

(Robinson and others 2003). Improved fire management in the far northwest will seek to protect significant cultural sites, protect significant species populations or habitats, and instigate measures such as patch burning and firebreaks to limit the spread of future fires.

In 2004, the *National Parks and Wildlife Act 1972* was amended to create an innovative framework for the cooperative management of parks with Aboriginal people in South Australia. The framework enables the establishment and cooperative management of national parks and conservation parks over both Crown (Government-owned) land and Aboriginal freehold land (see Leaman 2004). The Unnamed CP was subsequently handed back to the traditional Aboriginal owners by the South Australian Government in 2004, while maintaining its status as a conservation park and retaining its pre-existing no mining regime and public access rights. The park is now managed by a traditional owner majority board in accordance with a co-management agreement between the State Government and the traditional owners.

The Unnamed CP is of significant biological and conservation value and of great cultural significance to its traditional Aboriginal owners. The philosophy for cooperative management of Unnamed CP explicitly acknowledges the compatibility of continued use of the Park by Anangu people in a manner consistent with their traditions and the protection of biodiversity and wilderness quality. Cooperative management enables the Unnamed CP to be managed as a core with clear biodiversity goals, integrated with cultural aspirations and initiatives on the Park and on adjacent Aboriginal lands.

The inclusion of provisions for the establishment and cooperative management of both Crown and Aboriginal-owned parks creates opportunity for further partnerships on Aboriginal lands within the East meets West project. Other groups have expressed interest and the State Government is working closely with Aboriginal people to identify additional opportunities for cooperative management to progress landscape scale ecological objectives within the project area.

**Marine Protected Areas.** While the focus of East meets West is primarily terrestrial, marine protected areas established over adjacent coastal waters extend the landscape approach into the marine environment.

The Great Australian Bight Marine Park (168,320 ha/415,928 acres) extends approximately 300 km (186 miles) east from the South Australian-West Australian border and encompasses all State waters (out to the 3 nautical mile State limit). The region has considerable importance for conservation. The marine park protects the most significant Australian breeding and calving sites for the nationally endangered Southern Right Whale (*Eubalaena australis*), habitat for a number of other whale species, and breeding populations of the New Zealand Fur Seal and Australian Sea Lion (Edyvane 1998). Commercial fishing is permitted in sections of the park outside the whale breeding season. Mineral and petroleum exploration and extraction is not permitted. Due to its remoteness and limited access, visitor activity in the marine park is largely shore-based, with the main focus on whale viewing.

The Great Australian Bight Marine Park is contiguous with the Nullarbor National Park (582,673 ha/1,439,816 acres), Wahgunyah Conservation Park (39,906 ha/98,610 acres) and the Yalata Aboriginal Lands (456,300 ha/1,127,542 acres).

The coastline contains “uninterrupted coastal vistas and areas of very high scenic value in a remote and relatively pristine wilderness” (Edyvane 1998). Management objectives include protection of the natural and cultural values of the landscapes and seascapes (DEHAA 1998), and the marine park and adjacent coastal lands are managed as an integrated coastal-marine region.

Southeast of the Great Australian Bight Marine Park, but within the broader East meets West project area, a further four marine parks are proposed under the SARMPA (DEH 2004b). These proposed parks will be centered on offshore islands (most of which already have protected area status) and coastal embayments. These marine parks will further contribute to *NatureLinks* and broader landscape-seascape connectivity.

## Conclusions

The concept of an integrated landscape scale approach, particularly the *WildCountry* model promoted by The Wilderness Society, has been adopted by a number of non-Government organizations in Australia. However, South Australia is the first Government in Australia to formally build such a framework into policy and planning instruments. The adoption of *NatureLinks* by the State Government enables landscape ecology principles to be built into key State planning and natural resource management processes. The value of this is demonstrated by the renewed focus of the State’s protected area strategy on the role of protected areas as cores in achieving goals of landscape scale restoration and adaptation to climate change.

State Government will not be able to deliver landscape scale goals in isolation. Government plays a key role in coordinating and facilitating planning and implementation, and partnerships such as those described in this paper will be required across South Australia if Statewide and landscape scale ecological goals are to be achieved.

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# Conservation Planning in a Tropical Wilderness: Opportunities and Threats in the Guianan Ecoregion Complex

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Tom Allnutt

**Abstract**—With increasingly limited resources, conservation planners are challenged to provide policymakers with conservation portfolios that: 1) are representative of all important biodiversity features, 2) incorporate socioeconomic data, 3) are flexible to change, 4) require less financial resources over the long term, 5) overcome substantial information gaps, and 6) are developed across disciplines to maximize efficiency and stakeholder buy-in. The practice of setting priorities for conservation in a largely undisturbed region differs greatly from methods commonly applied to highly disturbed, human-dominated regions. The resulting portfolio should include a spectrum of conservation tools including protected area and policy recommendations, trade-off mechanisms, buffer zones, and conservation incentives encouraging certain land uses. Here we present a method for developing a conservation biodiversity vision and action plan, based on lessons learned in a planning process for the Guianan Ecoregion Complex that combined the input of regional stakeholders and local experts with geographic information systems (GIS) and computer-assisted decision-support systems (DSS). We highlight how we addressed some of the challenges associated with conservation planning in a tropical wilderness and offer reflections on how our methods could be modified to suit other areas.

## Why Plan for Wilderness?

Wilderness is a concept of the human mind. In many cases it's what is left—the pieces of nature that endure and give us hope and inspiration. Scales of time and space relevant to the observer and/or the question at hand determines the definition of wilderness. In the context of conservation planning, wilderness can be defined as a spatial extent large enough to conserve viable populations of species with large area-requirements, species migrations, and genetic diversity, ecological processes and ecosystem services. This definition

is not without its problems and even more so in tropical areas where many species remain undescribed, many areas are entirely unexplored and very little is known about the species and areas that are described. Additionally, in many developing countries biodiversity planning is neither a priority nor a national concern as efforts are focused on more pressing needs such as drinking water, food and disease.

It would thus seem that any planning effort would be frivolous under these conditions; that perhaps we don't need to worry about these areas yet since they are currently still large and unfettered. It is further complicated when wilderness areas stretch across national boundaries, when policy and legal mechanisms become plural, and as is the case in the Guianas and elsewhere, where borders remain disputed. It is our experience that planning for conservation in tropical wilderness areas can provide a proactive tool for encouraging cooperation among development and conservation interests. Biodiversity goals, in addition to environmental services and development needs, can be met simultaneously when trade-off mechanisms are developed by regional stakeholders and experts. There is an intrinsic link between environmental and human health and we feel that proactive planning can also be a useful tool for creating future scenarios based on development objectives to explore potential impacts not only on the environment but on water quality, pollution, etc.

Conservation science has been termed a crisis discipline, and often reactive or even retroactive to immediate threats to species and landscapes. Crisis management can be very costly and is often a cause for conflict between development, industry and conservation interests. With limited time and money, proactive planning in tropical wilderness areas can be a means of engaging the stakeholders prior to a crisis, and can provide a framework for working towards a long-term multi-disciplinary "vision" for biodiversity while there are still options. We will define a biodiversity vision, in this case, on what we want the planning area to look like in say 50 years—ideally with its full complement of species and habitats. This also reinforces the need to take a "whole systems" approach to planning, that is to incorporate and integrate terrestrial, freshwater and even marine science into the analysis, recognizing the connectivity and flow between these realms.

For example, illegal gold mining is a terrestrial activity where pollutants primarily impact the freshwater environment. When conducted in the headwaters, mercury from gold mining operations can bioaccumulate in invertebrate and

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fish tissues progressively moving downstream, thus having an increasing impact moving up the food chain and down stream. Ultimately, the end consumers, for example, giant otter (*Pteronura brasiliensis*) and humans living along these rivers, suffer the most even though they are far removed from the source of the contaminant. There is a need to think about the whole system in the context of planning, and to use water as a planning template as it provides ecological connectivity from mountains to reefs.

In tropical America, as in many other areas, wilderness areas are rarely without a long history of human presence. In the Guianas and elsewhere, forest dwelling people have existed in the forests for thousands of years and are certainly part of the wilderness (fig. 1). However, increasingly these cultures are exploited by logging and mining companies, converted by missionaries, and are adopting modern lifestyles. What follows is loss of cultural and sustainable traditional practices, adaptation to permanent extractive settlements, increasing populations, use of firearms, and changes in world-view. Resulting from these changes, permanent forest villages are surrounded by so-called “empty forests” (Redford 1992). This is a further challenge to conservation and indigenous livelihoods, and reiterates the need to include indigenous peoples in the planning process as regional stakeholders and opportunities for conservation. These issues further complicate

the definition of wilderness; however, in the planning sense wilderness remains a concept, a target of sorts.

## Experts and Software

There is a growing body of literature describing systematic conservation planning versus ad hoc reserve design (Margules and Pressey 2000) and the need to involve experts and stakeholders at all stages of the planning process (Cowling and Pressey 2003). Software on the other hand incorporate reserve selection algorithms, which are mathematical tools for translating the “current state of knowledge” for a region into a systematic context from which data can be analyzed and iteratively modeled for representing biodiversity (Margules and others 2002; Pressey and Cowling 2001). Pearce and others (2001) describe a process for mapping vegetation with expert opinion, and readers are referred to Faith and others (2003), Ferrier (2002), and Pressey and others (1994, 1999, 2003) for further discussion on methods and examples of systematic conservation planning.

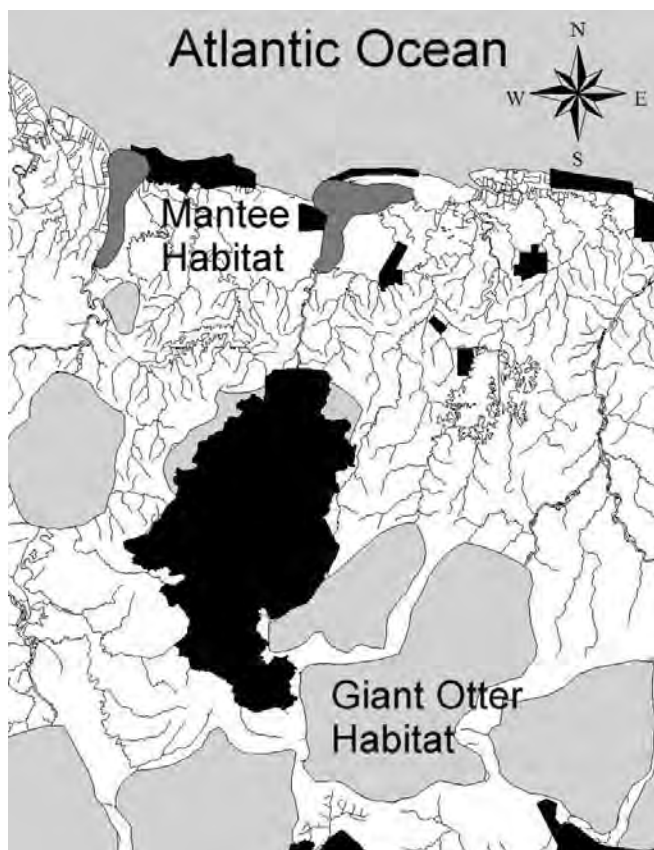
Software in this sense is simply a means to an end; it ensures that the planning process in question meets the representation and other goals set forth, is unbiased and yet uses expert knowledge to drive target setting, minimum areas requirements, etc. Setting the overall goals and specific site-selection targets and criteria, as well as developing the datasets, are the job of the experts. Stakeholders become involved as a steering mechanism for the process, determining feasibility, trade-offs and as a mechanism to link the science to policy. Software can provide insightful analysis and iterative scenarios based on information and can be a means of exploring relationships between development, policy and biodiversity conservation options. The information that goes into the software is derived first from the literature, but then relies entirely on the knowledge (data) and opinion (experience) of regional experts. From our experiences in the region we feel that it is critical to use both expert opinion and knowledge to fill data gaps and to drive the selection process.

It is beyond the scope of this article to present the results of the biodiversity vision and action plan discussed; these will be posted on the web site for WWF-Guianas (<http://www.wwf-guianas.org/>) following peer-review. Following, we present a brief and simplified example of the software results using actual data and analysis in MARXAN software (<http://www.ecology.uq.edu.au/marxan.htm>) on a theoretical landscape to demonstrate the tools and process in a nutshell. In all maps presented below, the black areas represent protected areas, and shades of gray represent data and analysis results. Because a goal of this exercise is to develop a planning process that takes into account both conservation and development targets, we use a variety of data sets to map species distributions that are then reviewed and modified by experts. In order to ensure that the software selected important areas for giant otter (*Pteronura brasiliensis*) and West Indian manatee (*Trichechus manatus*), for example, we drew upon expert knowledge to map critical areas as targets for conservation of these species (fig. 2).

Recognizing that not all areas are equally attainable or desirable in a conservation portfolio, we attempted to map the “cost” of the landscapes in terms of meeting the targets



**Figure 1**—A young Wayana girl from Apetina, Suriname, holds a brown capuchin (photo by J. Schipper).

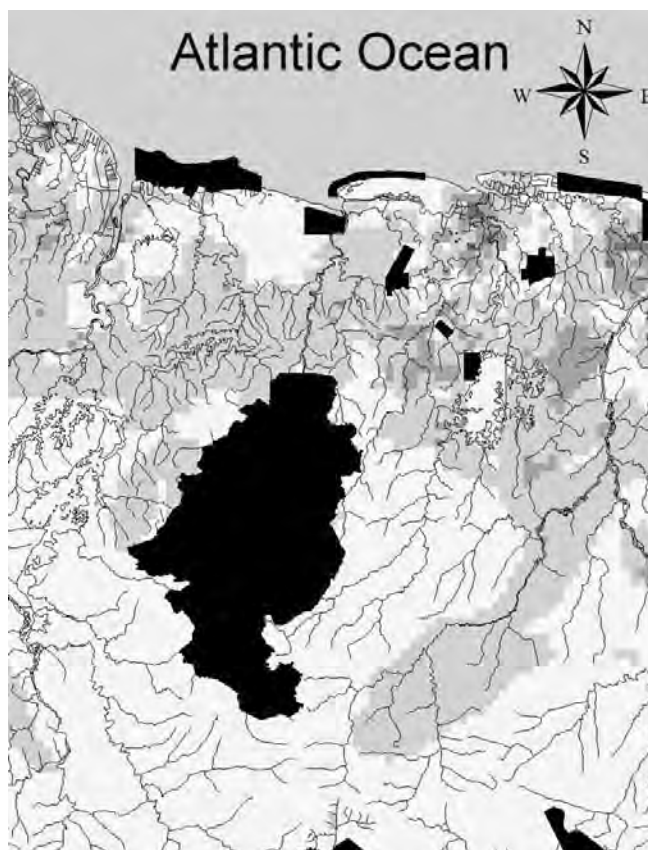


**Figure 2**—Two examples of species data used for demonstration analysis: areas along the coast are important manatee habitat (dark gray) and areas in the south are important otter populations (light gray).

for biodiversity. In order to direct conservation targets away from regions important for development (and from cities, highways, etc.) we used a cost surface (fig. 3). In this sense the “cost” steers the software away from high conflict areas so that targets are first met in areas with less conflict to development (but ensures that they are still met). This cost map can be modified iteratively in the future as lands are developed or protected. As goals are met and opportunities are lost, the cost surface will provide new options and help us meet biodiversity conservation targets away from developed areas, and can help release conflict without compromising the vision.

Finally an “irreplaceability surface” is created that shows a given planning unit’s relative importance for meeting targets. Highly irreplaceable planning units must always be selected to meet targets; they cannot be replaced. Only some planning units with lower irreplaceability values are needed to meet targets, hence there is more flexibility in these areas to meet targets (fig. 4). This final map depicts areas most necessary to meet the conservation targets. Notice how the selection for irreplaceable planning units steers away from high cost areas and attempts to connect current protected areas.

The importance of this process is its iterative and flexible nature; as targets are met, the software can be rerun to find the next best solution. In addition, by incorporating



**Figure 3**—Cost surface: major cities (dark gray) and human populations along the coast and major river systems (light gray).

future development into the cost surface, we can predict the effect on optimal conservation areas for the future. In the Guianas, for example, we gave forestry and mining concessions, developed or not, an equal cost so that the software would first find conservation solutions away from areas already tied into economic development. It is important also to mention, however, that if solutions cannot be found elsewhere (in other words, the area in a mining concession is irreplaceable) the software will also make us aware of that. If this is the case, we must then use this information to explore trade-offs and approach the mining company to seek alternatives. These are just a few of the many uses of spatial decision-support systems such as MARXAN, C-Plan, SITES, SPOT, PANDA, etc.

## Introduction to the Guiana Ecoregion Complex Planning Process

Systematic and expert driven planning for biodiversity conservation can be an important tool for conservation areas around the world, and is useful both in human dominated and wilderness areas. The planning process has useful results in terms of developing an action plan. In addition, the processes of gathering and curating data, consulting





Figure 4—Irreplaceability surface: areas are selected to best meet the selection criteria (dark gray) while also providing alternative areas (light gray) based on the irreplaceability of the planning unit for meeting set targets.

and bringing together experts, and modeling and mapping ecosystems can have equally valuable side products. Below we discuss the process of developing a biodiversity vision and action plan for the Guianan Ecoregion Complex (GEC) in South America, present the decision criteria that resulted from numerous expert and stakeholder workshops, and suggest an approach based on lessons learned.

The need to begin a systematic conservation planning exercise was realized in the process of priority setting within the framework of the World Wildlife Fund (WWF)—Guianas Program in the region (Schipper 2005). Adding a systematic and data driven component to the planning process was voiced during an IUCN-CI (World Conservation Union-Conservation International) expert workshop held in Paramaribo, Suriname (Huber and Foster 2003). The area under analysis in this initial workshop spanned the entire northern Amazon, most of which was unexplored wilderness unknown even to the experts. Most experts knew some areas or taxa well but it was obvious that compiling these data was just a first step to achieving long term management options. Likewise, the

priority areas resulting from this workshop were too large to be useful for on-the-ground action.

Although experts could drive the process of compiling and prioritizing the biodiversity in need of conservation, regional stakeholders would need to be included in the planning from the beginning so that there was participation and buy-in from corporations, organizations and the governments that could implement a plan when it was ready. With this in mind, a consortium of stakeholders was formed and began the process of developing a biodiversity vision and action plan within an ecoregional framework. This scale was chosen for several reasons: 1) both terrestrial and freshwater ecoregions had been delimited by regional experts, 2) ecoregions delimited for the area shared many of the species communities important for conservation, 3) the great diversity of ecosystems in the study area could best be represented by a complex of ecoregions containing both freshwater and terrestrial elements (for example, mangroves), and 4) encompassed areas of great species endemism (such as, tepuis, inselbergs, white-sand savannas).

The importance of including freshwater biodiversity and threats in the analysis was realized early on in the process, however, there are very few examples of where planning efforts have been able to incorporate these two systems effectively. Additionally, because the threats to both freshwater and terrestrial (and ultimately marine) systems are driven by socioeconomic factors, we felt it was urgent to document both the threats to biodiversity and opportunities for conservation as means of driving priorities for conservation action. The need for trade-offs is increasingly important when stakeholders are included from various interest groups—where mining and forestry interests need be reconciled with biodiversity conservation, for example.

The primary goals for the conservation of biodiversity were to identify a suite of sites, complementary to the existing protected areas, that would be 1) representative of some portion of all species and species surrogates (for example, vegetation types identified by experts), 2) large enough to retain populations and metapopulations of species requiring large areas, 3) with sufficient connectedness that ecological flows, species migrations and genetic diversity could be maintained, 4) that could be driven by expert knowledge in a systematic framework, and 5) in areas with the least conservation cost. However, because the results also need to be realistic and flexible around the needs of national development

priorities, the analysis needed to be conducted and presented as a spatial decision-support system; in other words, one which industry, government agencies and non-government agencies could use as a tool for discussing trade-offs and scenarios for both conservation and development. Additionally, we wanted to create a system that could be iterative and easily adjusted as more data became available and as priorities and opportunities changed. Because of the lack of data in the area, experts were used to drive the information end of the analysis, with the goal of using this same process as a databank and repository for information on biodiversity in the planning area.

## Guiana Ecoregion Complex

The study area considered in the planning exercises described herein consists of a “complex” of ecoregions. This approach was taken for a variety of reasons, though first and foremost so that the unique processes, interactions and ecotones between these ecoregions could be maintained over the long term. The GEC, as we have defined it, consists of six ecoregions, which together share many of the same species, some of which rely on more than one ecoregion for survival (fig. 5).



**Figure 5**—The Guianan Ecoregion Complex spans five countries in NE South America.



There are a number of unique geological and climatic features associated with the GEC (fig. 6). The ancient Precambrian Guianan Shield is the underlying geological formation in the northeastern portion of South America. Sandstone tabletop mountains (tepui) in the eastern and central GEC, including Mt. Roraima and Mt. Ayanganna, rise above the surrounding area to heights of 2,810 meters (9,219 ft). Tafelberg Mountain in central Suriname (1,026 m/3,366 ft) is the easternmost outlier of the Pantepui ecoregion and, as with most tepuis, remains isolated from other formations and thus contains high levels of endemism. Along the southern GEC is a complex of large savannas that form along a transverse dry belt across northern Amazonia. Additionally, the inter-tropical convergence zone (ITCZ) transverses the northern portion of the study area, creating a complex set of climatic features. Also, in the northern portion there exists a savanna “belt” intermixed in a complex matrix of forest embedded with white sand savanna patches. These geological and climatic features are important determinants of forest type and species distributions both within and between ecoregions.

Freshwater biodiversity in the GEC is extremely diverse and has been included in the biodiversity vision and action plan from the beginning. Many free-flowing rivers still contain their full complement of biodiversity (fig. 7), and are extremely important for the livelihoods of the indigenous peoples in the region. From these rivers, forest peoples, such as the Wayana, derive food, water and transportation

(fig. 8). The impact of upstream contamination on both the biodiversity and on the people who rely on these rivers is an important consideration for long-term sustainability, and reiterates the need to combine terrestrial and freshwater data in conservation planning efforts, especially in wilderness where systems are still intact.

## What Are We Trying to Protect?

Because of the great variety of species that exist in the GEC, we found it helpful to derive a subset of species and species surrogates to focus on for biodiversity conservation. We refer to these as focal species, as they were eventually the focus of the analysis and thereby of conservation efforts. These species were defined by two broad criteria: 1) endemism (species found nowhere else outside of the GEC), and 2) threat (species globally threatened and/or listed under international treaties). Within these two criteria experts were asked to create a means of prioritizing the species via a weighted algorithm to direct the selection of planning units; however, the details of this process are beyond the scope of this report. Focal species were used in the analysis as site targets for representation (endemic species) and as area targets for viable populations (area-sensitive species).

There are a great number of species endemic to the Guianas, and using ecoregions to delimit the study area greatly facilitated inclusion of endemic species in the analysis in an area where very little data exists. Endemic species are



**Figure 6**—Kasikassima, a granitic protrusion known as an inselberg, rises above the Guianan moist forests of southern Suriname (photo by J. Schipper).



**Figure 7**—Many rivers, such as the Coopename pictured here, are extremely diverse and still intact (photo by J. Schipper).



**Figure 8**—The small village of Apetina, still derives food, water, and transportation from the Tapanahoni River (photo by J. Schipper).

high priorities for conservation if we acknowledge the goal of representing all biodiversity features. Knowing where these species are and how they are affected by development is useful in ensuring that species are adequately represented in the conservation plan.

Proactive planning provides an opportunity to develop a conservation portfolio with the requirement of individual species in mind. Keeping focal species in the conservation portfolio is thus essential in identifying spatial targets (sites) and specific actions for intervention. Flagship species such as Guianas cock-of-the-rock (*Rupicola rupicola*) and Guianan saki monkeys (*Pithecia pithecia*) are also important in drawing attention to the uniqueness of the area. Wilderness areas in the Guianas present a unique opportunity for the conservation of area-sensitive, globally threatened (<http://www.redlist.org/>) species such as harpy eagle (*Harpia haryja*-LR), jaguar (*Panthera onca*-NT), bush dog (*Speothus venaticus*-VU), bearded saki (*Chiropotes satanus*-EN) and giant otter (*Pteronura brasiliensis*-EN), which persist in the GEC but are otherwise imperiled over much of their range. However, basic research is needed even to obtain baseline data on populations of these species and their distributions (area of occupancy). These species were used in the planning process in three ways: 1) to identify important population segments (for example, giant otter), 2) to determine an endemic species total extent of occurrence, and 3) to define the minimum area of habitat blocks for species persistence. For example, based on the limited information available, experts determined that approximately 25,000 km<sup>2</sup>/9,653 mi<sup>2</sup> was necessary to maintain a viable population of harpy eagle (with the hope that this would also provide an umbrella for jaguar and other threatened species). Thus in the analysis, the software was required to select at least three areas large enough for harpy eagle populations. Although somewhat arbitrary, the purpose of this restriction is that the software will first attempt to meet the planning targets in single large blocks of habitat, and in many cases will avoid the “salt and pepper” patterns of attempting to randomly meet all criteria with no spatial constraint for minimum size.

## Lessons Learned

The process for planning for biodiversity conservation is almost always a work in progress. However, periodically results need to be presented to guide decision-making. Below we summarize a possible approach based on 4 years of workshops and planning exercises in the GEC. We have attempted to make the suggestions for this approach as broad as possible such that they can be applied elsewhere. Each of these suggestions may need to be revisited throughout the planning process, and workshops and subgroup meetings should be conducted throughout the process:

**1. Define the Area Under Consideration:** Ecoregions are a useful scale for large-scale conservation planning—and are an ideal scale in the context of wilderness as they, 1) share a large majority of their species, dynamics and environmental conditions, and 2) function together effectively as a conservation unit (Dinerstein et al. 1995). Efforts should be made

early on to include all ecological flows and processes into the area of consideration—including terrestrial, freshwater and marine.

**2. Develop a Conceptual Model:** Once an area is defined, a conceptual model can help fine tune the linework for the spatial framework and can be useful in a general understanding of the system. A conceptual model can be an excellent exercise for an introductory experts’ and/or stakeholders’ workshop, where participants can be asked to draw a model of the ecological and human systems in place in the defined area (see Heemskerk and others (2003) for an example).

**3. Identify Stakeholders and Experts:** Identification and contact with the people and organizations that will make up the planning and review team is essential early on—recognizing of course that it will change over time. A clear description of the goals and objectives of the exercise and definitions of key terms can greatly improve the communication across disciplines and save much confusion. Additionally a statement of how this exercise will benefit the stakeholders is often very useful.

**4. Create a Databank:** It is important that all data collected be curated and maintained in one or more places for ease of access, inventorying data and as a point of reference (state of knowledge). It is sometimes best if one or more person has sole responsibility for data management, especially for spatial data for GIS, which might require a specialist to manage. Expert opinion as well as external data sources can only be used in systematic planning software if they are digitized and projected into a coordinate system for GIS analysis.

**5. Form Working Groups:** The diversity of expertise can best be taken advantage of by forming working groups around specific themes of the analysis. For example, a group of experts might form a team to identify focal species, while another might form a team to develop a seamless vegetation of ecosystems map, identify threats, etc.

**6. Define the Planning Objectives:** Identifying targets for use in a software system can be done in working groups per taxa but should be discussed across all participants. It is often necessary to use multiple targets in an iterative fashion to “test” outputs and see what effect adjusting targets has on outputs. Ask yourself, “What do we want this area to look like in 50 years?”

**7. Identify Data Gaps:** This is most effectively done in working groups per taxa. Parallel to this is identifying existing data, collecting that data and determining how it will be used. Since software relies on spatially explicit data, maps of species ranges, important populations, habitat types, etc., are important data types.

**8. Communication:** Keeping an open dialog between scientists, policy makers and development interests is extremely important. There is a risk of losing trust between the stakeholders when communication fails or when interest groups are excluded or marginalized from the planning process. Transparency and communication can reinforce buy-in from developers and conservationists alike.

**9. Develop Biodiversity Vision:** A vision for the future of biodiversity is a product that can combine the knowledge of the experts, spatial and temporal requirements of the focal species populations into a format useful for discussing



and planning for further action. A vision defines the areas and processes necessary for ecological integrity and species persistence.

10. *Develop Action Plan*: The action plan defines how to implement the vision. Stakeholders interpret the biodiversity vision with socioeconomic priorities and can create trade-off mechanisms and options based on conservation and development scenarios explored in the vision. The action plan is the “how to” guide for the long-term persistence of the regions’ biodiversity and ecosystem processes and services.

In conclusion, it is important to mention that this is an ongoing process by design. By creating and maintaining the data in a spatial decision-support system we hope to revisit the planning process as necessary and for measures of success and monitoring and evaluation. It is, in fact, the iterative nature of the planning process and flexibility to change that make it unique and palatable both to conservation and development interests. While working across five countries, and within five languages and political systems and perhaps 50 cultures, has been a challenge, we feel that thinking in an ecoregional context will be a benefit to all those involved in terms of thinking across political boundaries and perhaps some day using this perspective to engage in transboundary conservation.

## Acknowledgments

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# A Proposal for a Pamir International Peace Park

George B. Schaller

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**Abstract**—Wildlife surveys in the Pamir Mountains of Pakistan, Afghanistan, China, and Tajikistan revealed that Marco Polo sheep (*Ovis ammon polii*) roam back and forth across the frontiers of these countries. There has been a considerable decline of wildlife in recent years. The creation of an international peace park of about 50,000 km<sup>2</sup> (19,305 miles<sup>2</sup>) would offer the four countries one option of cooperatively protecting and managing not only Marco Polo sheep and other species but also the rangelands upon which the livelihood of local peoples depend.

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## Introduction

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From the Pamirs, with their wide valleys and mountain chains, radiate the Kunlun, Hindu Kush, Karakoram, and Tian Shan, four of the highest and most rugged ranges on Earth. The Pamirs lie principally in Tajikistan at elevations of 3,500 to 5,000 m (11,483 to 16,404 ft) and more, but they also extend into Kyrgyzstan, China, Afghanistan, and barely south into Pakistan. The flagship species, the icon of these uplands, is the Marco Polo sheep (*Ovis ammon polii*), first noted by Marco Polo in 1273 when he commented on the “great quantities of wild sheep of huge size” after he found their long, curving horns. With their habitat harsh, remote, and difficult to access, Marco Polo sheep had by the late 1800s become the most coveted of trophies by foreign hunters—and they still retain this almost mythical aura. However, the sheep have decreased greatly in recent decades, as have other wildlife in the region, because of unsustainable hunting by local herdsman, the military, and others, and there is great need to devise some form of protection for the landscape. An international peace park is one option.

## Peace Park Planning

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While conducting wildlife surveys in northern Pakistan during the early 1970s, I was told that Marco Polo sheep occur only in two small areas around the Kilik and Khunjerab passes bordering China. Visiting the two sites in late 1974, I found only skulls (fig. 1); the animals, I was told, were now in China. Pakistan established the Khunjerab National Park (now 2,270 km<sup>2</sup>/876 miles<sup>2</sup>) the following year (Schaller 1977). China created the Taxkorgan Nature Reserve in 1984 along

the Pakistan border, in effect establishing a trans-boundary reserve, a designation that was formalized between China and Pakistan in 2000. I checked on the status of wildlife in the Taxkorgan Reserve during the summers of 1985 and 1986. We saw Marco Polo sheep females and young (fig. 2) but no males, and we were informed that at this season many animals are now in Afghanistan and Tajikistan. Realizing that the species could only be adequately protected and managed through trans-boundary cooperation and joint conservation initiatives, we urged “the creation of one large reserve” that encompasses the four countries and preserves the integrity of the mountain landscape (Schaller and others 1987).

At the time Afghanistan was at war and Tajikistan would soon be in turmoil, making it inadvisable to plan projects there. The idea of trans-boundary reserves was successfully applied in many parts of the world during the following years (Hamilton and others 1996; Sandwith and others 2001). The purposes of such reserves include cooperation between countries for mutual benefit, better management of joint resources, and encouragement of good neighborly relations through conservation. After nearly two decades, I resumed surveys of Marco Polo sheep, this time in Tajikistan (2003, 2005) and Afghanistan (2004). Having evaluated the situation in these four countries, I can now suggest potential borders for a Pamir International Peace Park.

Different levels of protection would apply to different areas of the peace park and include both ecological and cultural considerations: 1) strictly protected areas and other forms of reserve, 2) hunting concessions to help raise funds for conservation and the local communities, and 3) areas in which nomadic herders can maintain their traditional lives. Each country would, of course, decide on the type of zoning that would be most effective and appropriate. Such a peace park would benefit not just Marco Polo sheep, ibex (*Capra ibex*), snow leopard (*Uncia uncia*), and other species that travel across frontiers, but all plants and animals, as well as protect the environment upon which local people depend for their livelihood.

The four countries already have a scattered network of protected areas along their borders and all of these could be incorporated into a peace park. Pakistan has the Central Karakoram National Park (9,738 km<sup>2</sup>/3,760 miles<sup>2</sup>) bordering the Khunjerab National Park and both border China's Taxkorgan Reserve. In addition, Pakistan has made a major effort to provide economic incentives to communities promoting sustainable use of natural resources by, for example, sharing entrance fees to parks and trophy hunting fees. Pakistan and India might also become formal conservation partners in a peace park by adding a part of Ladakh adjoining the Line of Control (Raja 2003; see also The Himalayan Journal, vol.59, 2003). Marco Polo sheep do not occur east of Khunjerab National Park, but other mountain species, such as ibex and snow leopard, are found there.

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**Figure 1**—The Pamirs in China, near the borders of Pakistan and Afghanistan with the skull of a male Marco Polo sheep, about 9 years old at time of death (photo by author).



**Figure 2**—Female Marco Polo sheep in molt with young (photo by author).

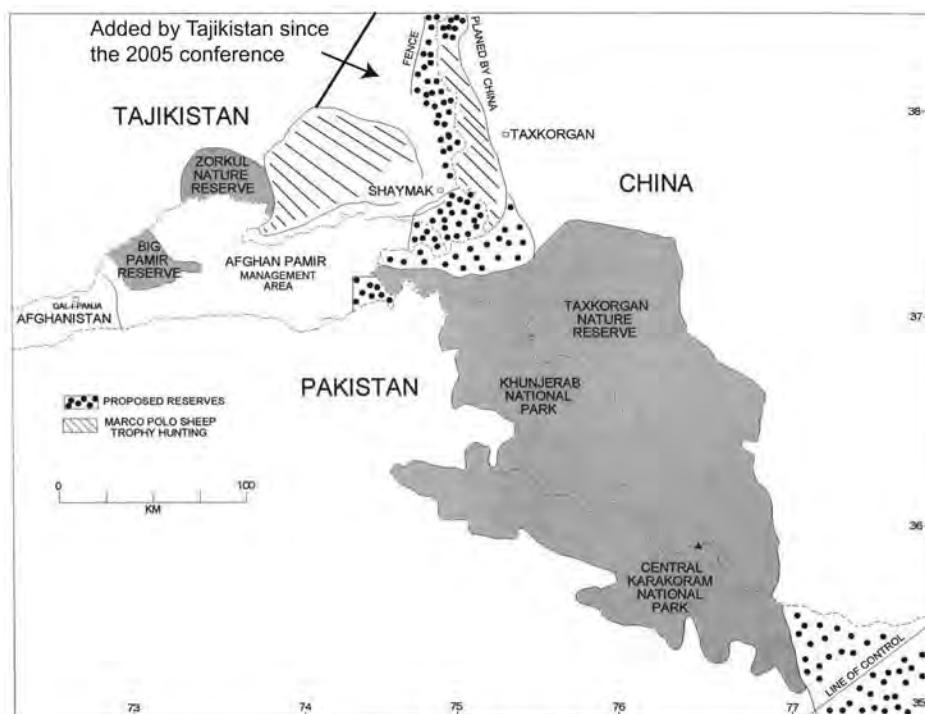
The staff of China's Taxkorgan Reserve also protects some surrounding areas. A small trophy hunting site along the Tajikistan border has recently been expanded, and there are plans to create another protected area in that region.

The Afghan Pamirs remain currently under the local control of a commander. President Hamid Karzai banned hunting in Afghanistan for 5 years in March 2005 and at the time of writing (May) is assembling an environment department. The Big Pamir Wildlife Reserve (679 km<sup>2</sup>/262 miles<sup>2</sup>) was designated in the 1970s but never legally established; it was primarily used for trophy hunting until Russia entered the country in 1979. Our 2004 survey found that the reserve still has viable wildlife populations, and we also noted two other areas, totaling 550 km<sup>2</sup> (212 miles<sup>2</sup>) that are only seldom used by Kirghiz herders and would benefit from reserve status. The rest of the 2,500 km<sup>2</sup> (965 miles<sup>2</sup>) or so of the Afghan Pamirs would need a flexible land use plan that recognizes the stewardship role of the local people.

Tajikistan has a strictly protected area, the Zorkul zapovednik (870 km<sup>2</sup>/336 miles<sup>2</sup>) along the Afghan border, though actual protection is minimal. East of Zorkul is the Murgab Company, a hunting concession of about 2,200 km<sup>2</sup> (849 miles<sup>2</sup>). It is the only area in the Tajik Pamirs that has an active guard force, privately funded, and not coincidentally the finest Marco Polo sheep population in the country. Russia built a border fence near the Tajik-China border, several kilometers within Tajikistan, leaving a no-man's-land in which Marco Polo sheep persist and move back and forth into China and Afghanistan. This strip of land requires protected status, especially from border guards who hunt wildlife for food.

As the map (fig. 3) shows, these various areas could readily be linked to create a Pamir International Peace Park of about 50,000 km<sup>2</sup> (19,305 miles<sup>2</sup>). There is need for a cooperative framework, established at an international workshop, where each country shares information, has a policy dialogue, sets priorities, agrees on principles, and, most important, decides on specific actions. These might include establishing relevant legislation, conducting basic research on wildlife and rangelands, developing joint programs to raise funds from development organizations, creating joint education and training programs, and developing compatible goals for trophy hunting and sharing the economic benefits with communities. My discussions with relevant officials in Tajikistan, Afghanistan, and China elicited positive responses with respect to the creation of a peace park; I have not visited Pakistan so far. The President of Tajikistan, Imamali Rahmanov, has approved a peace park as part of a larger plan for protected areas submitted by the State Committee on Environment and Forestry. [A four-country workshop was attended by officials in September 2006 in Urumqi, China, and the peace park idea was formally endorsed. A second workshop will be held in Dushanbe, Tajikistan, in December 2007.]

It should be noted that the Tajik National Park in the western Pamirs is not included in the proposed peace park. This large park (26,000 km<sup>2</sup>/10,039 miles<sup>2</sup>) with a land area covering 18 percent of Tajikistan, virtually lacks infrastructure, knowledge of status of wildlife, and various aspects of development essential to a functional reserve (see also Hamilton and others 1993). It deserves a major conservation effort in itself.



**Figure 3**—The proposed Pamir International Peace Park along the borders of Pakistan, China, Afghanistan, and Tajikistan, showing existing and suggested protected areas and hunting concessions. [Arrow indicates proposed reserves added since the 2005 conference.]



## Marco Polo Sheep Numbers

Management of any resource requires adequate knowledge. Trophy hunters pay about U.S. \$25,000 for killing a Marco Polo sheep in Tajikistan and China and perhaps Afghanistan at some future date. The income derived from such hunts could contribute significantly to conservation and community development. However, the number of animals must be known, as must the number of trophy-sized males that can be sustainably shot in a population. Furthermore, given intermittent deep snows and droughts, both of which may lead to malnutrition, and the occasional impact of disease, sheep populations need to be monitored to detect major changes. Marco Polo sheep have so far been little studied (Fedosenko 2000; Petocz 1978). Number estimates that have been published are often outdated or of questionable accuracy, and a principal task of a peace park would be to census populations and monitor them.

In the 1960s several hundred Marco Polo sheep frequented Pakistan, but numbers dropped then precipitously due to illegal hunting, especially during the construction of the Karakoram highway, so that by the end of the 1980s only occasional small herds visited seasonally from China (Rasool 1989). I was told that as many as 120 animals are said to enter Pakistan at present. No figures for sheep numbers in China are available at this time. [Subsequent census results show a count of 2,175 Marco Polo sheep in October to November 2005 (see *Journal of Wilderness*, August 2006: 44).] In 1986, Schaller and others (1987) saw 89 sheep and estimated 150 in the corner of the Pamirs where the four countries meet.

Petocz (1978) censused Marco Polo sheep in the Afghan Pamirs in 1973 and tallied 1,260 animals, but he estimated 2,500 to include those he may have overlooked. Our survey in 2004 (fig. 4) revealed that the range of the species had contracted since the 1970s due to unrestricted hunting. We counted 624 Marco Polo sheep, a minimum figure because we did not visit every valley, and animals are known to cross the frontier seasonally into Tajikistan and China.

Various counts have been made in Tajikistan since the early 1990s but none were comprehensive. It is believed that a great decline in numbers has occurred since the 1960s. The *Action Plan on Conservation* (Republic of Tajikistan 2003) gives a total population figure of 3,000 to 5,400, and Breu and Hurni (2003) estimate 3,000 to 14,550. In June and July 2003, we censused four blocks of terrain known to have substantial sheep numbers at that season. In three blocks, totaling 937 km<sup>2</sup> (362 miles<sup>2</sup>) sheep densities varied from 0.3 to 0.5 animals/km<sup>2</sup>. The fourth block comprising 800 km<sup>2</sup> (309 miles<sup>2</sup>) within the Murgab Company hunting concession had a density of 1.4 animals/km<sup>2</sup>. We revisited that hunting concession in March 2005 (fig. 5), at a time of year when wildlife had concentrated low on hills to avoid deep snow, and counted 2.7 animals/km<sup>2</sup>, partly in the same area we had censused in 2003. Incidentally, the concession prohibits the killing of snow leopards and brown bears, and two of the former were seen during the 2005 census.

The number of Marco Polo sheep in Kyrgyzstan is unknown. The distinction and geographic separation, if any, between the Marco Polo sheep and the so-called Tian Shan argali (*O. a. karelini*) further north, remains obscure.



**Figure 4**—The Little Pamir, Afghanistan, looking south toward the Pakistan border. Our expedition yaks are in the foreground (photo by author).



Figure 5—The southern Pamirs in Tajikistan with a herd of male Marco Polo sheep (photo by author).

## Conclusion

There is considerable interest in preserving the ecological integrity of the Pamirs and in promoting development programs there. For example, WWF-Pakistan promoted the idea of a “Pamir International Conservancy” at a conference in 2003, the Aga Khan Foundation in Kabul proposed a program entitled “Pamir Conservation: Pamir Integrated Development” in 2004, and Fitzherbert and others (2003) endorsed the peace park idea. My surveys in the four countries and personal contacts contribute to these preliminary ideas by providing a specific, immediate, and limited goal that would advance the conservation process in a critical area through the creation of a Pamir International Peace Park. The area would also qualify as a Biosphere Reserve. The need now is to transform the concept into action.

## Acknowledgments

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Otabek and Aidibek Bekmurodi, Eric Engel, Kokul Kasirov, and Neimatullo Safarov (Tajikistan).

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# Action Toward Wilderness Protection in Australia

Keith Muir

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**Abstract**—In 1992, a National Forest Policy Statement created a political opportunity to protect wilderness across Australia. The following decade saw over a million hectares of wilderness reserved in the state of New South Wales (NSW) but, until recently, little progress was made elsewhere in Australia. The success in NSW, as opposed to other states, can largely be attributed to the activism of the NSW environment movement and its different relationship with both the political and executive arms of government. This relationship is structured through the NSW Wilderness Act, 1987, which was the first Australian statute to allow the community to formally nominate wilderness areas. Such community-based proposals can advocate the suitability of areas to be managed as wilderness by consideration of particular wilderness values and social and economic factors, as well as provide suggestions for management.

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## Introduction

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Wilderness, in all its diversity, has evolved over 3.5 billion years. When we experience wilderness, we reconnect with the environment of our seven million year human evolutionary journey, but now the environment that nurtured this development can only continue on its evolutionary journey with our help. This paper is about Australia's efforts to protect wilderness from the all-pervasive influence of modern technological society.

Australia, just like America, is a federation of states and each one is as different as the people within it. Due to the constitutional difficulties of coordinating the nine governments of the federation, any national resources strategy, such as for wilderness protection, generally requires bilateral agreements between each state and the federal government based upon a set of over-arching principles. The 1992 National Forest Policy Statement provided just such a framework (Commonwealth of Australia 1992).

The Statement committed all governments to establishing a comprehensive, adequate and representative reserve system on forested lands and, concurrently, timber resource security. The implementation policies developed under the Statement included a reservation target of 90 percent of all forest wilderness and the development of management plans to protect these wilderness lands (Commonwealth of Australia 1997).

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By the time governments had signed the Forest Policy, all except for Tasmania had passed legislation for the protection of wilderness areas (Whitehouse 1993). Yet only the most populous and developed states of Victoria and New South Wales had active wilderness programs, a trend that has continued until recently.

## Northern Territory, Western Australia, and Queensland: Three States With a Frontier Mindset

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The Northern Territory is Australia's 'frontier' and perhaps has more wilderness than anywhere else in Australia. The Territory has no formally protected wilderness areas, except for an area of Kakadu National Park, a park managed by the Commonwealth Government. The Territory Government, however, has been notably progressive in its attitude toward joint management of national parks with indigenous people. The Gurig National Park became Australia's first jointly managed park in 1981, and in 2004 the government decided that Aboriginal traditional owners would jointly manage all of the Territory's reserves in cooperation with the Parks and Wildlife Commission.

Arnhem Land contains perhaps the most important wilderness in the Territory's Top End and is a stronghold of Aboriginal culture (Mittermier 2002). It is also the latest uranium exploration site for the Canadian-based mining giant Cameco. At this point in time arguments between Indigenous people and non-Indigenous people about the Arnhem Wilderness would be unhelpful. In these circumstances those concerned with environmental justice should close ranks with those who support social justice and use their collective talent to fight for the earth. It isn't a dress rehearsal where we can split hairs over the meaning of wilderness while the bulldozers push exploration roads into remote river catchments. Those concerned with social and environmental justice will learn respect for the different perceptions of wilderness most quickly when joined in a common struggle. As the world's resources run out, these beautiful, precious, undamaged areas will be on the front line for those environment issues climbing to the top of the political agenda: energy and greenhouse policy.

So why has the Territory disregarded its duty toward wilderness preservation? A commonly held opinion is that there is lots of wilderness and few Territorians, so there is no urgency. The National Wilderness Inventory (1995) indicated that more than half the Territory is in a high wilderness condition. This positive assessment of condition needs to be treated with care, however, as the impacts of pest species, particularly cane toads, horses and camels, have caused serious impacts. These impacts have included local extinctions,



loss of native vegetation and massive soil erosion in much of the area identified as wilderness. Unless backed by reliable scientific assessment and data, a regional-scale wilderness assessment, like the National Wilderness Inventory, can produce misleading results that ignore the need for urgent management action for areas vulnerable to environmental degradation, inappropriate use and development.

There is another important reason for concern in relation to the Territory's present wilderness estate. The Territory is working to develop a more comprehensive reserve system without adequate regard to protection of wilderness values. The national parks estate in the Northern Territory has increased from 2 million ha (4,942,108 acres) in 1992 to 5 million ha (12,355,269 acres) today. Nine national parks larger than 100,000 ha (247,105 acres) contain considerable wilderness areas. The management plans for several of these large parks have either a "limited use" or "natural" zone to regulate development and high impact use. There was even a proposal for a Spirit Hills Wilderness Conservation Area (Gregory National Park Draft Plan of Management 2001). But this area, like all wilderness-like zones in the Northern Territory, may be open to mining activities and some national parks are being actively explored. The draft plan of management for Barranyi National Park describes the need to preserve the unique wilderness character of the island, which has only one species of feral animal and few weeds. The draft plan of management unfortunately fails to live up to its stated intentions toward wilderness by leaving the way open for future wilderness lodge development.

An open assessment of the issues and problems of preserving naturalness is essential as Territorians continue to develop their land, on-park as well as off-park. I fear that what I call "wilderness" and indigenous people may call "our country" is all too often available for someone else's plans for wilderness lodges, 4WD vehicle-based recreation, development of roads, mining activities, clearing, grazing, safari hunts and other forms of commercial tourism.

In contrast to the Territory, Western Australia has progressed toward wilderness protection in the last 5 years. A "super-department," the Department of Conservation and Land Management (CALM), manages the state's national parks, state forests and other Crown Land (that is, lands owned by the state government). For decades CALM has been the gatekeeper for the future use of the state's public lands. In such large bureaucracies wilderness protection struggles to have a voice, being represented by a small branch of a division and a long distance from the source of political power. Wilderness protection has been a hard fight in Western Australia and The Wilderness Society has put in a tremendous effort to save wilderness in that state. There are all the usual interests competing for each piece of wilderness land and CALM, with its multiple use mindset, trades off these last remnants, even within national parks.

A 1998 outcome of Australia's National Forest Policy saw 342,000 ha (845,100 acres) of forests reserved in national parks in the southwest of Western Australia by 2003, but the subsequent wilderness assessment of the new reserves initially did not identify any areas for protection. The assessment was redone following an outcry, but only small areas were eventually flagged. The assessment process used criteria to find areas remote from modern technology.

The application of remoteness criteria work most effectively when used to describe threats of proposed development to areas already identified or protected as wilderness. In the case of a proposed development, such as road or logging operations, the potential retreat of wilderness is graphically illustrated by the map-based remoteness criteria (Kirkpatrick 1980). When defining suitable wilderness boundaries, however, the application of remoteness criteria facilitates a reductionist process that often emphasizes the obstacles more than the opportunities for wilderness protection. The remoteness approach also creates the misleading impression that the areas are rarely visited. Despite the political settings for an adequate forest wilderness protection outcome, achieved after much hard work by a broad coalition of environment groups over a decade, the CALM bureaucracy and the wilderness assessment methodology focused the public debate on 4WD roads and made a successful outcome for on-park wilderness protection very difficult.

In the longer established national parks, four have wilderness zones within them, totaling about 225,000 ha (555,987 acres) but these were never afforded statutory protection available under the Conservation and Land Management Act, 1984.

Examination of options for protection of wilderness values is now part of a plan of management review process. The results of this process may prove more fruitful although, so far, CALM has only proposed 21,000 ha (51,892 acres) of wilderness for protection. Placing wilderness protection last in a long chain of land use decision-making creates difficulties as competing activities, such as tourist operations and the pervasive off road vehicle user, become established and then tend to dictate park management. In these circumstances some form of interim protection is necessary, even if this measure is initially only a negotiated moratorium on road making and upgrading, park facilities development and commercial use until the wilderness assessment processes are completed.

Queensland has presented major opportunities for wilderness protection over the last decade but first the major setbacks created by a previous right-wing government, who used national park reservation as a tool to block indigenous land rights, had to be overcome. The Wilderness Society and the Australian Conservation Foundation undertook a strategy of placing land rights on an equal footing with park reservation. They agreed to work with the traditional owners, so when a progressive government was swept into office over a million hectares of land were reserved as national parks or handed back to the region's traditional owners. Queensland now has 7.2 million ha (17,791,588 acres) of protected areas, including 6.7 million ha (16,566,061 acres) of national parks.

The national parks estate can, however, never be big enough to carry all Aboriginal and Islander aspirations forward. A regional land use agreement approach, such as that developed for Cape York in Queensland, provides a cogent solution to ensure an economic base for indigenous people. Providing for claims over lands with a broad range of productive resources can greatly assist with self-determination and economic independence. This alternative is better than remote areas of national parks being developed by the first Australians to provide for economic and social objectives.

The current challenge for the new national parks in Cape York, being taken up by The Wilderness Society, is to obtain adequate funds for the management of feral animals, particularly cattle and horses, and weeds, which are huge problems in the tropics. You cannot separate people from wilderness because wilderness needs management.

There are no wilderness areas formally protected under the Nature Conservation Act, 1992, in Queensland because conservation groups have dropped formal wilderness reservation from their campaign priorities. Wilderness is protected 'de facto' in national parks, such as Mount Barney, Hinchinbrook Island, Currawinya and Carnarvon. In the case of Carnarvon and Hinchinbrook Island, national parks with high wilderness values, their plans of management designate remote-natural zones over most of the park with minimal or no visitor facilities and no motor vehicle access, except for management purposes. For the other parks, the plans of management have tended to make the remote-natural zones much smaller.

In 1999, the South East Queensland Forest Agreement resulted in an immediate addition to the reserve system of 425,000 ha (1,050,198 acres) and a further 215,000 ha (531,277 acres) of new national parks in 2004. A transition program is underway to phase commercial logging out of many areas, including the Wet Tropics. The Shelburne Bay Wilderness was protected from mining in 2003 when existing mining leases over its pure white dunes lapsed on expiry. As I write this paper the progressive Queensland Government is about to introduce a Wild Rivers Bill that would protect 19 of the state's best rivers, following yet another vigorous campaign by The Wilderness Society. The Bill, if passed, will represent the nation's first stand alone and comprehensive legislation to identify and protect wild rivers. The legislation will help to protect the wilderness characteristics of selected catchments of reserved rivers.

Indigenous people own almost half of Australia north of the Tropic of Capricorn and many desert areas. There should be a place for wilderness in the Indigenous landscape, and the management value of wilderness protection should not be compromised by a trend emerging in some quarters to have the definition of wilderness altered to accommodate modern technology, such as 4WD vehicles and permanent settlements.

The political debate regarding national parks must surely turn on what we can do for the land, not what nature and national parks can do for us. Aboriginal and Islander leaders should address the preservation of nature within their land base, particularly within their national parks. Not all areas should be developed, have road networks or permanent settlements within them.

## New South Wales: A Success Story

New South Wales (NSW) has earned a reputation as the center of wilderness protection in Australia. The state has just passed through an enlightened decade of government where wilderness was not just recognized, but received priority. A wilderness logging moratorium began in 1992 and was expanded as National Forest Policy negotiations progressed.

In most cases, the areas where logging was deferred in 1995 became declared wilderness by 2003.

This wonderful result came about, at least in part, due to seeds planted 25 years ago by a charismatic environmentalist, Milo Dunphy. He was famous for leading politicians on well-organized trips into the wilderness. He took one future state leader to Mount Cloudmaker, who became inspired by the majesty, awe and wonder of the Kanangra-Boyd, the second largest wilderness in NSW. That leader's name was Bob Carr. In 1987, Carr introduced the first Wilderness Act in Australia. The Act enabled any person to nominate wilderness areas in NSW for assessment and put forward a case for protection. The environment movement has since advanced a series of detailed proposals and these have been carefully assessed by the state's park agency, the National Parks and Wildlife Service (NPWS), which is now part of the Department of Environment and Conservation.

The NPWS uses a wilderness assessment method that examines naturalness of the environment by means other than its surrogate remoteness from development. It is recognized that some of the best wilderness in the state is not remote but within two hour's drive from Sydney, the state's capital city. A naturalness approach that assesses ecosystem disturbance can better provide for opportunities to protect wilderness. The nature-focused assessment reflects the assessment criteria of the Act, which allows for the restoration of land when considering whether an area should be identified as wilderness. Once a wilderness is identified, there can then be an open and transparent, even if politicized, debate over whether it should be protected. Issues associated with unsealed roads then come into play but are considered in the context of the need for protection of the natural environment rather than as the prime factor in defining wilderness boundaries from the outset.

Progress towards wilderness protection under the Wilderness Act began during the era of a conservative government, which declared 650,000 ha (1,606,185 acres) of wilderness between 1991 and 1995. Even in the darkest hours, when two Parliamentary mavericks compromised a major set of wilderness proposals, the future Premier Carr used the opportunity to censure government in Parliament for failing to meet its wilderness promises. He then announced a strong wilderness protection policy and his government secured 1.3 million ha (3,212,370 acres) of threatened forest wilderness over the next 10 years.

A new Premier, Morris Iemma, has recently replaced Bob Carr and a further set of wilderness proposals have been submitted for assessment. Whether wilderness remains on the agenda for the new government depends not only on continuous public education and dialogue between those interested in wilderness protection, key decision makers and everyone else, but also ongoing sympathetic consideration of wilderness proposals by the newly created Department of Environment and Conservation.

NSW has saved more wilderness than any other state but has only one wilderness in Indigenous ownership, within Mutawintji National Park. Very few national parks in NSW are Aboriginally owned but legislation has been established to allow for the transfer of publicly owned parks to traditional owners as freehold land on a term lease arrangement. Conservationists support these moves but are concerned that the lack of unalienable community tenure, and inadequacy of

the provisions preventing subdivision, sale and development when the park leaseback term lapses. These weaknesses in park laws may reduce the security of Aboriginally owned national parks in NSW in the long term.

Wilderness areas are important repositories for Aboriginal culture. A Bega Valley Aboriginal heritage study found that many Aboriginal pathways, migration routes, trade routes, cultural routes, song lines and dreaming or dreamtime tracks pass through the wilderness areas of southeast NSW and these pathways are essentially in an intact condition (Blay 2005). The most significant discovery of Aboriginal rock art in 50 years was found only 2 years ago in the Wollemi Wilderness near Sydney. At the time, Bob Carr described the 4,000-year old drawings as simply "the greatest advertisement for saving wild places in national parks" (Totaro 2003). The art gallery is in near-perfect condition and its exact location, along with the location of the now famous dinosaur tree, the Wollemi Pine also in the Wollemi Wilderness, will be kept secret.

The nation's capital, Canberra, lies within the Australian Capital Territory, which is within New South Wales. While the Territory is self-governing, its small size makes it essentially a glorified local government. The Australian Capital Territory protects its 28,900 ha (71,413 acres) wilderness under the Nature Conservation Act, 1980, and the area also adjoins a similar sized wilderness in NSW in the Kosciuszko National Park, but unfortunately separated from it by a recently established fence to exclude feral horses. While there are no provisions in the legislation to consider community-initiated wilderness proposals, the creation of two community-conservation group initiated roadless areas are proposed within the park under the recently released draft plan of management, but roads for essential fire protection purposes will be allowed (Namadgi National Park Draft Management Plan 2005). The Nature Conservation Act does not define wilderness but its wilderness management principles prevent road construction and are strengthened by other legislation that prevents access by motor vehicles and other mechanized equipment.

## Victoria and the One-Off, State-Wide Wilderness Assessment Strategy

The story of wilderness protection in Victoria is again different. In 1991, the former Land Conservation Council undertook a major study of wilderness. The Council identified many wilderness areas across the state, and subjected these areas to a transparent process of assessment and public review. The Land Conservation Council (LCC) was required to balance competing needs of Victorians. The state-wide processes, while efficient and democratic, relied on the remoteness approach that played into the hands of wilderness opponents. The LCC cut pieces off wilderness here and created easements there, as if every identified wilderness was a pie to be shared out to user groups, like off road vehicle enthusiasts, with nature only receiving a piece of the pie.

The LCC assessment increased the wilderness estate of Victoria to 842,050 ha (2,080,751 acres). The areas that became too small through balancing wilderness and development were

placed into a lower category of wilderness protection called remote and natural areas. These less protected wilderness areas total a further 268,900 ha (664,466 acres) within which existing high impact recreation abuses were retained, but with the promise of no additional abuse within these national park areas.

No wilderness outside national parks was considered for protection by the LCC process, which was completed just before the National Forest Policy was signed. Part of the Wongungurra Wilderness, a mere 7,420 ha (18,355 acres), was added to the national park estate in 1999 through the Forest Policy process but it was not reserved as a wilderness or a remote and natural area. No indigenous wilderness areas in Victoria have been created and no wilderness has been protected at all since 1992 when the state-wide process was completed. The downside of a state-wide process is that it creates the impression that the protection program was comprehensive, making the wilderness issue difficult to revisit. A recent decision to rapidly phase out cattle grazing in the state's alpine wilderness over the next 12 months, however, provides an opportunity to revisit wilderness boundaries that were, in some places, established to avoid grazing areas.

## Tasmania and the Case For Wilderness as a Criterion for World Heritage Listing

There is no systematic process for considering wilderness protection in Tasmania within protected areas. In this state, the World Heritage Convention has played a critical part in ensuring wilderness protection. The Tasmanian Wilderness World Heritage Area was inscribed on the World Heritage list of properties in 1982 and was greatly extended in 1989. At the time of its nomination the area was described as one of the last great temperate wilderness areas remaining in Australia. Wilderness was recognized as being of World Heritage value under the scenic beauty criteria for natural areas. As a consequence of the listing, a 1 million ha (2,471,054 acre) wilderness zone was established in the Tasmanian Wilderness World Heritage Area under the plan of management in 1992. The World Heritage Area has now had three areas of Aboriginal land handed back to the community with one of the areas in the wilderness zone and the other two in the self-reliant recreation zone. This wonderful wilderness is more or less intact except for two easements. One easement provides for commercial tourism along the Overland Track and the other provides road access to the Franklin River to enable short rafting trips in the wilderness. As these concessions to development indicate, the wilderness zone is vulnerable to policy changes and subsequent development through alteration of the plan of management.

One of the important threatened Tasmanian wilderness areas is the 390,000 ha (963,711 acres) Tarkine. Half the Tarkine is in a national park and the other half is mainly unreserved public land, including the Wellington Range. The Tasmanian government reluctantly signed the National Forest Policy Statement in April 1995. However, the timber industry in Tasmania obtained resource security legislation in 1991 and only small forest protection gains have been made through the forest negotiations under the National Forest Policy Statement.

Tasmania has a higher density of conservationists than any other state in Australia, and more green politicians as well, but this weight of support has not secured either wilderness-specific legislation or adequate wilderness protection through park plans for management. Areas like Tasmania benefit from granting World Heritage level recognition to high quality wilderness areas. Such listings help to give these areas the recognition and protection they deserve through the bilateral federal-state government processes that regulate the nomination and management of World Heritage Areas in Australia.

## Wilderness Mining: A South Australian Anomaly

South Australia (SA) passed the Wilderness Protection Act in 1992 and it provides for the creation of wilderness protection areas and wilderness zones. The Act can apply to indigenous and privately owned land as well as Crown Land. The Act has adopted the NSW model that allows any member of the public to propose wilderness areas for protection. In the case of South Australia, however, the mining lobby gained a major concession as mining activities are allowed in wilderness zones, as opposed to wilderness protection areas, a stricter reserve category preventing mining operations. This has greatly weakened the concept of wilderness as applied in SA and opportunities for mining in wilderness create public confusion over appropriate wilderness management.

South Australia's wilderness protection areas and wilderness zones are only reserved after repealing any existing protected area status and then proclaiming the new form of wilderness reserve. This approach to wilderness reservation is necessary because the state's other reserve categories are too weak to support wilderness management.

So far, eight wilderness areas have been protected totaling 184,419 ha (455,709 acres) and most of this area was reserved only last year. In addition, three large informal wilderness zones have been established under plans of management in National Parks and Conservation Parks but these areas lack the security of being reserved under the Wilderness Protection Act and are also open to mineral exploration.

The Wilderness Society has nominated eight terrestrial wilderness areas for assessment under the 1992 Act and a further eight marine wilderness areas. This growing pile of proposals also has a growing political weight that becomes increasingly receptive to a political trigger event. Trigger events can bring about determination of the outstanding proposals and rapidly advance wilderness protection. They include any conservation debacle, as the government will be keen to distract the public attention with important conservation news and placate agitation by the environment lobby.

The Yellabinna Wilderness Protection Area proposal is the most important mallee woodland wilderness proposal in the state and is currently under determination. The government's Wilderness Advisory Committee assessed Yellabinna as having high wilderness value in 1996 and recommended that 1.2 million ha (2,965,265 acres) be protected. The government announced its intention to protect 500,000 ha (1,235,527 acres) in 2004 and gazettal is expected this year. The new park will form the largest strictly protected reserve created

in South Australia since 1970. At the same time as making the Yellabinna wilderness protection announcement, the State's Premier signaled that some 14 mining exploration licences will be granted over 2 million ha (4,942,108 acres) in the Yellabinna mallee region. Some of these licences will be in the Yumbarra Conservation Park that had its protection status removed in 1999. Track construction for mining exploration is now fragmenting sensitive arid ecosystems.

## Two Wilderness Dreamings

Wilderness for non-indigenous Australians is seen as a place where the last remnants of the natural world are safe from the spoiling forces of modern technology. Outside wilderness, any economically useful land is generally dedicated to production for our urban-based society (although The Wilderness Society's Wild Country project and new land clearing laws are attempting to change that paradigm). Wilderness offers respite for the increasingly stressed urbanites and their feedlot society, where food and services are brought to them and their wastes are carried away. In wilderness we can connect with life that still evolves by natural processes.

The wilderness of Aboriginal and Islander Australians is a living story based on 40,000 to 60,000 years of belonging to the country—a land of spirits, dreaming paths, myths and ceremony that create a framework of indigenous responsibilities for country. The impacts and influences of indigenous societies in wilderness are recognized, as are the opportunities for indigenous people to retain links with the landscape. While some wilderness critics in Australia claim Aboriginal land use precludes wilderness, the issue of impact from indigenous land use is one of degrees, particularly when compared to recent use of modern technologies.

The harmonization of these two cultural dreamings is imperative to the survival of wilderness in Australia, as much unprotected wilderness is located on Aboriginal land. The belief that Indigenous land use treads more lightly on the land underpins the Malimup communiqué, developed by the former Australian Heritage Commission (Commonwealth of Australia 1998). The communiqué acknowledges and respects the right of indigenous people to maintain and strengthen their spiritual and cultural relationships within wilderness, and has built goodwill in that the preservation of wilderness does not exclude people or indigenous rights. Indigenous wilderness as described by the Malimup communiqué allows for indigenous hunting using firearms, the gathering of bush foods, the use of 4WD vehicles and the establishment of permanent accommodation. The agreement has, in effect, inadvertently defined the distance between these two dreamings.

This distance between the two dreamings will increase as indigenous communities living in a wilderness area use modern technology more intensively and extensively over time. While the occasional use of management roads by indigenous people in 4WD vehicles would perhaps pose a low level of threat, it does set a precedent for further public use of motor vehicles that would be incompatible with wilderness values and possibly damages the integrity of biological diversity. Further, the establishment of permanent settlements clearly contradicts the wilderness management principles



currently adopted in most Australian states, and the World Conservation Union (IUCN) defines wilderness as a:

... large area of unmodified or slightly modified land, and/or sea, retaining its natural character and influence, without permanent or significant habitation, which is protected and managed so as to preserve its natural condition.

Intensive use of modern technology and permanent or significant habitation is not consistent with accepted wilderness management practice. Everything that is true and just, desirable and worthwhile is not always compatible or mutually reinforcing (Lines, personal communication, July 2005). There will be times and places when the social justice for indigenous people and environmental justice for wilderness do not coincide. In a mature relationship between conservation groups and Indigenous communities there is space for acceptance of difference.

The efforts made to redefine wilderness, to allow modern technology into wilderness as a special case, can only erode the potential for understanding the management purposes of wilderness. Either the redefined wilderness becomes further fragmented by the expansion of permanent Aboriginal settlements and increased use of 4WD vehicles in these reserves or indigenous communities are alienated and infuriated by conservation groups who supported the granting of indigenous wilderness areas but then successfully oppose any further increase in the use of modern technology or the expansion of settlements into what they believe should be strictly protected reserve areas.

The two wilderness dreamings must be married so as to avoid potential confusion in wilderness reserve management, during public awareness programs about wilderness and, particularly in campaigns to save wilderness areas. This resolution should be achieved through the development of detailed wilderness proposals in consultation with indigenous communities.

The indigenous wilderness concept as found in the Malimup communiqué has not seen wilderness protection extend across northern Australia. Here, non-indigenous wilderness concepts could sit within indigenous wilderness, between the low density of existing roads and settlements. This solution has been developed for Kakadu National Park in a process evolving over the last 20 years and that will go on evolving. Kakadu National Park, a federally managed park within the Northern Territory, contains a wilderness area (designated 'Zone 4' in the plan of management) that covers about 475,300 ha (1,174,492 acre) of the 2 million ha (4,942,108 acre) park (Misso, personal communication, August 2005) However, such an approach contains in it the risk of repeating the lessons learned in the more settled districts where much wilderness has been compromised by development that should have been avoided.

The degree to which the Malimup communiqué creates conflict with wilderness management principles can be moderated through the Wild Country approach developed by The Wilderness Society. Wild Country management can partly accommodate ideological inconsistencies by retaining important bushland links around development areas and linking potential wilderness reserve areas.

Now is the time to preserve wilderness, not when the last options are being played out; when every national park is an outdoor amusement park for tourists on package tours and the

4WD vehicle enthusiast. Now is the time to save wilderness in Cape York in Queensland, Arnhem Land in the Northern Territory and the Kimberly in Western Australia. Aboriginal communities have 4WD vehicles, and should have modern settlements and all the best that modern society can offer. Yet, motor vehicles form a barrier between wilderness and the human soul. You must "walk the land" to fully relate and belong to the land. Surely the most sacred, most biodiverse places should be visited on their own terms.

## Conclusions

What I call protected wilderness is, in administrative reality, a park management system that successfully defends nature from the spoiling forces of modern technology. Wilderness is also a powerful belief that respects the rights of nature and those of indigenous people, and in politics such beliefs become reality. The wilderness idea has done much to protect nature and there is much more to be done.

Indigenous and non-indigenous Australians can effectively act together when the bulldozers, miners, loggers and resort developers arrive to despoil the wilderness. Such defensive campaigns should be closely integrated with positive plans for wilderness protection. The efforts toward wilderness protection will be most effective when detailed wilderness protection proposals are advanced that can then be assessed in an open and transparent manner. Such an assessment of wilderness should be nature-focused, provide opportunities for restoration and be undertaken by a receptive park administration supervised by a sympathetic minister. This requires constant dialogue between wilderness advocates and government.

The Colong Foundation for Wilderness advocates that management of large national parks can provide adequate visitor opportunities for quiet enjoyment and ensure effective conservation of aesthetic, cultural and natural values by adopting the following principles:

- All activities are governed by the plan of management.
- No visitor accommodation on-park.
- The majority of the park should be subject to wilderness-style management with suitable areas on the edges set aside for motorized vehicles.
- Vehicle access should be on formed 2WD roads approved for use by the plan of management.
- Low-key facilities such as picnic tables and basic camping grounds should be located near park boundaries.

Limited high quality road access on the edges of parks and associated low-key facilities are the key to visitor management that can provide ample opportunities for enjoying a national park, while ensuring the integrity of remaining areas. Almost all heavily used park areas are within an hour's walking distance of a vehicle access point. There are some exceptions to the above use versus distance rule, but they are few. These principles have been fundamental to the development of national parks and wilderness areas in NSW and it is time for the other states of Australia to reap the benefits of a greatly expanded wilderness estate.

The World Heritage Committee of UNESCO should consider advancing wilderness as one of the criteria in its World Heritage Operational Guidelines for the assessment of

nominated natural properties. Such a criterion would reflect the true value and role of wilderness in this increasingly crowded world. Under the current Operational Guidelines, the consideration of important wilderness values is relegated to being either a factor influencing the biophysical integrity of the nominated property or an element of the conservation of scenery criterion. These limited assessment opportunities do not give due recognition to the many enduring values of the last remaining pristine parts of the natural world.

The identification and promotion of wilderness that would follow the establishment of such a World Heritage criterion would provide more people with life changing experiences. Appropriate low impact wilderness use is a humbling experience that can provide many visitors with the inspiration to work for a more environmentally sustainable society. A wilderness World Heritage criterion would help to secure a higher priority for nature-focused management for the reserves listed under that criterion. Such a criterion may also assist with protection of the extensive wilderness areas in Queensland, Western Australia and the Northern Territory through the development of operational procedures under existing bilateral state-federal government agreements that regulate the World Heritage nominations.

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# Tanzania Wilderness Areas

M. G. G. Mtahiko

**Abstract**—Conservation in many of the African countries differs in terms of approaches but it is generally accepted that no matter what system is adopted all aim at protecting the resources in an optimum condition, as would be practicably possible through application of the most contemporary acceptable methodologies. All aim to balance development that assures acceptable levels of resource impacts while taking into consideration benefit to local communities.

Proactive communities and the private sector are key dimensions to ensure this achievement in the real sense. Presently, conservation aims at enhancing satisfaction of tourists through increasingly diversified activities at a high quality with very minimum negative impact to the resources. The largest challenge, however, is to balance resources utilization with development of different facilities in line with community needs.

## Conservation in Tanzania: Tanapa History

Protected Areas (PAs) were first established during the colonial era. Following independence in 1961, more conservation areas were established in several categories. Tanzania National Parks (TANAPA) are under trusteeship management (4 percent of total land area of the country). Human habitation (save for park and tourism investment staff, agricultural activities and hunting) is not allowed. Game reserves (managed by the Game Department) (10 percent of total land area) are where tourist hunting is allowed. Forest reserves (under the Forestry department) (15 percent of total land area, with some 3 percent overlap with PAs devoted to wildlife) are for conservation of forests, including catchment forests. Conservation areas are where human habitation and wildlife co-exists (Ngorongoro Conservation Area Authority).

Resource conservation in national parks, game reserves, conservation areas, and catchment forests is based on general management plans that are developed from Management Zone Plans. Management Zone Plans are developed essentially to govern the types and limits of tourism infrastructure and visitor use in defined zones of a PA. This paper shall concentrate on national parks, the highest level of conservation of natural resources in the country, where consumptive use of resources is not allowed.

Currently the trusteeship manages core-protected areas that cover 4 percent of the total land area of the country.

Tanzania National Parks (TANAPA) is a parastatal trusteeship under the Ministry of Natural Resources and Tourism, enacted by an act of parliament under law of the land (Chapter 412 of 1959).

TANAPA is currently managing 14 national parks, which form the major samples of different biomes and ecological systems in the country. The organization has, through years of experience, developed a strategic planning process, which is used to prepare general management and zone plans for national parks to ensure an appropriate balance between preservation and use of resources. It is mandated to

... manage and regulate the use of areas designated as national parks by such means and measures to preserve the country's heritage, encompassing natural and cultural resources, both tangible and intangible resource values, including the fauna and flora, wildlife habitat, natural processes, wilderness quality, and scenery therein. The park resources should provide for human benefit and enjoyment of the same in such manner and by such means as will leave them unimpaired for future generations.

The primary objectives or purpose of national parks is to preserve areas possessing exceptional values that illustrate the natural or cultural resources of the country; areas that offer superlative opportunities for public benefit, enjoyment, or scientific studies; areas with outstanding examples of a particular type of resource; water and soil resources critical to maintain ecological integrity and that support the subsistence needs of people outside park boundaries; and to ensure:

- Parks retain a high degree of integrity as true, accurate, and unspoiled examples of a resource;
- Management plans for parks are developed by interdisciplinary teams comprised of appropriate professionals with the best available information to achieve a balance between preservation and use that does not adversely impact park resources and values;
- A quality visitor experience rather than "mass tourism" at the expense of park values and resources; and
- Optimum levels of revenue and benefits accrue to the national economy, the parks and communities, without impairing park resources.

## Ruaha National Park

This area was first recognized as part of the Saba River Game Reserve in 1910, which was re-gazetted as the Rungwa Game Reserve in 1946. In 1964, the southern portion of this Reserve was declared the Ruaha National Park and in 1974 a smaller section to the southeast of the Great Ruaha River was added to complete the boundaries that exist today (fig. 1). Development of infrastructure has been largely restricted to the eastern central portion of the Park in the Rift Valley bordering the Great Ruaha River.

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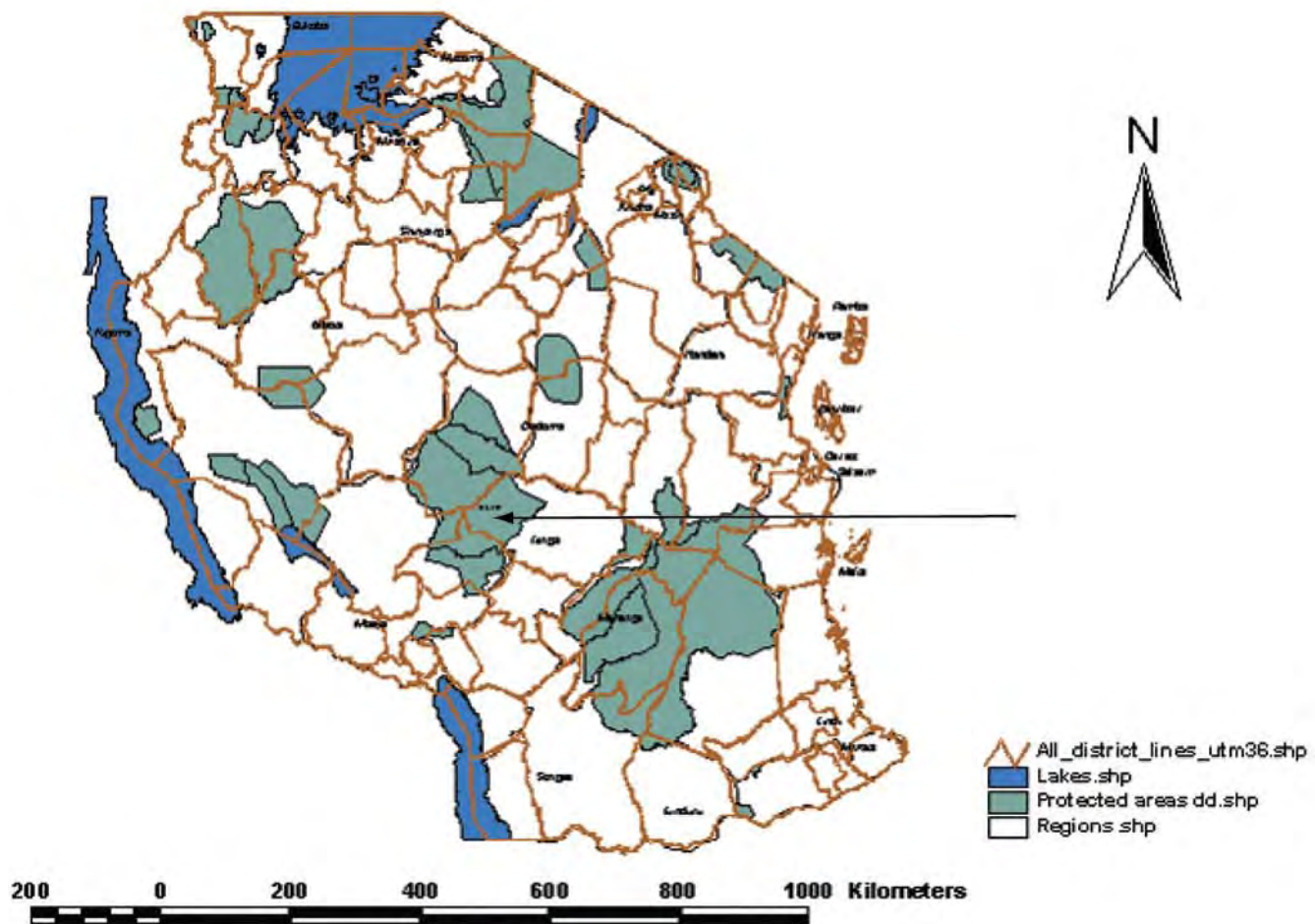


Figure 1—Location of Ruaha National Park in Tanzania, shown by the arrow.

A major event affecting the Park's status was the completion of the bridge across the Great Ruaha at Ibuguziwa in November 1991, allowing a reliable year round access by road from Iringa municipality some 130 km (81 miles) east from the Park boundary. The approach to management taken conforms to the current policy for the preservation and management of wilderness in Tanzania's national parks. Visitor surveys in 1993/94 indicated that the Park's wilderness character was far and away the most appreciated of its qualities and the vast majority of visitors pleaded against development that would destroy this.

The balance between use and revenue from tourism is guided by the General Management Plan (GMP) that spells out what activities and development structures can exist at a certain level at a given area. The plan thus recognizes eight zones for the purpose of resources sustainable management:

1. Wilderness Zone [WZ]
2. Semi-Wilderness Zone [SWZ]
3. Conservation General Use North Zone [CGUNZ]
4. Conservation General Use South Zone [CGUSZ]
5. Core Preservation Zone [CPZ]
6. Conservation Limited Use Zone [CLUZ]

7. Transit Road Zone [TRZ]
8. Park Administration Zone [PAZ].

## The Wilderness Zones

*Wilderness* is a term used in conservation aspects in Tanzania. It is generally used in all forms of protected areas. Wilderness in the Tanzania conservation context refers to management of resources in a portion of a PA. Such portions referred to as wilderness zones are designated for particular uses in addition to resources conservation.

*Wilderness zone* is not a category of resource conservation in itself, but an area for specific management objectives aiming at separating various uses, mainly resources management with low impact human activities. The management of these zones are directed by a Management Zone Plan, which spells out what activities are allowed and to what level development may or may not be done while emphasizing sustainable resource use and optimum protection.

The Ruaha National Park GMP, like in other parks and protected areas, stresses the natural quality, remoteness, and exceptional resource values for multi-dimensional visitor experiences. To achieve visitor satisfaction, it was important to establish an area that would offer visitor experience and

satisfaction through walking and camping. Wilderness zones give opportunities for diversified visitor activities and at the same time offer visitor distribution, hence alleviating the problem of ‘over concentration’ in certain areas but at the same time gives a chance to be “close to the nature.”

## Wilderness Attributes

The Park has an area of 4,200 km<sup>2</sup> (1,622 miles<sup>2</sup>) (about 41 percent of the Park area of 10,300 km<sup>2</sup> (3,977 miles<sup>2</sup>) established in a wilderness zone. This is a quite sizeable piece of land with usage set at low impact for high satisfaction to visitors. Physical development in the zone is at a minimum to offer low impact but high visitor experience and satisfaction activities. The wilderness zone provides for diversity of visitor recreation opportunities without compromising resources protection. The zone also retains qualities of remoteness while allowing a range of activities by keeping within Limits of Acceptable Use (LAU) stipulated. The area also serves as a “*resource bank*” for the future, an important component in biodiversity sustainable management. This approach of zoning clearly conforms to the current policy for the preservation and management of wilderness in Tanzania’s national parks (TANAPA 1994a).

## Other Similar Areas in TANAPA and Other Protected Areas Systems

Each park that has a comprehensive GMP has an area designated as a wilderness zone where development is at a very minimum. Two Parks’ (Kilimanjaro and Ruaha) GMPs are under review, and Mikumi is in preparation. Currently, the National Parks (not including the newly gazetted Kitulo and Saadani) have a total area of 14,573 km<sup>2</sup> (5,627 miles<sup>2</sup>) designated as wilderness zones (table 1). Similarly, other categories of protected areas have similar setting of zones designated as wilderness.

**Table 1**—Park area in wilderness zone.

Park	Area in Km <sup>2</sup>	Remarks
Arusha	?	Zone available, but no size given yet.
Gombe	33.99	
Katavi	1,000.00	1005.00 in semi-wilderness zone
Mahale	1,225.88	
Serengeti	5,149.55	
Lake Manyara	370.00	Includes the Marang Forest
Rubondo	?	Zone available, but no size given
Saadani <sup>a</sup>	No wilderness zone currently	74.00 km <sup>2</sup> semi-wilderness zone only. Newly gazetted park, GMP preparation underway.
Tarangire	1,266.53	373.36 km <sup>2</sup> in semi-wilderness
Kilimanjaro	?	GMP under review after annexure of catchment forest
Ruaha	4,200	GMP under review
Mikumi		GMP in preparation
Udzungwa	1,327.00	
Kitulo <sup>a</sup>		Newly gazetted park, GMP preparation procedures underway.

<sup>a</sup> Newly gazetted national parks.

## Challenges to Management of Wilderness Areas/Zones

Despite each wilderness zone having specific management objectives, they are managed jointly (as one unit) with little available resources. Difficult access, their size, limited financial resources, change of policies as influenced by politics (potential), and inadequate environmental education are challenges managers face.

Being zones of less visitation and low development, these areas are usually at risk of illegal activities unlike those that are frequently visited. Frequent hot fires during the dry season also keep resources at risk. Illegal taking of resources, besides reducing their numbers, also disturbs the animals. This may not be a good situation for the tourists, as frequently disturbed animals tend to be aggressive.

Inadequate funding is an issue since these areas are not established for revenue generation but management requires funds. The funds available will depend on revenue collected by the organization through services provided to visitors.

## Importance of Wilderness Zones in Tourism

Wilderness zones are an important setting in protected areas as they form a core base for biodiversity conservation. Wilderness zones are also resource banks, allowing for additional diversified activities, contributing to distribution of tourists, alleviating congestion, increasing stays, and providing opportunities for conventional activities, for example, walking and hiking.

Wilderness zones provide for a diversity of visitor recreation opportunities without compromising resources protection. They retain the quality of remoteness while allowing a range of activities by keeping within the Limits of Acceptable Use (LAU) stipulated.

## Park Operations

Park operations are done through linking seven departmental arrangements.

Emphasis is focused on three departments: law enforcement, some aspects of outreach and tourism.

## Law Enforcement

Law enforcement is charged with protection of resources and all matters of intelligence gathering, law enforcement including patrolling in and adjacent areas outside the Park. It also performs prosecution in a court of law. Rangers in the department are in different locations that are strategically placed for optimum deployment and policing. Currently, in addition to Headquarters, there are seven ranger posts (Mpululu, Magangwe, Jongomero, Madogoro, Lunda, Mafinga, and Isunkavyola). The last two are still temporary, because permanent structures are yet to be constructed. The GMP has identified one additional post in the north at Mkwambi, also yet to be in place.

These ranger posts range from 50 to more than 100 km (31 to more than 62 miles) from the Park Headquarters. In

ideal conditions, every ranger post should have a vehicle, high frequency transceiver (for long range communication), very high frequency radio—base/car set, hand-held set (for use during patrols), and global positioning (GPS) equipment for ease of movement in the bush. However, such items are not adequate as per requirements due to inadequate funding.

## Tourism

The first commercial interest (towards tourism development) in the Park was the construction of the Ruaha River Camp (now Lodge, with 100 beds) by Foxtreks, Ltd., at Mwayangi in 1981, some 10 km (6 miles) upstream of the bridge. Three more tented camps are operating now; these are Mwagusi Safari Camp (24 beds), Jongomero Tented Camp (24 beds) and Upper Mdonya River Camp (24 beds). The tented camps close during rain season, between February/March and end of May, as there are not many visitors then.

Two facilities exist outside the Park boundary; these are Tandala tented camp, which is only 6 km (4 miles) off the boundary in the east and Tungamalenga camp in the village, 38 km (24 miles) from the Park Headquarters. There is a new upcoming investment close to the village.

The Park owns and runs Bandas (30 beds), Rest House (8 beds), and Hostel (35 beds for schools and organized/educational groups). Booking for these facilities is necessary, as vacancy is limited. Additionally, for visitors interested in camping, there are two public and three special campsites.

The Park can be visited year round (table 2) depending on interest and activities, however, the best times for game and sightseeing and walking safaris (both short and long), is between June and December (before the onset of rains). It is pleasing to the bird watchers to visit the Park at the end of December/January through mid-May when the migrant Abdims' and yellow-billed storks can be seen. Tourism has been increasing in terms of visitation yearly. Ruaha National Park is reached by air (scheduled flights available) or by road (public service about 7 to 8 hours from Dar es Salaam, on the coast), and from Arusha via locally registered tour operators.

## Local Community Involvement and Benefit Sharing

The gazettement process of a national park starts with the local communities in the adjacent areas of the intended protected area. The communities are invited to give their opinion from the villages. The same system is adopted until the process is at the district and regional (equivalent to the province in other countries). During these stages, all matters that are forwarded by the communities are discussed and sorted out jointly between the regional and local government (conservation) and communities.

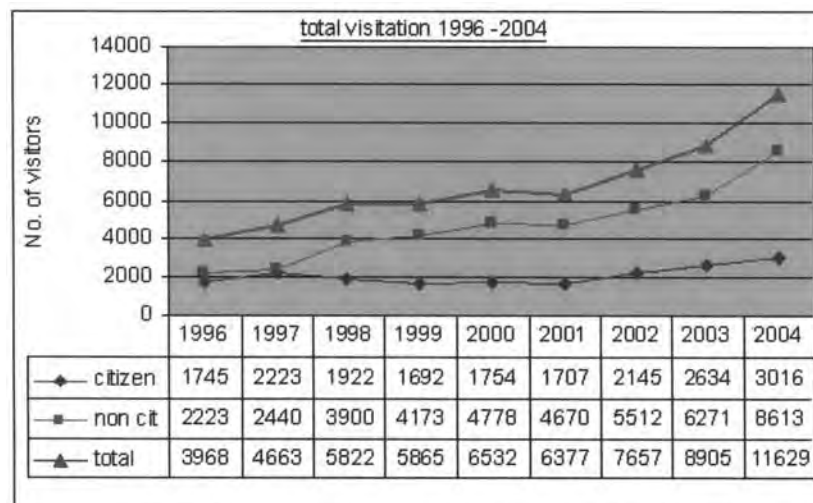
Having been agreed to by all concerned parties, the matter is forwarded to the responsible ministry with the relevant proposals, after which the same is verified with the local authorities. With the satisfaction of the ministry responsible, the document is prepared for the cabinet to discuss all matters including the legal issues, especially on the proposed boundaries, before the bill is tabled for the parliament.

In such an arrangement, there are normally no resentments, although on some occasions the process takes a long time to ensure that all things are done correctly in the first place, understanding the communities as among the key stakeholders.

## Community Based Organization

Villages adjacent to Ruaha National Park have registered an association for the management and sustainable use of natural resources in their area. This organization (MBOMIPA—sustainable use of natural resources in Idodi & Pawaga divisions of the Iringa district) works under village governments and is supported jointly by the Wildlife division, TANAPA, and the district council. This set-up is an easy way for communities to take their responsibility towards resources management but at the same moment it serves as a fair way of realizing benefits accrued there from. There were 19 villages as founding members and requests are being received now from other villages to be enrolled as

**Table 2**—Tourist visitation in Ruaha National Park, 1996–2004.



members of this association after realization of the benefits that founding members enjoy.

## Issues and Challenges: Focus on Ruaha National Park

The main management problems and concerns, which the General Management Plan has sought to address, are:

- **Biodiversity**—There are a scarcity of dry season surface water sources for all rivers, and rivers do flow on the surface during the rain season (mid-December through mid-May) but cease flowing on the surface during the dry season. Controlled use of surface water will maintain the flow, which is important for existing biodiversity.
- **Endangered species**—The Park is endowed with different species of flora and fauna, some of which are classified by IUCN as endangered (African hunting dog), endemic, threatened (cheetah, leopard, elephant), and rare. These require sound management initiatives for their survival. The core preservation zone is set to secure sensitive and fragile parts of the Park along the great Ruaha River.
- **Wildlife behavior**—Ensure naturalness of the Park through proper use of designated facilities so as to protect the animals from continuous disturbance in their habitats.
- **Vegetation and soils**—The Park aims to control usage of surface water to sustain vegetation and maintain natural processes.
- **Water resources**—Continuous surface and subsurface water recharge flows are critically important in ecological processes that require constant availability. The Park shall endeavor to control the usage to sustain other natural up-keep of the environment.
- **Visitor experience/limits of acceptable use**—These are set to ensure minimal impact of human activities to the Park resources for optimal visitor experiences.
- **Cultural and scenic resources**—The resources will have adequate protection for continued usage by the neighboring communities and tourists.
- **Neighboring communities**—The Park has negligible/low impact on quantity and quality of the water that runs through it. It is the obligation of the Park to ensure that this is continued for downstream users.
- **Park operations**—Strive to demarcate clearly all the Park boundary lines for ease of recognition by the communities and other stakeholders. Research conducted shall be geared to solving resource management issues. A comprehensive resources survey will be conducted to chart where these are placed in the Park.
- **Revenue and tourism**—Develop game viewing facilities for economical game drives, optimum enjoyment and benefit without impairing resources, and proper administration of revenue collection.
- **The Great Ruaha and Mzombe Rivers**—These two river systems partly form the boundary of the Park. Great Ruaha River forms the main water source for animals during the dry season (July through December). The Great Ruaha River ceases to flow during the dry season due to various uncontrolled human activities upstream of the Park boundary. The Park envisages working closely with other stakeholders in efforts aimed at sustaining continuous flows of the river throughout the year.

- **Unique interface on miombo and east African *Acacia/Commiphora* communities and riverine communities**—This is a unique interface of vegetation communities in the Park. It is aimed at protecting the species therein and prevention of introduction of species that are not common to the ecosystem.
- **Significant wildlife resources**—Elephants, sable, and roan antelopes, greater and lesser kudu are important wildlife species. Their abundance and unique coincidence in Ruaha is one of the Park's major attractions. The Park shall ensure protection of all wildlife in and around the Park.

## Funding

The Park realizes only about 30 percent of its base budget in the form of revenue presented to the head office. In turn, the Park develops its budget like any other park. The budget for every park is jointly discussed in line with expected revenue. All the parks are regarded equally as they are all dealing with conservation, the organization's goal. The revenue collected is shared with all the parks and the head office for base costs and some funds are set for development programs and government tax. The Park receives assistance in various ways from different institutions including: Friends of Ruaha Society, Friends of Serengeti, The WILD Foundation, World Wide Fund for Nature (WWF, Tanzania program office), and the Wildlife Conservation Society.

## Conclusion

The Park has the task of protecting resources while developing for tourism and ensuring that adjacent communities benefit from the revenues collected. There is always an issue on how to balance development for tourism with conservation. Amidst globalization, it may perhaps be inconceivable to maintain areas that do not generate enough funds to meet base budget requirements, however, the organization's main goal of sustainable conservation of resources and habitats remains. All parks are of equal status in terms of conservation, and needs, hence are rated on the same level no matter the amount of revenue collected.

Being in the southern part of the country, Ruaha is not well visited as compared to other parks in the north. On the other hand, this benefits the Park by being visited by tourists who are more interested in nature and who do not prefer seeing many tourist vehicles. It is a place for those who need enough time to get close, watch and appreciate nature.

## Acknowledgments

I wish to extend my gratitude to Sue Stolberger and Rob Glen who put me and Ruaha National Park in contact with Mr. Michael Sweatman and The Wild Foundation.

I thank Mr. Michael Sweatman and Mr. Vance Martin (President of The Wild Foundation) for generously affording me the opportunity to attend this year's congress and meet with the world's conservation community. The Wild Foundation invited and paid for my two-way air ticket and living expenses. I thank you all.



# Transboundary Protected Area Proposals Along the Southern Andes of Chile and Argentina: Status of Current Efforts

Peter Keller

**Abstract**—An evolving network of protected areas along the southern Andes of Chile and Argentina—the heart of Patagonia—are in various stages of evaluation and potential Transboundary Protected Area designations. This paper examines three such efforts. The first proposal is the North Andean-Patagonia Regional Eco-Corridor, which was the subject of a recent bilateral meeting between Argentine and Chilean officials to set a framework for pursuing international status of this 180-mile (300-km) long corridor. The second effort is based on a recent private land acquisition of a large ranch in Chile's 11<sup>th</sup> Region with plans to restore the area and create a "Patagonia National Park" that has the potential to be the impetus for a transboundary protected area. Finally, another private land acquisition provides the link to connect national parks in Chile and Argentina on Tierra del Fuego. Supporters are pursuing Biosphere Reserve status for this mountain range at the end of the world.

## Introduction: Chilean and Argentine Perspective

Since this is a paper about wilderness, I should forewarn readers that none of the areas presented are formally designated "Wilderness" by the national or regional governments. Of the two countries, only Chile has a category equivalent to Wilderness. However, this specific category from a 1984 law for the National System of Wild Protected Areas of the State (Law No 18.362) has never been used to designate such an area.

These areas are called *Reservas de Regiones Virgenes* or primordial (virgin) reserves. They are defined as areas where primitive natural conditions exist of flora, fauna and habitat with an absence of roads for motor vehicle traffic and closed to all commercial exploitation. The objective of this management category is to maintain these reserves as inviolable as feasible, with exception to scientific investigations authorized by Conaf (*Corporacion Nacional Forestal*, an agency responsible for both forestry issues and national parks) or for other purposes that are consistent with creating the reserve.

Although none of the protected areas addressed in this paper are legislatively designated wilderness, they cover

an array of legal designations from national parks, national reserves, provincial parks, and nature sanctuaries to those owned by non-governmental organizations—both domestic and foreign. Currently, none of these areas are recognized by an international body as Transboundary Protected Areas, which are defined by the World Conservation Union's World Commission on Protected Areas (IUCN/WCPA) as:

An area of land and/or sea that straddles one or more boundaries between states, sub-national units such as provinces and regions, autonomous areas and/or areas beyond the limits of national sovereignty or jurisdiction, whose constituent parts are especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed co-operatively through legal or other effective means (Sandwith and others 2001: 3).

Transboundary protected areas provide benefits that go beyond ecosystem concerns, such as encouraging friendship and reducing tension along border regions. In addition they provide these principal benefits (Hamilton and others 1996):

- Promoting international cooperation at different levels;
- Enhancing environmental protection across ecosystems;
- Facilitating more effective research;
- Bringing economic benefits to local and national economies; and
- Ensuring better cross-border control of problems such as fire, pests, poaching, marine pollution and smuggling.

In this particular case, the development of transboundary protected areas in the future could help prevent a repeat of the past. Between Chile and Argentina there is a long history of tension and rivalries, most recently in the late 1970s, when Argentina threatened war over the Beagle Channel claimed by Chile. The Beagle Channel, at the tip of South America, cuts between the Pacific and Atlantic Oceans providing ship access to Ushuaia (Argentina) on the north bank and Puerto Williams (Chile) on the south bank. At stake was the possession of three islands (Picton, Lennox and Nueva) in the Beagle Channel that had been under contention since the early 1800s. The islands themselves were not so important, but by extension of the border around them they included fish and oil rights. In 1977, an international court ruled in favor of Chile for possession of the islands. Argentina disputed the decision and repeatedly violated Chilean air and maritime space. Bilateral negotiations had failed and in January 1978 Argentina declared the court's decision "fundamentally null."

By December of that year, Argentina sent a naval squadron to the Beagle Channel and Chile followed suit. Both prepared

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for war. Pope John Paul II sent a personal message to the leaders of both countries, urging a peaceful solution. Eventually both countries accepted the Pope's mediation offer, although the tensions were not reduced until 1984, when both countries signed the "Treaty of Peace and Friendship." The final agreement was signed at the Vatican, giving the islands to Chile, but most maritime rights to Argentina.

Although this incident happened over 20 years ago, the results of that military build up are still evident in the form of minefields. In November 2000, Chilean military sources confirmed that land mines had been laid in seven different national parks. They also disclosed that nearly 250,000 mines in 293 minefields were still active throughout the country. They estimated the cost of clearing the minefields at U.S. \$300 million and the time to complete the process at ten years—if they had the funds to proceed.

As illustrated by this example, the need for transboundary co-operation obviously goes beyond the viability of protected areas, however for the purposes of this paper I'll concentrate on the ecological benefits of three likely candidates for Transboundary Protected Area status between Argentina and Chile.

## Three Transboundary Protected Area Efforts in Patagonia

### North Andean-Patagonia Regional Eco-Corridor

This effort for a transboundary protected area is an expansive corridor equaling the length of its name. The geographical area stretches over 180 miles (300 kms) north-south and averages 40 miles (70 kms) in width (fig. 1). The proposal includes the following protected areas in south central Chile and Argentina (areas are listed from north to south):

Chile	Argentina
Puyehue National Park	Lanin National Park
Vicente Perez Rosales National Park	Nahuel Huapi National Park
Hornopiren National Park	Rio Azul Protected Area
Pumalin Nature Sanctuary	Lago Puelo National Park
	Lago Epuyen Forest Reserve
	Cerro Pirque Provincial Park
	Rio Turbio Provincial Park
	Los Alerces National Park

What began in the early 1990s by local conservationists in Argentina as an idea to link protected areas in a contiguous corridor for protecting native forests, has led to a bi-national effort by government officials in both Chile and Argentina to create an official corridor. That impetus began with Project Lemu, which was founded by Argentine conservationist Lucas Chiappe to promote native forest protection at his home in the Epuyen Valley and north and south along the southern Andes (Keller 2001).

After attending an international conference in Missoula, Montana, organized by the Native Forest Network, Chiappe envisioned this Argentine corridor as a nucleus for his even more ambitious Gondwana Forest Sanctuary, which would encompass all the world's native forests south of the

40th parallel. This mega-vision began as an effort between Chiappe's Project Lemu and the Defenders of the Chilean Forest, a non-profit environmental group based in Santiago, Chile. Together, they concentrated on the first step of working to include Chile's Pumalin Park (which was declared a Nature Sanctuary in August 2005 by Chilean authorities) with Chile's Vicente Perez Rosales and Puyehue National Parks into the North Andean-Patagonia Regional Eco-Corridor.

Although government officials from both countries, such as Conaf (National Forestry Corporation) and APN (Argentine National Park Administration) staff had been reviewing the North Andean-Patagonia Regional Eco-Corridor proposal, it wasn't until May 31, 2005, that they held their first bilateral meeting. The resort town of San Carlos de Bariloche hosted the meeting with participants from the Provinces of Chubut, Rio Negro, APN, Chile's 10<sup>th</sup> Region and Conaf. They considered and discussed whether this eco-regional corridor could become a Biosphere Reserve. Previously, in February 2005, the President of APN, Hector Espina, announced the creation of the North Andean-Patagonia Regional Eco-Corridor for the Argentine side as a show of support for the bi-national effort.

Government officials from both countries are considering nominating the corridor as a Biosphere Reserve. Their objectives include transboundary conservation of the corridor's natural heritage, developing ecotourism activities and the sustainable development of goods and services for the well-being of local communities.

Currently, committees of APN and Conaf representatives are exchanging proposals and ideas to evaluate options and develop a strategy for the next steps in deciding how to nominate the Corridor as a Biosphere Reserve (Araya, personal communication, 2005). Under the UNESCO (United Nations Educational, Scientific and Cultural Organization) Man and the Biosphere Programme's Seville +5 Recommendations, countries participating in the establishment of a Transboundary Biosphere Reserve (TBR) have the option of establishing a separate biosphere reserve in each country or a joint nomination for the whole area as a TBR (UNESCO 2000).

Although a common approach and timeline has not yet been established, it's encouraging that government officials are continuing efforts initiated by local conservation groups in order to formalize the vision of a protected area corridor along the Andes of northern Patagonia. It may seem like a small step, but considering the state of affairs between Chile and Argentina 20 years ago, and most recently when I worked in the region from 2000 to 2002, this is a substantial improvement for transboundary coordination. Just a few years ago, only once had the staff at APN and Conaf been invited to a joint meeting and that was at the park ranger level. In light of the growing popularity of visiting Patagonian protected areas and potential resource impacts, coordination in this bio-region will become even more important.

### Patagonia National Park Potential

The wind-swept, rugged landscape between two of Patagonia's largest lakes may set the stage in a future national park of the same name—Patagonia (fig. 1). This effort is the latest in a line of protected areas created by Doug Tompkins and his wife Kristine McDivitt Tompkins.



**Figure 1**—Three transboundary protected area efforts: Patagonia Eco-Corridor, Patagonia National Park, and Tierra del Fuego potential biosphere reserve.

As a cursory background, the Tompkins team has been active for over a decade in South American land protection efforts. They have been involved in or directly protected (through land acquisition) nearly 2,000 miles<sup>2</sup> (5,180 km<sup>2</sup>) of land in Chile and 1,130 miles<sup>2</sup> (2,927 km<sup>2</sup>) in Argentina (Rohter 2005). In total, those 3,130 miles<sup>2</sup> (8,106 km<sup>2</sup>) are nearly equal in size to Yellowstone National Park or three times the size of the State of Rhode Island. These protected areas are scattered across Chile and Argentina in nearly a dozen projects, including such high profile ones as Pumalin, Esteros del Ibera, Monte Leon, El Rincon and Volcano Corcovado.

The Tompkins' have achieved this remarkable legacy through a variety of home grown organizations, such as their umbrella non-profit, the Foundation for Deep Ecology (FDE) and off-shoots of the Conservation Land Trust and Conversation Patagonica (formerly The Patagonia Land Trust). As of late 2002, the two off-shoots were relocated under FDE management.

Both Tompkins are using their personal wealth to help underwrite this effort. Doug Tompkins accumulated his savings by starting *North Face*, a company that specializes in outdoor equipment and clothing. He sold that years ago to begin *Esprit de Corps* clothing and sold his share in the early 1990s. Kristine McDivitt Tompkins became wealthy in her own right as the former chief executive officer of *Patagonia* clothing company. They have lived in southern Chile surrounded by Pumalin Park since the mid-1990s (Keller 2000).

The cornerstone for this new Tompkins initiative is Estancia Valle Chacabuco purchased through Conservation Patagonica. The scenery of Valle Chacabuco has been compared to that of Grand Teton National Park. This project was launched in July 2004 with the objective of converting the 173,000-acre (70,000-ha) ranch into a premier protected area that would be donated to the national government and hopefully bestowed the title of Patagonia National Park. The ranch is bordered by two national reserves, Lake Jeinimeni (398,000 acres/161,100 ha) and Lake Cochrane (17,100 acres/6,920 ha). On the Argentine side of the Andes, currently no protected areas are adjacent to the proposed Patagonia National Park, however a large ranch of over 54,000 acres (21,850 ha) could be a viable addition to the proposed Patagonia National Park complex if current or future owners are willing to participate in the project—thus creating the potential for a transboundary protected area.

The area is well known as one of the last homes to the endangered Huemul, a medium-size Andean deer. It is also home to flamingos, guanacos, pumas and black neck swans. The Tompkins team anticipates restoration of the former Valle Chacabuco ranch will take seven to ten years before the site is ready for donation to Conaf. The ranch was in operation for 80 years running up to 80,000 sheep and currently supporting 22,000 sheep, which will be removed over the next three to five years (Morgado, personal communication, 2005). Re-wilding the area will include removal of mining roads, grassland restoration impacted by heavy grazing and adapting infrastructure for tourism purposes. In order to complete the work, project organizers will be encouraging financial support from various donors, including in-kind volunteer labor, in order to restore this landscape.

Although, this project is currently not on the path to become an official transboundary protected area, the potential over the long term to protect the bi-national landscape under a coordinated management scheme is worth the effort for this critically important habitat for threatened species recovery in the region.

## Tierra del Fuego Biosphere Reserve Concept

At the end of the world, on the far tip of South America, a large island known as Tierra del Fuego conjures up wild images in a surreal landscape of mountains and fire. However, upon first landfall by ferry from the north, one would think they were stranded in North Dakota sandblasted by a fierce wind. It's not until the southern edge of the island, where the Andes dive into the sea, that one sees the rugged, fiord landscape they envisioned—without the columns of fire, naturally.

It is here, along the Darwin Range of the far southern Andes, that a long-awaited idea is taking hold. A key land bridge was fully acquired in 2002 between a Chilean national park and Argentine national park through private conservation efforts. Now, this corridor will provide an unimpeded flow of wildlife between the following three contiguous protected areas:

- Padre Alberto de Agostini National Park in Chile (3.6 million acres/1.46 million ha)
- Tierra del Fuego National Park in Argentina (155,000 acres/63,000 ha)
- Yendegaia preserve in Chile (96,000 acres/39,000 ha)

Yendegaia, the critical link, was a former ranch that is now held by the Yendegaia Foundation, which is considering several options for the private preserve. One option is to donate Yendegaia to Conaf so the government can enlarge Agostini National Park. Another option being discussed is the development of a bi-national biological conservation zone, which would include both the adjacent Chilean and Argentine national parks. Yendegaia Foundation President, Adriana Hoffmann, former head of the Chilean Environment Ministry and one of Chile's foremost botanists, is promoting the biological conservation zone concept through declaration of the entire area as a biosphere reserve.

Most recently, local and regional government officials have visited Yendegaia and discussed ideas with the Foundation; however, no formal proposals have been submitted thus far. In the meantime, productive dialogue continues as the Foundation moves ahead slowly with their plans for Yendegaia itself.

These plans include raising funds that will help with the removal of all livestock fences and the cleanup, demolition, or rebuilding of some buildings at the old ranch center. A small visitor center, park warden house, stables, greenhouse, gardens, micro-hydro energy system, campgrounds, and signage are all contemplated in the forthcoming years.

Even though nomination of the zone as a biosphere reserve could be years away, if ever, already positive steps are being taken in recognizing the need for transboundary connectivity. One example at the human scale, which will facilitate research, is an agreement to open a land border

crossing here to allow people to legally pass between Chile and Argentina. Before this, the only legal means of passage on the southern half of Tierra del Fuego was by boat via a Beagle Channel crossing to Puerto Williams.

**“Kiru Kinka:” Goldman Sachs Raises the Corporate Standard in Tierra del Fuego.** On the largest island shared by Chile and Argentina, Tierra del Fuego, a new conservation project is underway (fig. 1). Even though the project is not transboundary in nature, it will provide the benefits of a large protected area to both sides of the border. In September 2004, the Wildlife Conservation Society (WCS) accepted a donation of 680,000 acres (275,186 ha) on the Chilean side of the Island from Goldman Sachs investment bank. The area is just north of the Yendegaia preserve across Almirantazgo Sound and Lake Fagnano. The bank had acquired the land in 2003 as a package purchase of distressed assets. The prior owner, Trillium Corporation, had planned a program of sustainable forestry to harvest the timber, but after years of problems with the project they never realized their plans and defaulted on the bank loans. That’s when Goldman Sachs acquired a series of loans, one of which included Trillium Corporation’s land on Tierra del Fuego.

Goldman Sachs senior management and board of directors agreed the highest value of the land would be conservation instead of subdividing parcels for development. Eventually, the Goldman Sachs Charitable Fund took over the project and sought a partner to develop the objective of long-term conservation for the area. A partnership was developed with the Wildlife Conservation Society (WCS) to manage these lands in Chile. At one point, they also held land in Argentina through the acquisition of Trillium Corporation lands, however that has since been sold to the Lenga Patagonian company (Redford and Saavedra, personal communication, 2005).

The partnership includes an endowment by Goldman-Sachs Charitable Fund to initiate management plans and support management operations. A formal alliance between Goldman-Sachs, Goldman Sachs Charitable Fund and WCS will continue for three years to assure continuity. An advisory council has been established to guide management of the area, which will be called, “Kiru Kinka,” meaning “our land” by the native Selknam or Ona people. The advisory council is comprised of Chilean scientists and business leaders representing two-thirds of the 15-member council, the rest are associated with WCS and Goldman-Sachs. WCS country manager for Chile, Dr. Barbara Saavedra will serve as the Secretary to the Council. The first meeting was held in early September 2005.

WCS has gone to great lengths to develop this project from the ground up and provide opportunities for involvement by Chilean citizens and government officials. Well over 50

meetings have taken place during the last year in a constant effort to produce the best approach to protecting this area, which includes an environment of old-growth lenga forests (southern beech tree), Magellanic woodpeckers, guanacos and the culpeo fox. This bold beginning will hopefully provide a model for other corporations that encounter similar opportunities to protect a large, intact ecosystem in perpetuity.

## Conclusion: Designated Wilderness in Patagonia’s Future?

It may seem staggering to contemplate the amount of land already protected in these three potential transboundary protected areas, however, on a global scale this is only 14,000 miles<sup>2</sup> (36,260 km<sup>2</sup>), which is just one-quarter the size of Iowa. In comparison, from 1990 to 2000, the total loss of native forests in Chile and Argentina combined was over 18,000 miles<sup>2</sup> (46,600 km<sup>2</sup>) (FAO 2001). Statistics like this underscore the importance of coordinated, effective management to protect native forests and ecosystems. These reserves of biodiversity become more valuable as they increasingly become surrounded by developed landscapes. Considering the loss of native forests, if any of these three areas is declared a Biosphere Reserve, the initial work plan should include designating the core areas as Wilderness, which would be a first in the southern cone.

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# Some Biodiversity Points and Suggestions for the Myanmar Protected Area System

Daniel H. Henning

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**Abstract**—This paper is divided into a brief background section followed by Part I: Biodiversity Points, and Part II: Suggestions that are needed for the ecological integrity of actual and potential protected areas in Myanmar. Part I consists of general and Myanmar Biodiversity Considerations, and Part II consists of the following suggestions: (1) international financial and technical assistance, (2) establishing more protected areas, (3) transboundary protected arrangements, (4) creating Protected Study Areas (PSAs), (5) establishing Protected Natural Areas (PNAs) of small areas of high biodiversity, (6) Involving Buddhist Monks under a Deep Ecology orientation, and (7) innovative ecotourism.

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## Introduction

It is generally recognized that Myanmar has, next to Indonesia, the richest biodiversity in Asia, particularly with much of the country still forested, given massive logging operations. Currently, Myanmar has approximately 2 percent of its lands in protected areas in 23 wildlife sanctuaries and five national parks. Many Asian countries, like Thailand, Indonesia, etc., have approximately 10 percent of their country in protected areas (given some “paper parks”). However, these countries are also able to receive considerable international assistance for their biodiversity and protected area programs. The biodiversity and protected area potentials of Myanmar need to be given serious consideration by international sources concerned with the ecological integrity of biodiversity worldwide.

During my visits to Myanmar, I conducted “Protected Area Management and Interpretation” Workshops (four days) at various national parks and wildlife sanctuaries in the field. I also conducted a special workshop on this topic for all of the wardens/superintendents from protected areas and taught a three-week block course on protected areas to senior forestry students and graduate students at the Institute of Forestry, Yezin. With a great deal of strong interest and enthusiasm, the participants really wanted to learn about their first course on protected area management and interpretation training.

My training emphasis included biodiversity and ecological integrity considerations for protected areas as well as international aspects of protected areas for management

and interpretation, including ecotourism. This training and field experience also enabled me to observe biodiversity and protected area concerns in Myanmar.

In my training workshops, as well as in my professional/personal contacts, I found the leadership and staffs of national parks and wildlife sanctuaries, Division of Nature and Wildlife Conservation, Forest Department, to be very dedicated and interested in their protected area careers and work. Worldwide, I have visited and/or worked in protected areas in over 30 countries. I would certainly rank them at the top of this list in terms of real concern and effort for protected areas, despite shortages of funding, equipment, training, staff, and facilities.

In this sense, it is recognized that Myanmar has had practically no international funding (beyond the very limited science and science training funding from the Wildlife Conservation Society and Smithsonian Institution) for protected areas and biodiversity over the years. This situation is in direct contrast to other developing countries that have had substantial protected area and biodiversity funding from foreign aid programs, such as the World Bank, United Nations, U.S. AID, and other donor countries, private foundations, conservation organizations, etc.

Strong dedication, emphasis, and concern for protected areas everywhere are certainly required to protect and safeguard their biodiversity and ecological integrity from illegal logging, poaching, encroachments, overuse, etc. In my Myanmar training experiences, I found that the participants had a strong and unique professional and personal commitment for protection of biodiversity and/or “nature” within their protected areas as well as with the surrounding areas.

Given their strong commitments, there was concern in some of the protected areas about developments that were allowed to be undertaken inside these protected areas. Developments included gold mining with arsenic in rivers and streams, sugar cane, kachim, logging, etc. Although these developments were limited, they were not considered to be proper for protected areas by their staffs who were trying very hard to protect the biodiversity and ecological integrity from illegal logging, poaching, encroachments and other developments.

John Terborgh (1999) notes the lack of law enforcement and institutional control of illegal activities and developments in tropical forest protected areas in developing countries worldwide with the result that they are being degraded with serious violations to their ecological integrity and biodiversity. As a result, they become “paper parks” even though they may receive considerable funding from international sources (Terborgh 1999).

In Myanmar, the staffs were very serious about enforcement with considerable arrests or with driving illegal loggers and poachers away during their patrols (often at the risk of their

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own lives). I considered the various staffs, and their respected leadership, to be definite professionals in their strong and dedicated efforts to safeguard their protected areas, given a lack of funding, staffing, and equipment. Many of them are very concerned about the disappearing biodiversity in Myanmar and other parts of the world.

## Biodiversity Protection

Worldwide, there has been increasing interest as well as international programs and funding for biodiversity protection aimed at maintaining the numbers of different kinds of plant and animal species, their genetic variations, and their complex ecological processes. It is estimated that there may be from ten to 100 million species of plants and animals (mostly insects) that have not yet been discovered or classified. There are approximately 1.4 million species actually classified at this time.

Tropical forests, which are located in developing countries, contain the majority of species in their biodiversity. Yet, leading scientists (for example, Terborgh 1999) as well as reliable scientific and international studies are now predicting that most tropical forests, and their biodiversity, will be destroyed within the next 20 years.

According to the Council on Environmental Quality and Department of State (1981), the best projections indicate that unless governments, individually and collectively, take action, much of the world's tropical forests will be scattered and highly degraded remnants by the first quarter of the 21st century. Consequently, present and future protected areas such as national parks and wildlife sanctuaries may well be the only feasible and permanent way of saving some of the remaining tropical forests and their rich biodiversity.

Virtually all leading scientists verify the incapacity of tropical forests to re-generate themselves in their primary forms of biodiversity and ecological complexity once they have been logged, degraded, or disturbed in some way. Developments in tropical forests, consequently, are irreversible for biodiversity. It is estimated that tropical forests are being destroyed at 100 acres (40 ha) a minute or approximately the size of England every year.

In the Asia region, many countries have already lost most of their tropical forests. Thailand, for example, now only has approximately 12 percent of its tropical forests/biodiversity remaining while over half of Thailand was forested approximately 70 years ago. Yet, these remaining areas are in protected areas that are being illegally and heavily logged, poached, or encroached upon.

The Burma Forest Department, in 1894, based proposals for protection of its forests on the following basic principles:

- (1) The forests of Burma are a valuable national asset and, as such, shall be safeguarded for all time by state ownership and management; (2) The forest estate shall be administered not only for the benefit of the population of today but also for posterity; hence suitable areas shall be reserved on a permanent basis, brought under proper protection and management; and (3) a scientifically trained staff (Morehead 1944).

It is generally recognized that Myanmar has the richest biodiversity in Asia, particularly with approximately 50 percent of the country still forested at this time. With over 1,400 tree species, 7,000 plant species, 1,000 bird species, 300

mammal species, and 400 species of reptiles and amphibians, Myanmar can certainly claim an abundance and diversity of species. Moreover, many of these species are endangered such as the Asian elephant, the tiger, golden deer, gaur, Aveyarwady dolphin, and four species of marine turtles (Forest Department 1998).

The "Protection of Wildlife, Wild Plants and Natural Areas Law" was promulgated in Myanmar in June, 1994, in order to carry out biodiversity and environmental conservation more effectively. The Government of Myanmar is a signatory to the Biodiversity Convention, which has provisions for the establishment and maintenance of protected areas for biodiversity. Currently, Myanmar has approximately 2 percent of its lands in protected areas in 23 wildlife sanctuaries and five national parks with plans to increase this amount to 5 percent and eventually 10 percent of its land area (Forest Department 1998).

The World Conservation Monitoring Centre has noted that Myanmar has one of the lowest levels of protected areas worldwide, which cover approximately 8.84 percent of the world's surface with 30,300 protected areas which total over 32.6 million acres (13.2 million ha). About two thirds of these worldwide protected areas have been established over the last 35 years (World Commission on Protected Areas 1996).

Like other tropical forest countries, Myanmar faces continual and severe loss of its remaining biodiversity through logging, poaching, encroachment, and developments. Leading ecologists like Eugene and Charles Odum and others strongly recommend that developing, tropical, agricultural countries like Myanmar have approximately 50 percent of their land area in natural systems/ biodiversity for ecosystem services.

Constanza and other economists estimated the economic value of ecosystem services (pollination, watersheds, genetics, nutrient cycling, soil, erosion control, climate stability, biological control, etc.) for one year. They arrived at an annual value of \$33 trillion U.S. dollars in comparison to the global gross national product, which is about \$18 trillion U.S. dollars (Constanza and others 1997). Too often, short-term gains are placed ahead of biodiversity and its greater, long-term benefits, which are not as tangible or obvious.

Wilson (1999) suggests that every country has three forms of wealth: material, cultural, and biological. Biodiversity protection is an issue because biological wealth is taken less seriously than the others. Over time, this will change. Diversity is a potential source for immense untapped material wealth in the form of food, medicine, and amenities. The fauna and flora are also part of a country's heritage, the product of millions of years of evolution centered on that time and place and hence as much a reason for national concern as the particularities of language and culture (Wilson 1999).

Under the auspices of the United Nations Environment Programme, many governments are now starting to draw up National Biodiversity Action Plans. There are also a growing number of countries, both temperate and tropical, that have pledged to protect at least 10 percent of each ecosystem type represented within their borders (Terborgh 1999). Besides being national and natural heritages, many of the unique biodiversity and ecosystems areas of Myanmar have obvious international interests and concerns, including financial, technical, and scientific assistance.



In a Resolution on Transboundary Protected Areas/National Parks at the 6th World Wilderness Congress, Bangalore, India, October 24-28, 1998, it was noted that there is high biodiversity along shared land boundaries, which contain about 35 percent of the world's biodiversity hotspots. Yet only 5 percent of the world's recognized protected areas lie along national boundaries. And only a dozen of these are functionally linked with some degree of formality (Henning 1998).

The Resolution also noted that opportunities for transboundary cooperation are opening up and that the World Bank, United Nations Development Program (UNDP), and other international donor organizations are increasingly involved in supporting transboundary initiatives for protected areas (Henning 1998).

With joint transboundary protected areas establishment, advantages would include (a) more effective management of shared resources such as watersheds, (b) more effective conservation and management of ecosystems services and species, (c) more jobs in local communities through enhanced ecotourism, and (d) better general cooperation between countries—all of which would contribute to biodiversity for the involved (Henning 1998).

With national boundaries along India, Bangladesh, China, Laos, and Thailand, Myanmar has tremendous potential for a unique system of transboundary protected areas that could protect threatened areas of high biodiversity as well as a range of its ecosystems. A transboundary protected area study and paper at a transboundary conference in China by U Uga, Director, Training and Research Division, identified several potential protected areas along the various national boundaries. All of these areas, however, were noted as needing urgent protection due to ongoing depredations.

## Conclusions

Based on the above points as well as my experience in Myanmar as a volunteer protected area trainer and my overall background/experience, I would like to submit the following suggestions:

### International Financial and Technical Assistance

International financial and technical assistance is obviously needed for Myanmar's protected area system maintenance and expansion for biodiversity preservation. It is also obvious that much of this biodiversity will be irreversibly lost or severely degraded in the near future under current trends. With the richest biodiversity in Asia, it has received very little help in this area due to various complexities while other countries with tropical protected areas and way less biodiversity have received considerable funding.

Because of the complexities with current international funding constraints, it is proposed to establish a special Myanmar Protected Area/Biodiversity Foundation, which could be administered by the World Commission on Protected Areas of the World Conservation Union (IUCN). This Foundation would be authorized to receive funding from various international and national organizations, including the World

Bank and UN, specifically for protected area biodiversity projects and assistance in Myanmar.

To ensure that the funding would go directly to protected area/biodiversity work in Myanmar, a select board and administration of protected area, international experts would oversee all funding and operations in conjunction with officials from the Division of Nature and Wildlife Conservation and with national representatives from the Wildlife Conservation Society and the Smithsonian Institution.

This funding would be utilized to provide needed equipment, facilities, training, and staffing for existing and planned protected areas as well as to finance studies and proposals for potential areas. Funding priority would be given to new and proposed areas with high biodiversity.

### Recommendations for Potential Protected Areas

As noted, Myanmar Forest Department has indicated its intention to include 5 percent and then 10 percent of its total land area in protected areas from the present 2 percent (Forest Department 1998). With needed financial assistance from international sources, more emphasis could be directed toward study and recommendations of potential areas of biodiversity for protected area status.

In this regard, it is noted that a professional study and project of possible national park areas for Myanmar was conducted by UNDP in the early 1980s. Much of the information in this project should be relevant and valuable for current protected area proposals, particularly in bringing in ecosystem considerations.

While conducting a special training workshop for protected area wardens in March of 2001, I was impressed with the quality of leadership as well as the wardens and their concern for protecting the remaining biodiversity of Myanmar. Consequently, at the warden's training workshop, I suggested that the wardens form a special committee to make recommendations on protected area proposals. There was a strong interest in this suggestion and I certainly consider the wardens to be highly qualified for this type of assignment. With the past UNDP study, there would certainly be possibilities for building on past information as well as experience from U Uga, U Ye Zhut, and others who participated in this project.

With the strong interest in biodiversity by international funding sources (public and private), the formulation and beginning operation of a committee of this nature could serve as strong indicator for acquiring specific funding for its activities and proposed areas. The committee could also serve as a vehicle for getting more scientists, including university scientists, involved in needed biodiversity research for proposed protected areas.

### Transboundary Protected Areas

As noted, transboundary protected area arrangements have a great deal of potential for protecting high biodiversity for Myanmar and neighboring countries. As also noted, U Uga, Director, Training and Research Division, has completed a study and conference paper (presented in China at a transboundary conference) on possible transboundary protected

areas for Myanmar. It was recognized that these areas are in urgent need of protection.

The World Bank, UNDP, and other international organizations have strong interests in funding transboundary cooperation and arrangements for biodiversity protection. Current constraints may not allow them to directly fund Myanmar protected areas at this time. However, there would still be possibilities for them to consider funding the adjacent neighboring country's protected area with the understanding that specific funding could then be reallocated to Myanmar for management and operation costs involving its protected area part. The key here would be to protect the rich biodiversity along border areas as international as well as national heritages, including possibilities for world heritage sites and biosphere reserves.

## Protected Study Areas

Much of biodiversity in Myanmar, as elsewhere, is in tropical forests that are being rapidly deforested and degraded. Once disturbed, these areas will not regenerate into their ecological complexity, species composition, or genetic variation. The process of protected area considerations for some potential areas of high biodiversity may take extended periods of time. In the meantime, many of these unprotected areas are currently being exploited by legal and illegal means with urgent needs for their protection.

Consequently, it is suggested that potential protected areas of high biodiversity be declared "Protected Study Areas" (PSAs) so that they would have some protection during the consideration and study process until a decision is made for their establishment. This temporary arrangement for protection would be particularly valuable for the potential transboundary protected areas discussed above.

Also, international conservation and scientific organizations are often interested in funding and research associated with potential protected areas of high biodiversity concerns. If Myanmar were to suddenly declare 5 percent to 10 percent of its land as protected study areas, it would seem very probable that a great deal of international interest with some funding might be forthcoming, particularly from the above organizations.

## Protect "Pockets" of Biodiversity

There are small areas or "pockets" of biodiversity and/or unique flora and fauna, which need protection at this time. These areas are usually too small to be considered as regular protected areas. The World Conservation Union Commission on Protected Areas only lists areas of over 247 acres (100 ha) in its 10,000 protected areas of the world. Yet these small areas or "pockets" of biodiversity deserve protection before it is too late.

As an example, there is a small natural teak forest near Yezin. This natural forest is used by the Forest Research Institute for research and by the Institute of Forestry for teaching in that there are no other natural teak forests in the entire area. Visiting and international forest researchers and professors are also given study tours of it. Some of the trees are named and trails go through the forest.

I visited this forest December of 2000, while teaching at the Institute of Forestry. After observing the small forest, I became very concerned about the logging operations that involved a number of teak trees being cut and dragged on the trails. There was a large pile of teak logs lying by the stream bank outside the forest. I was told that there were no formal protection measures for the forest that, obviously, cannot take this type of logging pressure. If logging continues without protection, it simply will not be a natural teak forest, let alone valuable for research and teaching.

Consequently, consideration should be given to a protection category that would encompass small areas of biodiversity and/or unique flora and fauna such as "Protected Natural Area" (PNA). Some of these types of areas might be located in pockets or core areas of reserve forests. Besides being valuable for biodiversity protection, they (PNAs) would certainly be of interest for national and international research and teaching as well as general nature study by the public and ecotourism.

On the international ecotourism aspect, a great deal of discernment and emphasis is placed on visiting areas that are in natural or near natural condition, not disturbed by human development. The average age of ecotourists is now 55 plus and many older Myanmar citizens, including Monks, need nearby access to wild and undisturbed nature. Many natural areas, if protected, would be particularly valuable for older ecotourists and citizens who could enjoy day or short trips to nearby areas.

Also, nearby universities could assist in the administration and protection of protected natural areas (PNAs) as well as provide natural history interpretation and environmental education programs for schools and the public, including ecotourists. University and international scientific research requires undisturbed natural environments and PNAs could supply this need for "living laboratories." It is recognized that international science and conservation organizations could bring in needed expertise, equipment, training and funding, provided the biodiversity and/or natural areas are relatively undisturbed.

In this regard, it would appear advisable to form specific NGOs for PNAs as well as regular protected areas that could consist of university, scientific, conservation, and other interested parties. These NGOs could serve as "Friends or Natural History Associations" to given protected areas on a private basis. They could, in turn, provide needed support, volunteer services, and contingency funds for requested equipment and projects, such as, slide projectors, special field studies, etc. This system has worked well internationally for providing supplemental and needed assistance to protected areas.

## Public and Political Support

Existing protected areas as well as proposals for new protected areas to preserve biodiversity require public and political support. This is particularly true for villages and human settlements around existing or proposed protected areas with associated illegal logging, poaching, and encroachments. There is a great deal of potential for involving Buddhist Monks, under a Deep Ecology orientation, in environmental education programs toward gaining support for biodiversity and protected areas.

Much of the teachings and laws of Dhamma are concerned with the protection of nature and life. Pagodas are usually considered teaching centers for all ages and usually protect surrounding nature. As a highly respected religion or philosophy in Myanmar, Buddhism has great potential for influencing people and their thinking, values, and behavior toward tropical forests and biodiversity under a Deep Ecology orientation.

A mark of any great civilization is its care and protection of its wild nature or biodiversity. And much of this care and protection calls for spirituality and intangible concern for future generations of all life, not just human life, as good ancestors. In this sense, Buddhism and Deep Ecology asks us to face this needed and urgent care with protection of biodiversity and its myriad of life forms (Henning 2002).

In combination, Buddhism and Deep Ecology have a "Oneness," ecocentric, and spiritual approach toward the environment if the Deep Ecology aspects of Buddhism are brought out. Yet much of this relationship and potential has not been developed nor have many Monks, Nuns, and lay people been exposed to Deep Ecology orientations per se.

Consequently, it is suggested that special workshops on the interface between Buddhism and Deep Ecology for Buddhist Monks, Nuns, and laypeople be made available.

## Ecotourism Contribution

It is generally considered that ecotourism can contribute to protected areas and biodiversity as well as to local and national economies. Durst (1994) an internationally recognized expert on ecotourism, however, notes that ecotourism is far from being a panacea for economic development and environmental protection. In some places, however, under well-managed conditions, it can make significant contributions.

Many other ecotourism professionals observe "the two edged sword" part of ecotourism in which it can destroy the very thing that attracts it. Consequently, good environmental planning and "well managed conditions" are needed and necessary as ecotourism starts developing in Myanmar, particularly in terms of the biodiversity and ecological integrity of protected areas. One of the Myanmar Tourism Development Management Committee policy elements in this area is: Tourism will be developed, without damaging the natural environment, through appropriate legislation (Ministry of Tourism 1999).

The International Society for Ecotourism as well as ecotourism companies observe that the average age on international ecotourism trips is 55 plus and that this age average is increasing. (Many "older" ecotourists have disposable income without time constraints). And many of these ecotourists want easy access to natural or near natural conditions, besides nearby good facilities. Consequently, areas too disturbed or developed would not only be bad for biodiversity and the protected areas but also for ecotourism and its economic contributions on a long-range basis.

It is suggested that there be more mutual arrangements between protected areas and ecotourism companies, particularly in the areas of planning, biodiversity, naturalist interpretive programs, and training. For example, naturalist interpretive/environmental education staff in protected areas could make substantial contributions in nature walks, evening talks, natural history information, and treks to ecotourists and their companies. Also, mutual training arrangements would ensure more correlation and cooperation for the biodiversity and sustainable ecotourism concerns of protected areas.

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# Transboundary Natural Area Protection: Broadening the Definition of National Security

Haven B. Cook

**Abstract**—This paper looks at the definition and concept of national security, and examines how the environment is linked with national security. The traditional, state view of national security that guides most foreign policy includes the concepts of military power, sovereignty and geopolitical stability. This paper advocates broadening the definition of security to include protection of the environment. Access to natural resources, or their depletion and degradation, affects human welfare and can result in the breakdown of political stability. The assumption behind adding the environment as a dimension of national security is that conservation and protection of natural resources will not only sustain the productivity of the land, but will also preserve and sustain international relations. The destruction and depletion of natural resources in one country can do as much harm to neighboring countries as military aggression. Transboundary natural areas can play an important role in the concept of environmental security, as the conservation of the Earth's plant and animal biodiversity may well depend on the protection of large, undeveloped natural areas. This theory paper attempts to challenge the traditional "state" view of impermeable borders and lead us to a broader concept of security.

## Introduction

The traditional concept of national security is defined by military defense and geo-political power. In this traditional view it is the state that is the referent object to be secured. In recent years many scholars, researchers and international theorists have argued that the traditional framework centered on territorial defense and economic and political stability fails to consider the environment as a dimension (Barnett 2001; Brock 1991; Dalby 2002; Elliot 2002; Hauge and Ellingsen 1998; Hemple 1996; Myers 1986; Ronnfeldt 1997; Soroos 1994). Several authors have argued to broaden the definition of national security to include the environment, giving rise to the concept of environmental security.

As humans spread across the globe, conservation of the Earth's plant and animal biodiversity may well depend on the protection of large, undeveloped natural areas. In many cases around the world, these remaining large undeveloped

areas span international boundaries. This has led to the idea of "transboundary natural areas" in which one or more countries share these natural resources along a border. Transboundary areas can play an important role in the concept of environmental security, where degradation of natural resources can pose threats to the environment as well as political structures.

## Defining Environmental Security

Access to natural resources or their depletion and degradation affects the human population and can result in the breakdown of political stability. The assumption behind the concept of environmental security is that the conservation and protection of natural resources will not only sustain the productivity of the land but will also preserve and sustain international relations. The destruction and depletion of natural resources in one country can do as much harm to neighboring countries as military aggression.

This paper will examine how the environment can be linked with the concept of national security. There is a vast literature on environmental diplomacy and international cooperation concerning the environment, as well as a large body of work on transboundary environmental issues such as resource sharing, pollution, and externalities. Many authors, such as Carraro (1997), look at environmental negotiations and agreements from a cost-benefit economic analysis. Others have attempted to explain these environmental negotiations from a game theory standpoint (Ali 2003; LeJano and Davos 1999; McCarthy 2003; Soroos 1994). This paper does not intend to look at the broad arena of environmental diplomacy. The focus instead is on how the environment is linked to national security.

One of the most powerful concepts to come out of the Brundtland report (1987) was the recognition that environmental problems now occupy a prominent position on the international stage. Many scholars, researchers, policy makers, and international relations theorists argue for broadening the concept of security beyond its traditional military and geopolitical meaning to include environmental threats. Myers (1986) insists the notion of national security is no longer a simple matter of military prowess; it concerns the stability of the environment that supports human well-being. Dalby (2002) contends that conventional international relations theory does not provide the "intellectual toolkit" necessary for addressing environmental problems, and that we must "rethink security." There is also recognition that the linkage between security and the environment is firmly established as part of the agenda of peace research (Brock 1991; Gleditsch 1998).

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## A Sustainable Future

A widespread fear that the Earth is undergoing, or has already experienced, irreversible environmental damage is leading people to search for more ways of cooperating to conserve natural resources (Ali 2003). With the ecological balance of the Earth at stake, realization that all nations could be endangered has spawned international efforts such as the Montreal Protocol to protect the ozone layer. Brock (1991) wrote about the possibility of using environmental cooperation to build peace. Linking the consequences of environmental degradation to the destructive consequences of war allows us to view environmental degradation as a threat to the state and to our common security. In fact, Brock goes so far as to argue to replace the term “environmental security” with the term “sustainable development,” because the use of the word security denotes static and particularistic thinking, whereas ecological thinking such as sustainability is dynamic and global. He also broadens the idea of sustainable development to include social, political, and cultural contexts.

As scientific evidence continues to mount on the impacts of environmental degradation, deforestation, and global climate change, nations will realize that such change will not be advantageous to them and will not only seek more cooperation, but will look to defining sustainable levels of resource use (Ali 2003; Sorros 1994). Scientific literature and research during the 1990s has attempted to better conceptualize the link between environment and politics.

Dalby (2002) says the major question is what kind of shift in social values would come from viewing environmental degradation as a threat. Would it move us closer to sustainable levels of resource utilization? Ecological science and the complexities of global climate change must emerge as the basis for political, economic and social decisions, and we are a long way from that level of understanding.

## Traditional Concept of National Security

The concept of national security has its roots in European warfare, where expansionism, as a national strategy, required other countries to defend their territories. Machiavelli's famous treatise *The Prince*, written in 1513, defined the state and equated the concept of security with national defense;

in this sense security is associated with the attainment and retention of power (Bull 2003). Dimensions of the concept of national security usually include military/defense capability, political sovereignty, and secure geographical borders (fig.1). Indicators to measure these dimensions form the base of political and international relations theory. The state of the environment has not historically been considered a dimension of national security, perhaps because in previous centuries large-scale environmental degradation did not pose a threat to a nation's political power.

In previous centuries, the scale of military aggression and expansion of empires did not have immediate effects on the environment. The exploitation of natural resources through expansionism was regarded as a means of asserting or retaining political dominance by one group over another, not as a way to secure the stability of the state. However, as people become vulnerable to the effects of resource degradation, the environmental problems expand to social and political ones. Dalby (2002) notes it is the degradation of the environment that sets off an increase in crime, social disintegration, and ethnic conflict, leading to population explosion, social unrest and resource scarcity becoming key national security interests. Journalist Robert Kaplan's oft-cited article in a 1994 issue of *Atlantic Monthly* called *The Coming Anarchy* casts the environment itself as a threat (Kaplan 1994). According to such doomsayers, depletion of natural resources and degradation of the environment threatens human security to such an extent that it will be the basis of a future world war. Unfortunately, theoretical inquiry on eco-politics remains largely undeveloped.

Over 30 years ago, Falk (1971) was probably the first to describe the problem of access to resources as begetting violence, generally started by the more powerful nation as a way to maintain and reinforce their control over resources, even in the face of calls for justice by the less powerful. Under this geopolitical theory, responsibility for violence and inequity, as well as finding solutions to them rests with the more powerful nation. Barnett (2001) in his theory-laden book *The Meaning of Environmental Security*, looks at the increasingly global recognition of environmental problems by examining what he calls the “collision of environment and security.” He places the concept in the realm of politics, though embedded in an increasing awareness of the interconnectedness of modern problems. The traditional approach, which Barnett calls a view of environment and security, is



Figure 1—Dimensions of national security.

that the state is the object to be secured, and this view is consistent with strategic concerns about warfare and territorial defense and is influenced by political and international relations theory.

## Moving to a View of Common Security

The alternative approach of including the environment as a dimension of security advocates the security of the biosphere and its ecosystems as a means of protecting the habitat of all life on Earth, emphasizing that it is the ecosystems and ecological processes that must be secured (that is, their health, integrity, and functioning maintained). By shifting the focus to the ecosystem, the concept of ecological security concerns the overall welfare of the planet. The notion of environmental security posits the state as being responsible for security of the resources and maintaining access to resources for its people.

What is needed is to replace the traditional concept of national security with a new paradigm of human welfare dependent on a balance between interdependence and self-sufficiency of nations (fig.2). Despite its idealistic nature, the ascendancy of common security over national security will increasingly be the dominant theoretical view in the future, with elements of common security, equity, and common heritage replacing the exploitative ideals of nationalism and military industrialism. Before this paradigm shift takes places, however, a causal link must be firmly established between environmental degradation and threats to national security. What indicators would be used to measure this concept? How is the environmental dimension linked to the other dimensions? A theoretical base needs to be constructed in the literature, as well as research on the indicators of the environment as a dimension.

A number of authors have examined the linkage between the concepts of natural security and environment, examining the difference between the traditional, statist view of national security as a military/territorial defense concept and the humanist, ecological view that presents a new paradigm of seeing the world as an integrated whole rather than a collection of parts.

One of the best known attempts at developing a theory to link environment and national security was done by Thomas Homer-Dixon (1991) and his colleagues on the Global

Environmental Change Committee of the Social Science Research Council at the University of Toronto, leading to their work being referred to as "The Toronto Group." His 1991 study focused on how environmental scarcity affects conflict, suggesting an analytic framework for exploring causal pathways using environmental effects as the independent variable. His 1994 study (Homer-Dixon 1994) expanded on his original hypotheses, using a number of carefully documented case studies to show environmental scarcity functions as an independent variable. The rest of the literature on environmental security throughout the 1990s centers around Homer-Dixon's work, either expanding on his attempts to link environmental stress with conflict, or offering critiques on his methods.

Hauge and Ellingsen (1998) attempted to examine the environment-conflict link at a larger scale than Homer-Dixon's case studies, conducting a multivariate analysis on a larger number of studies to show a causal relationship between environmental degradation and armed conflict. Their main critique of Homer-Dixon's work is that Homer-Dixon chose studies where both environmental degradation and armed conflict occurred, thus having no variation in the dependent or independent variables and allowing for no comparisons.

Hauge and Ellingsen's work was the first attempt to use a large number of cases to examine the link between environmental scarcity and conflict and to test the variation in the dependent variables of civil war and of domestic armed conflict and how they are affected by the independent variables of annual change in forest cover, land degradation, and freshwater availability. They also used other conflict-generating independent variables to control for economic and political conditions. Although other authors have suggested potential indicators that could show this linkage (Ronnfeldt 1997; UNESCO 1998), few have attempted the analysis.

Graeger (1996) attempts to lay out a clear reasoning for establishing a theoretical and operational linkage between security and changes in the environment caused by humans. Graeger suggests that the concept of environmental security can result in international confidence-building effects and alleviate some concerns about military insecurity, thus leading to improvements in political security. She uses the example of environmental cooperation in the Baltic Sea region as using environmental cooperation to promote peace building, and notes that environmental security can be defined as the normative link between the environment and human activities. With the link between the environment and security



Figure 2—A new dimension of national security.

established, the idea of environmental sustainability can become a part of the political and social agenda of nations.

Cooperating on environmental protection measures can uphold and reinforce international agreement processes. Brock (1991) notes that transboundary national parks or conservation areas can serve as "buffer zones" between conflicting parties, demilitarize ecologically sensitive border areas, and function as a model for cooperating on other fronts. Singh and Jackson (1999) report that transfrontier conservation areas can be a mechanism for peace in Central Asia by offering new opportunities for cooperation and different levels of cooperation based on respective political climates. Lastly, Ali (2003) explores how resource scarcity and conservation can be a catalyst for resolving other kinds of disputes. Looking at issue linkage, he states that environmental cooperation can enlarge the zone of agreement between countries; for example, the idea of debt-for-nature swaps has been used by many countries, even when there is no physical border or shared resources.

## Future Directions

Among the calls for considering the environment as a component of national security is one arguing the opposite. Levy (1995) notes the main arguments against adding the environment as a dimension of security. Levy defines both "security" and the "environment" in a traditional realist-political way, insisting the environment is too broad to make it a practical consideration of security issues. Levy charges that the notion of environmental degradation imperils security by undermining human life support systems is simply rhetoric aimed at boosting support for environmental protection.

A review of the concept of national security indicates two broad themes. The first is the recognition that the concept of national security has indeed been broadened, in the mind of many theorists, to include the notions of environmental security and human well-being. Many authors write as if this is the new paradigm. Secondly, it is clear that there remains a great deal of work to be done on conceptualizing environmental security. More detailed studies and better data will help define the relationship between environmental stress and conflict and strongly establish the linkage that places the environment squarely as a dimension of national security. More theoretical work that recognizes environmental change as posing a direct threat to human security will provide a basis for seeing security as fundamentally a human value, not an end to be achieved.

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# Challenges of Nature Conservation in Postsocialist Bulgaria: A View From the Rhodope Mountains

Barbara A. Cellarius

**Abstract**—Since the crumbling of its socialist dictatorship in 1989–90, nature conservation efforts in Bulgaria have accelerated. New parks have been established, protected area management plans are being developed, and legislation has been passed standardizing protected area categories. Yet this small and relatively biodiversity-rich country in southeastern Europe has faced many challenges in the postsocialist era as it has sought to protect its wildlands. The postsocialist restitutions of forests and agricultural land to former owners have affected land ownership in some areas identified or designated for protection. Western countries have provided financial and technical assistance to postsocialist conservation efforts, yet these efforts have been hampered by Bulgaria's difficult financial situation as well as relatively limited development of a protected area management network at the start of the period. The example of postsocialist conservation efforts in the Rhodope Mountains illustrates these challenges.

## Introduction

Since socialist regimes crumbled in the countries of the now former Soviet bloc in 1989–90, one of the environmental issues receiving attention has been nature conservation. While this reflects increasing concern in the last two decades about protecting biological diversity around the globe, some of the challenges to recent conservation efforts in Eastern Europe are associated specifically with the changes underway in the postsocialist period as these countries move away from the state-socialist system towards something that is presumed to be more socially just, politically democratic, and economically market-oriented. This paper examines recent wildland conservation efforts and challenges in the small southeast European country of Bulgaria.

While it did not escape the environmental contamination and resource damage associated with state socialism, substantial areas of relatively unspoiled mountain and wetland landscape remain in Bulgaria, and it ranks among the more biologically diverse countries in Eastern Europe (Baker and Baumgartl 1998; Meine 1994). Building upon presocialist and socialist-era efforts, conservation activities in the form of establishing new protected areas as well as developing structures and practices to manage them have accelerated

since the democratic changes of 1989–90. These activities have been supported in part by financial and technical assistance from the West, that is, from the United States and Western Europe. They have been challenged, however, by the country's difficult financial situation, limited infrastructure for nature conservation, and changing land ownership associated with postsocialist property restitutions.

After reviewing the history of Bulgaria nature conservation, this paper describes postsocialist efforts to establish and manage protected areas and then focuses in particular on the case of the Rhodope Mountains. It is written from the perspective of a non-Bulgarian observer, a cultural anthropologist who has spent a total of approximately three years in the country during the postsocialist period. In addition to the written sources cited throughout, the discussion that follows is based on interviews conducted and other information collected during my periodic research visits to Bulgaria on rural livelihoods, nature conservation, and environmental nongovernmental organizations (NGOs) between 1995 and 2002.

## Brief History of Nature Conservation in Bulgaria

Formal nature conservation efforts in Bulgaria date back to the mid-1930s, with the creation of the first nature reserves and national park and the passage of the country's first law on nature protection. Bulgaria established its first two nature reserves in 1933—Silkosiya in the Strandja Mountain area and Parangalitsa in the Rila Mountains—and its first national park, on Vitosha Mountain just outside of the nation's capital, was created in 1934 (see fig. 1 for a map of the country showing the location of major cities and the main mountain ranges). The 1936 Law for the Protection of Bulgarian Nature specified several different types of protected territories: reserves (originally *branishta* or protected places), national parks, natural landmarks, and natural-historical places. The law called for special regimes for the protection and use of these territories, although it did not affect their ownership status. A few more reserves and small national parks were created in the 1930s and early 1940s, including Bistrichko Branishte and Torfeno Branishte on Vitosha Mountain, thereby beginning the tradition of designating strictly protected nature reserves within national park borders at an early date (Georgiev 1993; Peev and others 1995).

After a period of little action during World War II and the following decade, conservation again received attention in the 1960s and 1970s with the passage of a new law on nature protection in 1967 and the creation of additional protected

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areas (Georgiev 1993). In addition to the designation of some smaller protected sites, the second Bulgarian national park of any substantial size, Pirin National Park, was established in 1962. The 1980s similarly saw establishment of a few new parks as well as the designation of two existing protected areas as World Heritage Sites. Thus, the middle decades of the 20th century saw the creation of additional protected areas in Bulgaria. Yet, many of them were small, they often lacked management plans, and their oversight was scattered across many different government bodies, often local forestry authorities and municipalities (Mihova 1998).

## Bulgarian Conservation After the Fall of Socialism

The focus of government conservation efforts in Bulgaria shifted in the 1980s and especially in the 1990s from

relatively small nature reserves to national parks and nature parks that cover larger geographic areas. This parallels a worldwide trend since the 1970s of significant increases in the area of land under such formal protection (for example, IUCN 1994). Recently established parks include Central Balkan in 1991, Rila in 1992, Strandja in 1995, Persina and Rila Monastery in 2000, and Bulgarka in 2002 (see table 1), and this has led to a substantial increase in the area accorded some form of protected status in Bulgaria. As of 2005, Bulgaria has three national parks, 10 nature parks, 90 nature reserves, and hundreds of other protected natural phenomena and sites (see table 2). The parks are generally located in either wetlands or mountains, and the three national parks are all mountain ones. The national and nature parks alone cover 455,477 ha (1,125,508 acres), or about 4.1 percent of Bulgaria's territory. Two of the three national parks and four of the 10 nature parks have been established since the political changes of 1989–90. This

**Table 1**—Characteristics of National Parks and Nature Parks in Bulgaria.

	Year established	Park area	High point	Reserves within park	
				Number	Percent of park area
		<i>hectares</i>	<i>meters</i>		
<b>Nature Parks:</b>					
Blue Stones	1980	11,380.8	1,182	1	6
Bulgarka	2002	21,772.2	1,511	0	—
Golden Sands	1943	1,320.7	269	0	—
Persina <sup>a</sup>	2000	21,762.2	260	3	2
Rila Monastery	2000	27,370.7	2,671	1	13
Rusenski Lom <sup>b</sup>	1970	3,408.0	255	0	—
Shumen Plateau	1980	3,895.8	502	1	2
Strandja	1995	116,068.0	710	5	5
Vitosha	1934	26,606.0	2,290	2	6
Vrachanski Balkan	1989	28,844.8	1,482	1	5
<b>Total area</b>		<b>262,281.2</b>			
<b>National Parks:</b>					
Central Balkan	1991	71,669.5	2,376	9	28
Pirin	1962	40,332.4	2,915	2	15
Rila	1992	81,046.0	2,925	4	20
<b>Total area</b>		<b>193,047.9</b>			

Source: Except as noted below: National Database of the Protected Areas in Republic of Bulgaria; Ministry of Environment and Waters, National Nature Protection Service; Internet database located at <http://chm.moew.government.bg/pa/>; and Parks in Bulgaria, pages for individual park units; Internet documents located at <http://www.bg-parks.net/> [both accessed 6/8/2005].

<sup>a</sup> For Persina: email of 8/19/05 from Valeri Valchinkov, Chief Expert, Protected Areas Division, National Nature Protection Service, Ministry of Environment and Waters.

<sup>b</sup> For Rusenski Lom: email of 8/7/2005 from Milko Berberov, director of Nature Park Rusenski Lom.

**Table 2**—Protected areas in Bulgaria.

Category	Number
Reserve	55
National park	3
Natural landmark	340+
Maintained reserve	35
Nature park	10
Protected place	400+

Source: Protected Areas; Internet document located at <http://chm.moew.government.bg/nnp/IndexDetails.cfm?VID=23> [accessed 6/8/2005]; Ministry for Environment and Waters; National Nature Protection Service.

represents nearly a three-fold increase in the area protected during the postsocialist period (Ministry of Environment and Waters 2000). Bulgarian conservationists also take pride in what they describe as “the greatest network of strict reserves in Europe” and the fact that 60 percent of the territory of strict nature reserves is located within park boundaries, so that the parks serve as buffer zones to the more strictly protected and ecologically important reserves (Peev and others 1995; see table 1). Recall here that this practice is not new; it started in the 1930s with Bulgaria’s first national park.

The first postsocialist decade has also seen a more systematic approach to nature conservation. In the early 1990s, Bulgaria developed a National Biological Diversity Conservation Strategy with help from the U.S. Agency for International Development and the Biodiversity Support Program—a consortium of three U.S. based environmental organizations (Meine 1994)—and a National Biodiversity Conservation Plan was approved in 1999 (Ministry of Environment and Waters 2000). The Ministry of the Environment (now the Ministry of Environment and Waters) was established in 1990 as a ministerial-level body with responsibility for environmental issues (Baker and Baumgartl 1998), and the National Nature Protection Service (NNPS) was created within the ministry in 1994 as the government unit with primary responsibility for protected areas and biodiversity conservation. Creation of the NNPS was part of an ongoing institutional strengthening effort, sponsored in part by external donors, to help Bulgaria create its own protected area management system.

An important development for Bulgarian nature conservation at the national level was passage of a postsocialist law on protected areas by the National Assembly in November 1998. The law sets out categories of protected areas in the country (see table 2), their purposes, and the conditions for their declaration, protection, use, and management (*Durzhaven Vestnik*, No. 133, 11 November 1998). The six categories of protected areas are largely designed to reflect the internationally recognized standards of the World Conservation Union (IUCN) (Government of the Republic of Bulgaria, Ministry of Agriculture and Forests, and United Nations Development Programme 2003). Of concern for some environmentalists in the development of the law was a distinction made in the legislation between ‘national’ parks, which are protected areas owned exclusively by the Bulgarian state, and ‘nature’ parks, which include lands that are in private, municipal, or other non-state ownership as well as state-owned lands. The two types of parks also differ in the kinds of activities and developments that are allowed within their boundaries, with national parks being more strictly protected. Previously only the term national park had been used, with the documents establishing each individual park setting out the conditions for that specific park. At the time that the law was passed, the country had 12 national parks (Ministry of Environment and Waters 2000). Under the new legislation, only three of the country’s parks—Rila, Pirin and Central Balkan—retained the status of national parks, in part due to their land ownership status. Most of the others were re-classified as nature parks. For both nature and national parks, the law required the development of park management plans as well as a review of the existing park boundaries.

Beyond these structural developments at the government level, numerous projects with a conservation focus have been undertaken by the Bulgarian government, international donors, and a re-emerging community of Bulgarian environmental NGOs. Many of these projects have received financial support, technical assistance, or both from various Western governments and donor organizations. Details of these efforts are described elsewhere (Cellarius 2004). The discussion that follows highlights some of the key challenges to nature conservation in postsocialist Bulgaria, before turning to the specific case of efforts to establish a large-scale protected area in the Rhodope Mountains.

## Challenges to Nature Conservation in Bulgaria

One challenge facing nature conservation efforts in Bulgaria is that while some protected areas exist on paper, in many cases, the existing parks and reserves in the early 1990s had little in the way of on-the-ground management and oversight. A summary of the NGO contributions to Bulgaria’s biodiversity strategy, presented in March 1993, for example, included the statement that “the members of the NGOs report that, in the course of the many visits they have made to protected areas throughout the country, they have never been inspected by anybody. This leads to the conclusion that most of the protected areas exist only on paper” (Mihova 1998: p. 709). While this is changing through some of the projects and programs mentioned earlier, it still means that Bulgaria’s parks and reserves are in a developmental or capacity-building stage. This reflects a more general observation made by Baker and Baumgartl (1998), who write that the Bulgarian government lacks the administrative and institutional capacity to tackle environmental problems in many instances.

This stems, in part, from the country’s dire economic situation in the postsocialist period and consequent lack of government financial resources. In a 1995 interview, the then director of the National Nature Protection Service expressed a desire to mobilize his employees quite literally by providing them with the vehicles needed to do their jobs. And this was before the near collapse of Bulgaria’s economy in the winter of 1996-97. The financial support of foreign governments and donor organizations, such as two large projects supported in part by the Global Environmental Facility and several smaller projects supported by the Swiss government, have helped further Bulgarian conservation efforts in the context of limited internal funding for environmental projects. Yet it remains to be seen what will happen when foreign donors pull out; some of the internationally sponsored conservation projects have been extended beyond their planned time frames in part due to concerns about whether the efforts will be sustainable without the Western donors (Cellarius 2004).

Beyond the questions of funding for park management and administration and the growing pains associated with developing a functioning protected area management system, Bulgaria faces the challenge of balancing conservation and development as well as issues related to changing property ownership. The first issue is likely a familiar one to many

who work in conservation. Some examples from the Rhodope Mountains are discussed in a later section (see also Staddon and Cellarius 2002 for examples from elsewhere in the country).

An issue perhaps more unique to the former socialist-bloc countries concerns property restitution, especially the restitutions of agricultural land and forests. During the socialist era, most agricultural land in Bulgaria was incorporated into cooperative farms or other state-run agricultural enterprises, and many forests previously owned by individuals, religious institutions, municipalities, and other non-state owners were nationalized. Subsequently, one of the tasks undertaken by postsocialist parliaments was to pass legislation to undo these actions. The Law on the Ownership and Use of Agricultural Lands (*Durzhaven Vestnik*, No. 17, 1 March 1991) was one of the early acts passed by the Grand National Assembly in February 1991, while Bulgaria's forest restitution was not authorized until November 1997 (*Durzhaven Vestnik*, No. 110, 25 November 1997). In both cases, the restitutions were based on a principle that a 2000 report from the Organization for Economic Co-operation and Development (OECD) called "historical justice" in that they sought to "restore ownership and property rights to former (pre-communist era) owners and their heirs" (OECD 2000: p. 16). The restitutions have affected conservation efforts, as a couple of examples below illustrate. (For additional discussion of the agricultural land and forest restitutions and their implications for natural resource use, see Cellarius 2003.)

Perhaps the most dramatic example of the impact of postsocialist property restitutions on conservation efforts in Bulgaria comes from Rila National Park, in the country's southeast. It is here that one finds the highest point in Bulgaria, and indeed on the Balkan Peninsula, Peak Musala (2,925 m or 9,596 ft). Currently the largest of Bulgaria's national parks at approximately 81,000 ha (200,155 acres), Rila National Park was created in 1992. The park was initially much larger, and this is the story to be related here. Under amendments to the Protected Areas Law passed in 2000 (*Durzhaven Vestnik*, No. 28, 30 March 2000), more than 23,000 ha (56,834 acres) of Rila National Park—some 20 percent of the park's former territory—was removed from the national park and reclassified as the Rila Monastery Nature Park. This reclassification was done as part of returning these lands to private ownership under the provisions of Bulgaria's forest restitution.

Religious organizations and institutions were among the entities owning forests in the decades before socialist rule in Bulgaria. Following passage of Bulgaria's forest restitution legislation in 1997, the Bulgarian Orthodox church applied for restitution of a large area of forests around Rila Monastery. The largest monastery in Bulgaria, Rila Monastery was designated as a World Heritage Site by the United Nations Educational, Scientific and Cultural Organization (UNESCO) in 1983 in recognition of its role in protecting Bulgarian culture during several centuries of Ottoman rule (UNESCO World Heritage Committee 1983). Located in a valley high in the Rila Mountains, the monastery holds a special place in the hearts of many Bulgarians. Its forests fell largely within the borders of Rila National Park, but under Bulgaria's new protected area law the designation 'national park' is limited to areas that are exclusively state property. The compromise worked out was to designate the

forests and associated lands returned to the church as a nature park, a designation that places fewer restrictions on allowed activities. It is too early to know the long-term consequences of this action, however, some conservationists were concerned about what one person described as a bite that was taken out of one of the country's premier protected areas, and what it means for the park's integrity.

## Creating a Nature Park in the Rhodope Mountains

The Rhodope Mountains are an extensive, moderate-elevation mountain range located along Bulgaria's southern border with Greece (see fig. 1 and fig. 2). The largest in area of Bulgaria's mountains, the Rhodope range covers an area of 14,735 km<sup>2</sup> (5,689 square miles) in the country. About 80 percent of the range—which covers a total area of roughly 18,000 km<sup>2</sup> (6,950 square miles)—is in Bulgaria; the remainder is in Greece. These mountains average 785 m (2,575 ft) in elevation above sea level overall, with higher territory in the central and western part of the range and lower hills to the east. The high point at Peak Golyam Perelik in the south central part of the range reaches an elevation of 2,191 m (7,188 ft) (Danchev 1998; Perry 1995). Although no large-scale protected area has been established in the Rhodope Mountains, numerous smaller nature reserves and other protected sites have been designated in the region (see fig. 3), including four small reserves listed under UNESCO's Man and the Biosphere Program. Most of these designations occurred prior to the political changes of 1989-90, although the region has seen various projects and proposals in the postsocialist period.

Conservation efforts in the lower elevation eastern Rhodope typically focus on the raptors found there, while attention to the western and central parts of the range has a wider biodiversity focus on the plants and animals found in the thick forests, deep rock gorges and high mountain pastures. Large mammals found in the region include brown bears, wolves, red deer, wild boars, and wild goats or chamois (see Peev and others 1995). The Rhodope rank second, after the Balkan Mountains, in the number of plant species found only in Bulgaria with more than 80 endemic species and subspecies. About 16 of these are found only in the Rhodope (Peev and others 1995).

Although not as dramatic as the Rila case, property restitution has also affected postsocialist conservation efforts in the Rhodope Mountains. Specifically, one explanation for the delay in establishing one or more protected areas in the region during the 1990s was the need to first resolve issues of land restitution and property ownership. Unlike other mountains in Bulgaria, where settlements typically ring more compact mountain terrain, villages and small towns are scattered throughout the range (see fig. 4). This is significant for conservation efforts in that property ownership and local livelihoods consequently play perhaps a greater role here than in other Bulgarian mountains. While the forests in most of Bulgaria's other mountain ranges were largely in state or municipal ownership prior to nationalization, private forest ownership in some parts of the Rhodope was extensive, and the forest restitution did not take place until the early 2000s. And now that the restitutions have largely



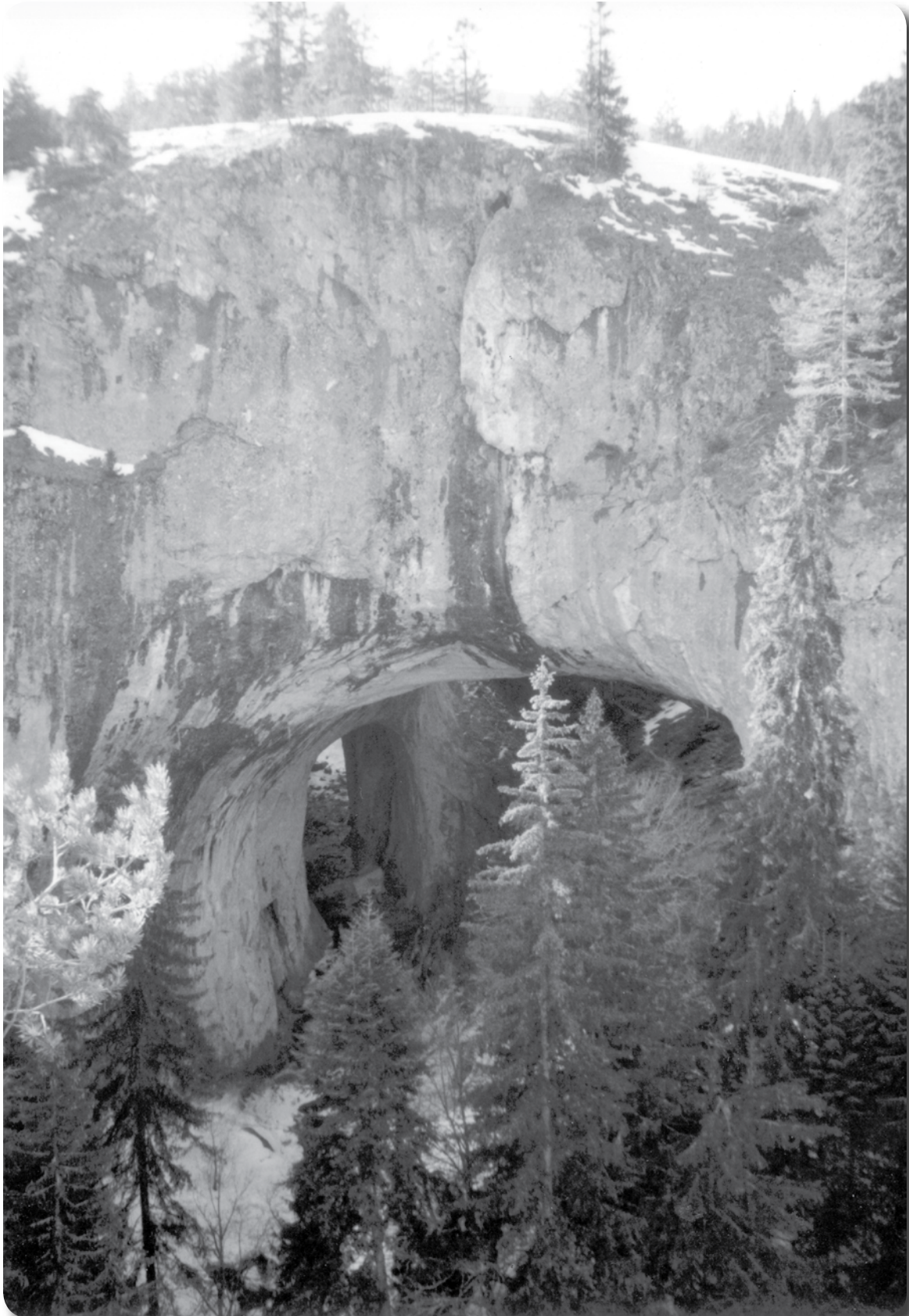
Map prepared by University of Kentucky Cartography Lab

**Figure 1**—Map of Bulgaria showing location of major cities, rivers, and mountain ranges (map prepared by University of Kentucky Cartography Lab).



**Figure 2**—From ridge tops, the Rhodope Mountain landscape appears to consist of meadows, thick evergreen forests, and mountains (photo by the author).





**Figure 3**—The Wonderful Bridges (Chudnite Mostove) is a natural landmark located a short distance from the author's village field site. It is one of several small, protected sites in the Rhodope (photo by the author).



**Figure 4**—A closer view of the Rhodope landscape reveals scattered stone buildings along with hay meadows and potato fields of village farmers. The borders of the hay fields are discernible as lines of brush or low stone walls (photo by the author).

been completed, the high percentage of non-state ownership of many agricultural lands and forests in the Rhodope region has affected local support for the establishment of a protected area, as will be discussed below.

While not an uninhabited, roadless wilderness, the Rhodope include substantial wildlands that are home to a wide variety of flora and fauna. This wildland status is recognized in existing protected area designations as well as in ongoing conservation planning efforts. The Rhodope are identified in Bulgaria's biodiversity conservation strategy as a top priority for conservation and for the creation of new protected areas (Meine 1994), and Bulgarian environmental NGOs and external donors have been engaged in conservation-related efforts in this region since the early 1990s. During the early 1990s, for example, the Worldwide Fund for Nature provided support to two Bulgarian NGOs for conservation-related projects in the Rhodope (Cellarius 2004). In August 2000, two NGOs collected more than 2,400 signatures in support of a park designation at a folklore festival in the Rhodope (see fig. 5), and a large conservation planning project is now underway with funding from the Global Environmental Facility (GEF) as well as the Bulgarian government.

Yet, 15 years after the fall of socialism in the country, the conditions for conservation in the Rhodope are not that different from those in other parts of the country a decade or so earlier. The project document, entitled "Conservation of Globally Significant Biodiversity in the Landscape of Bulgaria's Rhodope Mountains" (Government of the Republic of Bulgaria, Ministry of Agriculture and Forests, and United Nations Development Programme 2003), describes some of the following conditions:

- Only 12 of 55 protected areas in the Rhodope are larger than 500 ha (1,236 acres) and very few are large enough to maintain viable habitats or populations of species. Many protected areas are habitat "islands" surrounded by pasture or production-oriented state forestlands.
- Only four of the 12 Rhodope protected areas greater than 500 ha (1,236 acres) in size are regularly patrolled by a guard or ranger.
- None of the protected areas in Rhodope are managed on-site. They are all managed remotely by the regional forestry board or the Regional Inspectorate for Environment and Waters.
- Few protected areas in the Rhodope Mountains have management plans or data from ongoing field research.

In an effort to alter these conditions, the project document describes the creation of two nature parks, one of approximately 250,000 ha (617,763 acres) in the Eastern Rhodope and one of approximately 400,000 ha (988,422 acres) in the Western Rhodope. Compare these sizes to the current parks listed in table 1; they would be significantly larger than Bulgaria's existing parks and would more than double the area of the country protected as a nature park or national park. Given the mosaic of land ownership in the Rhodope, any large-scale protected area created would include substantial areas of private and municipal land as well as land under state ownership. A project fact sheet notes that there are 28 priority municipalities in the two sub-regions of interest (UNDP 2005), and the project document recognizes the need for intensive consultation with local stakeholders in establishing the park as a result of this mixed land ownership.





**Figure 5**—The sign on this booth at the 2000 folklore fair at a high Rhodope Mountain meadow called Rozhen says, “Support the establishment of Nature Park Western Rhodope.” Staff and volunteers from two environmental organizations staffed the booth and collected signatures in support of creating the nature park (photo by the author).

Meanwhile, concerns about balancing conservation and development are clearly on the minds of local officials as they consider whether to support the establishment of a park. In August 2001, an activist from Green Balkans, an active and well-established Bulgarian environmental organization working in the Rhodope, had just returned from a road trip during which he visited with municipal leaders in the region of the proposed nature park. He reported that some communities had been supportive of the nature park concept from the start, but that others—particularly those with substantial forest resources and heavily involved in timber production—were more reserved in their support due to concerns that the nature park designation would negatively impact their development opportunities. The president of the Bulgarian Society for the Conservation of the Rhodope Mountains, another NGO working in the region, likewise related that local officials she spoke with had similar concerns about the kind of restrictions designation as a nature park might place on their ability to develop local natural resources. In addition to logging, development opportunities that are being discussed for the Rhodope and could potentially conflict with conservation efforts, are ski area development and mining.

## Conclusions

This paper has described some of the key challenges that have faced and in some cases continue to face wildland conservation efforts in Bulgaria during the postsocialist period. Examples from the Rhodope Mountains mirror in many cases the situation elsewhere in the country. Some of these challenges are familiar to conservationists in many

parts of the world, such as how to balance conservation with various kinds of development or resource exploitation. Limited funding and limited conservation infrastructure are similarly challenges facing many areas, particularly in countries with limited economic resources, which have seen rapid increases in their protected area networks in recent years, or both. Issues of property restitution, including ownership, as well as how the restored land will be managed, are perhaps more unique to postsocialist countries. For the Rhodope, the recent restitution of formerly private forests has been particularly significant for land ownership in some parts of the range.

Yet, with the help of various partners and projects and the involvement of Bulgarian NGOs, Bulgaria appears to be making progress in addressing the challenges of wildland conservation in the postsocialist period. It has taken more than a decade, but efforts seem to be accelerating to create possibly two large nature parks in the Rhodope Mountains, an area with particularly interesting challenges to conservation due to their populated nature and the dependence of local residents on the area's natural resources, but also one with considerable wildlands. The landscape approach being taken, with its emphasis on sustainable livelihoods and involving local stakeholders, seems to be a reasonable one given the populated nature of the Rhodope and the reliance of local residents on the resources found there.

## Acknowledgments

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# Rewilding in England and Wales: A Review of Recent Developments, Issues, and Concerns

Steve Carver

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**Abstract**—This paper reviews the emerging wild land policy in the United Kingdom—in England and Wales in particular—and the environmental, social, political and economic drivers that make extensive protected wild land areas a possibility in what is otherwise a crowded and intensively developed island nation. Various future scenarios for wild land and rewilding in England and Wales are described including some warnings about the threats from renewable energy developments. Should there develop a strong political will, the paper concludes that there remains a core of significant wild lands in key areas that can be built on to create a spatially continuous network of wilder areas for the benefit of people and wildlife.

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## Introduction

Parts of the United Kingdom (UK), the Highlands of Scotland and the northern counties in particular, have regularly been described in recent years as our “last great wilderness.” A romantic notion no doubt, but to those who live and work on the land, and to anyone with an educated eye, it is far from being a wilderness. Thousands of years of human history have created a landscape that is a mosaic of different land uses, in which even those that appear to be wholly natural are, on closer inspection, the product of human action in recent or more distant times. Nevertheless, there are parts of this crowded island that do retain a feeling of wildness; wide, open vistas uncluttered by obvious signs of human action, a sense of remoteness, solitude, tranquility and of nature in the raw. These areas by their definition focus in the main on the uplands, though selected forests and coasts also engender some of the same feelings. It is also a mistake to think of these landscapes as static, since they are, like landscapes the world over, constantly changing.

Some early cultures used the metaphor of interlocking and overlapping circles or wheels to describe the links between humans and nature. This is still relevant today as human induced landscape change is influenced by cycles or systems wider than the landscape itself (for example, the global economy and national planning policies), but are necessarily restricted and molded by the physical possibilities and natural processes of the canvas on which they are played out. Recent changes in the economy of upland agriculture in England and Wales, brought on partly by wider political

and economic forces and partly by crises such as Bovine Spongiform Encephalopathy (BSE, or mad cow disease) and Foot-and-Mouth Disease (FMD), have created a situation widely regarded by some as an opportunity to instigate some more radical changes to the landscape by encouraging “wilderness” attributes in marginal or less profitable areas. This process of drawing back or de-intensifying agricultural or commercial forestry production in carefully selected areas using natural principles and processes is termed “rewilding,” and is the subject of this paper. As should be already apparent, this is not a simple and straightforward topic; there are a great many competing and conflicting issues to consider such as traditional farming practices versus modernization and European Union (EU) policy, as well as some as yet poorly defined issues and a smattering of unknowns such as defining what we mean by “wild” and knowing exactly what we might be aiming at in terms of “natural.” With this in mind, this paper will attempt to identify the main issues and take a holistic overview of their relevance to the question of rewilding in England and Wales before spelling out some of the challenges facing the adoption of rewilding as a strategic option for land management in the future.

## Defining Wild

Whenever you get people around a table to discuss issues pertaining to wilderness and wild land there are, more often than not, as many different definitions of the concepts of wildness, wilderness, wild land and natural areas as there are people in the room. Indeed, the number of events I have personally attended or organized on the wilderness issue where the discussion is hijacked or flounders because the very thing we are there to discuss in the first place is not easily nor tightly defined, are too numerous to fully recall. The serious point to note from this is that little or no progress on rewilding can be made in England and Wales unless we can arrive at some mutually acceptable definitions that can be embedded in policy and planning guidelines. This is no mean feat, remembering that it took Howard Zahniser some 15 years and multiple drafts to get the definition of wilderness in the 1964 Wilderness Act past the U.S. Senate. Fenton (1996) goes somewhat towards providing us with working definitions of wilderness and wild land that are repeated here:

**Wild land:** An area where natural ecological processes are paramount (can be of any size).

**Wilderness:** An area little affected by current civilization where nature and natural processes are in charge, and where people can isolate themselves from other people (Fenton 1996: p. 17).

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Fenton goes on to make the distinction between primary and secondary wilderness as wilderness areas with either fully natural or semi-natural flora and fauna, and the different levels of experience possible in wilderness or wild land. This distinction between wilderness and wild land is useful because in the UK there are no real wilderness areas left (at least not in comparison to places like Greenland, Alaska or Siberia). Defining what may be regarded as natural and what is artificial is central to this discussion. Again, Fenton (1996) fuels the debate by stating (if a little obviously) that humans are natural and therefore everything we do may also be considered natural to some extent, thus blurring the boundary between natural and artificial landscapes. Clearly we need to draw the line somewhere in reference to wilderness and wild land, and removing post hunter-gather humans and their effect on landscape from the definition of natural is probably the most acceptable solution.

The experiential dimension to wilderness and wild land definition is a useful adjunct, if not central, to this discussion since wilderness is widely considered to be a social/cultural concept. To quote from Roderick Nash's classic book *Wilderness and the American Mind*, "one man's wilderness is another's roadside picnic ground" and "to accept as wilderness those places people call wilderness... [with emphasis on] not so much what wilderness is, but what men think it is" (Nash 1982: 3). These oft used definitions stress the importance of the individual and the role of prior experience in defining wilderness as an essentially fuzzy concept that varies remarkably from person to person. Not very helpful in a policy concept, but it does clearly demonstrate the difficulties involved.

It may be that certain lessons for England and Wales can be learned from the development of wild land policy in Scotland. In Scotland, both Scottish Natural Heritage (SNH) and The National Trust for Scotland (NTS) have developed their own and very similar wild land definitions that have enabled the drawing up of a national wild land policy. The SNH definition of wild land takes its lead from the Scottish Office's National Planning Policy Guideline 14 (1998) that wild land is "uninhabited and often relatively inaccessible countryside where the influence of human activity on the character and quality of the environment has been minimal." The SNH policy document goes on to say that the "appreciation of wildness is a matter of an individual's experience, and their perceptions of and preferences for landscapes of this kind. Wildness cannot be captured and measured, but it can be experienced and interpreted by people in many different ways" (Scottish Natural Heritage 2002: 5); apparently accepting Nash's definitions of wilderness as an individual ideal. The NTS perhaps provides the best all round definition in "Wild land in Scotland is relatively remote and inaccessible, not noticeably affected by contemporary human activity, and offers high-quality opportunities to escape from the pressures of everyday living and find physical and spiritual refreshment" (National Trust for Scotland 2002: 4).

Although some upland areas south of the Scottish border possess some large tracts of countryside that meet the requirements of such a definition, the emphasis in England and Wales might best be placed not only on conserving existing wild land areas, but on developing new wild lands where the opportunities arise. Rewilding or ecological restoration in Britain takes its cue from the 1991 Edwards review of

National Parks of England and Wales, which proposed, "a number of experimental schemes on a limited scale should be set up in National Parks where farming is withdrawn entirely and the natural succession of vegetation is allowed to take its course" (Recommendation 6.3, Edwards 1991). The Council for National Parks (CNP) held a seminar in April 1998 to debate the concept of rewilding and launch their "Wild by Design" report (Council for National Parks 1998). In this report they outline plans for the enhancement of the wild qualities of our National Parks. Two broad categories of wilder areas are described:

**Semi-natural areas**, which appear natural but are in fact influenced by management for agriculture or forestry.

**Near-natural areas**, where the land is totally divorced from agricultural or forestry use—in which natural processes are encouraged to maintain the diversity of habitats, and vegetation is free to vary naturally with variations in the physical environment (Council for National Parks 1998: p. 3).

These two categories help define approaches to rewilding based on:

- Promotion of the wilderness qualities of an area while maintaining productive use that may best be applied to semi-natural areas and is in accordance with the aims of the UK Biodiversity Action Plan (BAP) to conserve and enhance biological diversity.
- Enhancing existing semi-natural habitats and recreating others by, for example, reducing grazing pressure to allow vegetation to develop more naturally, enhancing and restoring natural features such as river restoration schemes, restructuring specific landscape elements such as conifer plantations to give a more natural outline, changes to alternative and less intensive land uses such as agro-forestry.
- Promotion of areas where ecological processes can be paramount, especially in near-natural areas where relatively large areas of land can be left without management for long periods of time.

The National Parks in England and Wales, and now in Scotland, together with other conservation areas such as Areas of Outstanding Natural Beauty (AONBs) and National Nature Reserves (NNRs), are perhaps the most obvious target areas for rewilding schemes as outlined in recent reports such as Land Use Policy Group's *The New Wildwoods Project* (Worrell and others 2001) and the Royal Society for the Protection of Bird's *Futurescapes* (2001). The Countryside Stewardship Scheme is one example where farmers are offered government grants to manage their land in environmentally friendly ways, and rewilding schemes are a step further in this general direction, though based more firmly on fundamental ecological principles of natural succession and disturbance operating over much larger areas and over much longer times scales. It is appropriate that this discussion is taking place in northern England since a significant number of existing rewilding projects are local to the Northumberland National Park and North Pennines AONB (for example, College Valley, Simonside Hills, Otterburn, Whitelee and Kielder Head) and their respective management plans both make explicit reference to enhancing naturalness and biodiversity through appropriate land management and agri-environment schemes.

## Themes and Issues in Rewilding \_\_\_\_\_

The main areas that need to be addressed in considering the possibility of rewilding selected areas of the countryside can be grouped into issues of landscape evolution and character, biodiversity and conservation, farming and land management, and socio-economic development. While such theme groupings are convenient in drawing attention to the various issues that are relevant to rewilding, many of the issues cut across and are interwoven with these themes in complex ways. What is needed at the end of the day is a thorough understanding of the wider issues and how they may be addressed in future rewilding programs. These, it is proposed here, can be encompassed within one, if rather unfashionable, view of the world as *landscape* (in other words, the holistic/ecological perspective of nature and humans interacting within the physical space of the landscape unit).

### Landscape Evolution and Character

If the landscape is the basic spatial unit in which all processes, be they natural or human, take place, then this is the spatial scale at which rewilding must surely be considered. There are two basic views of role of landscape and human agency, biocentric and anthropocentric. A biocentric view of landscape emphasizes the physical and natural processes that shape the human use of the land—a kind of environmental determinism—and hence the patterns of human land use and settlement we see today (for example, climate and soil type determine which crops can best be grown where and when). An anthropocentric view of landscape alternatively emphasizes the power of human determination over our utilization and shaping of the basic land resource (for example, turning heath land into rough pasture by the human acts of drainage and soil improvement). Whichever view of the landscape we ascribe to, we must recognize that landscapes change over time, sometimes slowly, sometimes rapidly, under the forces of nature and human intervention. With the exception of extreme events, natural change is generally slow and imperceptible through the processes of ecological succession and erosion/building of landscape features by the forces of wind and water. Human induced changes are much quicker resulting from forest clearance, enclosure, farming, drainage, channelization, urbanization and industrialization.

The fact that landscapes evolve and have a history is important for rewilding since landscape change, while inevitable, is rarely seen as a good thing by the living. Recent and modern history (such as in “second hand” narratives or living memory) acts as a kind of cultural veneer over a landscape that shapes the way that we, and particularly those people who work closely with the land, perceive the *status quo*. Archaeological and written history tells us that landscapes have not always been the way they are today or were in the immediate past. Hadrian’s Wall, for example, acts as a very visible reminder of a past landscape in northern England. The geological record, if we take this argument to its extreme, tells of even greater changes. Indeed, the present is but a very short moment in the much longer-term trajectory of landscape evolution. The point I am trying to make here is that whatever our view of landscape, and whatever the drivers of landscape change, be they human or natural, landscapes are transient features constantly in a state of

flux and we must recognize this when working towards a particular goal, be it social and economic regeneration in the face of a collapsing heavy industrial heritage such as in the cities of the northeast of England, or in our case, rewilding in the face of the declining fortunes of upland agriculture and forestry.

### Biodiversity and Conservation

Nature conservation in the UK can mean different things to different people. In the past, conservation has been rather too species focused—a kind of “wildlife gardening” approach aimed at favoring the conservation of particular species made rare by human activities. Fenton (2003) describes three broad approaches of nature conservation; the *wilderness approach* where letting nature “do its own thing” with no predefined outcomes is the central theme; the *nature reserve approach* where defined outcomes and focused intervention are more the norm (for example, the wildlife gardening approach described above); and the *fitting in approach* where wildlife conservation is worked around economic activities wherever possible. Rewilding most probably sits somewhere between the first two approaches in that while there may be some predefined outcomes (such as a more natural-looking landscape), the precise ecological mix is not known and the processes of ecological succession are central while human intervention is minimal.

The current interest in biodiversity is a relatively recent phenomena, indeed the term itself is rather new and still somewhat ill defined. It is widely assumed that high biodiversity is a good thing and that conservation planning and land management should work together to preserve and enhance wildlife habitats and so facilitate the survival of a wide range of flora and fauna indigenous to a particular area. This is very much the approach adopted by the government through its program of national and local Biodiversity Action Plans (BAPs).

The relationship between biodiversity and wildness is not a straightforward one however, as they are not directly correlated (for example, the Greenland icecap is certainly wild in all senses of the word but has virtually zero biodiversity, whereas a patch of inner city industrial wasteland is likely to have a diverse population of weeds, insects, birds and mammals but is not a wilderness). Spatially it has been shown, however, that relationships do exist between wilderness attributes and biodiversity at regional scales where less modified environments are likely to demonstrate higher biodiversity than their intensively managed neighbors. The relationship breaks down again with increasing **and** decreasing scale as correlated patterns in local and global biodiversity/wilderness quality take over (Dymond and others 2003). On biodiversity grounds, therefore, the arguments in favor of rewilding need to be carefully spelled out for each landscape unit, the ecosystems presented therein and their relative spatial scales.

Returning to the issues of landscape for a moment, one very persuasive biodiversity argument in favor of rewilding is to create a series of linked natural habitat zones that are together large enough to accommodate viable species populations and allow ecological processes/succession to operate largely unhindered by human activities. By this means, islands of biodiversity may be linked and species can

better respond to external drivers such as climate change (for example, through migration) that might otherwise force local or even global extinctions. Such a plan requires a great deal of cooperation between land owners, government and local, national and international conservation bodies, but may well be a prime force in promoting the rewilding concept.

## Farming and Land Management Policy

In the previous discussion about drivers of landscape change, the actions of farmers (and foresters) in response to general economic demand for produce (food and timber) are a significant force of change and development in rural areas. The rural landscapes we see today are the result of many generations of people working the land (constructing walls, maintaining hedgerows, creating enclosures, draining wetlands, planting trees, woods and forests, building farms, tilling the land, etc.) to satisfy this demand. It is this historical attachment to the land that generates a strong sense of place and local pride among the rural community that can be fiercely resistant to change; witness recent examples such as the proposed ban on hunting with hounds and the resulting countryside campaigns.

BSE in the 1990s and FMD in 2001 put extreme pressures on an agricultural economy that was already under pressure and had a number of long-term effects that are still being played out. Changes to the EU Common Agricultural Policy (CAP) are likely to accelerate change further as emphasis is shifted from production subsidies to agri-environment schemes. There is an important issue of differing scales here, between policies developed to deal with regional and national problems of agricultural over production and inefficiencies (for example, CAP) and their local implications at a community/farm level, especially in terms of subsidies received and profits made.

The question on many people's minds is what will happen to the marginal lands if they are no longer farmed because it is simply not profitable to do so? Can marginal lands be farmed in other ways using, say, more extensive grazing and harvesting methods? Or can marginal lands be rewilded to create better wildlife habitats and a more tourist focused landscape resource? It is probably true to say that simply abandoning such areas would not be a popular option, though in the long run the resulting landscape might well be seen as a valuable resource for wildlife, tourism and watershed protection. A more carefully managed program of assisted rewilding might be the most acceptable option, particularly if the social and economic arguments in its favor are well researched, developed, marketed and supported.

## Socio-Economic Aspects

In most rural areas, agriculture (or forestry or fishing) has traditionally been the primary unit of production, supporting local economies by employment and the processes of "trickle down." In more recent years, rural economies have been forced to diversify in order to continue to compete. Tourism is now the mainstay economic activity in many areas, especially the national parks. Agri-landscapes are, as a result, often seen more as a recreational and landscape resource, than as a primary unit of production. The fact that

it is the agricultural activity, both past and present, that has created the landscape resource that forms the basis of the tourist economy, means that there are some serious issues regarding the sustainability of this symbiotic relationship. This is particularly true considering the current uncertainty over the future of agriculture in the more marginal areas typical of our national parks and upland areas in general.

A peculiar aspect of the local economy of many rural areas is the rise in the number of homes owned by people not linked directly to agriculture or forestry. These include second homes, holiday homes and homes occupied by commuters, retired people, teleworkers and those employed principally in the tourist service industry. This trend represents an urban in-migration that is steadily changing the demographics of selected rural areas, particularly those in attractive landscape locations, with significant portions of the population now having little or no connection to the land beyond a desire for a rural lifestyle. At the same time the popularity of "a place in the country" has dramatically increased house prices in these areas such that lower income agricultural/forestry workers cannot afford to buy their own homes. This is partially responsible for a corresponding rural out-migration, particularly by the younger generations, to find employment, affordable housing and better access to services elsewhere. The net result is a kind of social dilution with an associated reduction in sense of place and community. The effect on attitudes towards landscape change is perhaps a moot point. It may be argued that overall resistance to change may be reduced by the more diverse social mix, but at the same time many incomers may actually be quite vehemently opposed to any changes to their new found rural idyll (as in, "We like it like this... it's why we moved here in the first place").

## Wilder Futures?

So, where do we go from here? Well, if any of the above has made sense it can be acknowledged that some kind of change is inevitable and we all need to recognize this (including the diehards in the farming and countryside lobby). What will or needs to change, how things change and, indeed, how rapidly is a matter for serious debate. This debate must be well informed and inclusive, both in terms of points of view and coverage of the relevant issues. Decisions made in planning for change, responding to change and initiating change need to be based on a thorough understanding of the issues and their likely implications. The decision making process could also do well to be as inclusive as possible, involving all relevant stakeholders at all stages.

If we are to develop sensible approaches to landscape changes then we need to be prepared for all possible outcomes. A number of possible scenarios are tentatively developed here to stimulate discussion.

- *Continued status quo.* Despite changes in emphasis to CAP subsidies, upland farming and forestry continues with intensive grazing of the fells by sheep and continued commercial forestry operations supported by alternative government subsidies. The present overgrazed and denuded landscape characteristic of British uplands with its regular patches of spruce monoculture is therefore maintained. The likelihood of this happening is perhaps very low because the UK government is unlikely

to bridge the gap in production subsidy payments to upland farmers and forestry left by CAP reforms.

- *Abandonment.* As production subsidies are reduced and withdrawn, significant upland areas become unprofitable to farm and so are abandoned. Left to nature with little or no grazing by sheep, these areas begin to revert to mixed woodland via the slow processes of ecological succession. Commercial forestry operations are similarly abandoned with remaining forest blocks clearfelled and left to nature. The likelihood of this scenario is also low because of its unpopularity with most people and replacement of CAP production subsidies with more agri-environment grants. Farmers and land managers would not like the idea of hard won grazing land going to waste. The general public would probably not like the look of the scrub vegetation that precedes woodland, preferring the familiarity of our open and close-cropped fells.
- *Rewilding.* As areas of land become unprofitable to farm, existing grazing lands are combined into larger farm units for economies of scale and more extensive grazing patterns are introduced. Commercial forest is removed and replaced, especially in planted ancient woodland sites (PAWS), with native species. This allows for reinstatement of more natural vegetation patterns in the least profitable areas via a program of carefully planned natural or assisted regeneration that is made possible by the reduced grazing pressure and removal of conifer plantations. Benefits accrue to the local economy from increased tourism and maintenance of an agricultural economy base, as well as the obvious benefits for biodiversity and conservation. The likelihood of this scenario is higher because there is something of benefit in it for everyone.
- *Diversification.* A popular economic response strategy to the threats facing the main agricultural base of marginal areas is diversification. In this scenario, farmers, foresters and the local community employ intensive diversification of business as a means of maintaining their individual farm units, forests and village/market town economies as per the Department of the Environment, Food and Rural Affairs (2001) "Task Force for the Hills" Report. The main focus is on tourism related activities and high value/low volume premium produce such as free-range meat from traditional breeds, woodland products collected from low intensity managed forests, cottage craft industry, niche-marketed sporting and recreational opportunities (for example, adventure and eco-tourism, photo-hunting, etc.) and exclusive country resorts. This scenario is also highly likely to happen and may well be linked to or merged with the rewilding scenario. It should be a popular choice for all but the most traditional of farmers as it maintains farm and community units and ensures a sustainable economic future for the younger generation and their families.
- *Urbanization.* In this scenario, planning restrictions on residential development in rural areas are relaxed to enable more housing to be built. This is done to cater to the increasing demand for high quality lifestyle homes from urban in-migration as well as for affordable housing for lower income agricultural/forestry/tourism workers who want to live in the country so stemming rural

out-migration. The likelihood of this scenario is low as it is perhaps difficult to see how planning restrictions might be lifted and because of the negative effects that increased development would have on the rural landscape.

- *Energyscapes.* The final scenario is the one that currently represents the greatest threat to wildland and rewilding in the UK. This is the targeting of the remote and wild areas of the country by the growing renewable energy businesses as potential sites for large-scale wind energy developments. Despite claims that these represent green energy sources, they are highly intrusive when sited in otherwise wild landscapes and can have negative physical and ecological impacts (for example, through construction of foundations and access tracks, disturbance of nesting birds and noise occurs). If the UK government is to meet its targets for CO<sub>2</sub> reduction, many of the country's wild land areas, and just as significant, target areas for rewilding projects, may be adversely impacted by wind farm developments. The problem is perhaps not restricted to wind farms either, with recent examples of hydroelectric and biomass schemes also impinging on wild landscapes.

Playing around with scenarios like these is all well and good, but it is still difficult to accurately predict the probability of them occurring and therefore making suitable plans is not always possible. Setting of goals or objectives is perhaps a more sensible approach if it is possible to agree on what these should be. Working towards these through the planning system should be the aim of all stakeholder bodies involved rather than a more *laissez faire* approach.

Assuming that the rewilding option, most likely combined with elements of diversification, is accepted by the majority of stakeholders, then a number of problems arise that need to be addressed in deciding how exactly to proceed. These include:

- *Knowing what to aim for in terms of flora and fauna.* We have a good idea of what species of plants were present prior to human settlement, from the pollen record, but their pattern, mix and distribution is more difficult to determine. It is often assumed that the pre-human landscape of Britain was dominated by dense unbroken woodland with only the lowland marshes and high fells being free from tree cover. A recent (though not universally accepted) hypothesis by Dutch ecologist Frans Vera (2000) suggests this might be wrong and points more towards a more open landscape of mixed woodland and grassland with dense scrub and woodland kept in check by grazing animals.
- *Defining target areas for rewilding.* Knowing which areas to target for rewilding might be more a case of availability or willing landowners than of exact science. However, it would nonetheless be sensible to have an idea of the best location, size and shape before embarking on any program of rewilding. Using appropriate criteria it is possible to use Geographical Information Systems (GIS) and existing spatial datasets to model wild(er)ness attributes such as remoteness and naturalness (Carver and others 2002; Fritz and others 2000). Such maps could be used as a baseline index on which to evaluate lands proposed for rewilding in terms of their existing wild/natural attributes and how/where they fit



into the overall landscape and policy mosaic. Additional important points to consider here include ecological issues such as connectivity, fragmentation, diversity, etc., as well as potential impacts on landscape aesthetics. Again, these may be assessed using GIS methods.

- *Deciding on natural or assisted regeneration.* Whether to rely on natural regeneration or give nature a hand through tree planting and river restoration schemes is an important issue in the “Wild by Design” discussion. The answer to this question is likely to depend very much on the target area in question (for example, presence of a seed bank/seed trees, grazing pressure, exposure, etc.) and the degree of landscape design required.
- *Deciding on which (if any) human features/artifacts to remove.* Part of the rewilding concept involves the removal (where deemed necessary or appropriate) of human features or artifacts such as four wheel drive tracks, plantation forestry, fences, buildings, bridges, sections of channelized river, etc. Deciding what to remove and what to leave *in situ* depends very much on the ethos of the rewilding that is taking place. A purist approach would be to remove all human features, but a more moderate approach would be to leave those features that are beneficial to recreational use, such as footpaths and bridges, and those that are beneficial to landscape history, aesthetics and sense of place such as archaeological remains and industrial/agricultural heritage sites.
- *Deciding on the level of conservation management to employ.* Once an area has been targeted for rewilding and the process started (such as, planting if necessary and/or removal of artifacts), the degree of conservation management to be employed over the next 10, 20, 50, 100 years is a crucial question if the project is to be successful. Much of the above discussion focuses on the fact that landscapes are dynamic, and this implies that management too needs to be responsive to change, especially over the long timescales required for successful rewilding projects. In primary wilderness areas, management is focused solely on the users and pressures that might act to reduce wilderness quality. In the case of rewilding projects, active management of the environment itself may also be needed to help ensure that the natural processes of ecological succession remain on track and that they respond appropriately to external drivers (such as, global climate change).

## Next Steps?

In the *Wild by Design* report, the CNP clearly highlight the obvious challenge of rewilding as having, “the commitment to leave minimal intervention areas on a much larger scale (landscapes of thousands of hectares) and over much longer periods (hundreds of years)” (Council for National Parks 1998: p. 5). Almost certainly the real challenge here is the successful integration of rewilding objectives with the social and economic imperatives of farming and forestry, or in Fraser-Darling’s words, “*Wilderness and Plenty*” (1970). The key to the challenge will be selling the rewilding “package” to the farmers, landowners, planners, politicians, conservationists, pressure groups and local and visiting public

as an appropriate and viable alternative to existing land management practice. Moves are afoot on this front with a number of dedicated individuals and embryonic groups working towards these wider goals. The challenge for us is to debate and arrive at a common understanding of the issues, map out a strategy for promoting rewilding in England and Wales that involves all the relevant stakeholders, sets in place rigorous safeguards within the planning system, and begins to formulate a set of potential projects to start work in the field.

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# Designating Wilderness Areas: A Framework for Examining Lessons From the States

Gary Bryner

**Abstract**—Although wilderness designations require congressional action, state-level political decisions usually determine whether and when Congress formally acts to designate new wilderness areas. In some cases, such as in Alaska, the issue of wilderness protection becomes nationalized and a wide range of interests beyond the borders of the state shape the eventual policy. But in most states, the fate of wilderness proposals is largely a function of local economic, political, and ecological issues and concerns. While the issues are different in each state, there is great value in comparing the experience of efforts across the states in securing protection for wilderness areas to see how the experience in some states can illuminate efforts in others. Why have some states been successful in getting wilderness areas protected by Congress, and other states have not? What can states where wilderness proposals languish learn from others who have been successful in getting legislation enacted? What factors contribute to successful wilderness campaigns and what causes failures? What kinds of economic analyses, ecological assessments and other scientific studies are most useful in wilderness policy making? How have wilderness proponents been able to generate the kind of political support required for action? The purpose of this paper is to propose a framework for exploring answers to these questions by examining wilderness designation efforts in the western states during the past several decades.

## Overview of Wilderness Policy

The Federal government owns some 29 percent of the total land mass of the United States. Approximately 23 percent of all federal land (7 percent of all land) has been designated as wilderness or is being protected as potential wilderness. Nearly 55 percent of all wilderness is located in Alaska, and Alaskan wilderness areas represent nearly 16 percent of the state. If those lands are excluded, about 4 percent of U.S. lands are protected as wilderness. There are 681 wilderness areas in all but six states (Gorte 2005). An additional 46 million acres (18,615,539 ha) of land are being protected as potential wilderness areas.

The first wilderness area was administratively protected in 1924, when U.S. Forest Service officials decided to designate part of the Gila National Forest in New Mexico as wilderness. Over the subsequent 40 years, 14.6 million acres (5,908,410 ha) of Forest Service lands were protected through administrative action. In 1964, Congress enacted the Wilderness Act and designated 9.1 million acres (3,682,639 ha) of

national forest lands. In 1968, Congress began expanding the wilderness system and wilderness designations included National Park Service, Fish & Wildlife Service and Bureau of Land Management lands, peaking in 1979-1980, when Congress added nearly 61 million acres (24,685,824 ha) of land to the system, including 56 million acres (22,662,396 ha) in Alaska. In 1984, Congress passed 21 wilderness laws, expanding the system by nearly 9 million acres (3,642,171 ha), protecting more lands outside of Alaska than any Congress had done since 1964. In 1998, the Clinton administration sought to designate additional forest lands as roadless areas, ensuring their protection as potential wilderness areas, but that rule was replaced by a Bush administration regulation that allows governors to petition the U.S. Forest Service to issue rules on a statewide basis governing roadless areas (Gorte 2005). In addition to these Forest Service roadless lands that are potential wilderness areas, the National Park Service manages nearly 26 million acres (10,521,827 ha) as potential wilderness, and the Bureau of Land Management (BLM) has designated nearly 15 million acres (6,070,285 ha) as Wilderness Study Areas that are protected until Congress acts to designate or not designate them as wilderness (Gorte 2005).

The 1964 Wilderness Act (Section 2(c)) outlines several criteria for governing the designation of wilderness lands:

*“lands designated for preservation and protection in their natural condition,”*

*“an area where the earth and its community of life are untrammelled by man,”*

*“an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvement or human habitation,”*

*“generally appears to have been affected primarily by the forces of nature, with the imprint of man’s work substantially unnoticeable,” and*

*“has outstanding opportunities for solitude or a primitive and unconfined type of recreation.”*

Only Congress can formally designate lands as wilderness, but the decision to establish new wilderness areas is largely a decision made within state boundaries and is a function of state politics. While there are some important exceptions, in general when federal land agencies, the state congressional delegation, the governor and the legislature, and major interest groups all agree on creating a new wilderness area, Congress typically ratifies the decision.

One way to examine wilderness politics is to focus on national trends. Table 1 charts the evolution of the national wilderness system and the laws passed by Congress that designated wilderness lands. We would expect the number of wilderness laws to decline over time, since there is only a finite amount of land available for wilderness designation, and as lands are protected, the possibilities for future

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**Table 1**—Laws forming the National Wilderness Preservation System.

Year/Congress	Party control of House/Senate	Number of laws	Number of states	Number of areas—new	Number of areas—additions	Acres designated
1963-64 88 <sup>th</sup>	D/D	1	13	54	0	9,139,721
1965-66 89 <sup>th</sup>	D/D	0	0	0	0	0
1967-68 90 <sup>th</sup>	D/D	5	4	5	1	794,550
1969-70 91 <sup>st</sup>	D/D	3	12	25	0	305,619
1971-72 92 <sup>nd</sup>	D/D	9	7	8	1	912,439
1973-74 93 <sup>rd</sup>	D/D	5	22	35	0	1,264,594
1975-76 94 <sup>th</sup>	D/D	6	21	35	0	2,12,486
1977-78 95 <sup>th</sup>	D/D	7	18	28	5	4,555,496
1979-80 96 <sup>th</sup>	D/D	6	10	70	11	60,799,111
1981-82 97 <sup>th</sup>	D/R	5	5	7	0	83,261
1983-83 98 <sup>th</sup>	D/R	21	21	177	49	8,576,450
1985-86 99 <sup>th</sup>	D/R	4	4	11	2	97,393
1987-88 100 <sup>th</sup>	D/D	7	8	22	4	1,988,509
1989-90 101 <sup>st</sup>	D/D	5	5	68	3	1,759,479
1991-92 102 <sup>nd</sup>	D/D	2	2	6	4	424,590
1993-94 103 <sup>rd</sup>	D/D	2	2	79	14	8,272,699
1995-96 104 <sup>th</sup>	R/R	1	2	1	2	29,420
1997-98 105 <sup>th</sup>	R/R	1	1	0	1	160
1999-00 106 <sup>th</sup>	R/R	8	6	18	1	1,086,490
2001-02 107 <sup>th</sup>	R/R	5	5	18	13	441,520
2003-04 108 <sup>th</sup>	R/R	1	1	14	0	768,294

Source: adapted from Gorte 2005.

designations shrink. Nevertheless, there was considerable activity in the 1990s, well after the initial process of wilderness designation was complete. Wilderness designations were much more frequent during Congresses under the control of Democrats. This should be no surprise given the patterns of support for environmental protection policies in the two parties. Republican-led congresses, however, continued to enact wilderness bills.

As shown in table 2, Congress began passing multi-state wilderness bills in 1964; the last one was enacted in 1978. After that, wilderness bills largely addressed only one state. These bills were all passed when Democrats controlled both chambers of Congress. But it is difficult to draw political conclusions from this data, since it is not clear why Congress shifted from multi-state to individual state bills. The designation process has mostly continued to proceed on a state-by-state basis.

More interesting and relevant is wilderness politics at the state level. While 44 states have wilderness areas, the vast majority of designations are in the western states. And these states are home to almost all of the 46 million acres (18,615,539 ha) of wilderness study areas and millions more that have been proposed for protection by citizen groups. Table 3 summarizes the state of wilderness designations

and proposed wilderness in the 12 western states (including Alaska).

The data in table 3 highlight the differences between states in terms of wilderness designation. Setting aside Alaska, based on the percent of federal land designated as wilderness, states can be grouped into three categories: Washington and California are high wilderness states; Arizona, Colorado, Idaho, Montana, and Wyoming are medium wilderness states; and, Nevada, New Mexico, Oregon, and Utah are low wilderness states. It is useful to compare the percentage of federal lands designated as wilderness because states differ significantly in terms of the amount of land owned by the federal government, and this provides a gross measure of success in wilderness designation. Of course, states differ in terms of the amount of land within their borders that are eligible for wilderness designation. The table raises a number of questions, such as what accounts for the differences in wilderness designations achieved in these three groupings of states, and what states contain the most significant opportunities for wilderness designation. In terms of the potential for new wilderness lands, table 3 suggests three different groups: Utah and Nevada as states with the highest wilderness potential; Arizona, California, Colorado, Idaho, Montana, New Mexico, and Oregon as moderate wilderness potential states; and, Washington as low wilderness potential. One way to summarize the task is to examine what lessons can be learned from the high wilderness states (Washington and California) that can help illuminate prospects in the high wilderness potential states (Nevada and Utah). But it is useful to examine wilderness politics in all western states.

Table 4 charts the history of wilderness designation in these different groups of wilderness lands. Alaska is not included here because wilderness designation largely occurred through one statute. In the western states, the typical pattern has been several wilderness laws passed over decades, ranging

**Table 2**—Multi-State wilderness bills passed by Congress.

Year	Number of wilderness areas	Number of states
1964	51	10
1970	7	5
1975	5	4
1976	15	7
1978	17	9

**Table 3**—Federal designated wilderness acreage and acreage protected as potential wilderness.

State	Total designated area	Percent of federal land	Share of NWPS	Total recommended area	Percent of federal land	Share of U.S. recommended area
Alaska	57,522,408	23.6	54.14	18,430,038	7.8	39.66
Arizona	4,528,973	12.4	4.26	2,098,646	7.6	4.52
California	14,058,378	29.9	13.23	1,138,769	2.6	2.45
Colorado	3,348,700	14.5	3.15	1,129,282	4.8	2.43
Idaho	4,005,712	11.4	3.77	2,757,109	8.4	5.93
Montana	3,443,038	11.8	3.24	2,514,611	9.4	5.41
Nevada	2,754,180	4.3	2.59	5,213,015	9.2	11.22
New Mexico	1,623,843	6.1	1.53	1,133,960	4.8	2.44
Oregon	2,274,167	7.4	2.14	2,878,638	8.8	6.19
Utah	800,614	2.3	0.75	5,191,342	15.6	11.17
Washington	4,317,133	32.6	4.06	20,518	0.2	0.04
Wyoming	3,111,232	9.9	2.93	2,700,929	0.9	5.81

Source: adapted from Gorte 2005.

**Table 4**—History of wilderness designations.**Relatively High Wilderness States****California**

Year	Acres
1964	1,258,884
1968	179,000
1969	161,500
1972	97,442
1974	141
1975	123,881
1976	115,882
1978	82,250
1984	1,632,890
1992	400,450
1994	994,049
1994	3,687,020
1999	18,500
2002	56,880

**Washington**

Year	Acres
1964	583,196
1968	510,000
1970	179
1976	355
1984	1,005,950
1988	1,157,886

**Middle Wilderness States****Arizona**

Year	Acres
1964	422,990
1970	57,260
1972	68,000
1976	80,840
1978	370,270
1984	972,110
1990	2,433,364

**Middle Wilderness States (cont.)****Colorado**

Year	Acres
1964	274,859
1975	640,261
1976	187,310
1978	70,000
1980	1,422,430
1993	611,780
1997	160
1999	22,119
2000	18,000
2000	75,550
2002	17,195

**Idaho**

Year	Acres
1964	987,910
1970	43,243
1978	206,000
1980	2,344,600

**Montana**

Year	Acres
1964	1,698,155
1972	240,000
1975	75,588
1976	64,606
1978	932,940
1978	345,771
1980	33,000
1983	38,000

**Wyoming**

Year	Acres
1964	1,813,012
1972	208,000
1976	197,600
1978	14,940
1984	879,129

**Relatively Low Wilderness States****Nevada**

Year	Acres
1964	64,667
1989	761,400
2000	757,800
2002	451,915

**Oregon**

Year	Acres
1964	662,847
1968	100,000
1970	38
1978	387,559
1984	859,500
1996	12,895
2000	425,550

**Utah**

Year	Acres
1978	29,567
1984	749,550

from large designations to small additions to existing wild lands. The Wilderness Act suggests a minimum of 5,000 acres (2,023 hectares) to qualify as wilderness, so most of the bills affecting small tracts of lands were extensions of existing areas.

Table 5 summarizes the wilderness designations in place and the opportunities for future designations. While these opportunities are impressive, they underestimate the amount of land that could be protected because many eligible lands identified by citizen groups are not officially protected.

## Modeling the Policy Making Process for Wilderness

Political scientists often employ a model of the policy making process that builds on Kingdon (2002), a very influential book on how public policies get on the policy making agenda. The predominant model of the policy making process, rooted in the work of early theorists, described the policy process as a system of distinct functions, interconnected with feedback loops. The steps in the policy process for policy making typically include the following:

- Getting on the policy making agenda (the issues that decision makers are paying serious attention to at any one time; at the national level, the key decision makers are Congress and the White House; the governor and legislature play that role at the state level).
- Formulating policy options and alternatives.
- Selecting policy goals and instruments and legitimizing them, either through legislation or executive action such as rulemaking, executive orders, etc.
- Designing and implementing programs to achieve policy goals.
- Evaluating policy outputs of government agencies and the outcomes produced.
- Revising the definition of the problem and beginning the process anew.

This policy stages model is helpful in describing how policy making occurs, whether for wilderness policy or any other issue, as it breaks down the complicated process of policy making into manageable parts that allows us to better understand what actors and institutions are involved, what political forces are involved, and how the evolution from defining a problem to fashioning and putting in place a solution actually occurs. While helpful, this descriptive model does not explain most of the questions we have about the process, such as how policies get on the agenda in the first place, how they move through the process, and what determines their success in achieving policy goals.

Policy making is a function of a wide array of factors, including chance and the personalities in place at a particular time; the incentives driving choices made by self-interested political actors as well as those motivated by concerns beyond rational calculations; events and developments beyond the control of policy makers; the consequences of policy making in parallel policy arenas that are addressing other issues; and political ideology and partisan politics and the way in which different actors view the appropriate role of government. Kingdon (2002) focused on national policy making and interviewed nearly 250 senior policy makers over a four year

period, including governmental officials and interest group leaders, about the policy problems they were working on, why they focused on them, and what were emerging policy issues. He concluded that the process is one of "organized anarchy," but found that there was considerable organized activity in three separate, independent streams of activity:

1. The problem stream where researchers, activists, and others seek to understand the causes and consequences of public problems.
2. The policy stream where policy makers, academics, policy analysts, and advocates seek to design solutions to public problems.
3. The politics stream where politicians seek ways of establishing and expanding their political influence.

Activity in these streams continues independently until policy entrepreneurs are able to bring the three streams together and produce policy action. This window of opportunity can occur as the result of a variety of developments. Within the problem stream, a major incident or accident can focus attention as can the accumulation of knowledge that becomes so compelling that action is required. Within the politics stream, a broad change in administration or party control in Congress or, more narrowly, the naming of new committee chairs, can create an opportunity for political change. Policy windows open when compelling problems surface or political changes occur, and policy solutions are ready to be joined to these problems (Kingdon 2002).

The role of policy entrepreneur is key in harnessing the changes in the different streams and bringing the largely independent and parallel flows of action together. Policy entrepreneurs are advocates who are willing to invest time, energy, money, and other resources to produce a policy outcome they favor. The essential attributes of a policy entrepreneur include having a claim to a hearing because s/he speaks for others or is in a position of authority; is known for political connections and negotiating skills; and is persistent and tenacious. Policy issues are like a queue of items, waiting to have a turn on the policy agenda. Policy entrepreneurs may constantly push their proposal or lie in wait for the window to open. Open windows are scarce because there is a limit to the capacity of the policy system to consider alternative policies, although the capacity of the system is not fixed, there is no zero-sum competition for a place on the policy agenda, and it contracts and expands over time (Kingdon 2002). Success in one area can spill over to another, as politicians believe they can find success in a related area by repeating their effort and transfer a winning coalition to a new policy issue and finding support from precedence (Kingdon 2002).

A key role for the entrepreneur is to frame the issues in ways that get the attention of others and generates sufficient attention that the issue breaks through and rises above other possible issues. How an issue is framed has significant implications for the likely success of the issue moving through the policy stages and being successfully implemented. The intersection of ideas and political actors is critical in joining solutions to problems and connecting both to favorable political forces, and issue framing defines the problems and their solutions in ways that are politically salient and can garner significant support. Opponents may offer a more compelling way to frame an issue that favors their policy positions. The importance of framing suggests

**Table 5**—Wilderness and proposed wilderness areas, by state.

<b>Alaska wilderness and proposed wilderness areas</b>							
	<b>Area managed by federal land management agencies</b>	<b>Federal designated wilderness acreage</b>	<b>Wilderness as a percent of total federal lands</b>	<b>Share of national wilderness preservation system</b>	<b>Acreage protected as potential wilderness</b>	<b>Percent of total land</b>	<b>Share of total potential wilderness area</b>
USDA	21,973,662	5,753,448	26.2		1,412,000	6.4	
NPS	51,078,663	33,079,611	64.8		16,143,800	31.6	
FWS	76,567,246	18,689,349	24.4		0	0	
BLM	85,652,163	0	0		784,238	0.9	
<b>Total</b>		57,522,408	23.6	54.1	18,430,038	7.8	39.66
<b>Arizona wilderness and proposed wilderness areas</b>							
	<b>Area managed by federal land management agencies</b>	<b>Federal designated wilderness acreage</b>	<b>Wilderness as a percent of total federal lands</b>	<b>Share of national wilderness preservation system</b>	<b>Acreage protected as potential wilderness</b>	<b>Percent of total land</b>	<b>Share of total potential wilderness area</b>
USDA	11,262,527	1,345,008	11.9		61,000	0.5	
NPS	2,602,990	444,055	17.1		1,973,716	75.8	
FWS	1,677,951	1,343,444	80.1		0	0	
BLM	12,228,398	1,396,466	11.4		63,690	0.5	
<b>Total</b>		4,528,973	12.4	4.26	2,098,6468	7.6	4.52
<b>California wilderness and proposed wilderness areas</b>							
	<b>Area managed by federal land management agencies</b>	<b>Federal designated wilderness acreage</b>	<b>Wilderness as a percent of total federal lands</b>	<b>Share of national wilderness preservation system</b>	<b>Acreage protected as potential wilderness</b>	<b>Percent of total land</b>	<b>Share of total potential wilderness area</b>
USDA	20,769,716	4,430,849	21.3		164,000	0.8	
NPS	7,554,824	5,997,045	79.4		0	0.0	
FWS	281,258	9,172	3.3		0	0.0	
BLM	15,198,670	3,621,312	23.8		974,769	6.4	
<b>Total</b>		14,058,378	29.9	13.23	1,138,769	2.6	2.45
<b>Colorado wilderness and proposed wilderness areas</b>							
	<b>Area managed by federal land management agencies</b>	<b>Federal designated wilderness acreage</b>	<b>Wilderness as a percent of total federal lands</b>	<b>Share of national wilderness preservation system</b>	<b>Acreage protected as potential wilderness</b>	<b>Percent of total land</b>	<b>Share of total potential wilderness area</b>
USDA	14,498,801	3,146,150	21.7		93,000	0.6	
NPS	604,333	60,466	10.0		414,545	68.6	
FWS	70,042	2,560	3.7		0	0.0	
BLM	8,368,106	139,524	1.7		621,737	7.4	
<b>Total</b>		3,348,700	14.5	3.15	1,129,282	4.8	2.43
<b>Idaho wilderness and proposed wilderness areas</b>							
	<b>Area managed by federal land management agencies</b>	<b>Federal designated wilderness acreage</b>	<b>Wilderness as a percent of total federal lands</b>	<b>Share of national wilderness preservation system</b>	<b>Acreage protected as potential wilderness</b>	<b>Percent of total land</b>	<b>Share of total potential wilderness area</b>
USDA	20,715,568	3,961,667	19.1		1,406,000	6.8	
NPS	96,268	43,243	44.9		9,400	9.8	
FWS	48,563	0	0.0		0	0.0	
BLM	11,993,499	802	0.01		1,341,709	11.2	
<b>Total</b>		4,005,712	11.4	3.77	2,757,109	8.4	5.93

Continued



Table 5—Continued

Montana wilderness and proposed wilderness areas							
	Area managed by federal land management agencies	Federal designated wilderness acreage	Wilderness as a percent of total federal lands	Share of national wilderness preservation system	Acreage protected as potential wilderness	Percent of total land	Share of total potential wilderness area
USDA	16,923,859	3,372,503	19.9		812,000	4.8	
NPS	1,214,234	0	0.0		1,090,208	89.8	
FWS	627,548	64,535	10.3		161,580	25.98	
BLM	7,964,028	6,000	0.1		450,823	5.7	
<b>Total</b>		3,443,038	11.8	3.24	2,514,611	9.4	5.41
Nevada wilderness and proposed wilderness areas							
	Area managed by federal land management agencies	Federal designated wilderness acreage	Wilderness as a percent of total federal lands	Share of national wilderness preservation system	Acreage protected as potential wilderness	Percent of total land	Share of total potential wilderness area
USDA	5,836,348	870,567	14.9		0	0.0	
NPS	774,509	125,000	16.1		659,950	85.2	
FWS	2,333,538	0	0.0		1,675,148	72.7	
BLM	47,860,756	1,758,613	3.7		2,877,917	6.0	
<b>Total</b>		2,754,180	4.3	2.59	5,213,105	9.2	11.22
New Mexico wilderness and proposed wilderness areas							
	Area managed by federal land management agencies	Federal designated wilderness acreage	Wilderness as a percent of total federal lands	Share of national wilderness preservation system	Acreage protected as potential wilderness	Percent of total land	Share of total potential wilderness area
USDA	9,419,498	1,388,262	14.7		66,000	0.7	
NPS	376,527	56,392	15.0		97,428	25.9	
FWS	326,664	39,908	12.2		0	0.0	
BLM	13,371,4331	139,281	1.0		970,532	7.3	
<b>Total</b>		1,623,843	6.1	1.53	1,133,960	4.8	2.44
Oregon wilderness and proposed wilderness areas							
	Area managed by federal land management agencies	Federal designated wilderness acreage	Wilderness as a percent of total federal lands	Share of national wilderness preservation system	Acreage protected as potential wilderness	Percent of total land	Share of total potential wilderness area
USDA	15,667,116	2,086,504	13.3		0	0.0	
NPS	190,955	0	0.0		127,058	66.5	
FWS	557,686	940	0.2		50,390	9.1	
BLM	16,135,906	186,723	1.2		2,701,190	16.7	
<b>Total</b>		2,274,167	7.4	22.14	2,878,638	8.8	6.19
Utah wilderness and proposed wilderness areas							
	Area managed by federal land management agencies	Federal designated wilderness acreage	Wilderness as a percent of total federal lands	Share of national wilderness preservation system	Acreage protected as potential wilderness	Percent of total land	Share of total potential wilderness area
USDA	8,193,568	772,894	9.4		83,000	1.0	
NPS	2,094,161	0	0.0		1,852,852	88.5	
FWS	107,227	0	0.0		0	0.0	
BLM	22,867,662	27,720	0.1		3,255,490	14.2	
<b>Total</b>		800,614	2.3	0.75	5,191,342	15.6	11.7

Continued

Table 5—Continued

Washington wilderness and proposed wilderness areas							
	Area managed by federal land management agencies	Federal designated wilderness acreage	Wilderness as a percent of total federal lands	Share of national wilderness preservation system	Acreage protected as potential wilderness	Percent of total land	Share of total potential wilderness area
USDA	9,276,203	2,569,391	27.7		15,000	0.2	
NPS	1,832,050	1,739,763	95.0		0	0.0	
FWS	146,771	839	0.6		0	0.0	
BLM	403,316	7,140	1.8		5,518	1.4	
<b>Total</b>		4,317,133	32.6	4.06	20,518	0.2	0.04

Wyoming wilderness and proposed wilderness areas							
	Area managed by federal land management agencies	Federal designated wilderness acreage	Wilderness as a percent of total federal lands	Share of national wilderness preservation system	Acreage protected as potential wilderness	Percent of total land	Share of total potential wilderness area
USDA	9,238,063	3,111,232	33.7		45,000	0.5	
NPS	2,323,693	0	0.0		2,090,088	88.8	
FWS	70,674	0	0.0		0	0.0	
BLM	18,355,293	0	0.0		575,841	3.1	
<b>Total</b>		3,111,232	9.9	2.93	2,700,929	0.9	5.81

Source: adapted from (Gorte 2005: 11–14).

that ideas matter, that policy success is not simply a function of mobilizing political resources but can also be affected by the way in which problems are defined and solutions presented.

Finally, the opening of the policy window is difficult to predict because it is a perception in the minds of policy makers, and there may be disagreements over whether a window is actually open at any particular time. But timing is critical. Policy windows open for issues that appear to have a chance of enactment, and are typically open for only short periods of time. If they are missed, advocates must wait until the window reopens. Advocates typically hold firmly to their positions until the window opens, prompting negotiation and compromise. Once movement occurs, the process is typically unpredictable and very difficult to control. While problems or politics typically trigger the opening, all three streams need to be joined in order for successful policy making to occur, and if one of the three is missing, the window will likely close before there is time to generate the missing element. Critics of Kingdon argue that the three streams are not really as independent as he depicts them, that the model is ahistorical and fails to account for the way in which previous policy actions affect subsequent ones, and that it fails to provide a basis for predicting policy choice (see Zahariadis 1999).

## Explaining Wilderness Policy Making

Kingdon's policy stream model has been used to help illuminate changes in highly visible policy problems that capture widespread attention. Aside from the case of protecting wildlands in Alaska in the 1970s, which led to the Alaska National Interest Lands Conservation Act in 1980 and the current debate over the Arctic National Wildlife

Refuge, issues like wilderness are largely seen as state rather than national issues for most members of Congress. Despite the limitations, the model provides a useful framework for examining how wilderness policy has developed during the past four decades and for exploring the prospects for future wilderness designations.

This paper only suggests the framework and is part of a project that will eventually result in a book on wilderness policy. But some brief examples might help illustrate what the model suggests we look for in understanding and comparing state wilderness politics. A change in the political stream might result from the election of a new member of Congress. A change in administration, the other most frequent development in the political stream, is less likely to affect wilderness policy directly since it is largely a congressional initiative. But, given the powers of incumbency, turnover in Congress is quite infrequent. It may also occur as a result of state or local-level policy entrepreneurs who decide to make this a priority, or stakeholders who come together to fashion a solution. Sometimes, consensus building takes a long period of time before a breakthrough occurs as participants change.

A dramatic change in the problem stream may not be very likely, given the nature of wilderness, but changes in other, overlapping problem streams, such as energy crises and demands to expand domestic energy production from public lands, may affect wilderness policy making. Changes in the broader social and economic context in which wilderness is part can also help open a window of opportunity. The threat of a major new development, the decline of an extractive industry, or some other local crisis can create opportunities to reframe problems and rethink issues.

Finally, a change in the policy stream may open up opportunities. While policy conditions are outlined in some detail in the Wilderness Act, stakeholders may come up with new ways to package wilderness protection with other public

lands provisions that expand the benefits that come from parties supporting a wilderness bill. Many wilderness bills have place-specific provisions that do not affect wilderness designations elsewhere, but provide enough flexibility to bring parties to agreement.

This model is primarily a framework for aggregating the experience of states in making wilderness policy. It is primarily a descriptive tool, aimed at clarifying what happens in a very complicated process and encouraging comparative studies of the politics of wilderness designation in different countries. Good comparative studies, carefully structured, can help aggregate knowledge and illuminate preconditions and patterns that can suggest how wilderness can be protected in other areas. Much has been accomplished in building the National Wilderness Preservation System but

it is far from finished. Like the National Park System that is much older but continues to grow and evolve, there are tremendous opportunities in many states to protect millions of acres of wild lands.

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# Identifying Core Habitat and Connectivity for Focal Species in the Interior Cedar-Hemlock Forest of North America to Complete a Conservation Area Design

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Baden Cross

**Abstract**—To identify the remaining areas of the Interior Cedar-Hemlock Forest of North America and prioritize them for conservation planning, the Craighead Environmental Research Institute has developed a 2-scale method for mapping critical habitat utilizing 1) a broad-scale model to identify important regional locations as the basis for a Conservation Area Design (CAD), and 2) fine-scale models for analyzing habitat quality and connectivity at site-specific locations targeted by the broad-scale analysis. The basic assumption is that if we can maintain healthy populations of focal species, we can protect biodiversity and healthy ecosystems. A habitat modeling approach was used that can be adapted to any landscape in the United States and Canada for almost any wildlife species.

The initial phase of this project was a CAD for the Canadian portion of the Interior Cedar-Hemlock Forest that utilized existing conservation plan data combined with original analyses to address the conservation needs of: 1) Focal terrestrial ‘umbrella’ species and the prey and habitats they depend upon; 2) Focal aquatic ‘umbrella’ species and aquatic species at risk; and 3) Biodiversity as captured by representation and special element analysis.

A broad-scale regional-level modeling approach for the Interior Cedar-Hemlock Forest of British Columbia (BC) was completed that identified 47.5 percent of the region to be prioritized for a high degree of protection in order to ensure the persistence of our focal terrestrial and aquatic species for several hundred years. An optimization of these core areas is underway that may reduce the overall area needing protection and still meet thresholds for each species. In 2005, a similar process was begun for the United States; in 2006 a seamless, transboundary CAD will be completed. To date, the CAD has formed the basis for an effective environmental coalition and issue campaign in BC.

## Introduction

A Conservation Area Design (CAD) is a science-based architecture for identifying and prioritizing areas for sustainable conservation. Much current conservation planning

includes the generally accepted elements of representation, special elements, and focal species analysis (Noss and others 1997, 2001). However, most current CADs do not adequately identify core areas sufficient for long-term viability of focal species or networks of habitat for movement.

Forest carnivores and other wide-ranging species such as grizzly bear (*Ursus arctos*), wolf (*Canis lupus*), wolverine (*Gulo gulo*), lynx (*Lynx canadensis*), cougar (*Felis concolor*), and woodland or mountain caribou (*Rangifer tarandus caribou*) all need large landscapes to maintain viable populations. Other wildlife species need less space overall, but they need to move across the landscape as well to survive and reproduce. A major problem facing conservation efforts is to accurately identify critical habitat, and to maintain or restore it, in order to ensure that wildlife populations can persist as human activities and developments continue to destroy and fragment natural habitat. Most current conservation planning efforts do not prioritize sufficient habitat necessary to maintain viable populations and metapopulations, and they do not address or identify adequate habitat for wildlife movement or connectivity. Once completed, conservation plans are seldom validated.

Using appropriate techniques, computer habitat suitability model results can be an effective first step to identify core and connectivity habitats in order to direct land development, highway construction, and mitigation so that wildlife are protected as they move across the landscape to meet their daily, seasonal, and lifetime needs.

## Study Area

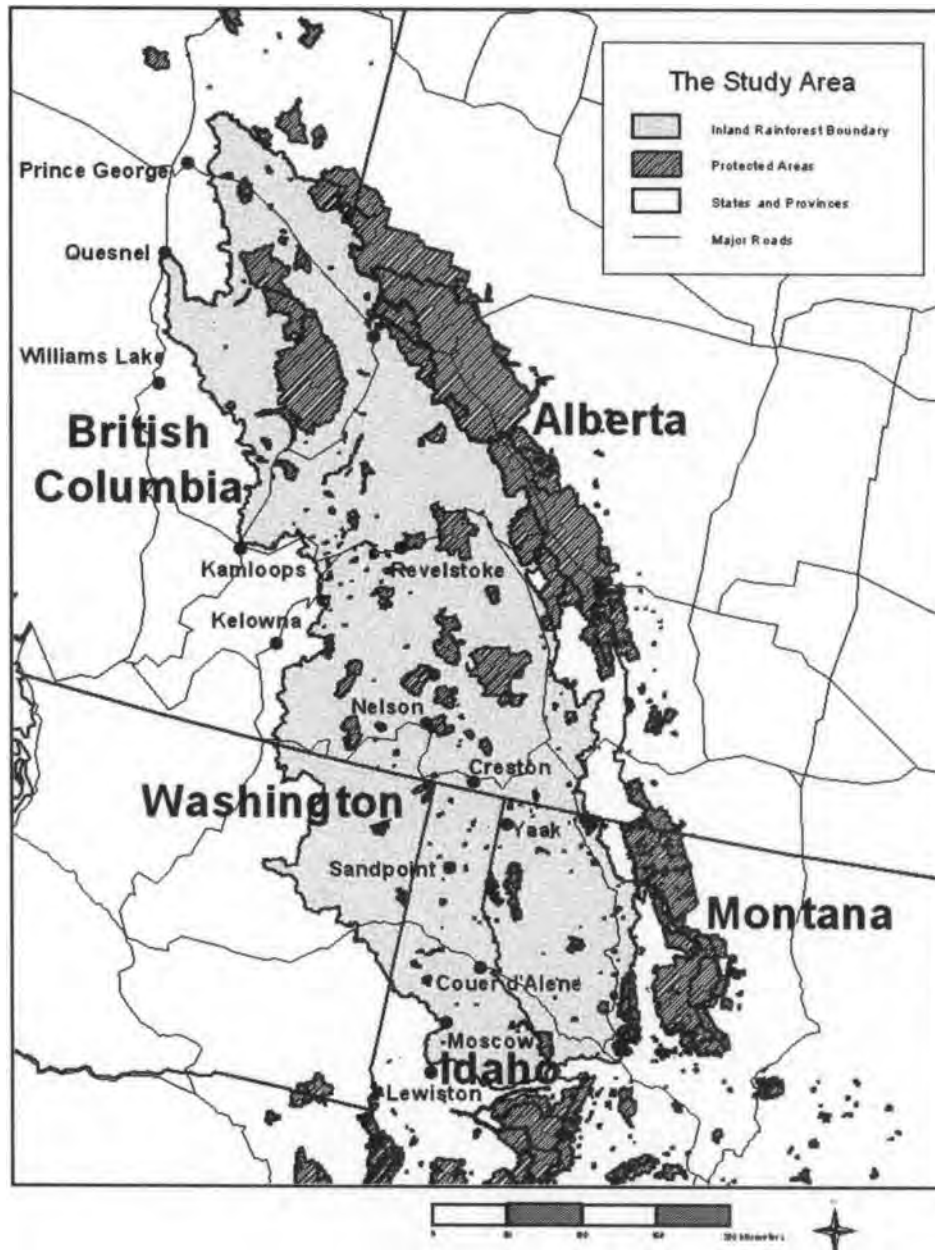
The overall study area extends roughly from Prince George in British Columbia, Canada, to the Clearwater River in northern Idaho, United States (fig.1). In general, it encompasses the lowlands comprised of interior cedar-hemlock forest as described by the Province of British Columbia Ministry of Forests (DeMarchi 1996). At higher elevations this area is comprised primarily of Engelmann spruce-subalpine fir forest and alpine tundra. The boundaries of this area include pockets of sub-boreal spruce forest, ponderosa pine forest, and montane spruce. For this initial project, we restricted the analysis to the Canadian portion of this region. In order to incorporate The Nature Conservancy (TNC) Canadian Rocky Mountains (CRM) Ecoregional Plan, we restricted this analysis to that portion of Interior Cedar-Hemlock Forest region that is within the CRM boundary because equivalent datasets were not available for areas outside that analysis

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**Figure 1**—The inland temperate rainforest.

area. We also expanded the boundary slightly to the west for this analysis to include the known range of the woodland (or mountain) caribou.

## Methods

The methodology for the CAD includes three areas of focus following current scientific consensus: focal species analysis, representation analysis, and special elements analysis (Noss and others 1997, 2001). We paid particular attention to focal species analysis by developing computer-based habitat suitability models of core habitat areas for sustainable populations of grizzly bear, wolf, wolverine, lynx, cougar, and woodland caribou. We chose this suite of terrestrial

focal species because we felt they met most of the desired criteria and there were adequate data and scientific understanding to develop habitat suitability models (Carroll and others 2001, 2003; Lambeck 1997; Roberge and Angelstam 2004). Landscape and habitat suitability characteristics were evaluated for the interior cedar-hemlock forest region in terms of Land Cover Class, Human Population Density, Road Density, Slope and Elevation for each species. Relative suitability rankings were assigned to classes in each of these five landscape characteristic categories for each of the six focal species (table 1). Results were mapped at 1 km<sup>2</sup> resolution based upon the BC Broad Ecosystem Classification (BEC) data. Results identify habitat concentration areas (cores) for each of the six focal species that were then merged into composite areas that could satisfy

**Table 1** Species-specific rankings for landscape characteristic categories.

<b>Land cover class index</b>						
<i>type</i>	Gray wolf	Lynx	Grizzly	Wolverine	Caribou	Cougar
Alpine	10	3	10	10	10	1
Forest Old/ Young	10	10	10	10	10	10/6
Sub Alp-ava	8	8	10	8	10	5
Ice and Snow	1	1	3	8	5	1
Wetlands	3	8	4	8	7	3
Water	1	1	1	1	1	1
Bare ground	6	3	3	8	3	6
Logged (last 40 years)	4	10	8	5	7	5
Agriculture	8	3	2	2	3	2
Urban	1	1	1	1	1	1
Recently Burned	4	4	4	4	4	3
Rangeland	8	2	10	6	7	6
Shrub	7	8	8	6	8	6
<b>Population density index</b>						
<i>people/mi<sup>2</sup></i>	Gray wolf	Lynx	Grizzly	Wolverine	Caribou	Cougar
010	10	10	10	10	10	10
1025	5	7	5	5	5	8
2550	3	3	3	3	3	5
50100	1	1	1	1	1	1
100 +	1	1	1	1	1	1
<b>Road density index</b>						
<i>mi/mi<sup>2</sup></i>	Gray wolf	Lynx	Grizzly	Wolverine	Caribou	Cougar
0-0.01	10	10	10	10	10	10
0.01-1	10	10	10	10	10	10
12	8	10	10	8	10	10
24	5	8	5	5	10	8
46	5	5	3	3	8	5
68	2	5	2	2	8	5
810	2	3	2	2	8	3
1050	1	1	1	1	1	1
>50	1	1	1	1	1	1
<b>Elevation index</b>						
<i>Elevation</i>	Gray wolf	Lynx	Grizzly	Wolverine	Caribou	Cougar
01000	10	10	10	6	8	10
10001500	10	10	10	8	10	10
15002000	10	10	10	10	10	5
>2000	10	10	10	10	10	1
<b>Slope index</b>						
<i>%_slope</i>	Gray wolf	Lynx	Grizzly	Wolverine	Caribou	Cougar
020	10	10	10	10	10	5
2040	8	8	10	8	8	8
> 40 (4060)	6	6	10	10	5	10
6080	0	0	10	10	0	10
80100	0	0	10	10	0	10
100120	0	0	10	10	0	10
>120	0	0	1	1	0	1

needs for several species. Relative habitat values for ‘core’ habitat were subjectively chosen using expert opinion and thus threshold values vary between species. We then used the least-cost-path connectivity methodology of Singleton and Lemkuhl (1999, 2000) and Singleton and others (2002, 2004) to identify probable movement corridors between core areas. We modified Singleton’s ‘cost surface’ approach to reflect local habitat preferences. We thus prioritized core protected areas and zones of interconnection that should

be sustainably managed: critical ecological foundations that have been inadequately addressed in previous planning efforts. We then incorporated other existing conservation plan results to develop a comprehensive plan encompassing both Canadian and U.S. regions.

To address aquatic focal species we utilized available BC government data on salmon (*Salmo spp.*) escapement and distribution. Native salmon species found in the study area are Coho (*Onchorhynchus kisutch*), Chinook (*Onchorhynchus*

*tshawytscha*), Steelhead (*Onchorhynchus mykiss*), Sockeye (*Onchorhynchus nerka*), and Pink Salmon (*Onchorhynchus gorbuscha*). A quantitative measure was created based on salmon escapement figures using an index algorithm developed by Round River Conservation Studies (RR) and a Shannon Diversity Index. The RR index algorithm (Sanjayan and others 2000) provides a normalized mean abundance (calculated by mean abundance for each stock) by stock, which accounts for both the abundance of salmon and individual stocks while the diversity index gives a relative value of variability within each system. The final value applied to the subwatersheds was a result of adding the RR normalized mean abundance score (as values from 1 to 10) with the diversity values (as values from 1 to 10). To rank subwatershed salmon values, drainages containing fish species-at-risk were obtained from Dr. David Mayhood and the Yellowstone-to-Yukon Science Program and were added to the priority salmon drainages to complete the aquatic focal species analysis.

To address representation analysis and special elements for the Canadian Inland Temperate Rainforest (ITR), we adapted the TNC/NCC representation analysis (coarse filter) that resulted from the Canadian Rockies Ecoregional (CRM) Assessment (Rumsey and others 2003). Results of the composite focal species core and connectivity analyses plus the salmon priority watersheds identified by the aquatic analysis were overlain with the TNC Tier 1 and Tier 2 summed solution for the Canadian Rockies Ecoregional plan to produce an initial prioritization of conservation areas.

To evaluate our results we are continuing to compare them with other modeling approaches, conduct rigorous statistical and optimization analyses, and validate them on-the-ground through workshops and field surveys.

## Results

The results are presented as a series of maps (figs. 2 through 12) included at the end of this paper. Because map detail could not be adequately presented in black and white printed versions, we have made the figures available on our website at: <http://craigheadresearch.org/planning/y2y/index.php?cmd=rspsichbc>. This paper reports the first iteration of the Conservation Area Design results from British Columbia; subsequent refinements since 2005 for the United States-Canada transboundary region are also available on our website at: <http://craigheadresearch.org/planning/y2y/index.php?cmd=rspsich>. Core areas and connectivity for each terrestrial focal species are shown individually in figures 2 to 7. Overlapping of core areas resulted in composite core areas as shown in figure 8. The overall process is summarized in figure 9: this figure is very difficult to read, but was included to convey the method of combining focal species maps to produce a composite result. A detailed version is available at the above website. Salmon priority watersheds were mapped as illustrated in figure 10. Finally, the TNC Tier 1 and Tier 2 results, which include representation analysis and special elements, were added to the final CAD, illustrated in figure 11. The complete CAD process is summarized in figure 12: again this figure is very difficult to read, but illustrates the overall process graphically. A detailed version is available at the above website.

The total area that we feel needs protection is thus derived from three analyses that overlap to some degree:

1. Core habitat for terrestrial focal species (grizzly, wolf, wolverine, cougar, lynx, and caribou). Identified priority areas for 4+ species take up 2,699,759 ha (6,671,250 acres), or 19 percent of the BC ITR area.
2. Aquatic priority areas (salmon priority areas and drainages supporting fish at risk). Priority areas for aquatic species require 33 percent of the BC ITR area.
3. The Tier 1 and 2 results from the TNC/NCC Canadian Rocky Mountains Ecoregional Plan.

Each of these priority areas may overlap other priority areas. Adding the 4+ species cores, TNC Tier 1 & 2 areas, and salmon and aquatic species at risk areas, results in a total of 7,873,543 ha (19,455,949 acres) or 55 percent of the ITR that should be 'protected'. Of this, about 1,070,650 ha (2,645,634 acres) (7.5 percent of the ITR area) is already under Protected Area status leaving 47.5 percent, which needs to be protected to ensure maintenance of biodiversity, focal species, and species at risk.

To address the question of 'protection' we would suggest an Ecosystem Based Management approach as outlined by the BC Coast Information Team (Cardinall and others 2004; Rumsey and others 2003). This is an approach for timber harvest, mining, and other development that identifies and maintains the best wildlife habitat in those areas on a watershed scale. This process designated areas by "risk thresholds" to define the amount of development or habitat alteration acceptable. Areas with no acceptable conservation risk (areas of high irreplaceability or conservation value) are given high priority for complete protection. Areas where some risk is acceptable were assessed at a finer scale of analysis and planning processes designated some areas for development and some areas for protection within those planning units. Using a similar approach with the ITR CAD, we would suggest the darker gray (purple) core areas on the final map (the areas with more focal species present) are "high risk" areas and should be given the highest protection. All old growth forest should be highly protected, and roads that are constructed should be removed quickly.

Connectivity, or movement habitat, the light gray (green) 'corridor' areas on the final map (see fig. 9) map, should have habitat that is 'friendly' enough for animals to travel through from one core area to another, but individuals don't necessarily need to be resident and/or reproduce in those areas. In both the connectivity and medium risk areas, roads should be restricted as much as possible. The connectivity areas represent 2,884,900 ha (7,128,743 acres) or 20 percent of the ITR. In some places these connectivity areas overlap Tier 1 and 2 results and/or aquatic priority drainages. Some movement routes without man-made barriers should be maintained by management actions and/or habitat protection somewhere in those corridors. The lighter gray (purple) core areas (habitat for three or less focal species) could be considered "medium risk" areas where ecologically sensitive development can be allowed.

We feel that this combination of results adequately addresses, respectively, the conservation needs of: 1) Focal terrestrial 'umbrella' species and the prey and habitats they depend upon; 2) Focal aquatic 'umbrella' species and aquatic



species at risk; 3) Biodiversity as captured by representation analysis.

In summary, the CAD is just a broad blueprint. Concerned residents and managers need to look closely at local areas, see what species or other conservation targets exist there, and try to guide development accordingly. Similar mapping projects at a finer scale can help make those decisions, but much of the analysis needs to be done on-the-ground in the real landscape. The broad-scale CAD type of analysis should help to put local conservation values in perspective and add support for local efforts by showing that a given area is part of an important core or corridor. Additional information concerning this project and future iterations can be found on the Craighead Environmental Research Institute websites above. The results of this CAD should constitute a defensible scientific basis for implementation of conservation planning and for campaigns to facilitate such implementation.

## Discussion

The initial results of the CAD process are broad-scale maps and generalized conservation guidelines over large areas. Our results identified habitat concentration areas (cores) for each species that were then merged into composites of these areas that could satisfy needs for several terrestrial species. Next, we modeled priority habitat for aquatic focal species: salmon and threatened fish species. We supported these results with local knowledge and empirical data.

The subsequent products of the CAD process will be fine-scale maps and site-specific conservation plans. The fine scale is most effective for a 'bottom-up' approach where local residents and groups use the data to guide on-the-ground efforts to secure conservation easements, purchase land, provide input into land management planning processes and otherwise work to ensure that conservation priorities are met. The results, over a wide landscape, are solutions for pieces of the larger puzzle that are important to people at a local level.

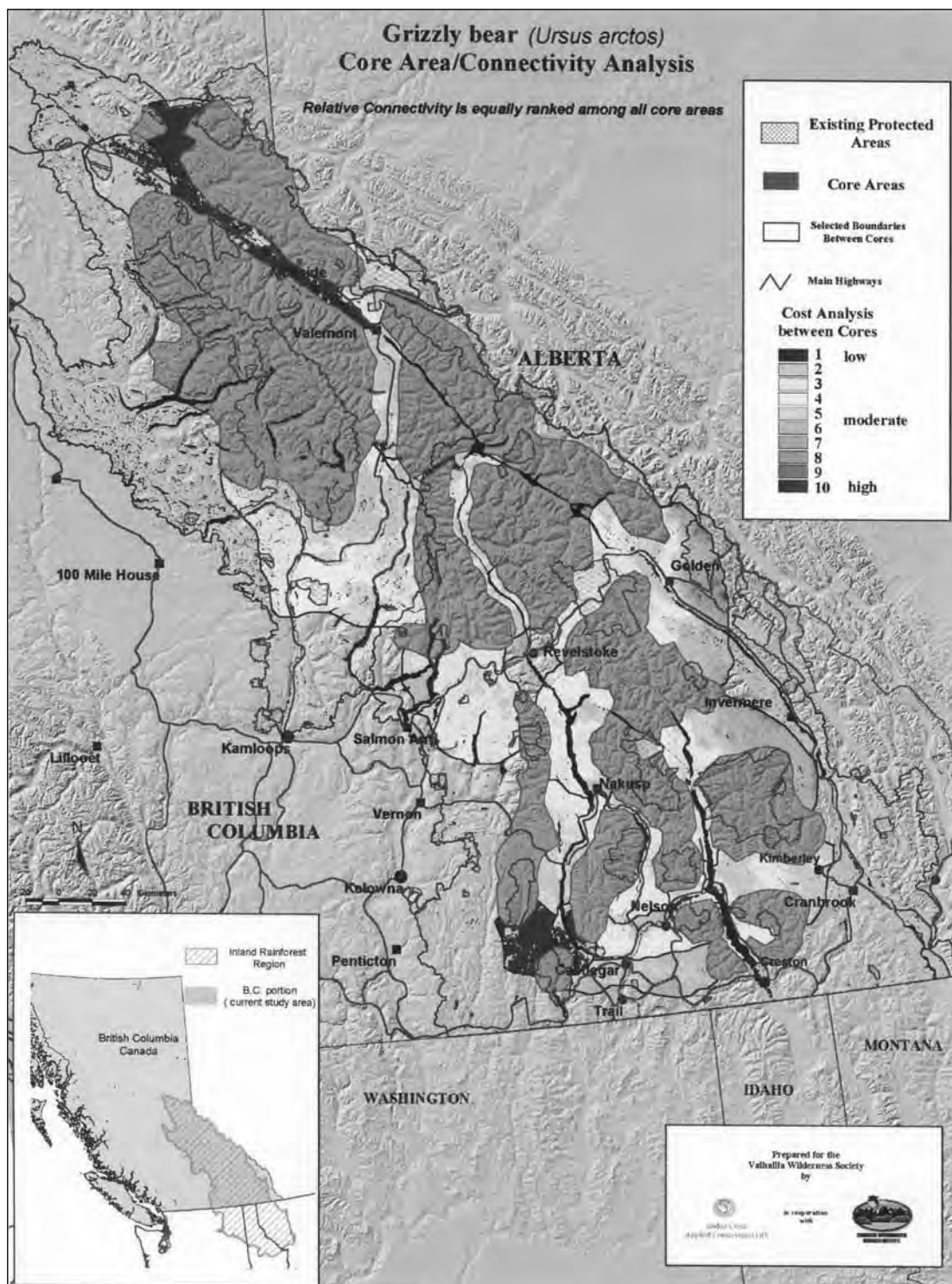
The overall objective is to serve four well-accepted goals of conservation: 1) represent ecosystems across their natural range of variation; 2) maintain viable populations of native species; 3) sustain ecological and evolutionary processes within an acceptable range of variability; and 4) build a conservation network that is resilient to environmental change. We feel that this CAD meets those goals, and in particular provides adequate guidelines to maintain viable populations of native species. We feel that this approach meets the needs of focal species better than previous conservation plans that we have built upon. In so doing, this CAD should also adequately meet the other three goals of conservation.

To ensure viable populations of focal species, at a minimum, we feel that the areas with habitat for four or more focal species should be protected as parks (or the equivalent of 'designated wilderness areas' in the United States). The same level of protection should be given to priority aquatic

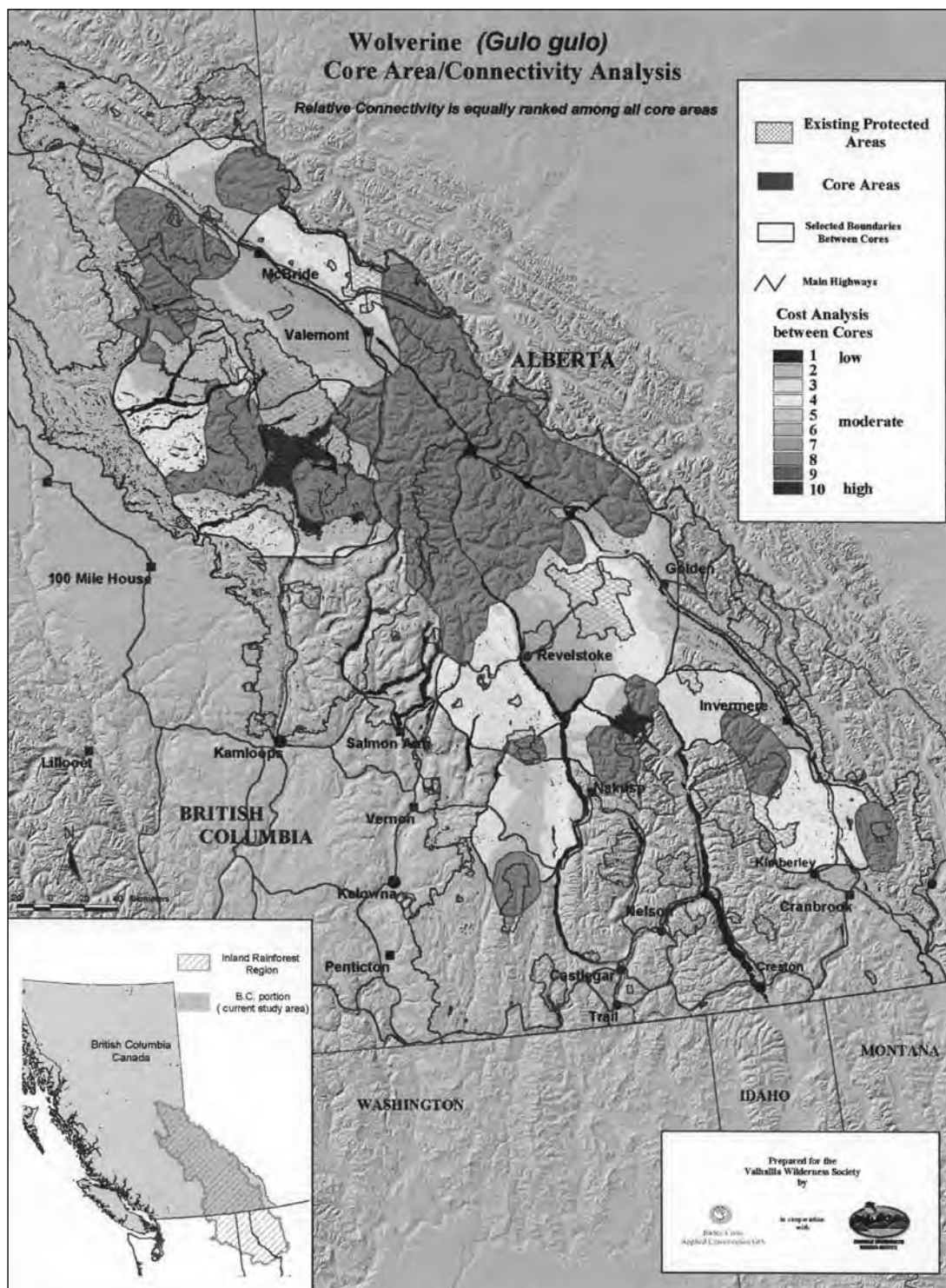
habitat (priority salmon streams and species at risk) and the TNC Tier 1 & 2 areas.

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**Figure 2**—Grizzly bear core habitat and connectivity areas.



**Figure 3**—Wolverine core habitat and connectivity areas.

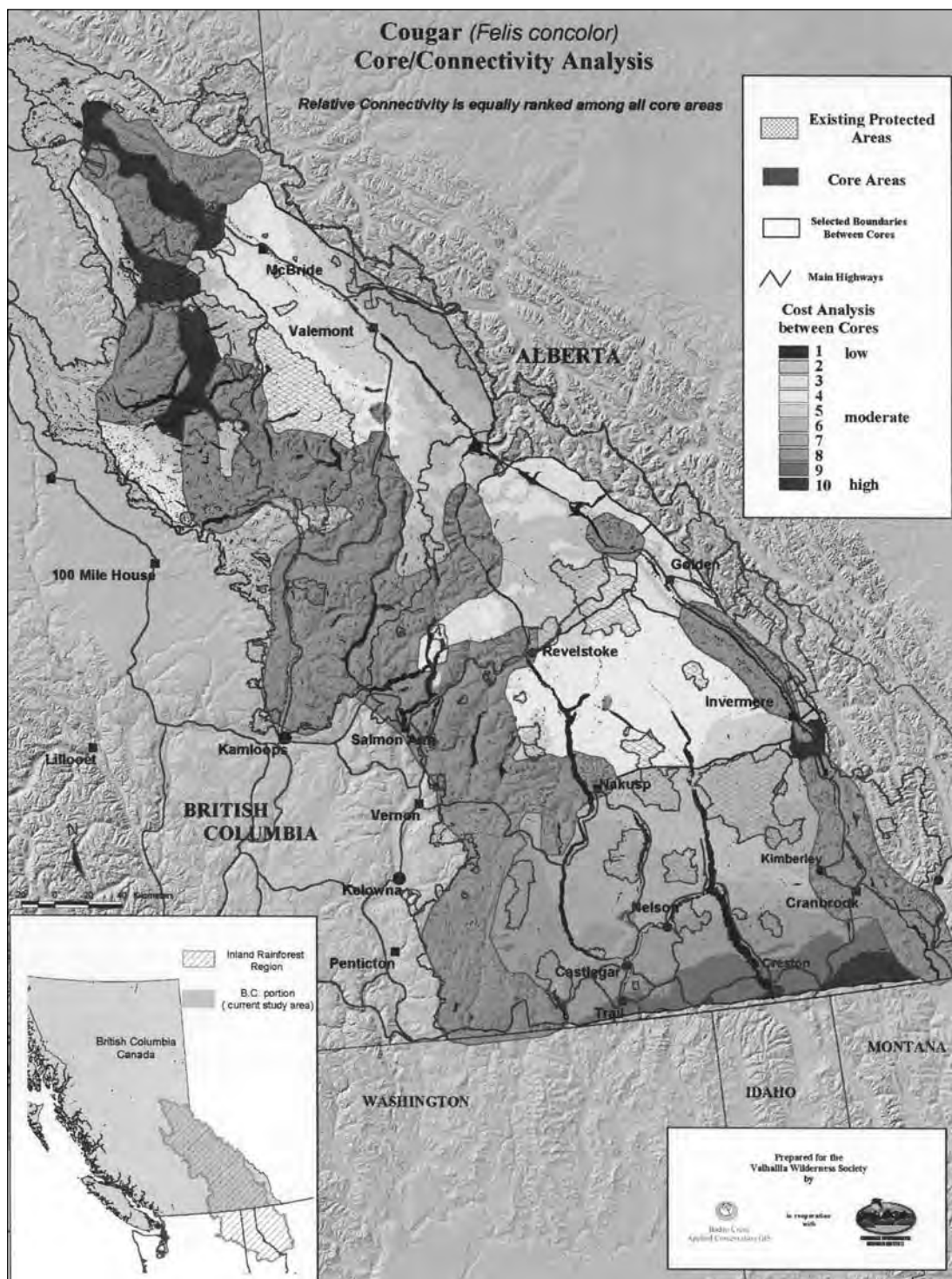
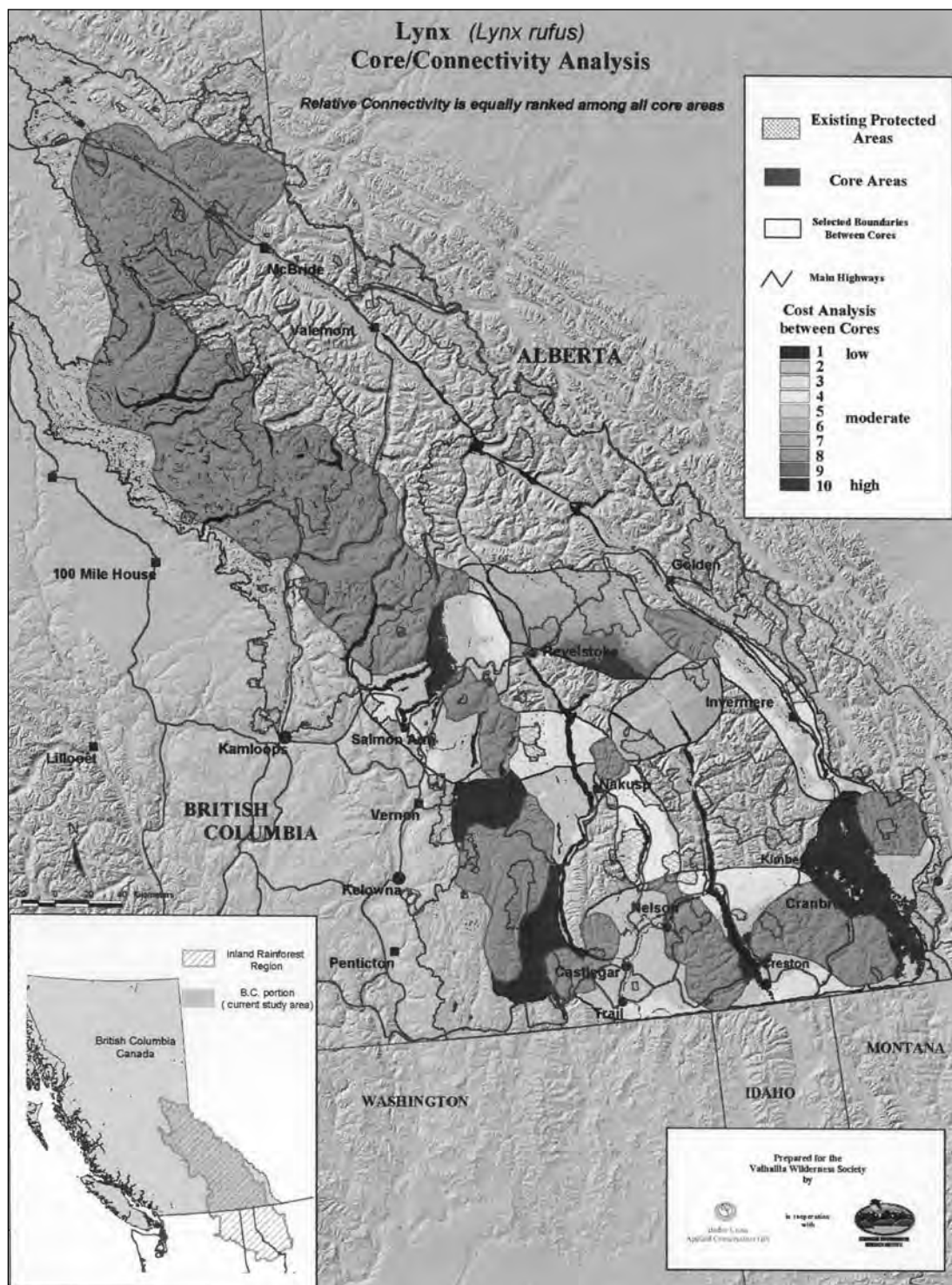
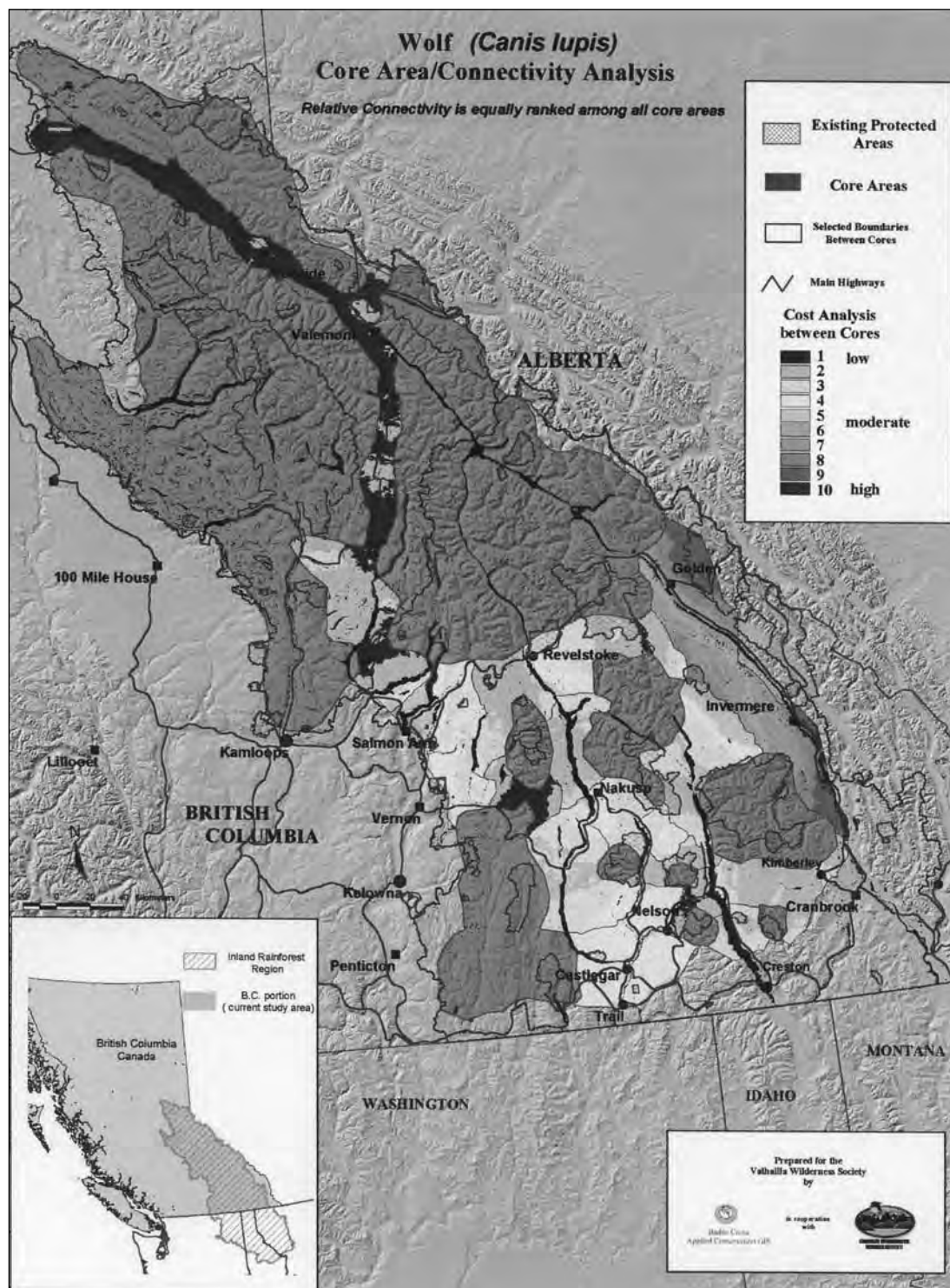


Figure 4—Cougar core habitat and connectivity areas.

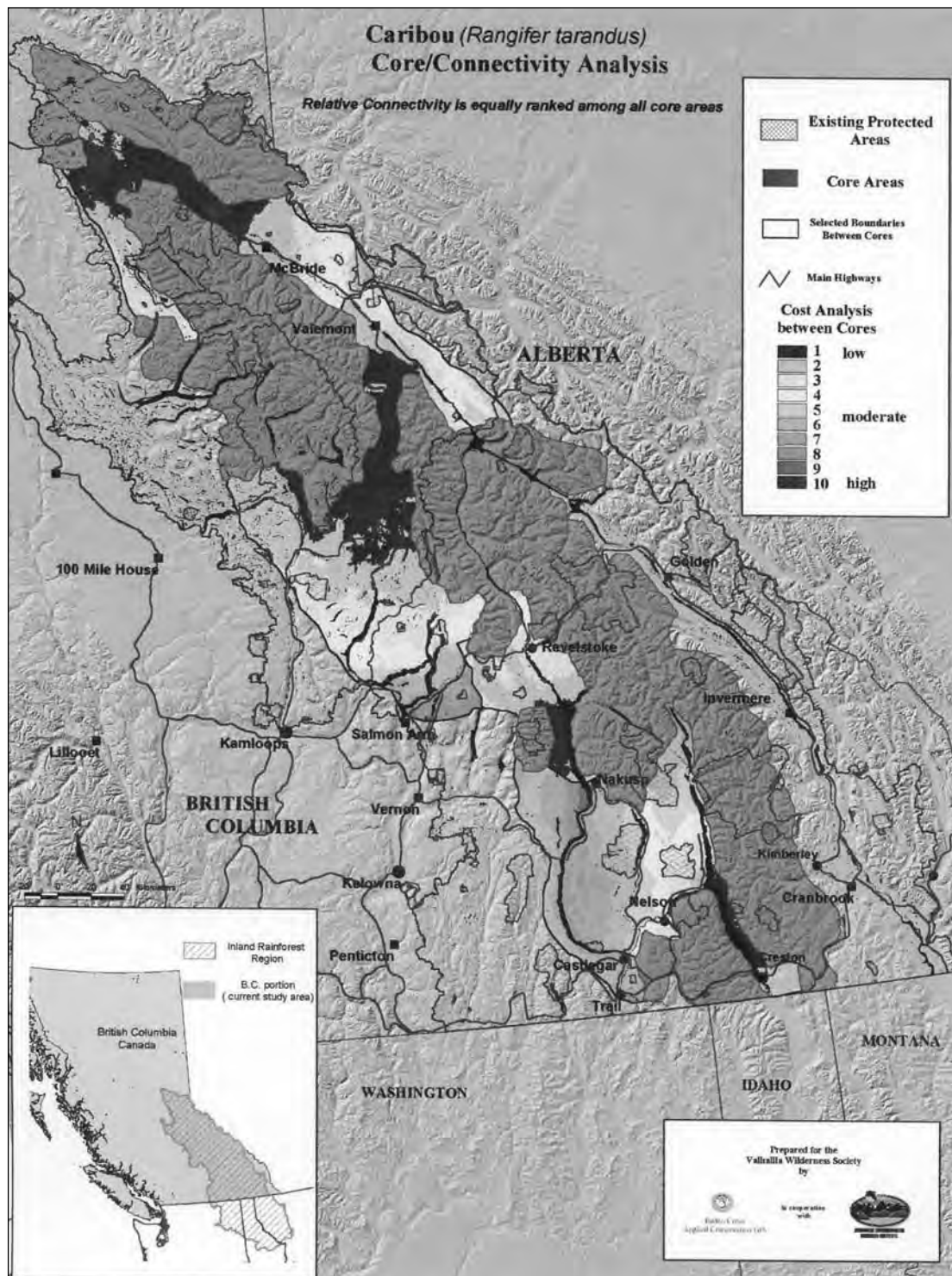


**Figure 5**—Lynx core habitat and connectivity areas.



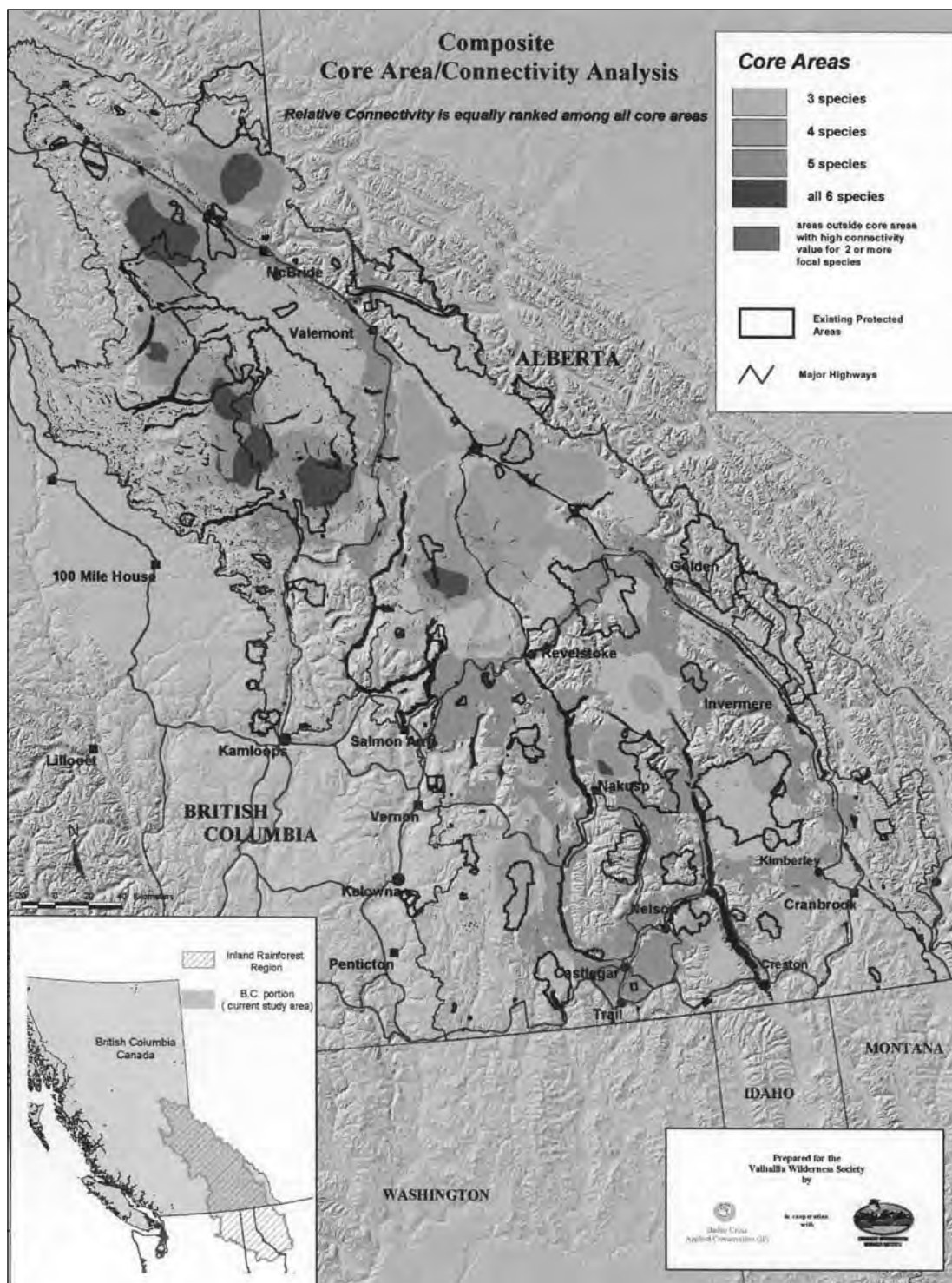


**Figure 6**—Wolf core habitat and connectivity areas.



**Figure 7**—Woodland caribou core habitat and connectivity areas.

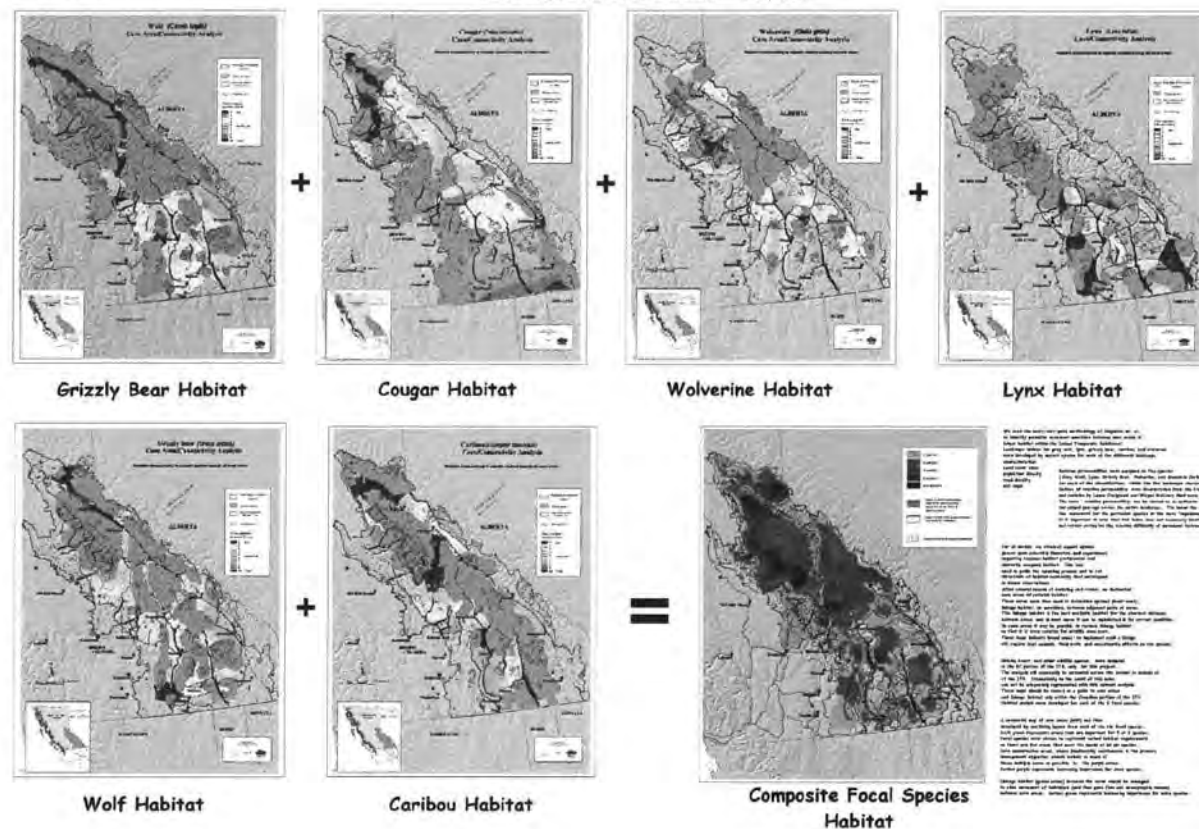




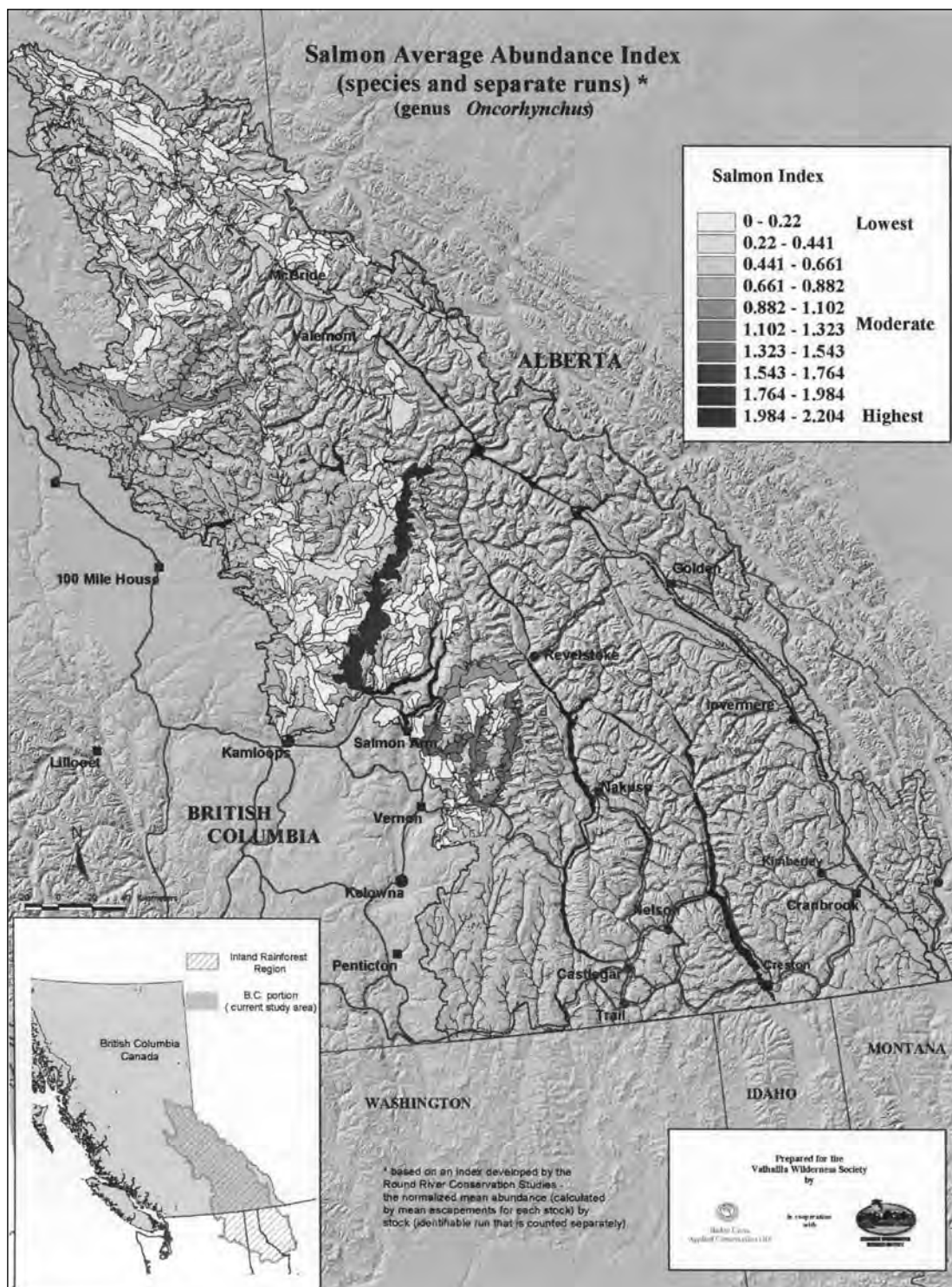
**Figure 8**—Composite terrestrial focal species core habitat and connectivity areas.

In developing the CAD for the Inland Temperate Rainforest (ITR) in Canada we began by creating the best available scientific knowledge, and incorporated available existing conservation plans. We submitted the Nature Conservancy of Canada and Nature Conservancy Canada Ecological Plan for the Canadian Rocky Mountain Ecoregion which covered the ITR area to a large extent. Although we feel that this analysis was extremely well done with the best available data and scientific expertise, we added additional data and analyses to the ITR plan to address the specific concerns and issues of riparian connectivity. But we felt to be accurate additions to the Ecological Plan. This connectivity analysis is integral to our vision of a CAD for the ITR region. For the connectivity analysis we modified the widely recognized methods of Gillingham et al. (2002), Smith and Smith (2001) and added additional and some original methods to our final resolution.

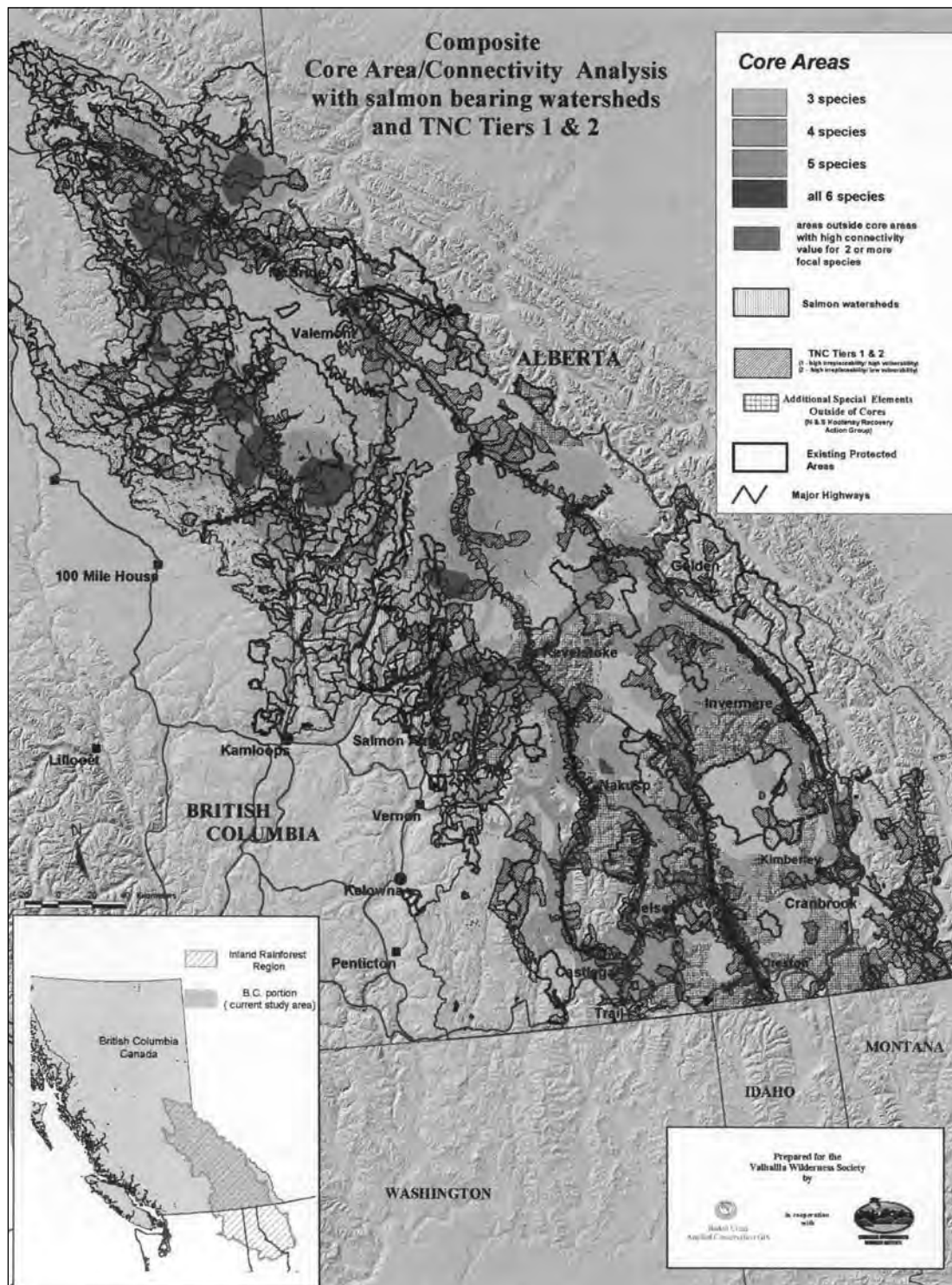
Dark green represents the best linkage habitat between adjacent pairs of cores where all linkage corridors have the same relative connectivity values.



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**Figure 10**—Salmon Average Abundance Index: aquatic focal species priority areas.



**Figure 11**—The Conservation Area Design: priority terrestrial and aquatic habitat.



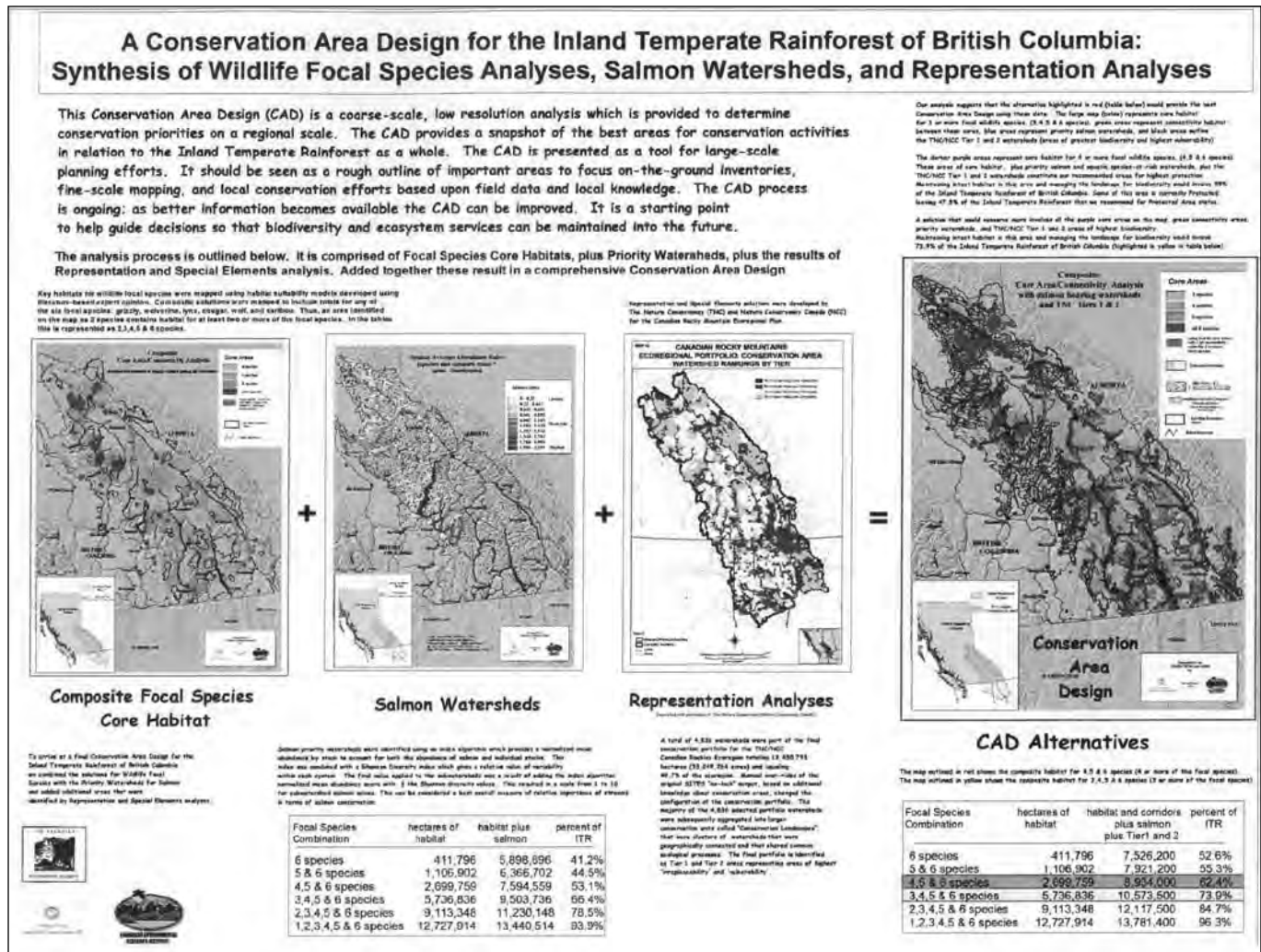


Figure 12—The overall Conservation Area Design process and components

## 5. Wilderness Stewardship Challenges in a Changing World



*Managers, scientists, nongovernmental organizations, and the public all have wilderness stewardship responsibilities (photo by Claudia Sellier).*





# Developing Additional Capacity for Wilderness Management: An International Exchange Program Between South Africa and United States Wilderness Rangers

Pierre van den Berg  
Ralph Swain

**Abstract**—Wilderness managers have limited time to initiate international exchanges. Additionally, the benefits to developing capacity for wilderness management around the globe are not significant enough to make the effort cost-effective. International assistance, including wilderness management exchange programs, is critical to protecting wild areas around the globe. Former Chief of the Forest Service, Jack Ward Thomas, stated, “our mission is to provide international technical assistance and scientific exchanges to sustain and enhance global resources and to encourage quality land management. By helping others take care of the ecosystems they have, we help take care of the ecosystems we have been entrusted to steward for future generations” (Thomas 1994).

## Developing Additional Capacity \_\_\_\_\_

One way to develop additional wilderness management capacity is to link on-the-ground protected area managers with managers of the United States (U.S.) National Wilderness Preservation System (NWPS). In the Forest Service (FS) alone, there are over 300 on-the-ground, experienced wilderness managers and wilderness rangers that apply stewardship principles to areas they administer in their daily work. This amounts to a vast pool of experience, knowledge and skill that can be tapped and applied when requested by protected area managers around the globe. International assistance generally focuses on upper level managers such as planners and administrators, but misses the direct on-the-ground rangers who must deal with site specific problems in their every day work (Olwyler 2000, U.S. Forest Service Internal Report, *Manager to manager: field based training for protected areas workers around the globe*).

In 1998, the 6<sup>th</sup> World Wilderness Congress in Bagalore, India, passed Resolution 21, entitled, “The Need For Training In The Techniques And Science Of Wilderness Management For Management Staff, And Others With A Specific Interest In Wilderness Conservation.” Resolution 21 addresses the need to stimulate inter-country and inter-agency pollination

of ideas and work techniques for on-the-ground wilderness rangers.

A goal and challenge for U.S. wilderness administrators should therefore be to reduce the environmental impacts to protected areas within developing countries and in wilderness areas in the United States, while improving the experience of nature based tourism and the recreating public, and encouraging environmentally sustainable economic alternatives for the welfare and benefit of local people.

According to Olwyler (2000, U.S. Forest Service Internal Report, *Manager to manager: Field based training for protected areas workers around the globe*), the development of an international exchange program for managers can foster a dialogue between field-based protected area workers, managers from developing countries and from the Forest Service, and other U.S. Federal agency wilderness managers. In addition, international exchange programs can provide an experiential learning opportunity for both partners.

Benefits of such a program commonly include:

1. Linking field-based managers from various regions so they can experience alternate systems of work and management and adapt what would be useful to them in their home country situation.
2. Sharing experiences of workers in protected areas in developing countries through direct technical training and on-the-ground assistance from managers in the NWPS.

Wilderness managers and rangers from the NWPS will learn about issues that are relevant to the management of areas in developing countries. These may include issues such as the association of local people and cultures with protected areas; the current methods that are being used to integrate the community in the management objectives of protected areas; and how to maintain and improve the quality of life for local people through environmentally sustainable development and nature based tourism.

Managers from developing countries will gain first-hand experience of management and work systems used in recreation and tourism in wilderness areas of the United States. They can then adapt their experience to fit their particular home country protected area management situation.

An international exchange program can provide direct technical assistance, training, work exchanges, and consultancies for field-based workers, managers, and first line supervisors who work for national parks, wildlife preserves, recreation areas, wildernesses, and other protected areas throughout the world.

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In: Watson, Alan; Sproull, Janet; Dean, Liese, comps. 2007. Science and stewardship to protect and sustain wilderness values: eighth World Wilderness Congress symposium: September 30–October 6, 2005; Anchorage, AK. Proceedings RMRS-P-49. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

This will include, but not be restricted to, efforts such as:

- Providing training, either in the United States or in the host country, for trail layout, trail surveys, trail maintenance, ecosystem restoration methods, statistics collection, and their application for management purposes.
- Hosting managers from developing countries at wilderness areas, national parks and preserves in the United States so they could observe and experience first-hand, systems and methods of management of the NWPS that they could then adapt and use in their home countries.
- U.S. wilderness managers making site visits to developing country protected areas that request assistance.
- Organizing work groups of U.S. managers to travel to host countries to work on specific projects, such as assisting with wildlife inventories, collecting visitor use statistics of foreign tourists, creating interpretive plans and materials, and working on trail construction and maintenance.
- Providing other examples and training of management plans, wildlife sighting record forms, research papers, advice on visitor permit management, how to perform trail surveys, and how to develop protected area manager expertise.

On-the-ground rangers throughout the world maintain protected areas with, in some cases, little or no support, experience or understanding of the impacts that will be caused by tourism or their own management practices. They may want additional information and a broader perspective from which to make their management decisions or accomplish work projects, but do not know how to connect with those who could provide it.

## Exchange Program Is Born

In November 2001, the Forest Service Office of International Programs sponsored a team of wilderness managers to attend the 7th World Wilderness Conference in Port Elizabeth, South Africa (SA). During this event, SA managers initiated the idea of an educational visit to FS wilderness managers, and an exchange idea was born. Six months later, in May 2002, three SA wilderness rangers arrived in Denver and were the first to pilot-test an international exchange program hosted by the FS Rocky Mountain Region.

These three SA wilderness rangers attended a 5-day wilderness training academy in Aspen, Colorado to learn from managers of congressionally designated areas in the Rocky Mountain Region of the United States. The international exposure brought great insights and rewards for the SA rangers and the U.S. wilderness rangers gained a tremendous amount of knowledge about the challenges of managing wild places in the Western Cape Province of SA. It was during presentations at this academy and the interaction with "on-the-ground" wilderness rangers that a volunteer program for U.S. rangers in SA wilderness areas germinated. Both groups realized that experts from the United States could lend a hand to help SA's wilderness managers.

In December 2002, three FS seasonal wilderness rangers that had ended their summer-seasonal jobs, traveled to SA to volunteer their expertise at Boosmansbos Wilderness and other protected areas. Because of critical shortages in funding and manpower, the leading conservation agency in the Western Cape Province of SA, Cape Nature Conservation has a huge need for trained and experienced rangers to assist in managing their wild and protected areas. Now 3 years later, close to 20 U.S. wilderness rangers have volunteered their talents to trail maintenance, rehabilitation, Leave No Trace (LNT) training and education in SA protected areas. In return, the U.S. wilderness rangers have been rewarded with awe-inspiring, fynbos-clad mountains of the Western Cape that appear even more striking than the rugged Rocky Mountains. Additionally, they have learned that the management issues, problems and challenges are very similar to the concerns found in most U.S. wildernesses, including lack of field staffing.

Since the start of this international volunteer program, support has been given by the WILD Foundation (U.S.A.) and the Wilderness Foundation (South Africa). An announcement in the *International Journal of Wilderness* (2003) read:

### SOUTH AFRICA WILDERNESS SEEKS VOLUNTEERS:

Exciting opportunities exist for experienced wilderness rangers and professionals to become active in South Africa. Host to the smallest of the six plant kingdoms—the Cape Floral Kingdom—the conservation authority, Western Cape Nature Conservation Board invites volunteers to become involved in the identification, management and educational aspects of their WILDERNESS. Support is needed to start identifying potential wilderness from the fast disappearing pieces of "unspoiled" land with its abundant diversity. Skills required include path maintenance, rehabilitation, and eradication of non-native species, zonation, staff training, public education and fundraising. The program promotes international exchanges between wilderness professionals and is viewed as an innovative approach to the challenges facing these reserves.

Vance Martin, president of the WILD Foundation, remarked the following:

You have started something important, necessary, and an initiative which can serve as a model around the world. The WILD Foundation has worked in Southern Africa for almost 30 years. One of the many things we do is try to strengthen the professional ties between the United States (and other countries) and SA. Because we are modestly-sized and need to target our resources carefully, we specialize in assisting and leveraging the work of highly motivated individuals who care about wilderness and wildlands and commit themselves to their well-being. This volunteer initiative is a great example of important benefits accruing from individual commitment rather than significant expenditure. I've already received comments from several of the American rangers who went to South Africa and more are lining up to go. This will certainly spread within the United States, but could also do so to other countries. This not only helps some of your work get done at ground level, but it also expands the horizons of the critically important field staff, increases their knowledge and self-confidence, and leads to further contacts for other types of assistance, funding and training (Martin 2003, personal correspondence).

## Conclusion

With a well developed international exchange program, managers of protected areas in developing countries will be better able to achieve their own management objectives while reducing undesirable impacts to their local ecosystems. U.S. wilderness managers will better understand the relationships of wilderness areas in the NWPS to protected areas around the globe and how local communities and local economies can be integrated into the management of wilderness areas in the United States. By linking managers to managers, a valuable step will be taken toward the goal of maintaining the environmental quality of protected areas around the globe, benefits to people within and surrounding protected areas will be enhanced, and the U.S. Forest Service will make strides toward its goal of being a world leader in ecosystems management (Olwyler 2000, U.S. Forest Service Internal Report, *Manager to manager: field based training for protected areas workers around the globe*).

Although the current U.S. ranger volunteer program to SA is slowly expanding, the steady yearly flow of five or more Americans to SA is solid proof that financial and bureaucratic difficulties do not hamper the commitment and passion of rangers to become involved with wilderness stewardship abroad. All the volunteers who participated up to now have had an immense life enriching experience, and through first-hand exposure to conservation issues in another country, have gained ability and professionalism for their future careers. In return, the local staff received support and much needed exposure to wilderness training. The passion for wilderness conservation is strengthened, and a local volunteer culture, which is totally undeveloped in SA, is created. The unselfish effort of the volunteers helps to elevate the need for professional wilderness management in SA. The skill and knowledge of all are enriched and critical work is being accomplished in some of the most wild and scenic places in SA.

The continuation of efforts between wilderness managers from the United States and SA, to structure a partnership, to build on the successes so far achieved, to attract more volunteers for wilderness tasks, and to create international opportunities for training and exchanges, is strongly encouraged. Because of overwhelming work responsibilities, very few managers are currently involved with the coordination of these fruitful efforts, and relatively low support and capacity need to be addressed. With the necessary support, wider marketing and expansion of the volunteer program and exchange opportunities will be realized, and funding opportunities will be created. This is only a small step away from the development of a fully integrated international exchange program.

Wilderness managers and rangers with an adventurous and travel spirit will always find a creative way to enrich their lives and fulfill their ambition. As long as committed professionals can keep up with their efforts in creating the opportunities, these managers and rangers will grab the chance to see and experience another country, and by living out their passion, contribute to protecting ecosystems around the globe. In October 2005, another three American rangers will arrive in the Western Cape Province of SA to do their part in wilderness stewardship during a 4-week visit. They will be members of a growing team of professionals that have learned that by helping others to take care of their ecosystems they have helped to take care of the ecosystems they have been entrusted to steward for future generations. The benefits far out-weigh the cost. [By August 2007 this program is still running and the aim is to have a yearly increase in the number of international volunteers visiting the Western Cape Province of SA.]

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# Managing Consumptive and Nonconsumptive Use in the United States Largest Wilderness

Vicki Snitzler  
Barbara Cellarius

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**Abstract**—With more than 13 million acres (5,260,913 ha) of land and in excess of 9 million acres (3,642,171 ha) of designated Wilderness, Alaska's Wrangell-St. Elias National Park and Preserve is the largest national park in the United States and includes the country's largest single-name wilderness area. Park managers face a variety of challenges in managing consumptive and nonconsumptive uses of the park and its resources while at the same time protecting wilderness values. When it was created, efforts were made to protect the fragile resources of its varied ecosystems while at the same time honoring well-established traditions of human use within the park. Under the provisions of the park's enabling legislation, subsistence hunting and fishing by local rural residents—Native and non-Native—are allowed on park lands, recognizing the important role that the harvest of wild resources has played in the lives of area residents. In addition, sports hunters and fishers as well as tourists come to Wrangell-St. Elias in search of their desired experiences and with their own sets of expectations. This paper explores the challenges of managing consumptive and nonconsumptive uses of park resources while at the same time protecting wilderness values.

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## Introduction

Wrangell-St. Elias National Park and Preserve was established in 1980 when the United States (U.S.) Congress passed the Alaska National Interest Lands Conservation Act, commonly referred to by the acronym ANILCA. Consisting of more than 13 million acres (5 million ha) of land and more than 9 million acres (3.5 million ha) of designated wilderness, the park is the largest unit managed by the U.S. National Park Service and encompasses the largest single-name wilderness area in the United States.

Wrangell-St. Elias, along with the other ANILCA parks, is different from most national parks in other parts of the United States. When it was created, efforts were made to protect the fragile resources of its varied ecosystems while at the same time honoring well-established traditions of human use within the park. The park territory includes

the homelands and hunting and fishing grounds for at least three Alaska Native groups (Ahtna, Upper Tanana, and Tlingit), and non-Native use and occupation of the region dates back to the early 20th century. Under the provisions of ANILCA, subsistence hunting and fishing by local rural residents—Native and non-Native—are allowed on park lands, recognizing the important role that the harvest of wild resources has played in the lives of area residents. In addition, sport hunters and fishers as well as tourists come to Wrangell-St. Elias in search of their desired experiences and with their own set of expectations. Nonconsumptive users may see Wrangell-St. Elias as a vast mountain wilderness with few roads or trails; local residents may see it as home, crisscrossed by trade routes; and sport hunters may focus on world-class Dall sheep trophies.

This paper explores the challenges of managing consumptive and nonconsumptive uses of park resources in the largest designated wilderness area in the United States, while at the same time protecting wilderness values. After a brief background section, the main uses and users of park resources are described, along with interactions that occur among them. The paper concludes with a discussion of the implication of these varied uses and users for protected area management. It is based on a variety of sources including surveys of visitors, analysis of wildlife harvest data, and the authors' interactions with a variety of park visitors, neighbors, and residents.

## Background

Wrangell-St. Elias National Park and Preserve is located 200 miles (322 km) northeast of Anchorage, Alaska (see fig. 1). The park contains superlative scenery, abundant wildlife, and fascinating human history. Wrangell-St. Elias together with the adjacent Glacier Bay National Park and Preserve and two parks across the border in Canada—Kluane National Park and Tatshenshini-Alsek Provincial Park—form one of the largest terrestrial protected areas on earth. The United Nations Educational, Scientific, and Cultural Organization (UNESCO) designated Wrangell-St. Elias National Monument and Kluane National Park as a World Heritage Site on October 26, 1979. Glacier Bay was added in 1992 and Tatshenshini-Alsek in 1994.

The landscape within Wrangell-St. Elias National Park and Preserve ranges from tidewater at Icy Bay to forests and tundra to the rock and ice of high mountains. Four major mountain ranges converge here with nine peaks more than 14,000 ft (4,267 m) tall, including Mt. St. Elias, the second highest peak in the United States. Several rivers, including

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In: Watson, Alan; Sproull, Janet; Dean, Liese, comps. 2007. Science and stewardship to protect and sustain wilderness values: eighth World Wilderness Congress symposium: September 30–October 6, 2005; Anchorage, AK. Proceedings RMRS-P-49. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.



**Figure 1**—Map showing location of Wrangell-St. Elias National Park and Preserve in relation to Anchorage and the rest of Alaska.

the Copper and the Tanana, have their headwaters in the park. This varied landscape is home to a variety of wildlife, large and small, predator and prey.

The park is bordered by and visible from two of Alaska's major highways—the Richardson and the Glenn highways. Two gravel roads enter the park. The Nabesna Road, 42 miles (68 km) long, begins at Slana. The 60-mile (97-km) McCarthy Road begins at Chitina and ends at the Kennecott River on the doorstep of the historic communities of McCarthy and Kennecott. Visitors also access the park on small planes, which depart from communities such as Tok, Gulkana, Chitina, and McCarthy and land on numerous airstrips in the park. Under the provisions of ANILCA, Wrangell-St. Elias does not charge entrance fees, and accordingly, the park has no entrance stations on these roads or elsewhere. Park offices and the main park visitor center are in Copper Center, while additional visitor contact facilities are located in Slana, Kennecott, Chitina, and Yakutat.

## Legislative Background

Wrangell-St. Elias was first established as a national monument in 1978 by then President Jimmy Carter under

the authority granted to him by the 1906 Antiquities Act. It remained as such until Congress passed ANILCA in 1980. The latter act created or expanded 13 National Park Service units, including Wrangell-St. Elias. Wrangell-St. Elias National Park and Preserve was established to, among other purposes:

...maintain unimpaired the scenic beauty and quality of high mountain peaks, foothills, glacial systems, lakes, and streams, valleys, and coastal landscapes in their natural state; to protect habitat for, and populations of, fish and wildlife including but not limited to caribou, brown/grizzly bears, Dall sheep, moose, wolves, trumpeter swans and other waterfowl, and marine mammals; and to provide continued opportunities, including reasonable access for mountain climbing, mountaineering, and other wilderness recreational activities. Subsistence uses by local residents shall be permitted in the park, where such uses are traditional, in accordance with the provisions of title VIII (ANILCA, section 201(9)).

In addition to creating new conservation units, ANILCA designated portions of those units as wilderness. Recognizing the special conditions present in Alaska, it modified some of the provisions of the Wilderness Act of 1964. In particular, some activities prohibited in wilderness areas in other U.S. states are permitted in Alaskan wilderness areas, including the use of airplanes and the construction and maintenance of cabins (see table 1).

Figure 2 illustrates the relationship between park and preserve and how both are overlain with the wilderness designation. The national preserve is largely managed like the national park, with the main difference being that sport hunting under state regulations is allowed in the preserve but not in the park. Approximately 1 million (404,686 ha) of the 13.2 million acres (5.3 million ha) within the park and preserve boundary is in non-Federal ownership, with Native corporations established under the Alaska Native Claims Settlement Act being the largest inholders.

## Consumptive and Nonconsumptive Users of Park Resources

Activities in the park include hunting, fishing, trapping, mountaineering, wildlife viewing, snowmobiling (snow machining in local terminology), flight-seeing, rafting, touring the historic Kennecott mill town, and, of course, exploring the great American Wilderness. These are all popular activities that draw people to Wrangell-St. Elias National Park and Preserve, even if some of them may be only minimally aware that they are in a national park.

As the nation's largest park and largest designated wilderness area, Wrangell-St. Elias National Park and Preserve encompasses a wide array of resources and associated human values and uses. Along with centuries of use and occupation by the indigenous Ahtna, Tlingit and Upper Tanana peoples, the area has more recently become a popular place for recreational hunting and also for nonconsumptive recreational activities. In contrast to what might be called "traditional" values associated with park and wilderness settings in the rest of the United States, the park's founding legislation specifically recognizes the values associated with preserving opportunities for subsistence and recreational hunting and fishing.

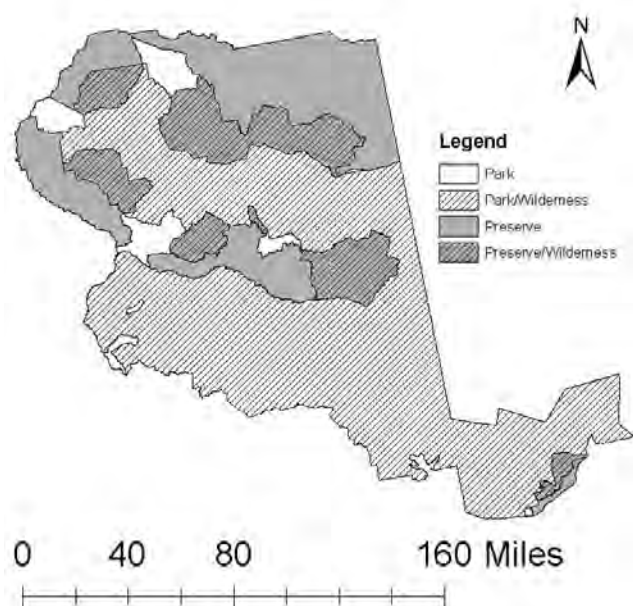
**Table 1**—Comparison of the 1964 Wilderness Act as originally passed with the provisions of ANILCA wilderness.

Wilderness Act of 1964	ANILCA revisions
Prohibition on the use of motorized/mechanized vehicles	Allowed use of motorized vehicles for subsistence activities, access to inholdings, and for traditional means of access. Solicitor's opinion allows use of bicycles for access (determined to be traditional).
Prohibition of cabins and other types of new structures and facilities	Existing cabins may be maintained or replaced. New cabins allowed for health and human safety. New and replacement navigation aids permitted.

Sometimes one user group never knows that another exists—tourists whose visit consists of a brief stop at the visitor center for a nature walk and to watch the park movie, for example. Other times, different types of park users meet, with varying results. Tourists from other states and countries may be fascinated to learn about local subsistence traditions, while backpackers may find it disconcerting to encounter armed men on “four-wheelers” (a type of off-highway vehicle or OHV) who are hunting the wildlife they are excited to catch a glimpse of. The result is a highly complex and potentially contentious arrangement of park uses and users.

## Local Subsistence Users

When the U.S. Congress established Wrangell-St. Elias and several other protected areas in Alaska, it recognized the important role that the harvest of wild resources has played in the lives of rural Alaskans over many generations.

**Figure 2**—Map of Wrangell-St. Elias National Park and Preserve showing designation of lands as national park, national preserve, and wilderness.

Specifically, ANILCA provides for the continued opportunity for subsistence uses of fish, wildlife, and plant resources in both the park and the preserve by local rural residents (ANILCA Section 203 and Title VIII). Important subsistence activities in Wrangell-St. Elias include hunting, trapping, fishing, berry picking, collecting firewood, and harvesting green logs for house construction. The most important fishery in the area—for salmon on the Copper River—largely occurs outside of the park and preserve boundary, although some of the famous Copper River salmon spawn in the park.

Under the provisions of ANILCA, only local rural residents are eligible to engage in subsistence in Wrangell-St. Elias under federal regulations, and subsistence eligibility is largely determined on a community, rather than individual, basis. According to 2000 U.S. Census data compiled by the Alaska Department of Community and Economic Development, approximately 6,000 people lived in the 23 communities that are eligible to engage in subsistence activities within Wrangell-St. Elias National Park. These so-called resident zone communities range from Yakutat in Alaska's southeast through the Copper Basin to several communities along the Alaska Highway. Some local rural residents are Alaska Natives whose families have lived in the area for hundreds if not thousands of years; others are the descendents of early Euroamerican settlers to the area; and yet others have arrived more recently to work for the Alaska pipeline, various government agencies, or a variety of small businesses.

Most rural Alaskan families depend on subsistence hunting and fishing at some level. For some people, such as ourselves, wild fish, berries, and so on supplement what they—and we—purchase at the grocery store, while for others these subsistence foods are central to their customs and traditions, make up a large proportion of their diet due to lack of cash resources, or both. An estimated 55 percent of the rural households in southcentral Alaska, in which many of the park's resident zone communities are located, harvest game and 80 percent harvest fish (Wolfe 2000). The percentages of households using subsistence resources are even higher, when people who hunt or fish share with those who do not or cannot. Not everyone eligible hunts, and not every local hunter hunts in the park. That said, in 2004, 269 people obtained federal subsistence permits for registration hunts in the park and preserve, indicating a minimum number of hunters intending to hunt there. And this doesn't count the people hunting in the preserve under state sport regulations (see the next section) or people hunting animals for which the federal government does not require a permit.

## Sport Hunters and Fishers

Sport hunting is authorized within Wrangell-St. Elias National Preserve (but not the national park) under section 1313 of ANILCA, and sport fishing is allowed in both the national park and the national preserve. According to Wolfe (2000: 1):

Sport fishing and sport hunting differ from subsistence in that, although food is one product, they are conducted primarily for recreational values, following principles of "fair chase." While subsistence is productive economic activity that is part of a normal routine of work in rural areas, sport fishing and sport hunting usually are scheduled as recreational breaks from a normal work routine.

One important caveat to this explanation is that there are undoubtedly urban residents hunting under sport regulations who are not eligible to hunt under federal subsistence regulations but who have food procurement as their primary goal.

The preserve's accessibility via the road system and chartered fly-in hunts makes the area especially popular for Alaskan sport hunters. The preserve has produced several world-class Dall sheep and so attracts sheep hunters from around the globe (Batin 1989; Heimer and Smith 1975, 1979; Murphy and Dean 1978; Nesbitt and Parker 1977). A major portion of sport hunter access is by aircraft, both private planes and air taxis.

Sport hunters can be separated into guided versus non-guided. Under State of Alaska regulations, non-state residents are generally required to have a guide for Dall sheep, brown bear, and mountain goat unless accompanied by a close relative, and non-U.S. residents must have a guide for all large game. Guided sport hunting has been occurring in the region for at least 85 years (Young 1985). The preserve portion of Wrangell-St. Elias is divided into 16 guide areas, and the park has 16 concession contracts with hunter guides to provide guiding services within these areas. Each guide has his or her own area, though there is some overlap between areas. For the most part, guided hunting clients are interested in harvesting Dall sheep. The trophy-sized rams found in the preserve are highly valued, and the guides charge accordingly. A 10-day hunt can cost \$7,000 to \$12,000.

## Sightseers and Recreators

Nonconsumptive visitors can be subdivided into two groups; one is the sightseeing visitors and the other, the recreational visitors. The distinction between the two is that the sightseers' visit is focused primarily on the easily accessible road area of the park while the recreational users visit the park's backcountry areas through activities such as hiking and rafting. These are a more traditional national park visitor than the hunters and fishers discussed earlier.

Information gathered by a visitor survey in 1995 helps paint a picture of the sightseers and recreators who visit the park. Almost 40 percent went into the backcountry for two to three nights, and 50 percent day hiked. The most visited area of the park was McCarthy-Kennecott (58 percent), with its rich human history, colorful buildings of the historic mill town, glacier access, and several maintained hiking trails. As for the demographics of this group, 11 percent were international travelers (40 percent from Germany),

and within the U.S. visitors, 31 percent were from Alaska. Fifty-five percent were in family groups, 20 percent were in groups of friends, and 49 percent were in groups of two. Most visitors (56 percent) were aged 26 to 55 years. The most popular activities were viewing scenery or glaciers, watching wildlife, and walking around the historic mill town of Kennecott (Littlejohn 1996).

Further research has been conducted by the Aldo Leopold Wilderness Research Institute into the nature of the backcountry experience at Wrangell-St. Elias (Kneeshaw and others 2004). This research was accomplished by interviewing backcountry users about their trips. Overall, the quality of the wilderness experience was ranked very high. A number of qualities were mentioned that characterized what they experienced including vastness, remoteness, diversity of terrain, primitive conditions, unconfined access and challenge. In general, users of the backcountry and wilderness find a landscape that is without trails or bridges with the occasional cabin as the only facility. Access is by foot from one of the two roads or by air taxi. There are no requirements for a permit, whether you are hiking or mountaineering, and there is no guarantee of rescue should there be a problem. Recreators are on their own to navigate their route and are responsible for their own safety. Comments from one visitor group interviewed as part of the study provides an example of the kind of challenges found in the backcountry. They were surprised by how different their perception of a "creek" on a map was from their actual experience of it, saying, "well you get to the creek and it's you know forty feet wide and a class four river, you know there's no way you could cross that" (Kneeshaw and others 2004: 35).

## Interactions Among User Groups

In the last few years, park staff have been hearing comments or anecdotes suggesting possible conflicts between the hiking and recreating public and the hunting public. Accordingly, park management partnered with the Aldo Leopold Wilderness Research Institute in 2000, as a way to gather information on park backcountry visitors in general and potential conflict between groups in particular. Anecdotal evidence suggested that hikers and backpackers had animosity for hunters, but the research conducted in 2000 did not seem to bear this out. For the most part, the two groups showed a healthy respect for each other, and backpackers/hikers expressed concerns about discharge of firearms in a safe manner. The following excerpt from an interview with a hiking visitor illustrates his safety concern about sharing the same area with hunters:

Interviewer: And if you did encounter hunters, how would you feel about it?

Hiker: Um, I don't have a problem per se, [and] I don't have a problem with hunting in a national park. The, um, I'm coming here more to see nobody, so if I saw hunters, if I saw a family of backpackers, I would probably react the same. I just don't, I would get a little nervous if I heard gunshots going off near me. Because, you know, ricochet and things like that. But that's it (Glaspell and Watson 2003: 69).

Some subsistence hunters, meanwhile, might prefer to not be questioned by the recreational or sightseeing visitor about what they are doing. For some Alaska Native hunters this is in part related to cultural beliefs about the relationships



between humans and animals as well as to customs about how strangers should interact.

Rather than conflicts between hunters and nonconsumptive park visitors, the crux of the competition is between sport and subsistence hunters. The issues between these two types of hunters involve competition for perceived limited resources and the perception that subsistence users have an unfair advantage. For example, subsistence users have a greater ability to use OHVs than do sport hunters. The differences can stretch to more than just the tools, as well. The following excerpts from interviews with sport hunters illustrate their concerns over subsistence hunters:

**Sport Hunter:** The Park is off limits for sheep hunting. At least for people like us [recreational hunters]. I believe there are subsistence rights in this park. So they basically have their own private hunting reserve. When you don't live out here in this environment it kind of grates on you because we used to be able to do it and now we can't but they can (Glaspell and Watson 2003: 75).

**Another Sport Hunter:** Subsistence hunting in the Park? I do have a big problem with it. Especially if they're hunting sheep, because I don't feel sheep is a subsistence animal. You don't get enough meat off a sheep to use it for subsistence. Why should they be able to hunt for trophy sheep for subsistence? (Glaspell and Watson 2003: 75)

Another issue that arose when differentiating between hunters and non-hunters and among the different types of hunters centered on values. Hunters as a whole perceived that non-hunters would view them as non-conservationists. And perceptions among hunters indicated that there was a segment of the hunting population that lacked morals and ethics, which could negatively impact outsider views of the entire population of hunters. The following is an excerpt from an interview with a non-hunter concerning his perceptions regarding hunting for subsistence purposes:

**Interviewer:** And if you were to encounter local residents engaged in subsistence hunting, how would that make you feel?

**Sightseer:** I think that would be interesting to see. You know, if it was a ... I wouldn't be interested in seeing a big group of hunters from Texas or something, that was being rowdy, [but] ... subsistence people I think would be interesting to see (Glaspell and Watson 2003: 78).

Meanwhile, some subsistence hunters have expressed concerns to the park staff about trails being damaged by sport hunters using large OHVs (not all subsistence users can afford OHVs) and about hunting etiquette or experience of sport hunters. At one meeting, for example, a subsistence hunter complained to park staff about a sport hunter who shot at a sheep that she had been stalking, that shot coming from behind them and scaring off the sheep. Her hunting etiquette holds that you do not shoot an animal that someone else is stalking. She felt that the other hunter was reckless in not knowing that there was someone else in the vicinity, thereby endangering her and her hunting companion. She had spoken to the other hunter after this incident and was concerned that it did not matter to him that they were there.

An important point to note is that the sport hunters interviewed for the study and quoted above were non-guided hunters who were accessing the national preserve primarily from the Nabesna Road by foot or OHV and not with an

air taxi. Consequently, this group would be more likely to compete with subsistence hunters than sport hunters who use an air taxi or a guide.

Guided sport hunting is generally supported by aircraft and occurs in remote, rugged portions of the preserve where trophy-size animals are most likely to be found. Subsistence hunting, in contrast, is more opportunistic in nature and occurs mostly around roads and other easily accessed areas. Thus, to a large extent, the areas used for guided sport hunting and the areas used for subsistence hunting are geographically distinct. Additionally, guided sport hunters pursue trophy-class animals that are, in almost all cases, older males. Subsistence hunters, on the other hand, may take females and younger animals when this is allowed by regulations. Consequently, a member of the Wrangell-St. Elias Subsistence Resource Commission—a group of local subsistence users that advises park management on subsistence matters—commented at one meeting that he views unguided sport hunters as competing with subsistence hunters and would like to see sport hunting move to guided hunting only.

Finally, there is also competition between the two kinds of sport hunting providers—the hunting guides and the air taxis. Most guides are pilots and view the air taxis as infringing on their guide areas by dropping off hunters at landing strips that they pioneered prior to the establishment of Wrangell-St. Elias. There is nothing below board from a legal standpoint or an ethical standpoint from the air taxis using these landing strips, and non-guided hunters have the right to the same opportunities as non-guided clients. In general, the conflict between the providers is not reflected in either's client's experience. The guides and the air taxis typically vent their frustrations to park management, and park management attempts to mediate the concerns.

## Implications for Protected Area Stewardship

This paper has described Wrangell-St. Elias National Park and Preserve and its various users. How do we achieve a sustainable balance between preservation and park use and between the various park uses? This is a key question for park managers. The park covers a huge area, its staff is relatively small, and it is difficult to know everything about the park resources and visitors. This concluding section discusses some of the implications of this situation for protected-area stewardship.

Since the park's creation, its staff have been trying to determine approximate visitor numbers and information on where they go and the activities in which they are engaged. As mentioned earlier, the park has no formal entrance stations, and access is by air as well as by ground. This makes counting visitors difficult. The best source of information tends to be the annual reports that the commercial operators complete. Any type of guide—hunting, hiking, climbing, rafting, etc.—working within the park is required to have a permit and to report the number of clients they had per season, where they've taken them, and what they've done. Tracking and analyzing this information has proven challenging. Consequently, we have to make management decisions without highly accurate information about visitation.

Like park visitors, we also need good quality data on park resources and how they are impacted by various park uses. Because the Wrangell-St. Elias allows activities beyond those in a typical U.S. park, there are additional issues that need to be addressed—not just how many caribou there are and how they interact with natural predators such as wolves or bears, also questions about the impact of hunting or trapping on wildlife populations in the park and the impact of OHV use for hunting access.

While the park has spent a good deal of effort preparing visitors for the challenges and logistics of a backcountry or wilderness trip, there has not been a similar effort to prepare recreational visitors for potential encounters with consumptive users, such as hunters. Some recreational visitors are surprised that a national park allows hunting since most national parks in the United States do not. The concept of subsistence itself is a new one for most out-of-state visitors. They are surprised to learn that there are still places where people are still tied so closely to the land and need to use resources in such a direct manner. The park recently completed a Long-Range Interpretive Plan that identifies important themes and messages to all visitors to the park. Consumptive uses and subsistence are high priority educational goals that the park will be emphasizing over the coming years.

The park currently does not have a backcountry management or commercial services plan. Such a plan could serve as a tool for making decisions about facilities in the backcountry. It would also help to provide consistency in decision-making through changes in leadership at the park.

In sum, Wrangell-St. Elias faces some issues in managing the largest national park and the largest designated wilderness area in the United States. Yet, we are not facing any imminent crises. Although it may not be as fast as we would like, the park is relatively young and we are making progress towards having the data and plans that are needed to respond to our challenges or those crises that the future

might bring. And in the meantime, we are the stewards of an enormous wilderness area with all the values associated with it.

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# Expansion of the Wilderness Values Scale With Three Sub-Scales: Personal Maintenance, Expression and Learning, and Societal Maintenance

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**Abstract**—The purpose of this research was to expand the wilderness value scale administered in the 1994 and 2000 versions of the National Survey on Recreation and the Environment using questions included in the 2003 NSRE. A data set of 1,900 cases was randomly split in half. Validity of the additional questions was tested using principal component analysis, a confirmatory factor analysis cross validation procedure, Cronbach's alpha and weighted omega reliability coefficients, and identification of a simplex pattern among the scales. Results revealed that the three sub-scales, personal maintenance, expression and learning, and societal maintenance have adequate levels of reliability and validity. Concluding sections include recommendations for further testing of the scales and definitions for the specific value measures to aid in understanding the intended theoretical meaning and foster consistent replication.

## Introduction

Previous research suggests that a shift may be occurring in how American citizens value the National Wilderness Preservation System (NWPS). Cordell and others (2003) stated that this shift is devaluing a paradigm that emphasizes economic uses and human dominance over nature and placing more value in a paradigm that posits sustainable development and a balance between human and non-human uses of nature. In most paradigm shifts, there is bound to be variation among interest group attitudes and a stage during which interest groups have difficulty articulating opinions. In an on-going effort to identify, understand, and confirm these values, the United States Department of Agriculture Forest Service has included questions concerning

social values of wilderness on three iterations (1994, 2000, and 2003) of the National Survey on Recreation and the Environment (NSRE).

The 1994 and 2000 iterations of the NSRE used a 13-item wilderness value scale (WVS) that was founded on the concepts of onsite use and offsite values (table 1). Onsite use values require one's physical presence in a wilderness. Use values have been the main focus of previous research as a result of the perceived link with recreational use of wilderness, profit involving services (for example, guide services), or extraction of raw materials from wilderness. Use values are often tangible, observable, and sometimes marketable (Cordell and others 2003). Offsite, or nonuse, values "include a range of potential benefits that can accrue to people whether or not they ever enter wilderness" (Cordell and others 1998: 28). Nonuse values are more difficult to measure; they tend to be less understood, intangible and not marketable. However, Cordell and others (2003) and Loomis and others (1995) posit that nonuse values are equal to and in some cases surpass use values.

**Table 1**—Factors and loadings found using the 1994 and 2000 NSRE wilderness values data.

Wilderness value item	Factor loadings	
	1994	2000
<b>Factor one</b>		
<b>Wildland protection</b>		
Protection of wildlife habitat	0.81	0.75
Protection for endangered species	.79	.76
Preserving ecosystems	.79	.74
For future generations	.77	.68
Protecting air quality	.73	.73
Protecting water quality	.71	.68
Future option to visit	.58	.54
Just knowing it exists	.57	.54
<b>Factor two</b>		
<b>Wildland utilization</b>		
Income for tourism industry	.82	.75
Recreation opportunities <sup>a</sup>	.71	.66
Providing spiritual inspiration	.56	.65
For scientific study <sup>a</sup>	—	.50
Scenic beauty	—	—

<sup>a</sup>Redundant with 2003 question.

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Using the previous 13-item WVS, Cordell and others (1998) identified two factors using principal components analysis (PCA) (table 1). The first factor, *wildland protection*, reflected offsite nonuse values such as protection of air and water quality, habitats, ecosystem functioning, existence, option, and bequest values. The second factor, *wildland utilization*, was more a reflection of onsite use values realized through recreation or scientific study, and economic benefits of tourism and business. Two of the questions (*use of wilderness for scientific study and providing scenic beauty*) loaded on both factors and could not be assigned to either. In 2000, a PCA with varimax rotation identified the same two factors as in 1998; thus, the 2000 NSRE data performed consistently (Cordell and others 2003). Again, the question *providing scenic beauty* loaded on both factors. However, the item *use of wilderness for scientific study* loaded on the *wildland utilization* factor, as one might expect. The authors asserted that the “consistency in structure...over time indicates persistence of the dichotomy between nonuse and use values” (Cordell and others 2003: 30). A necessary step in understanding wilderness values is to expand the WVS to be more inclusive of the variation in the human relationship with wilderness.

The 2003 NSRE included an added module of wilderness questions that increased the breadth of possible values. The purpose of the current research was to expand the wilderness value scale used in the 1994 and 2000 NSRE by validating the additional questions. The new wilderness value questions address less tangible values than the previous WVS items.

The overall intention of the analyses herein was to identify scales that could be combined with the original items to create a WVS that accounts for more variation in attitudes toward the National Wilderness Preservation System. The next section provides brief descriptions of the new value items. For convenience, the items below are organized according to the value class and factors listed in table 2.

## New Value Meaning

### Personal Maintenance

*Therapeutic value* is found in the ability of wilderness to isolate an individual from external pressures and provide opportunities for healing and the development of self-concept, personality, locus of control, and self-assertion (Burton 1981). *Personal well-being* is fostered through opportunities for escape from urban and social settings (White and Hendee 2000). Unlike therapeutic value, this value focuses on maintenance of psychological health rather than recovery from traumatic events or using wilderness as a prescription. *Self-enlightenment* is the pursuit of higher levels of consciousness. Wilderness holds this value to the extent that it can remove urban or social stimuli from a self-reflective experience and provides opportunities for self-relevant feedback (Scherl 1989). *Family and social* bonds are strengthened through wilderness-based leisure outings. Such experiences improve family stability, interactions, and relationship satisfaction

**Table 2**—Factor loadings, means, and standard deviations for the wilderness value variables from the 2003 NSRE.

Wilderness value and factor	Value class	PCA loadings sample 1	CFA loadings sample 1	CFA loadings sample 2	Mean N = 1924	SD <sup>a</sup>
<b>Personal Maintenance</b>						
		$\alpha = .78^b$	$\Omega = .82^c$	$\Omega = .76$		
Helps one recover from tragic life events or illness, such as death of a loved one, divorce, or depression.	Therapeutic	0.826	0.629	0.590	1.90	1.0
Helps people escape the stresses of every-day life.	Well-being	.678	.753	.680	1.36	0.71
Helps people meditate and reflect on how one's life is going.	Self-enlightenment	.671	.767	.622	1.51	0.79
Strengthens family bonds, values, and friendships.	Family/Social	.598	.657	.643	1.58	0.26
Helps people learn skills beneficial in everyday life such as leadership, overcoming challenges, and self-confidence.	Character building	.563	.599	.544	1.76	0.89
<b>Expression and Learning</b>						
		$\alpha = .77$	$\Omega = .83$	$\Omega = .71$		
Provides an opportunity to study wildlife, plants, rocks, and minerals as they occur in nature.	Educational	0.814	0.787	0.587	1.23	0.55
Allows people to see and experience nature such as wildflowers, wildlife, clear streams, or mountains.	Esthetic	.809	.780	.639	1.19	0.52
Allows people to have fun and enjoy outdoor recreation activities.	Recreational	.676	.678	.644	1.26	0.56
Provides unique and outstanding subjects for art such as painting or photography.	Artistic	.631	.671	.587	1.36	0.65
<b>Societal Maintenance</b>						
		$\alpha = .70$	$\Omega = .68$	$\Omega = .71$		
Nature and wild lands are important symbols of American culture.	Cultural	0.821	0.627	0.692	1.54	0.87
It reminds us what it was like before European settlement.	Historical	.766	.622	.666	1.96	1.1
It provides scientists an opportunity to study how nature works when not disturbed by humans.	Scientific	.583	.678	.671	1.31	0.70

<sup>a</sup>Standard deviation

<sup>b</sup>Cronbach's alpha reliability coefficient

<sup>c</sup>Weighted omega reliability coefficient

(Mannell and Kleiber 1997). Likewise, the reduction of formality and role barriers in wilderness activities enhance trust and communication among social groups (Cheek 1981). Finally, *character building* occurs as an individual gains self-control by successfully overcoming physical and emotional challenges (Scherl 1989) or is presented with opportunities for self-reflection or concentration. Human character is enriched when the outcomes from such experiences inform daily behavior.

## Expression and Learning

The *education* value of wilderness is found in its use as a classroom, as a tool in the classroom, as an object of personal study, or in the general media (Driver and others 1987). The minimization of human influence provides unique subject matter in the physical, biological, and social sciences. *Esthetic* values relate to the sublimity of wilderness. Scenic beauty and the enjoyment of nature consistently rank as strong wilderness values and associations for visitors (Driver and others 1987). Offsite esthetic value is expressed through the frequent use of wilderness themes in advertising, writing, and the media. Wilderness provides esthetic value when it challenges the senses and forces new perceptions (Thompson 1995). *Recreation* provides the vehicle for the realization of most of the other 11 values discussed here. Apart from these values, however, wilderness recreation provides opportunities for physical exercise (Godfrey-Smith 1979), wilderness-dependent activities, stimulation, independence, and risk-taking (Driver and others 1987). Additionally, wilderness has value as the left-hand primitive anchor on the Recreation Opportunity Spectrum (Manning 1989). *Artistic* value describes the use of wilderness as a subject for creative expression. The popularity of wilderness art (for example, Ansel Adams) attests to the fact that artists and consumers value the opportunities for artistic inspiration in wilderness landscapes (Driver and others 1987).

## Societal Maintenance

*Cultural* values reflect the importance of wilderness as a repository of symbols affecting human cultures. For example, wilderness symbols, from mountain men to bald eagles to rugged peaks, serve to form and reinforce American cultural ideals of strength, diversity, and individualism. An appreciation of national origins is important for an individual's sense of self-identity and is aided by wilderness symbols (Hammond 1985). *Historical* value incorporates elements of cultural values, but is broader in scope and refers to the worth of wilderness as a relic of American and earth history. Appreciation of pre-settlement landscapes allows a greater sense of human duration and identity in the natural world (Rolston 1985). The final value, *scientific*, anticipates the use of untrammelled wilderness as a physical, biological (Driver and others 1987), and social (Manning 1989) laboratory.

## Methods

Data used for the analysis were collected as part of the 2003 NSRE. The 2003 NSRE was a random digit dial telephone survey of more than 19,000 noninstitutionalized persons

over the age of 16, in all 50 United States. A sub-sample of approximately 1,900 people was asked a series of questions specifically about wilderness. Data collection and sample weighting procedures were consistent with NSRE data collection conducted in 1994 and 2000 and described in previous studies (Cordell and others 1998; Cordell and others 2003; Cordell and Teasley 1998). This analysis focused on 12 questions that directly addressed the topic of wilderness value. The questions are listed in table 2. As noted in table 1, three of the questions from the original WVS scale are redundant with questions in the 2003 expanded WVS. All variables were measured on a five-point Likert type scale: 1 = strongly agree, 2 = moderately agree, 3 = neither agree nor disagree, 4 = moderately disagree, and 5 = strongly disagree. The complete sub-sample dataset consisted of 1,924 cases.

The analysis procedure was as follows. A single sample of NSRE respondents who answered the wilderness value questions was randomly split in half. PCA and confirmatory factor analysis (CFA) were used to identify and confirm a factor structure for the new wilderness value questions using sample one. The factor structure was cross-validated with sample two. Reliability was assessed using an internal consistency method (Carmines and Zeller 1979). To establish construct validity, correlations among the sub-scales were calculated to test for the presence of the wilderness use-nonuse dichotomy established in the previous research discussed above.

SPSS version 12.0 was used to randomly split the data into two sets. Sample one consisted of 983 cases and sample two consisted of 941 cases. PCA, with a varimax rotation, was performed using sample one. Scree plots and percent variance accounted for were used to identify plausible factor structures. Separate PCA analyses were run for the plausible models to identify the simplest structure. Factor loadings of greater than 0.5 were required for a variable to be included in a factor. Factors accounting for less than 5 percent of the variance were not considered acceptable. The factors identified by the PCA procedure were submitted to a confirmatory factor analysis (CFA) using EQS version 6.1. Based on the factor structure validation method described by Byrne (1994), sample two was submitted to a CFA in which all of the parameter, variance, and covariance estimates for sample two were constrained to be the same as the estimates from the sample one CFA. Factor structure validity is supported when an acceptable fitting model is identified while all estimates match the original factor structure estimates. An unstable factor structure is evidenced by identifying an unacceptable model, the need to freely estimate parameters, or the need to modify the model during the second CFA.

Initial analysis of sample one produced a multivariate kurtosis normalized estimate of 209, which is highly suggestive of nonnormality in the population. An appropriate response to nonnormal data is to use a test statistic that has been corrected to take nonnormality into account when evaluating model goodness of fit (Hu and others 1992). Thus, Robust Maximum Likelihood estimation was used with a covariance matrix developed from raw data. The Satorra-Bentler Scaled Chi-Square ( $S-B\chi^2$ ) is sensitive to sample size and should not be trusted with large samples. Following recommendations of Hu and Bentler (1998), additional robust fit indices used were the comparative fit index (CFI) and standardized root mean square error of approximation

(RMSEA). A CFI greater than 0.9 was considered acceptable and greater than 0.95 was considered an excellent fit. An RMSEA less than 0.1 was considered acceptable and less than 0.05 was considered an excellent fitting model.

## Results

### Principal Components Analysis

The exploratory, PCA produced a scree plot indicating that three and five factor structures were statistically plausible. The three and five factor models accounted for 52 percent and 72 percent of the variance respectively. Separate principal components analyses were run for the three and five-factor models. The three-factor model produced the simplest structure and was selected based on interpretability. Sixty-one percent of the variance was accounted for by the three-factor model. Factor loadings are listed in table 2. Factors were labeled based on the general theme that the values in each appeared to represent. The first factor consisted of five variables that appeared to represent wilderness as a means of re-creating the self or recovering from the stress of daily life. The second factor included four value categories and portrayed wilderness as a place for self-expression, individual learning, or having fun. The final factor, consisting of three value categories, was broader in scope. The third factor characterized wilderness as a symbol of American culture, as well as a resource for scientific research.

### Confirmatory Factor Analysis

The hypothesized factor structure based on the PCA was tested using CFA and supported for sample one ( $S-B\chi^2 = 131$ ,  $df = 51$ ,  $p < .000$ , Robust CFI = .910, RMSEA = .040). The factor structure with all parameter, variance, and covariance estimates constrained to match the estimates from sample one was imposed on sample two. The second CFA, with the constrained factor structure, produced acceptable fit indices using sample two ( $S-B\chi^2 = 117$ ,  $df = 51$ ,  $p < .000$ , Robust CFI = .928, RMSEA = .037). Factor structure validity was supported. An acceptable fitting model was identified without freely estimating parameters or making model modifications while all estimates were constrained to match factor structure estimates of the first CFA model.

### Additional Validity and Reliability Tests

Scale reliability, “the extent to which...any measuring procedure yields the same results on repeated trials” (Carmines and Zeller 1979: 11), was assessed through an internal consistency method (Carmines and Zeller 1979) using

Cronbach’s alpha reliability coefficient (Cronbach 1951) and weighted omega reliability coefficient (Bacon and others 1995; DeShon 1998; Werts and others 1974). Reliability coefficients of the factors ranging from 0.68 to 0.83 indicated acceptable internal consistency (table 2). The lowest reliability estimates were obtained for the social maintenance scale (0.68 to 0.71); considering that this scale consisted of only three items, it is thought to have adequate internal consistency. In addition, reliability coefficient patterns were consistent when repeated between the two samples.

Construct validity, “the extent to which a particular measure relates to other measures consistent with theoretically derived hypotheses concerning the concepts” (Carmines and Zeller 1979: 23), was assessed using correlations of the three scales and the identification of a simplex pattern (Pelletier and others 1995). Correlations among the three factors, in both sample one and two, ranged from 0.65 to 0.86 (table 3). We would expect to find high correlations among the factors since they are measuring related constructs of wilderness value. Correlations of this level indicate shared variance among the factors and suggest that it might be appropriate to create a second order factor. However, a second-order model was not tested because it was theoretically inappropriate at this time. The objective of this research was to evaluate questions to be added to the original WVS. It will be more appropriate to create a second-order factor model after the expanded WVS is confirmed using all items combined.

A simplex pattern exists when sub-scales adjacent on a continuum have higher-positive correlations and sub-scales at opposite ends of a continuum have weaker or negative correlations. Previous research using the original WVS scale identified a dichotomy between nonuse and use values. The questions listed in table 2 indicate that the *personal maintenance* and *expression and learning* factors represented onsite use values and the *societal maintenance* factor represented nonuse values. Thus, we can hypothesize that the *personal maintenance* and *expression and learning* factors are adjacent on the nonuse-use continuum and the *societal maintenance* is on the opposite end of the continuum. The correlations in table 3 supported this indicator of construct validity. The correlation between *personal maintenance* and *expression and learning* was stronger than the correlations between *societal maintenance* and both *personal maintenance* and *expression and learning*.

## Discussion

The purpose of the analysis reported in this article was to confirm and validate sub-scales to be added to the existing WVS. Results from the analyses revealed that the three sub-scales, *personal maintenance*, *expression and learning*, and *societal maintenance* have adequate levels of reliability

**Table 3**—Correlations among factors in both CFA models (sample one/sample two).

	Expression and learning	Social maintenance
Personal Maintenance	0.80/0.86	0.70/0.65
Expression and Learning		0.65/0.77



and validity. Specifically, the PCA of sample one produced a clear and interpretable three-factor structure. The CFA of the three-factor model using sample one was acceptable and did not require post-hoc modifications. In addition, the CFA cross-validation procedure using sample two was successful. Acceptable Cronbach's alpha and weighted omega reliability coefficients established internal consistency. Construct validity was supported through high correlations among the three factors considering their relationship within the overall construct of wilderness values. Construct validity was also supported by identifying a correlation pattern representing *personal maintenance* and *expression and learning* factors being adjacent on the nonuse-use continuum and the *societal maintenance* being on the opposite end of the continuum.

Overall, these results are encouraging. Albeit, additional research will be necessary to establish the psychometric properties of the scales when combining them with the original WVS items and when investigating relations with various constructs used in wilderness research. For instance, previous research has not produced consistent results using the WVS to identify relationships among various American demographic groups (Cordell and others 1998); however, demographic groups have been found to be important indicators in relation to similar constructs such as recreational use and environmental attitudes (Cordell and Tarrant 2002; Cordell and Teasley 1998). The efforts of the research herein were founded on the belief that expanding and reorganizing the WVS should contribute to accounting for more variance in wilderness values.

As part of the WVS reorganization, two of the items (*recreation opportunities* and *scientific study*, see table 1) from the original WVS factor *wildland utilization* were included in the new factors. Additional research is necessary to determine how the original *wildland utilization* factor will perform now that it contains a reduced number of indicators. In previous studies, the item *scenic beauty* thwarted classification by loading on multiple factors. Combining the original and new sub-scales will create a WVS that measures a minimum of four domains of wilderness values. Theoretically, this should allow researchers to account for more variation in wilderness values and provide better discriminant and predictive validity.

Finally, research methods using the WVS should be expanded to include more in-depth analyses of the indicators. Qualitative methods could provide data richness that allows for a more detailed understanding of how questions are interpreted and how wilderness is actually valued. This will also lead to more meaningful interpretations of quantitative analysis. The NSRE uses a telephone survey method targeting the entire American population. Future research should use more specific target populations and methods such as actual wilderness users and face-to-face interviews or surveys. Finally, there must be consistent replication in administration and analysis in order for theoretical development to occur.

## Conclusion

The findings of these analyses supported the initial reliability and validity of three scales that can be used to reorganize additional values and expand the original WVS.

While the scales performed well in the current analysis, all of the research using the WVS to this point has been associated with the NSRE. Future research should target additional and specific populations to fortify the psychometric properties of the WVS. In addition, the predictive and discriminant validity of the WVS should be investigated through relationships with variables familiar to wilderness research. Understanding how humans value wilderness can help managers understand visitor needs, help protect and expand the NWPS, and further theoretical, recreation research.

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# Commander Islands as the Significant Point for Monitoring Some Dangerous Changes in the Beringia Ecosystem

Vladimir Sevostianov

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**Abstract**—This paper explores the many natural, historical, and economic reasons the Commander Islands are an essential focal point for field expedition work and finally for conservation projects in the unique ecosystem of the North Pacific. Around the Commander Islands we can find a biologically productive and diverse marine environment. For example, it is one of the richest areas of seaweeds by species and biomass in the world. However, the number of sea otters has dramatically declined during the last seven years in some parts of the Northern Pacific. This fact clearly displays that something is drastically wrong with the natural functions in the whole ecosystem of the Bering Sea.

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Right now, we have a catastrophic situation with sea otters near Alaska and the Aleutian Islands. They have almost just disappeared for unknown reasons. According to Yereth Rosen (2004), in the Anchorage newspaper, "... sea otters are once again vanishing from Alaska's 1,000-mile (1,600-km) Aleutian chain and other parts of southwestern Alaska. This time, there is no obvious explanation. Alaska's sea otter population numbered 100,000 to 137,000 in the 1980s, with its core in the Aleutians and western Alaska. But numbers fell 70 percent from 1992 to 2000, according to the U.S. Fish and Wildlife Service. Some Aleutian populations are down to just a few thousand, about 5 percent of 1980s levels, the agency said." And the trend is continuing.

The Fish and Wildlife Service, which shares responsibility for protecting endangered species with the Commerce Department's National Marine Fisheries Service, had to move the sea otters to the list of endangered species for the USA. Almost the same situation is occurring with Steller sea lions and some other species, which are in the top level of the food chain.

All these facts clearly display that something is drastically wrong with the natural functions in the whole ecosystem of the Bering Sea. Around the Commander Islands we have biologically productive and diverse marine environments. The main reasons are the unique combination of some geological and hydrological factors around this small area. Also, near

the Commander Islands there are a few huge and active underwater volcanoes. Altogether, this is the most favorable condition for phito and zooplankton, which form the base of living for the other high range organisms in the ecosystem. It is the primary influence on the huge biodiversity of seaweeds near the coastal line of the Islands, too. Actually, it's one of the richest areas of seaweeds by species and biomass in the world.

That's why the sea otter population around the Commander Islands is still stable. So, I can establish beyond doubt that for many natural, historical, economic and other reasons, the Commander Islands are an essential focal point for field expedition work and finally for conservation projects in the unique ecosystem of the North Pacific. The urgency of the initiatives to be funded has been confirmed many times over by the United Nations Educational, Scientific and Cultural Organization (UNESCO). Already in 1993, the Commander Islands received the status of "Nature Reserve" under Russian Federal Law. In 2002, the Commander Islands received "Biosphere" status under UNESCO guidelines. We are hopeful (with all of the documents ready and with UNESCO approval) that the Commander Islands will obtain the highest status of "World Nature Heritage Site" under UNESCO.

Everybody acknowledges that the Commander Islands can serve as a wonderful model and preserve for the study of the Bering Sea ecosystem's natural processes, which is now starting to suffer stagnation and collapse. But for now we don't have real financial support for practical actions on the Commander Islands.

According to the role under UNESCO, the Biosphere status of the Commander Islands Reserve and the Nature Heritage status must work closely with native people (their population is around 300—mainly Aleut). First, they are going to work at the Reserve like a staff; second, they can use some natural resources in some special zones at the Reserve; and third, they will conduct some training programs at the Reserve and do all kinds of native activity outside and inside the Reserve and some of the territory on the Commander has been left for native people for fishing, hunting and harvesting.

During a long break in the lifestyle of the native people on the Commander, most of them have lost their ability to work with Nature. That's why one of the goals of the Biosphere Reserve will be restoring and protecting some unique aspects of the social and economic culture of the native people on the Commander Islands. Especially for Aleuts, it is extremely important they feel that their Islands will be safe with Nature forever!

In August 2003, a freight container (around 19 m<sup>3</sup>/160 barrels capacity) was thrown out of the ocean onto Bering

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Island (largest island in the Commander archipelago). The container was full of some kind of polymeric liquid that is used in the building industry and produced in the United States. With a large cooperative effort, the locals managed to move the container farther away from the ocean and place it in a safe position on the beach. Unfortunately, most of the aggressive liquid leaked into the ocean. Luckily, the storm weather and direction of the wind moved the poison away from the breeding colony of fur seals, sea otters, sea lions, seals and marine birds, but towards another unique island, called Ariy, where the natural habitat is full of life.

This is an additional reminder that it is necessary to think urgently about organizing, on the Commander Islands, some kind of International Monitoring Observation Center, which can be based at the Commander Biosphere Reserve.

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# Use of Stock to Maintain and Construct Trails in the Eastern United States

Eric Sandeno

**Abstract**—Trail construction and reconstruction utilizing stock is rare in the eastern United States. The Hoosier National Forest is the only forest in the Eastern Region of the Forest Service with its own pack string. The Hoosier is also the only forest in the eastern United States to utilize pack strings from western forests to complete trail work within wilderness. For the past 4 years, the Hoosier National Forest has taken great strides to improve trail and resource conditions in the Charles C. Deam Wilderness and to provide opportunities for solitude and an overall quality recreation experience for forest visitors. To improve conditions, the forest has partnered with the Bridger-Teton National Forest in the Inter-mountain Region of the Forest Service to provide two packers and a mule string of eight animals for the month of May each of the past 4 years. During this time, 13 miles (21 km) of trail have been constructed and over 600 tons of gravel have been moved using only a mule string and hand tools.

The Charles C. Deam Wilderness is located in the Hoosier National Forest, in Indiana, about 15 miles (24 km) south-east of Bloomington. The 12,953-acre (5,242-ha) area was designated wilderness by Congress in 1982 and includes features such as continuous forest canopy, steep ridges, five caves, five cemeteries, and 12.5 miles (20 km) of shoreline on Monroe Lake. The area at one time supported 78 homesites connected by 57 miles (92 km) of road. Negative effects due to past uses, a proliferation of user made trails, and erosion prompted the Forest Service to address the most appropriate way to protect the wilderness resource.

In June 2001, the Hoosier National Forest released the Charles C. Deam Wilderness Trail Project Environmental Assessment (EA) and five Decision Notices and Findings of No Significant Impact. This EA analyzed four separate trail relocation projects totaling 3.2 miles (5 km) of trail construction in the wilderness. In 2005, a Categorical Exclusion was completed and a Decision Memo signed for another 1.3 mile (2 km) trail construction project in the wilderness.

The purpose of these projects is to provide quality recreational opportunities and manage for safe public access to the Charles C. Deam Wilderness while providing for the protection of natural resources. The proposals are consistent

with direction found in the *Hoosier National Forest Land and Resource Management Plan 1991 (Forest Plan)* for Management Area 5.1 (Wilderness) (USDA 1991a). The proposed actions were designed to respond to goals provided in the *Forest Plan* for managing the Forest for people. Forest goals include providing ways for people to enjoy and view the Forest and its many ecosystems in harmony with the natural communities existing there.

The projects selected focused on locations along existing trails in the wilderness that were wet or muddy for much of the year, were eroding, were located in old entrenched roadbeds, and/or were seasonally flooded by backwater from Monroe Lake. These situations caused trail users to go around the muddy spots or create new crossings to bypass the high water and continue along the trail. The result has been widening and braiding of trails, creation of user trails off the main trail system, and accelerated erosion of certain trail sections.

All projects involved relocating trail segments utilizing trail construction methods that meet the intent of the 1964 Wilderness Act and Forest Service direction regarding trail construction in wilderness. In agreement with the Wilderness Act of 1964, wilderness use and administration is typically completed using primitive methods. Any device for moving people or material in or over land and water that uses machines that require a motor, engine, or air, having moving parts, that provides a mechanical advantage to the user is not allowed. Work completed by Forest Service employees must be completed using only primitive tools. Employees must acquire and maintain necessary skills for primitive travel by foot, horse, canoe, or other non-mechanical means. Only unique primitive skills were utilized during trail construction.

The Hoosier National Forest is not properly equipped with all the required tools to complete several miles of trail construction. Specifically, the soil types in Indiana require additional hardening/surfacing to protect the trail tread from eroding. Transporting enough gravel to surface trails within a wilderness setting, using minimum tools, requires a mule string to move materials. The Hoosier National Forest made an arrangement with a trail crew from the Salmon-Challis National Forest in Idaho to assist with the first of the trail construction projects. Due to record rains and flooding in the spring of 2002, the Salmon-Challis crew was sent home early and the project was delayed to allow soils in the project area to dry.

By the time the project area had dried out enough to continue trail construction, the Salmon-Challis National Forest crew was no longer available. The Hoosier National Forest made arrangements with the Bridger-Teton National Forest in Wyoming to provide a packer and a mule string of eight animals to come to Indiana in early summer 2002. The

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Hoosier National Forest also hired a five-person seasonal trail crew to assist with construction efforts. This partnering with the Bridger-Teton National Forest in 2002 has now led to 4 years of collaborative efforts between the two national forests and a successful completion of all projects utilizing minimal tools. During the past 4 years, 13 miles (21 km) of trail have been constructed (inside and outside wilderness) and over 600 tons of gravel have been moved using only a mule string and hand tools.

Trail construction and reconstruction utilizing stock is rare in the eastern United States. The Hoosier National Forest is the only forest in Region 9 with its own pack string. The Hoosier is also the only forest in the eastern United States to utilize pack strings from western forests to complete trail work within wilderness. For the past 4 years, the Hoosier National Forest has taken great strides to improve trail and resource conditions in the Charles C. Deam Wilderness and to provide opportunities for solitude and an overall quality recreation experience for forest visitors. A large part of the trail construction process in Indiana is hardening the trails with gravel. The use of the mule string is critical to placing gravel along the newly constructed trail.

According to a study recently conducted on the Hoosier National Forest by Aust and others (2005), hardening trails with gravel is a useful tool in preventing erosion. A number of tread hardening techniques may be employed during original trail construction or during subsequent reconstruction and maintenance. Wet soils can be capped with crushed stone, or excavated and replaced with crushed stone or other suitable fill material (Meyer 2002). Large stones are often used to form a stable base in wet soils, often capped with crushed stone and “crusher fines” or “whin dust” (screened material less than ¼ inch [6 mm]) to provide a smoother tread surface that can be periodically hand or machine graded (Scottish Natural Heritage 2000). In Scotland, aggregate placed on top of geosynthetics has been used to effectively “float” trails over deep peat substrates (Bayfield and Aitken 1992; The Footpath Trust 1999). Even soils that are not seasonally wet may require capping with crushed stone to create a tread surface capable of sustaining heavy horse or motorized traffic. Trail surfacing provides two basic functions: it can enhance the trafficability and/or it can reduce erosion. Surfacing such as gravel is commonly used to enhance the trafficability of wet areas. Unfortunately, applications of gravel to trafficked wet areas can be lost as the gravel is churned to lower horizons. Use of larger stone or geotextile underneath the stone can deter this problem and greatly enhance the longevity of the trail. As previously mentioned, gravel can be used to protect bare soil from the erosive forces of water. In general, larger sizes of stone withstand traffic better, but smaller stones provide a smoother walking or traveling surface.

Trail construction for these projects was unique and innovative to meet the requirements for trail construction in a congressionally designated wilderness. Since only primitive tools could be used, all aspects of this project required innovative thinking to properly protect soil, water, and wilderness resources.

The following procedures were used during work on trail construction projects in the Charles C. Deam Wilderness:

- **Layout and design**—The forest engineer, wilderness ranger, and wilderness manager designed and laid out the trail construction locations by walking and

re-walking the proposed routes several times. During layout and design, trail grade was not allowed to exceed 10 percent. Each new section of trail was walked, flagged, and trail grade checked.

- **Clearing**—Minor clearing of some vegetation along the selected routes was completed using crosscut saws, bow saws, and clippers. In some cases, the original route was slightly altered to minimize vegetation that needed to be removed. Only vegetation within 3 feet (1 m) of the centerline of the trail was trimmed or removed. No overstory trees were removed during this process.
- **Plow**—A Vulcan Hillside Plow was used to cut a “scratch line” along the new trail segments. The plow was harnessed to a Forest Service mule and a minimum of two drivers was required during the two-week plowing operation. Utilizing a plow in a wooded setting is very difficult work for the mule and drivers. The original plow broke during construction, so a new plow and several plow points were purchased from an Amish family in southern Indiana.
- **Grade**—After plowing the trail, a grader was harnessed to the Forest Service mule to establish a trail tread. During the grading process, the trail was outsloped, to reduce the chance for water to run directly down the new trail adding sedimentation into the watershed. As with the plowing process, grading is difficult, hard work.
- **Turnpikes/switchbacks**—Special structures, such as turnpikes or switchbacks were constructed to minimize the potential for erosion. Large rocks were carried by hand to the switchback locations. Approximately 250 large, flat rocks were used for each of the switchbacks. Geotextile was also applied in some areas to further reduce the risk of sedimentation. Materials such as logs and rolls of geotextile were packed to the site using the mule string.
- **Surfacing**—Due to soil types found in Indiana, a gravel surfacing was added to protect the soil and minimize the chances for soil erosion, boggy areas, or sedimentation. According to FSH 2309.18, some type of surfacing is often required for very high use trails or when soil, moisture, and volume of traffic make it impossible to hold the trail tread (USDA 1991b). When available, river gravel from nearby dry streambeds was shoveled into 5 gallon (19 liter) buckets and hand loaded into gravel panniers and hauled to the trail using horses and mules. When a native supply was not available, gravel was hauled by mule string to the site from the nearest trailhead. However, one project was located along Lake Monroe, 5 miles (8 km) from the nearest trailhead. Gravel was hauled in five gallon buckets by boat and then loaded on the mule string where it was finally taken to the trail. To load the gravel on the boat, the forest designed a conveyor system that was 60 feet (18 m) long. Gravel was loaded into buckets, sent down the conveyor, and loaded on the boat.
- **Final beautification**—Gravel was compacted into place using the flat surface of McLeod’s. Check dams were built where needed and other minor adjustments to the trail, including any rehabilitation of the worksite, were finished.

Use of primitive tools, including mule strings is very rare in Indiana. Since the Charles C. Deam Wilderness is the only

congressionally designated wilderness in the state, forest visitors are not used to seeing primitive tools in use. While preparing the mule string every morning at the trailhead or completing work on the trail, interested observers would stop by and ask questions about the project, the use of minimum tools, wilderness management in general, and the unique methods that were used to construct the trail.

Due to the cooperation of three national forests, and the countless hours (including weekends) of hard work, all construction projects in the Charles C. Deam Wilderness have been completed using only primitive tools.

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# Identifying Threats, Values, and Attributes in Brazilian Wilderness Areas

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**Abstract**—The protection of relatively pristine areas in Brazil provides a great opportunity to recognize the values of natural ecosystems. At the same time, it provides opportunities for economic development. The growing interest in these areas in Brazil has stimulated techniques for management and research to study the consequences of human activities on the natural environment and the experience of visitors. Protection of the values received from these areas in relation to ecological and social conditions and threats to those values and conditions are priority research topics in Brazil. In the year 2003, a Symposium, “Protecting and restoring relationships between humans and wilderness landscapes,” was held in Piracicaba-SP, Brazil. At this meeting a range of protected area issues were discussed; all of them outcomes of actual studies in protected areas and related to defining and protecting the human relationships with natural environments. Participants identified threats, values and attributes of protected areas that could help to guide ecological and social research and monitoring. They used a basic matrix of wilderness attributes and threats used previously at the Leopold Institute. The results reflect, in a way, the situation of other undeveloped countries where the main threats are related to illegal extraction of wood, traffic in wild animals and inadequate agricultural practices.

## Introduction

Asking stakeholders and managers to give their opinion about how management could be improved in a protected area assumes that public participation works well. This focus is quite new in Brazilian protected areas and the benefits are still not evaluated. Some authors have made progress on this process. Milano and others (1993) conducted a study evaluating the opinion of individuals involved with protected areas, and more recently, Theulen (2004) has evaluated the current perspective of managers of protected areas, and compared the current state of management and administration with that of 1993. Some of the conclusions obtained

by Theulen will help us to understand the results obtained from the interaction between stakeholders and managers at a symposium in Brazil focused on chronic problems in Brazilian protected areas.

Shroyer and others (2003) demonstrated the ability to work across interests to define wilderness qualities, threats, values and stakeholders in South Africa. The intention of these authors was to provide a baseline to help the South African government and agencies prioritize research needs. They also provided an exhaustive basis for appeal to stakeholders responsible for decisions about allocation or stewardship of wilderness places in South Africa.

## Methods

### Working Together and Focusing on the Brazilian Wilderness Context

In the year 2003, the Symposium, *Protecting and Restoring Relationships Between Humans and Wilderness Landscapes*, was held in Piracicaba-SP, Brazil (September 18–19). The participants were mostly composed of students (73 percent), but with professionals (20 percent) and professors (7 percent) that work directly with the protection of Brazilian natural areas. A great deal of recent research was presented to inform participants about how other countries were working to understand the relationship between humans and protected nature. Most presentations concentrated on: 1) Identifying and monitoring experiential aspects of wilderness use; 2) Identifying threats, values and attributes of wilderness to guide ecological and social research and monitoring; 3) Searching for compatibility between traditional, ecotourism and ecological values in protected area planning and management; and 4) The role of wilderness in mega-reserve inventories and monitoring: from South Africa to Nunavut.

During working sessions, participants were asked to formulate a matrix focusing on the values that need to be protected in the Brazilian wilderness context. To complete the analysis they identified the threats to these values and the variety of stakeholders who could gain or lose from protection or restoration of areas and associated values.

## Results and Discussion

We can have a better understanding of outcomes by analyzing the Symposium in two stages. The first is related to knowledge presented during the Symposium themes, and the second is focused on the working sessions where the threats, values and attributes matrix was developed.

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## About the Symposium

### Monitoring Experiential Aspects of Wilderness Use.

While much of the research and scientific values associated with protection of places such as wilderness has to do with ecological baselines, much of the political and popular support for wilderness has to do with highly emotional, symbolic relationships with specific places. The Leopold Institute has been the leader in identifying the experiential dimensions of wilderness visits and guiding inventory and monitoring to protect these personal and social meanings. This session presented the current status and range of experiential values monitored in wilderness in the United States.

**Identifying Threats, Values, and Attributes of Wilderness to Guide Ecological and Social Research and Monitoring.** More than a decade of work at the Aldo Leopold Wilderness Research Institute has concentrated on developing a series of matrices of wilderness qualities and threats to guide monitoring and management research. The logic behind this matrix, the degree of implementation, and future direction in the continental United States was presented along with applications in Finland and South Africa.

**Searching for Compatibility Between Traditional, Ecotourism, and Ecological Values in Protected Area Planning and Management.** Protected area scientists and managers in the Polar 8 countries (United States, Finland, Canada, Russia, Norway, Sweden, Iceland, Greenland-Denmark) have come together to define the values associated with protection of areas as wilderness, the attributes of these areas and the major threats and facilitating factors associated with them. Leopold Institute social scientist, Alan Watson, initiated this consortium in 1999 with support from the Fulbright Program, the National Science Foundation, and the Circumpolar University Association. There are many values associated with protection of areas as wilderness, with substantial benefit to identifying those values in common across cultures, but with many similar environmental, economic, geographic, and cultural influences. In spite of differences between the polar area and the tropics, the current efforts in Alaska, Canada, and Finland were presented on understanding how native people describe wild lands, the values they attach to those places, and the threats they identify to those values, and provided great insight into an important issue in Brazil. Symposium participants gained a better understanding on how to consider traditional uses when planning recreation and tourism development in protected areas.

**The Role of Wilderness in Mega-Reserve Inventories and Monitoring—From South Africa to Nunavut.** There is an international movement toward protection of wilderness qualities. Wilderness is often the baseline for large-scale inventories, such as for two proposed megareserves in South Africa and for remote national parks in Canada's Eastern Arctic. The Leopold Institute has been actively engaged in research to support these efforts and an overview of these activities demonstrates the value of consideration of wilderness in the context of larger social and ecological systems.

In the Brazilian context, megareserves also have been created in the Amazon area. Some examples are: Ecological Station Terra do Meio (3,387,799 ha/8,371,434 acres), Araguaia National Park (2,230,824 ha/5,512,486 acres) Tumucumaque Mountains National Park (3,882,120 ha/9,592,927 acres). To manage these areas will demand extensive and complex studies, considering local communities and their demands on the natural resources inside and adjacent to those protected areas.

## The Matrix—Do We Have Values and Qualities to Protect? From What?

After the presentation and discussions, the participants came out with a list of important values, attributes and threats that reflect, in a way, the situation of other undeveloped countries, where the main threats to protected areas are related to illegal extraction of wood, traffic in wild animals and inadequate agricultural practices, such as the use of fire. Table 1 summarizes the workshop results.

As Brazilian National Parks do not receive high visitation, we thought that tourism would not be considered a major threat, but all the groups listed it as a new threat to pristine areas. The groups composed of the managers and professionals that are in charge of the protected areas pointed out that the lack of linkage between the research results and the practice is one of the most important tasks to be worked on. Theulen (2004) pointed to 15 main problems in federal protected areas (fig. 1) that have changed very little in a decade. The managers she interviewed believe that the administrative problems can have alternative solutions related to: 1) Improvement in training and the number of personnel; 2) Encouragement of agreements and programs of co-management of administration; 3) Creating an organization that serves to support protected areas; 4) Land regularization and titling; 5) Creation of an adequate external/internal organization; 6) Revision and elaboration of management plan; 7) Increase in the resources for protected areas; 8) More efficient liberation of resources; 9) Encouragement of the process for educating the community; 10) Increase in the infrastructure/equipment; 11) Make bureaucracy more efficient; and, 12) More administrative and financial freedom for protected areas.

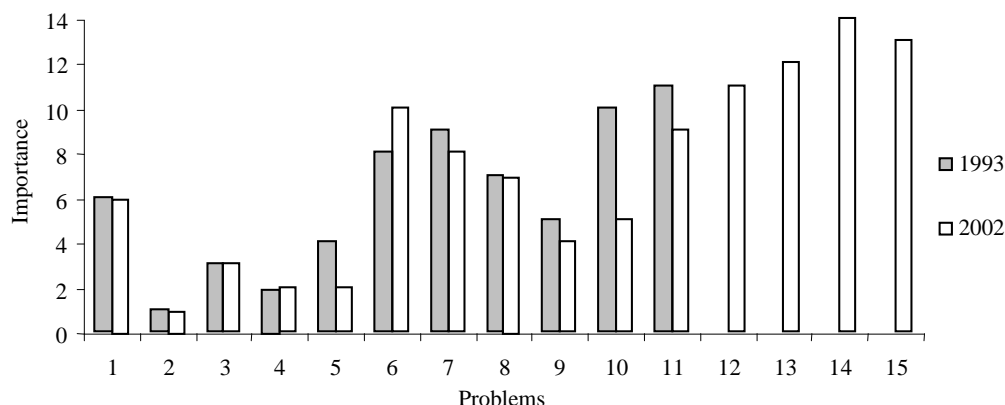
## The Threats Are More Relevant Than the Values?

We could take the risk to say that the threats, even if they can be worked on and solved (sometimes with larger budgets and in other cases with creative solutions co-management), are often so powerful that they blind the managers who then avoid solving them.

In order to complete this study, we will send this matrix to Federal and State Protected Area Managers in Brazil and ask them to comment on their perceptions of the importance of the various values and threats to wilderness in this country, in order to expand on our understanding of the Symposium results.

**Table 1**—Matrix of wilderness qualities and threats in a Brazilian context.

<b>Qualities</b> "What to protect"	<b>Values</b> "Why protect it"	<b>Threats</b> "What to protect from"	<b>Stakeholders</b> "Protecting for whom"	<b>Influence factors</b> "Things that facilitate or constrain protection"
Air	Air, water and soil quality	Activities on the buffer zone	Agriculturists	Access
Biodiversity / Endemic species	Appreciative / Experiential	Alien fauna and flora	Army	Anthropogenic pressure
Contact with wilderness	Beauty / Scenic view	Farming and cattle raising	Cooperative societies / Associations / Syndicates	Contact with other ways of life
Ecological process	Biodiversity sustainability	Fish and hunt	Educators	Economic pressure
Education/ Interpretation	Cultural diversity and identity	Flora and fauna over use by local communities	Enterprisers	Education
Emotional and sensorial experience	Education	Forest fire	Financiers / Investors	Environmental education
Flora and fauna	Emotional value	Human behavior	Future generations	Globalization
Genetic heritage	Environmental quality	Infrastructure	Governmental agencies	Information
Historical and cultural values	History	Invasions	Guides, lodges	Infrastructure
Microclimate	Human health	Lack of good policies	Indigenous communities	Land management
Pleasure / Interaction with natural environment	Human life	Lack of human and financial resources	Inspectorate / Licensing	Land situation
Scenic view/ Landscape/ Esthetic	Identity / Proud of preservation	Lack of link between research results and management	International communities	Land use
Soils / Geology / Geomorphology	Maintenance of ecological process	Lack of management	Local communities	Legislation
Subsistence/natural products	Perpetuation	Land regularization and titling	Local trades	Marketing / Publicity
Traditional cultures	Potential uses (energy, food, pharmaceuticals)	Military activities	Media	Media
Unmodified	Pristine condition	Mining / oil exploration	National and international NGOs	NGOs
Water resources	Recreation	Pollution	Pharmaceutical companies	Poverty
	Scientific knowledge	Recreation	Political groups	Public politics
	Spiritual inspiration	Research	Protected Areas Council	Researches / Knowledge
	Traditional Knowledge	Tourism	Protected Areas Staff	Socio-economic differences
	Unique opportunities for wilderness recreation	Urbanization / Roads	Religious groups / mystics	Tourism
	Wilderness maintenance		Scientific communities	Urban development
			Tour operators	
			Traditional communities	
			Visitors / Tourists	
			Wilderness management	



- 1=Hierarchic relation of executive management(s)  
 2=Need for personnel in the protected area  
 3=Lack of qualification/training of existing personnel  
 4=Lack of financial resources  
 5=Bureaucracy of public administration  
 6=Inexperience of administrative personnel in protected areas  
 7=Internal organization flawed  
 8=Lack of orientation and documentation of reference  
 9=Frequent political-administrative changes that cause discontinuities in programs and efforts  
 10=Local/regional political interference  
 11=Geographic location if the protected area in relation to executive management(s)  
 12=Protected area has not been firmly established or lacks land titling  
 13=Lack of adequate management plan  
 14=Lack of co-administration in management activities  
 15=Anthropic interference

**Figure 1**—Main problems in federal protected areas from the perspective of their managers (Theulen 2004).

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# A Look Inside the Dynamics of Trust: A Guide for Managers

Adam Liljeblad  
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**Abstract**—In the United States, federal public land managers are tasked with serving as stewards of land, but also as stewards of the relationships that people have with the land. By assessing the public's trust in the actions of land managers, insight can be gained into how good of a job managers are doing. This paper outlines a number of factors that influence the public's trust in managing agencies, and provides suggestions for monitoring the level of trust. The authors suggest that any efforts to increase the public's trust require the general attentiveness of land managers.

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To view interactions that occur between agencies managing public wildlands and the public as simple transactions is, we believe, an insufficient approach to meeting the legislative mandate that makes federal agencies stewards of public resources. In addition to serving as stewards of public land, agencies also serve as stewards of the relationships that people have with those lands (Watson and Borrie, 2006). Through their actions as managers, agencies simultaneously impact an area's ecological, economic, and social values, impacting how people are able to relate to the land. Negative impacts on these values lead to a weakening relationship stakeholders have with the land, while a positive action strengthens the ties they have to the land. Thus, the strength of the relationship between the agency and the public can be used to monitor the degree to which those values are impacted.

People value public land for a variety of reasons (Borrie and others 2002), and managers, therefore, need to consider the wide range of relationships people have with it when making management decisions. Considering those relationships, agencies need to understand the variation in the public's commitment to the land, their sense of social responsibility and public values, and their level of trust in agencies making stewardship decisions (Watson and Borrie, 2006). While it is impossible to know which of those three, if any, is more

important than the others, the remainder of this paper is limited in scope to the lattermost of the attitudes, trust.

## Why Is Trust Important?

Officials, managers, researchers, and the public have begun to recognize how important it is for agencies to maintain a high degree of public trust in their management. In the U.S., federal agencies from the Department of Energy to the Forest Service recognize the importance of maintaining this public trust (Devlin 2001; SEAB 1993), with Forest Service officials commenting that they “really want the [agency] to be a highly valued, highly respected, trustworthy organization” (Devlin 2001), and referring to specific legislation as an “opportunity to build trust” (Devlin 2003). These agencies realize the essential roles that trust plays in their everyday operation.

Because of the checks and balances of the American governance system, numerous opportunities and methods exist for members of the public to delay or block federal projects. However, when the public fully trusts stewardship agencies, there is a decreased likelihood of their opposition to projects, and they grant managers more leeway in their actions and decisions, making it easier for managers to do their job. Trust serves as an indicator of whether or not managers are effective as stewards of the land and the relationships people have with it. The public grants rights of operation to all government agencies, and without trust, they operate with weakened mandate and support (Watson and Borrie, 2006). Thus, it is important for agency representatives at all levels to put effort into building and maintaining the public's trust in their management.

## Building and Maintaining Trust

For wildland managers who seek to increase the level of trust the public has in their stewardship, there are no simple, easy solutions that can be rapidly implemented. The public's trust is fragile and must be allowed to develop slowly (Levi 1998). If the public perceives a few significant mistakes in the management of their lands, trust that was built over the course of months, years, or decades can be eroded almost instantaneously. Trust is based on the public's perceptions of managers, as well as their actions and the manner in which they relate to the public (Liljeblad 2005, 2006). Behaviors that impact any of these influences have the potential to significantly alter the public's level of trust in stewardship agencies. Considering the implications that management has on people's relationships with land needs to

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be common, and should come as second nature—something that isn't thought about, but done instinctively.

## What to Consider When Seeking to Build Trust

When attempting to build trust for land stewardship agencies by the public, there are a number of conditions that are essential for managers to concern themselves with. The more conditions managers are able to meet, the more the public will likely trust them as stewards. While it may still be possible for managers to retain the public's trust without meeting a few of the criteria listed below, it behooves managers to attempt to meet all of them (Liljeblad 2005).

- Agencies need to have and maintain a high degree of mutual understanding with the public, being certain that the public agrees on the objectives, process, and outcomes of management activities (Johnson 1999; SEAB 1993), as well as on standards of information used (SEAB 1993).
- It is important that managers ensure their interactions with the public are conducted with a high degree of integrity, honesty, morality, and good character (SEAB 1993; Shepard and Sherman 1998).
- The public must perceive managers to be sufficiently competent to understand the scientific and organizational challenges facing land management (SEAB 1993; Shepard and Sherman 1998).
- Stakeholders need to have a sense of ownership in natural resource decisionmaking, with a collective sense of involvement in the development, outcome, and impacts of management decisions (Lachapelle and McCool 2005). Managers need to allow for more equal roles with the public in defining terms of the relationship among parties (Levi 1998; SEAB 1993).
- Agency managers must be worthy of the public's pride, suggesting members of the public have a reasonably high level of regard and respect for them (Citrin and Muste 1999; SEAB 1993).
- Managers need to be attentive and responsive to the impacts that their interactions have on the public, ensuring to the best extent that they are not unduly burdened or impacted by management decisions (Citrin and Muste 1999; SEAB 1993).
- Managers also need to understand the implications that their actions have on the longevity of their relationship with the public (SEAB 1993), and be aware of the impacts that interactions with outside parties or influences can have on that relationship (Peters and others 1997).
- Managers need to ensure they behave in a reliable manner, consistently doing what they agreed to do or are expected to do (SEAB 1993; Shepard and Sherman 1998), to ensure to the best extent possible that they have a track record as effective land stewards (Citrin and Muste 1999; Kramer 1999; SEAB 1993).

If agencies are able to effectively meet these conditions, in both the eyes of managers and of stakeholders, then there is a reasonably good chance that they have managed to increase the public's trust in their stewardship. It is crucial

that managers do not simply use the identified conditions of trust as a checklist. How the public perceives each is important, and can seriously impact *how much* the public trusts managers and *what* they trust them to do. If, for example, managers believe they are responding to the impacts their actions have on the stakeholders, but are unaware that the stakeholders do not consider management response to be adequate, trust will likely not be gained.

To be most effective, trust needs to be continually monitored in order to ensure that managers are aware of the impact their actions have on stakeholders. Formal assessments of public trust levels can be conducted (see for example, Liljeblad 2005). Measures often allow managers to compare empirical assessments of the strength of their relationship with the public to some baseline trust level—or to establish a baseline. These formal measures, however, should not be the only type of evaluation conducted. It is important that managers frequently assess the public's trust informally. A number of informal assessments could be used but most simply, it involves reflecting on one's actions as an agency representative and asking, "Am I being an effective steward of the land, *and* of the relationships that the public has with those lands? If so, how? If not, why?" By considering the influences of public trust, managers can rapidly, easily, and economically shed insight into their effectiveness as stewards.

## Conclusion

Because agencies have an obligation to maintain the relationships people have with land, it is important that managers pay attention to how their actions influence that relationship. Monitoring the public's trust in their actions, both formally and informally is one way of assessing how good of a job agencies are doing at attending to those relationships. This paper has presented a number of criteria that influence trust for managers to consider when making management decisions. However, simply considering the criteria is not enough to affect the public's trust in stewardship agencies. To increase trust, they need to be integrated holistically into the actions of managers, through their general mindfulness and consideration of how their decisions impact people's relationship with the land.

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# Wilderness Stewardship Challenges in the uKhahlamba Drakensberg Park World Heritage Site

Sonja Krüger

**Abstract**—The location of the uKhahlamba Drakensberg Park wilderness areas along an international border and within a World Heritage Site and Transfrontier Conservation Area, provides unique opportunities and challenges for the stewardship of these areas. Although the wilderness areas were proclaimed more than 30 years ago, wilderness-specific planning, management and monitoring is a recent focus that is challenging managers and scientists to develop alternative management methods for the wilderness areas. Although the wilderness areas are buffered by the Park and transfrontier area, managers are faced with the present challenge of defending the wilderness philosophy and preserving wilderness qualities in an ever-changing environment dominated by social and political forces. An integrated planning and management approach is essential to ensure that the wilderness concept and the values and benefits of the wilderness resource are applicable to the majority of the population.

## Introduction

The uKhahlamba Drakensberg Park (from hereon referred to as the Park) is a state owned mountain protected area in southeastern Africa controlled and managed by a provincial conservation body, Ezemvelo KwaZulu-Natal Wildlife (KZN Wildlife). The Park is located in the KwaZulu-Natal province of South Africa and forms part of the Maloti Drakensberg Transfrontier Conservation Area, sharing its boundaries with two other provinces of South Africa and the Kingdom of Lesotho (fig. 1). The Park comprises 12 component protected areas (IUCN Category II nature reserve) totaling 242,813 ha (600,002 acres).

The Park was listed as a RAMSAR site in 1997 because of its globally important wetlands. In terms of World Heritage Site status, the Park was listed as a “Mixed” heritage site in November 2000 because of the unique biological diversity and scenic splendor of the mountains (fig. 2), and the richness and diversity of the area’s rock art (fig. 3). Only 23 such sites of mixed value have been listed throughout the world.

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## Wilderness Resource

Of the total area of the Park, 48.5 percent (117,765 ha or 291,000 acres) comprises four legally proclaimed wilderness areas (IUCN Category I) and a further 41,388 ha (102,270 acres) are zoned as wilderness.

The South African National Environmental Management: Protected Areas Act No. 57 of 2003, defines a wilderness area as; “an area designated ... for the purpose of retaining an intrinsically wild appearance and character, or capable of being restored to such and which is undeveloped and roadless, without permanent improvements or human habitation.” The mission statement for the Park, contained in the Integrated Management Plan, states that the Park must be managed and conserved for its globally significant natural, cultural and wilderness values and life support systems



**Figure 1**—The location of the uKhahlamba Drakensberg Park Wilderness within KwaZulu-Natal, South Africa.



**Figure 2**—The scenic splendor of the mountains, one of the factors contributing to the park's World Heritage Status.



**Figure 3**—One of the 600 sites of San rock art within the Park. Overall, these sites comprise at least 35,000 individual images.

through co-management with partners and all stakeholders, and to provide a flow of benefits beyond the boundaries of the Park (Ezemvelo KZN Wildlife 2005a). Fulfilling this mission statement in the stewardship of the Park, presents the management team with a host of challenges and opportunities, particularly in the light of its status as a World Heritage Site, its location within a transfrontier conservation area, the social forces that challenge the integrity of the wilderness resource and the political forces that provide a framework for the integrated management of this resource in terms of new national laws.

The successful stewardship of the Park's wilderness will ensure that these areas will continue to allow for an experience of solitude within an intrinsically unaltered natural environment, and thus to provide opportunities for inspiration, enrichment, self-reliance, and physical adventure.

## World Heritage Site Challenges to Wilderness

The wilderness areas of the Park were one of the major contributing factors to it being listed as a World Heritage Site for both its natural and cultural values. As the management authority of the World Heritage Site, KZN Wildlife has to meet the challenges that are associated with the elevated status of the Park.

Park management has to conform to the World Heritage Convention Act of 1999, which was enacted into law in the Republic of South Africa. The Act acknowledges that the loss, through deterioration, disappearance or damage through inappropriate development of any of these most prized possessions, constitutes an impoverishment of the heritage of all the peoples of the world and, in particular, the people of South Africa. The Act therefore provides for cultural and environmental protection by ensuring that cultural and ecological integrity are maintained through any development process, and that this cultural and natural heritage is transmitted to future generations. The requirements of the Act, forces managers to manage towards a higher state and according to international standards and ensures that future generations can benefit from the wilderness resource.

Although the Park is one of the top mountain destinations in the country, recreational impacts are minimal and focused monitoring of these has not taken place. The majority of the impacts are concentrated around the camps and areas that provide a significant destination, such as waterfalls and view sites. Only a small percentage of Park users venture into wilderness. The impact on the trail network by various user groups is one of the primary impacts experienced by the Park resulting in path maintenance being a high management priority. The status of the Park has already resulted in increased visitor numbers since 2000, and these are expected to escalate over the next few years with focused marketing of the Park as a world-class destination. A proactive implementation of monitoring strategies to address recreational impacts is thus required.

The Park's world heritage status provides an opportunity to raise the awareness of wilderness and gain international support to ensure its continued existence and to combat developments that threaten its integrity.

## Wilderness Challenges Within a Transfrontier Conservation Area

The Park's location provides some unique challenges as well as opportunities in that its entire western border is the international boundary between South Africa and the Kingdom of Lesotho. The northern boundary of the Park is shared with Lesotho and the Free State province of South Africa, where the land is state owned but communally managed.

The Park is located in the center of the Maloti Drakensberg Transfrontier Conservation Area, a project established in 2002. The project aims to conserve globally significant biodiversity and cultural heritage and contribute to community development through sustainable livelihoods. The project includes several protected areas within South Africa and two protected areas within Lesotho, one of which (Sehlabathebe National Park) borders Garden Castle, the southern tip of the Park. Negotiations are underway to establish a Transfrontier Park between Garden Castle and Sehlabathebe. This high altitude montane protected area will provide an opportunity to extend Garden Castle's wilderness area into Lesotho. An integrated approach will be adopted by the two countries in terms of species and habitat management; for example grassland management in terms of stocking rates, fire management and water resource management. The integrated management of the Transfrontier Park will be a challenge for the two countries that differ vastly in their capacity, available resources and the legal framework within which they operate.

One of the opportunities provided by the transfrontier area is one of collaboration in the management of species whose breeding and foraging ranges extend across both countries. The conservation status of the species is dependent on addressing the threats to its survival in both countries, and implementing measures to safeguard the species and its habitat requirements in both countries. An example of such a species is the Bearded Vulture, *Gypaetus barbatus*, an endangered species whose population is restricted to the Maloti Drakensberg Mountains of the transfrontier area (fig. 4). The species can be viewed as wilderness dependent because it seeks solitude and remote places away from any



**Figure 4**—The Bearded Vulture, *Gypaetus barbatus*, an endangered species whose breeding range is restricted to the Maloti-Drakensberg Mountains.

disturbances. Although its breeding areas are inaccessible, its foraging range includes the commercial farms and communal rangelands on the Park's eastern and western boundary where it is vulnerable to several threats such as poisoning, collision with powerlines and a limited food supply. The transfrontier project provides an opportunity for collaboration in the monitoring of the species and managing its habitat through collaboration with various landowners and managers.

The Park's wilderness areas all abut the international boundary. The areas along the boundary are zoned either as pristine or primitive wilderness and are essentially buffered by the communal rangelands within Lesotho. Although there is no permanent human habitation in this area, there are sections that are heavily overgrazed, threatened by transfrontier crime, commercial developments aimed at boosting the local economy, and the injudicious use of fire. Transfrontier collaboration, as an integrated approach to the management of these areas, is essential.

## Challenges Provided by Threats to Wilderness Stewardship

The various threats to the integrity of the wilderness resource that provide stewardship challenges include; transfrontier crime, the injudicious use of fire, soil erosion, alien (exotic) plants, land transformation and unsustainable tourism.

Transfrontier crime includes marijuana and firearm trafficking through the Park, attacks on hikers traversing the escarpment along the international border, illegal hunting, movement of stolen stock from commercial farms and communal land, and arson fires. Arson fires, or the injudicious use of fire, impacts significantly on the Park's fire management program, which is developed to achieve specific objectives. Grassland is often burnt by the stock thieves/traffickers to divert attention from the main smuggling routes, and also in retaliation to successful law enforcement. Poachers also burn grassland to attract game that are then hunted. A network of international and Park security forums has been

established through the transfrontier project to address the above-mentioned crimes.

Soil erosion, resulting from the creation of trails through illegal activities, poses a severe ecological threat and impacts on the wilderness user's experience. The lack of adequate budgets also means that existing trails cannot be maintained adequately, thus leading to further erosion.

Alien plants have a negative impact on water production and the sense of place experienced by wilderness users in an otherwise pristine environment. The National Department of Environment, Agriculture and Tourism has provided large amounts of funding for alien plant clearing both within and outside protected areas, through a poverty relief program focused on job creation.

One of the biggest challenges is that of managing for an unconfined wilderness experience in the midst of large scale developments and land transformation on the boundary of the Park, and inappropriate tourism developments inside the Park. Apart from the negative impacts on biodiversity, the visual impact of landscapes modified extensively through afforestation, cultivation or developments such as hotels and leisure resorts, also negatively affects one's wilderness experience.

All developments are subject to an Integrated Environmental Management process. However, although the necessary environmental laws are in place, there is a lack of capacity of government agencies to enforce them. Within the Park, the Integrated Management Plan provides the planning framework on which future development decisions are based (Ezemvelo KZN Wildlife 2005a). Only developments that are appropriate for the zonation of the area will be considered. Beyond the boundaries of the Park, KZN Wildlife as the conservation body for the province, comments on the impacts that proposed developments may have. Although impacts on the wilderness resource and the sense of place experienced by wilderness users are highlighted, it is the socio-economic and political factors that prevail when decisions to approve development applications are made.

One of the most significant threats and challenges facing wilderness managers in the Park and South Africa, in general, is the lack of sustainable financing of wilderness areas in the light of other social priorities. Through the Park's integrated planning process, a Business Plan will be produced in an attempt to ensure a constant government funding trend, set eco-cultural tourism net income targets, as well as to initiate actions to proactively explore and procure funding from other sources. One such source of funding is the concept of "payment for environmental services."

The Park's wilderness areas contribute to a wide array of environmental services. In particular, they contribute significantly to effective mountain catchment management ensuring an optimal flow of good quality water in one of the major water catchments areas of South Africa. The transfrontier project aims to influence government thinking towards the concept of "payment for environmental services" whereby water consumers will contribute towards the effective and appropriate management of mountain catchments. Should this be achieved, it will go a long way in achieving sustainable financing for the conservation of these wilderness areas.

## Integrated Planning and Management of Wilderness

Although the Park's wilderness areas were among the first to be proclaimed in South Africa over 30 years ago, these areas have not been managed according to strict wilderness principles and objectives detailed in a management plan specific to the wilderness resource. A Wilderness Management Plan has recently been drafted in an attempt to safeguard the wilderness resource (Ezemvelo KZN Wildlife 2005b). The plan forms part of the Integrated Development Plan for the Park that was recently developed (Ezemvelo KZN Wildlife 2005a). An integrated approach was used to develop these plans to ensure adequate public participation during the planning process, and thereby support for the management philosophy adopted by the Park. The process included a stakeholder workshop at the outset to develop the objectives for the Park, the drafting of the plan by the Park management team, followed by a period for public comment. The five-year management plan (2006 to 2011) will be implemented as soon as the necessary authorizations have been received at a national level. In the meantime, the plan is available to guide management staff in their daily decision making process.

One of the primary objectives of the Park is the effective management and sustainable use of wilderness. In order to achieve this objective, alternative methods must be considered for the management of wilderness. Alternative methods include the minimum tool concept for animal monitoring and alien plant removal programs, as well as only considering wilderness dependent activities for visitors and researchers. To this end, the Park has been zoned using the Recreational Opportunity Spectrum and the Wilderness Opportunity Spectrum, developed by the United States Forest Service. In addition, an activities matrix has been developed that includes Limits of Sophistication for the various zones in the Park. In addition, a Limits of Acceptable Change monitoring system has been developed as the monitoring framework for activities in the Park (Cole and McCool 1997). The activities and issues that are currently monitored include the trail network, caves, campsites and visitor experiences. The system will be expanded to include the monitoring of various management activities as well as the airspace above the Park.

One of the challenges to wilderness stewardship is the proclamation of additional wilderness zones or areas identified during the planning process. The new National Environmental Management: Protected Areas Act No. 57 of 2003, allows for the proclamation of wilderness areas or zones within any protected area and on private land, rather than only those within forestry reserves as was previously the case.

## Wilderness Education and Awareness

Apart from the Park-specific challenges to wilderness stewardship, wilderness managers on a national scale are faced with the challenge of defending the wilderness philosophy



and preserving wilderness qualities in an environment dominated by social, political and economic forces. Basic human needs such as the provision of food, health care and infrastructure are a priority, as is the constant pressure on the ecotourism sector to ensure that the country's protected areas become self-sustaining.

These pressures are compounded by the fact that a large proportion of the country's population does not understand the wilderness concept, even though the country has a history of wilderness stewardship of more than half a century. These factors all erode the wilderness resource and challenge managers to justify its existence. Although many do not understand the "American" concept of wilderness, the indigenous people of South Africa have certain areas that are sacred to them, and access to these is often forbidden. It is these "sacred places" that provide an opportunity for wilderness managers to set aside additional areas as pristine wilderness for the benefit of the majority.

Awareness is key to the acceptance of the wilderness philosophy among all South Africans to ensure its continued existence. The Park's awareness program focuses on the training of wilderness managers and hospitality staff, and on the production of various education and awareness materials such as pamphlets and posters (fig. 5) to benefit wilderness users.

## Conclusion

Although the uKhahlamba Drakensberg Park World Heritage Site's management team faces a myriad of challenges in the stewardship of their wilderness resource, there are numerous opportunities available that pave the way to address these challenges. Considering that less than one percent of South Africa's land surface is wilderness and the Park contains 36 percent of the country's proclaimed wilderness, these opportunities must be embraced to ensure an enduring resource of wilderness.

Our commitment is to ensure that there will always be places where people will be able to absorb wilderness first



**Figure 5**—Poster celebrating over 30 years of wilderness in the Park, aimed at increasing awareness among visitors.

hand, and be changed by it. The wilderness philosophy is one of the pillars of KZN Wildlife's corporate identity, embracing a deep respect for our natural world, restoring it as far as is possible to what it once was, and preserving it in as whole and as natural a state as possible.

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# Inter-Observer Agreement of a Multi-Parameter Campsite Monitoring Program on the Dixie National Forest, Utah

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**Abstract**—Precision is crucial to campsite monitoring programs. Yet, little empirical research has ever been published on the level of precision of this type of monitoring programs. The purpose of this study was to evaluate the level of agreement between observers of campsite impacts using a multi-parameter campsite monitoring program. Thirteen trained observers assessed 16 dispersed campsites on the Dixie National Forest in southern Utah. The data were analyzed using Cohen's kappa statistic to determine the level of observer agreement beyond chance for each of the impact attributes and the condition class rating. Results showed a moderate level of proportional agreement and a low level of agreement beyond chance. These results suggest that the data collection protocol must be improved to increase the level of inter-observer agreement. Results also indicate that managers should evaluate their training procedures to increase precision.

## Introduction

Outdoor recreation in the United States has increased dramatically during the past 50 years (Cole 1999). This increase is related to a number of factors, including a larger population, greater mobility, more leisure time, greater affluence, improved recreational technology, and a rise in private vehicle ownership (Cole 1999; Sun and Walsh 1998). As outdoor recreation grows, adverse ecological impacts increase as well (Cole 1999; Cole and others 1996; McEwen and Cole 1997; Williams and Marion 1995). Managers' concern for the effects of recreation on natural resources led to the emergence of the field of recreation ecology.

Recreation ecology is the field of study that examines, assesses, and monitors visitor impacts (Leung and Marion 2000). Early antecedents date back to E. P. Meinecke's (1928) examination of tourist impacts on the root system of redwood trees in California, and G. H. Bates's (1935) study of trampling effects on vegetation adjacent to footpaths in England. In the 1960s, recreation ecology began to expand as the number of studies grew and the first scientific conferences were held on the subject (Cole 1999). A considerable body

of information on recreation ecology has built up since that time, with contributions from scientists around the world (Cole and Schreiner 1980).

As the field of recreation ecology continues to grow, its application to land management has become more recognizable. During the past two decades, most wildland managers became aware of and concerned about biophysical impacts but had little objective information about impact levels or trends over time upon which to manage impacts (Cole 2000). A lack of objective impact information commonly led to whimsical and inconsistent impact management plans (Cole 2000).

Public acceptance of ineffective management plans diminished as natural resource management issues became increasingly controversial (Cole 2000). The shift in public scrutiny and participation in the planning process, combined with the passing of the National Environmental Policy Act of 1969 (42 USC 4321 *et seq.*), forced recreation managers to facilitate goal-oriented planning systems, such as the Limits of Acceptable Change (LAC) and Visitor Experience and Resource Protection (VERP) frameworks (Cole 2000; Stankey and others 1985). These frameworks rely on systematic and objective recreation impact assessments and monitoring data on which management decisions are based (Cole 2000). As a result, many recreation managers have developed ecological impact monitoring programs.

Monitoring programs vary in methods used to collect data (Leung and Marion 2000). The choice of methods is based on the questions asked, types of data needed for management, character of the study area, training of investigators, and logistical constraints (Leung and Marion 2000). Due to activity concentration and duration of stay, campsites receive high levels of visitor impacts, and are of primary concern in recreation impact monitoring (Cole 1994, 1995; Leung and Marion 2000; Williams and Marion 1995).

Campsite monitoring programs consist of a primary assessment process, often referred to as an inventory, where site impact information is assessed on a number of impact attributes on a sample or census of sites followed by a reinventory process where site impact attributes are reassessed at a determined interval. Most campsite monitoring programs include a 5-year reinventory cycle (Cole 1989b).

Management of wildland recreation areas requires valid research and monitoring data for preparing, assessing, and implementing effective policy (Cole 2000; Williams and Marion 1995). Campsite monitoring programs, when appropriately designed and implemented, can supply answers to a broad range of management information needs (Leung and Marion 2000). Effective monitoring programs provide managers with longitudinal data to detect changes

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in ecological impact from recreation use, as well as evaluate and make informed adjustments on existing management plans (Cole 1989a, 2000; Landres 1995; Leung and Marion 2000; Williams and Marion 1995). Monitoring programs help managers anticipate trends in recreation impacts rather than react to impacts, providing opportunity to prevent the proliferation of site impacts by implementing sound management plans (Cole 1990, 2000).

Campsite impact assessment and monitoring methods include photographic assessments, condition class approaches, quantitative measurements of multiple parameters, as well as combinations of all three methods (Leung and Marion 2000). Photographic systems were among the first applied and are based on repeat photographs taken from permanently established photo points (Williams and Marion 1995). The benefits of the photographic system are that it's relatively quick and easy. However, few impact types can be accurately evaluated using photographs and it is difficult to assign interval level ratings for site comparison (Cole 1989a). Condition class systems are based on observers comparing site conditions to pre-determined descriptive condition classes, and recording the class that most closely matches the conditions (Williams and Marion 1995). This system is also quick and easy, but observer bias tends to be high and lacks quantifiable data on specific resource conditions (Cole 1989b; Williams and Marion 1995). Multi-parameter systems are based on individual measurements and appraisals of specific indicators of resource condition. These systems require greater observer training and often take longer to perform but can yield more accurate and precise measurements of campsite conditions (Leung and Marion 2000; Williams and Marion 1995).

Over the last decade, emphasis has been placed on improving campsite monitoring procedures to increase the level of precision (Cole 1989a; Leung and Marion 2000; Williams and Marion 1995). Imprecise data may make it difficult for managers to distinguish real change over time from separate imprecise estimates of the same impact (Cole 1989a). It is also particularly relevant in monitoring programs where multiple individuals will be collecting information on the same sites at different occasions over time. In other words, the temporal and longitudinal nature of the monitoring process makes precision especially important.

The precision of a monitoring program refers to the variability in estimates of campsite impact indicators by many observers (Williams and Marion 1995). The level of precision is also referred to as the random error of the study. High precision indicates that random variation associated with the collection procedure is minimized (Province of British Columbia 1998). Precision can be studied through statistical analysis of repeated measurements. Unfortunately, because one individual or a group of individuals typically assess a campsite, at one point in time there is only one set of data or one measurement of an attribute, making it impossible to calculate the level of precision. Techniques that yield precise data are particularly important to government agencies where turnover of monitoring personnel is high. If the number of campsites in a monitoring program is large enough that it takes multiple field seasons, and different monitoring personnel are hired each season (as is typical with federal and state agencies), then it is important for the observers to be consistent in evaluating the impact attributes. Therefore, inter-observer agreement should be

a priority in any monitoring program. Knowing the level of precision of a monitoring program enables managers to identify the difference between two dissimilar measures of the same condition and a real change in the condition over time (Cole 1989b).

The precision of a monitoring program is crucial to its fundamental purpose, yet precision has never been empirically evaluated. It is the intent of this study to empirically evaluate the inter-observer agreement of the assessment process of a multi-parameter campsite monitoring program.

## Methods

### Study Site

**Area Description.** The study site is located on the Dixie National Forest in southern Utah. This is the largest national forest in Utah, occupying almost 2 million acres, and stretching for about 170 miles (274 km) east to west, straddling the divide between the Great Basin and the Colorado River. The forest is comprised of diverse ecosystems. Forest elevations range from 2,800 to 11,322 feet (853 to 3,451 m) above sea level, with annual precipitation ranging from 10 to 40 inches (25 to 102 cm), and temperatures ranging from -30 to over 100 degrees Fahrenheit (-34 to over 38 degrees Celsius). Vegetation types grade from sparse, sagebrush (*Artemisia tridentata*) and rabbitbrush (*Chrysothamnus nauseosus*) at lower elevations, low-growing pinyon pine (*Pinus edulis*) and juniper (*Juniperus scopulorum*) at mid-elevations, to aspen (*Populus tremuloides*), ponderosa pine (*Pinus ponderosa*), bristlecone pine (*Pinus longaeva*), Englemann spruce (*Picea engelmannii*), and subalpine fir (*Abies lasiocarpa*) at high elevations. This variety of environmental settings provides for a variety of recreation activities on the forest.

Recreation activities include hiking alpine mountains and slot canyons, mountain biking slickrock and single-track trails, and riding all terrain vehicles along the Great Western Trail. However, camping is one of the primary recreation activities in the forest. A recent inventory of campsites found over 1,800 dispersed campsites and over 80 wilderness campsites (Glidden 2001, 2002, data on file with the Dixie National Forest). The Dixie National Forest receives a great deal of recreation use by visitors to the three surrounding national parks (Zion, Bryce, and Capitol Reef) and one national monument (Grand Staircase-Escalante). In 2003, this national forest had approximately 2.5 million visitors (Max Molyneux, personal conversation on March 16, 2004).

**Campsites.** A sample of previously inventoried dispersed campsites (non-wilderness and non-developed) were used in this study. The sites were selected using a multi-staged stratified sampling approach. The forest was stratified into two areas delineated by political ranger district boundaries, the Cedar City Ranger District and the Panguitch Ranger District. The two districts contained 427 and 343 dispersed campsites, respectively, for a total of 770 sites. These two strata were then divided into sub-unit plots delineated by the Universal Transverse Mercator (UTM) coordinate system. Two sub-unit plots in each district were randomly selected using a random number generator. Within each of the two randomly selected sub-unit plots, four campsites were randomly selected for assessment. Therefore, 16 sites



(four sites in each of the four groups) were assessed. This method allowed for random selection of sites while maintaining a high level of efficiency by allowing a representative sub-sample of sites to be assessed.

## Monitoring Program

The monitoring program used to evaluate level of precision was the Dixie National Forest Campsite Monitoring Program (DCM). This monitoring program was developed in the summer of 2002 for dispersed campsite inventories, and combines the use of photographic, condition class, and multi-parameter techniques adapted from Cole (1989b) and Marion (1995). The program is unique in that it incorporates Global Positioning System (GPS) and Geographic Information System (GIS) technology to obtain and utilize data. The DCM includes 12 site characteristics and 12 site impact attributes (table 1). Because only the impact indicators are used in the overall impact index, I focused my study on these data along with the condition class rating.

## Monitoring Procedure

The first step of the monitoring process is to identify the site. For this study, the sites were selected and marked with a site identification number prior to data collection. Once a site is identified, its boundary is determined and recorded using a GPS. The DCM attribute impact data are then assessed and entered into a GPS unit via a data dictionary. The data are then downloaded from the GPS unit and differentially

corrected at the office. The tabular data, or observed data, were exported into a pre-formatted *Excel* spreadsheet that calculates the impact index totals.

## Observer Characteristics

The 13 observers who participated in this research were Dixie National Forest employees at the time of the project. Observers varied in age, gender, employment status (seasonal or fulltime), and job title. The observers also varied in experience and educational backgrounds (table 2). This group of individuals represented the range of experience and educational backgrounds common among seasonal monitoring personnel.

## Training and Data Collection

Individuals were given the DCM manual one week prior to the training to familiarize themselves with the protocol, followed by a day of training. Training began with time for the observers to re-read the manual and review the manual with the instructor, taking time to answer questions, and then proceeding to a demonstration site to systematically review the procedures specified by the protocol. After forming groups of three or four, each group evaluated the same four sites, reviewed with the instructor the sites, and discussed questions that arose. Observers were then divided into four different groups and evaluated another four sites. The idea behind forming new groups was to expose and ameliorate possible biases by comparing data from the different groups.

**Table 1**—Table of campsite characteristics and impact indicators and their associated attribute choices.

Site characteristic	Attribute choices
Date	(The date the site was inventoried)
Time	(The time the site was inventoried)
Photo/Site ID number	(Identification number based on the number of the first photograph taken of the site)
Inventoried by	(Initials of the person surveying the site)
Type of site	(Campsite) (Stock Tie Site) (Other)
Site location	(Meadow) (Forested area) (Rock) (Lakeside) (Streamside)
Site access	(2-WD) (4-WD) (ATV) (Hiking/Equestrian)
Potential site expansion	(Poor) (Moderate) (Good)
Number of campsite w/in sight	(Manually entered number of sites within sight)
Firewood availability	(Yes) (No)
Barren core camp area	(% of site that 90% or more of vegetation is absent)
Frissell condition class rating	(1) (2) (3) (4) (5)
Site impact attribute	Attribute choices
Vegetation cover onsite	(0-5%) (6-25%) (26-50%) (51-75%) (76-100%)
Vegetation cover offsite	(0-5%) (6-25%) (26-50%) (51-75%) (76-100%)
Mineral soil exposure onsite	(0-5%) (6-25%) (26-50%) (51-75%) (76-100%)
Mineral soil exposure offsite	(0-5%) (6-25%) (26-50%) (51-75%) (76-100%)
Tree damage	(0-5%) (6-25%) (26-50%) (51-75%) (76-100%)
Root exposure	(0-25%) (25-50%) (51-75%) (76-100%)
Presence of noxious weeds	(Yes) (No)
Evidence of stock	(None) (Feed / Manure) (Manure odor / Dishing)
Amount of development	(None) (Primitive structure) (Temporary structure) (Permanent structure)
Cleanliness	(No trash or manure) (Trash present) (Manure present) (Trash and manure present)
Presence of human waste	(Yes) (No)
Number of social trails	(None) (1-2) (3 or more)

**Table 2**—Experience and educational background of study observers.

Experiential/Educational background	Number of observers
	(n = 13)
Classes in recreation	5
Classes in forestry/ecology/wildlife	7
High school education	2
Post high school education	6
Completed undergraduate degree	3
Post undergraduate education or graduate degree	2
Previous resource impact assessment training/courses	4
Previously performed campsite assessments	5

Once the group site evaluations were complete, the sites were reviewed once again.

The 2-day data collection period began with the assessment of eight sites on the Cedar City Ranger District followed by the eight sites on the Powell Ranger District. Each observer went into each of the sites alone, assessed the campsite impact attributes, and entered the data into the DCM data dictionary on a GPS unit. Discussion among the observers was prohibited during the data collection process.

## Data Analysis

To assess inter-observer agreement on campsite impact attributes, data collected were analyzed using *Gkappa version 2.3* statistical software package developed in 1993 by Dr. John Uebersax to determine a kappa value. Kappa is a widely utilized statistical tool used to assess the level of agreement among raters, ultimately evaluating the reliability of an established protocol. This method has been used in a number of disciplines, including psychiatry, epidemiology, and wildlife biology (Lantz and Nebenzahl 1996; Neuman and others 1999; Rockwood and others 2000). For example, Neuman and others (1999), used kappa to evaluate inter-observer agreement between individuals observing nesting habits of birds. The kappa value is calculated based on two factors, proportion of observed agreement and proportion of chance agreement (Cohen 1960; Uebersax 1983). In this way, kappa is considered to be chance adjusted, taking into account the level of agreement among observers that may occur by chance alone.

The two most common versions of kappa are those developed by Cohen (1960) and Fleiss (1971). Cohen's original kappa is used to evaluate two raters, but later an extension was added to accommodate multiple raters (Komagata 2002). Cohen (1968) introduced a weighted kappa that allows for the seriousness of disagreement to be accounted for. For example, for attributes with ordinal variables such as categories of proportion mineral soil onsite (0 to 5 percent, 6 to 25 percent, 26 to 50 percent, 51 to 75 percent, and 76 to 100 percent), the researcher may want to consider the severity of the disagreement (Goodwin 2001). In this case, disagreement as to whether the vegetation cover onsite is 0 to 5 percent or 76 to 100 percent is more severe than disagreement between 0 to 5 percent and 6 to 25 percent. Though Cohen's weighted kappa sounds attractive, it requires arbitrary weights be assigned to the rating categories prior to data collection

and is not recommended by some researchers (Maclure and Willett 1987; Tinsley and Brown 2000). In addition, since some of the observers did not use all the rating categories and one of the rating categories was not used at all, software capable of calculating weighted kappa for the data of this study was not available. Weighted kappa was therefore not used to calculate kappa in this research.

Fleiss' kappa, introduced in 1971, was developed to evaluate the inter-rater agreement between multiple raters. This version of kappa differs from Cohen's kappa in the way in which the proportion of chance agreement is calculated (Komagata 2002). Komagata (2002) argues that Fleiss' kappa is less desirable than Cohen's kappa due to the way each formula accounts for chance. Cohen's kappa computes chance based on the individual rater's judgment, whereas, Fleiss' kappa computes chance by averaging out the probability of all categories of the raters, placing a larger assumption on the even distribution of responses between the categories (Komagata 2002). Due to the categorical nature of this study and the emphasis on observational data, the data were not equally distributed among categories. Thus, Fleiss' kappa was not chosen for this study.

The Cohen's unweighted kappa statistic was used because the data were from multiple observers, categorical (nominal and ordinal), not normally distributed, and responses were not equally distributed among rating categories. The kappa statistic is based on a rating from -1 to 1, with 1 being 100 percent agreement beyond chance. For most purposes, kappa values from -1 to 0.4 represent a low level of agreement beyond chance, 0.4 to 0.75 represents a fair to moderate level of observer, and 0.75 to 1 represent a high or excellent level of agreement beyond chance (Banerjee and others 1999). The inter-observer agreement between each observer was calculated for each site attribute for all sites. Some of the data collected were subject to the prevalence and bias effects associated with kappa. These paradoxes are associated with the uneven distribution of ratings between attribute choices (Hoehler 1999). For example, if observers choose the 0 to 5 percent root exposure category for most of the sites assessed, there would then be an uneven distribution of response variables across the rating categories. When present, the prevalence and bias effects tend to decrease kappa values (Hoehler 1999).

In addition to calculating the kappa value, the proportion of observer agreement was also calculated. The proportion of agreement was reported to supplement the kappa statistic to address the effects of the prevalence and bias effects aforementioned. It should be noted that the proportion of

agreement is not adjusted for chance agreement. Therefore, the proportion of agreement values should only be extrapolated to the observers in the study, whereas the kappa values may more accurately represent a wider range of monitoring personnel using this style of program (Goodwin 2001).

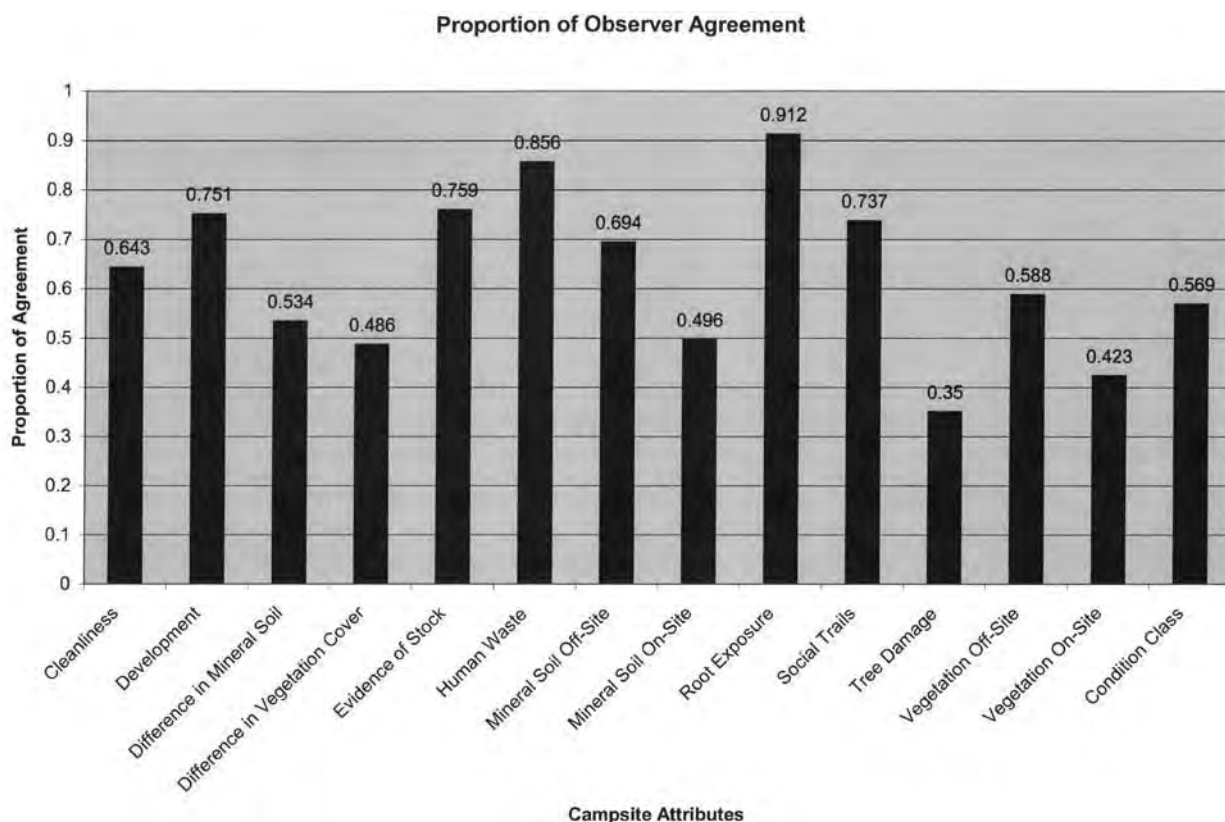
## Results

I quantified the level of inter-observer agreement of 13 observers for the 12 impact attributes presented in table 1 and found a moderate level of proportional agreement among observers, and a low level of agreement beyond chance (kappa). The proportion of observer agreement for each impact attribute ranged from 91 percent for root exposure to 35 percent for tree damage (fig. 1). The campsite impact attributes that showed the highest level of agreement (75 percent to 100 percent) among observers were: amount of development, evidence of stock, human waste, and root exposure. The campsite impact attributes that showed a moderate level of agreement (40 percent to 75 percent) were cleanliness, difference in mineral soil on and offsite, difference in vegetation cover on and offsite, mineral soil exposure offsite, mineral soil exposure onsite, number of social trails, vegetation cover offsite, and vegetation cover onsite. The lowest level of agreement (0 percent to 40 percent) among observers was for tree damage.

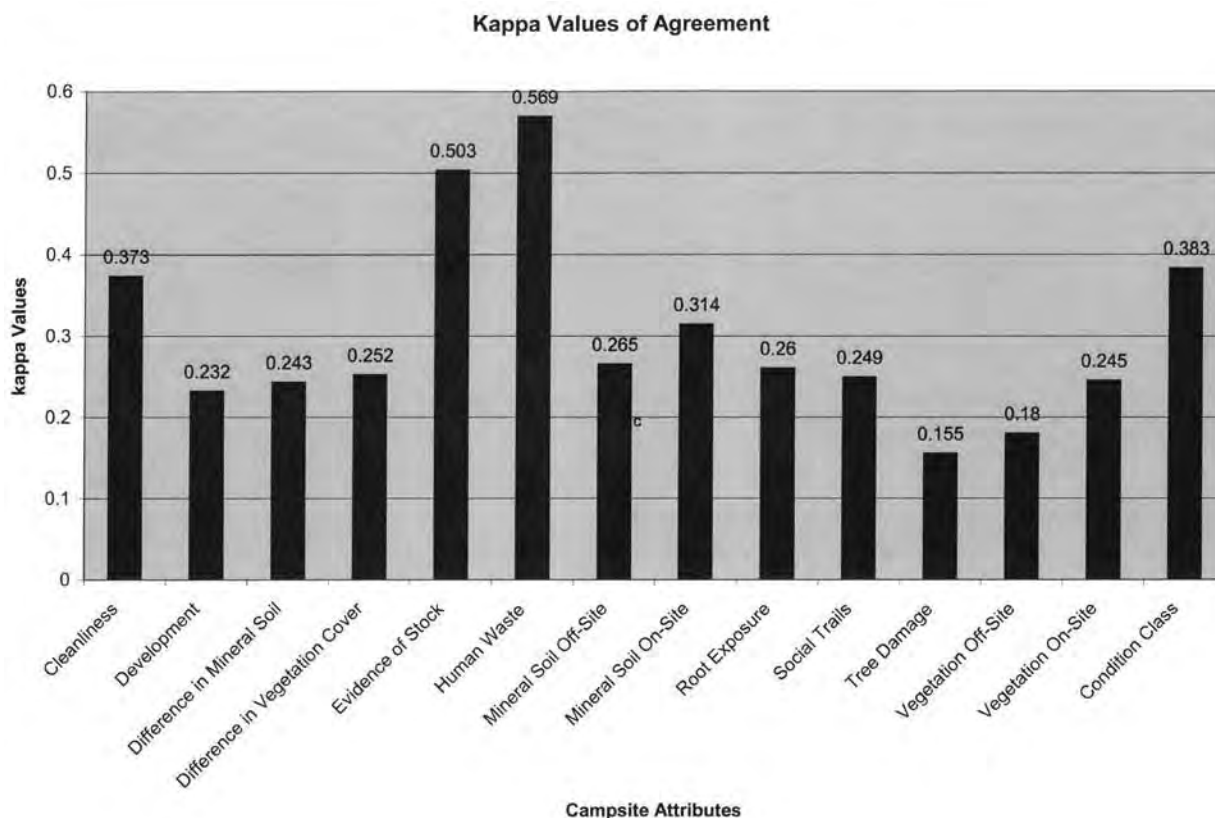
Kappa statistics for the impact attributes ranged from a high of 0.569 for the presence of human waste to a low of 0.155 for tree damage (fig. 2). Campsite impact attributes that showed a moderate level of observer agreement beyond chance (0.4 to 0.75) were evidence of stock, and human waste. The campsite impact attributes that showed the lowest levels of observer agreement beyond chance were cleanliness, development, difference in mineral soil exposure, difference in vegetation cover, mineral soil exposure offsite, mineral soil exposure onsite, root exposure, number of social trail, tree damage, vegetation cover offsite, and vegetation cover onsite.

The difference between the proportion of agreement and the kappa value for each attribute was substantial, with kappa values always being lower than the proportion of agreement (fig. 3). We would expect the kappa values to be lower because kappa accounts for the chance of observer agreement rather than just the level of agreement.

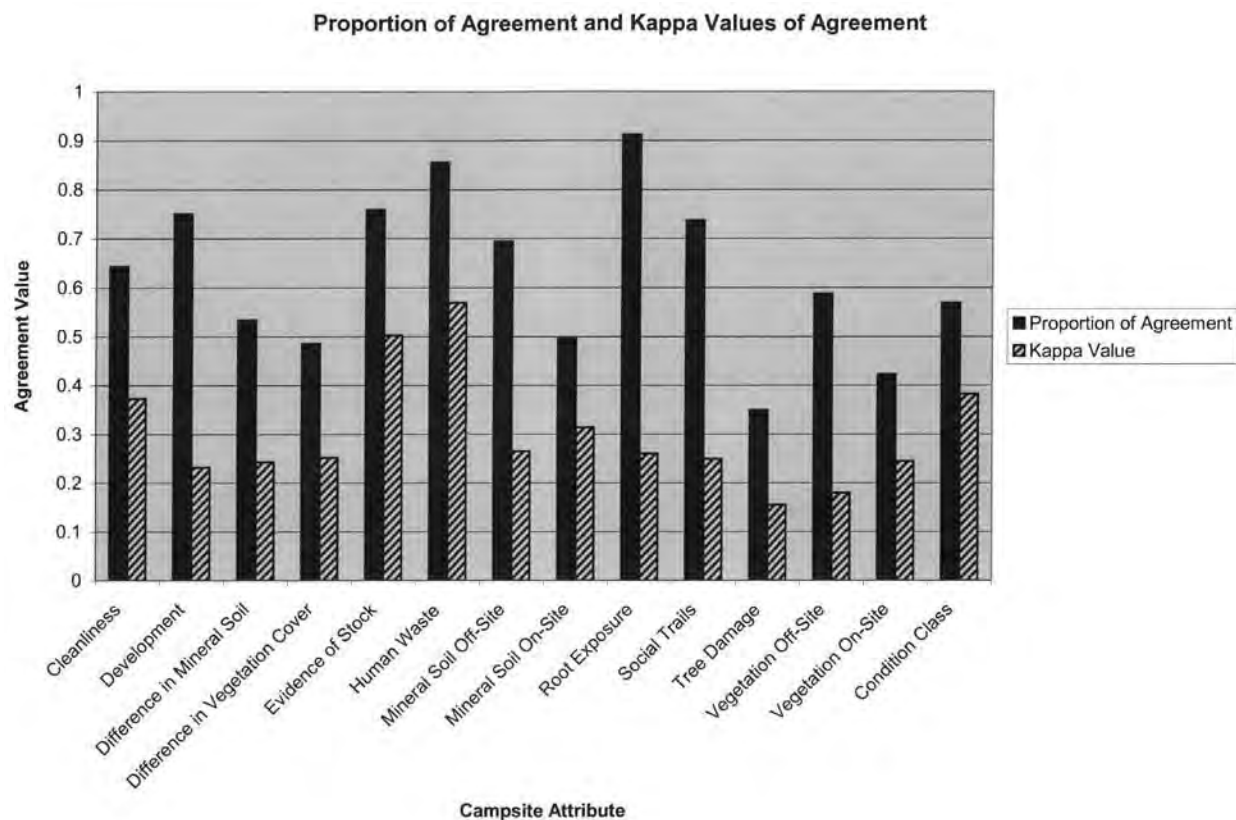
Overall, certain attributes showed consistent levels of inter-observer agreement from both the kappa statistic and the proportion of agreement. The difference in vegetation cover, mineral soil exposure onsite, tree damage, and vegetation cover onsite consistently showed low (< 0.5) kappa and proportion of agreement values, whereas evidence of stock and presence of human waste consistently showed moderate to high (>0.5) kappa and proportion of agreement values.



**Figure 1**—Percent of observer agreement for each impact attribute across all sites.



**Figure 2**—Level of observer agreement beyond chance (kappa) for each impact attribute.



**Figure 3**—Comparison of agreement between proportion of agreement and kappa analysis.

## Management Implications

The results of this study have important implications to recreation managers and researchers, especially for agencies that hire seasonal monitoring personnel. The moderate to low levels of precision suggest that managers using this or similar multi-parameter monitoring programs should thoroughly evaluate the protocol for collecting the impact indicators to identify any possible sources for observer confusion and/or bias.

The results indicate the protocol for collecting the percent mineral soil (on and offsite), the percent vegetation cover (on and offsite), and the amount of tree damage need to be improved to increase precision. In particular, these results indicate the precision of attributes based on whole-site measurements, such as percent vegetation cover, rather than a specific feature of the site, such as level of development, should be assessed. Impact indicators that consistently yield imprecise data may need to be given less weight in the overall campsite impact index, or removed from the monitoring program entirely.

Managers and researchers should also improve training procedures to increase the level of precision. Although the effect of the amount and complexity of observer training has never been empirically tested, it makes intuitive sense that properly trained individuals are likely to report more precise data. Training should be focused on improving the level of precision of impact attributes that yield imprecise data. The results of this research suggest additional training is needed to improve the level of precision of the percent vegetation cover, percent mineral soil exposure, and the amount of tree damage. One way this could be accomplished is by performing test site inventories and having observers calibrate off of one another. This process would involve a comparison of the observers' attribute rating, and a subsequent mental adjustment by each observer that would make the reported data more consistent with each other. Another way to improve the level of precision through training is by having an inexperienced observer work with an experienced observer, or just by having two observers work together. Once again, this will allow the observers to calibrate off of one another and also alleviate some biases.

The final implication of this research is that managers should calculate the level of precision of their campsite impact monitoring program and determine how much change would need to occur in the monitoring data to be considered a true change in campsite condition. By knowing the level of precision, managers will be able to decipher whether a true change has occurred or whether two observations of the same level of impact have yielded two different reported levels of impact. That is, managers can assume that the estimated trend in campsite condition will be more meaningful as the precision of the protocol increases. This concept becomes more pertinent as the number of sites per management decision decreases.

## Conclusions

Precision is particularly important to the fundamental purpose of a campsite monitoring program of predicting trends in site impacts. This study has shown that a moderate to low level of inter-observer agreement exists in the multi-parameter campsite monitoring program used on the

Dixie National Forest. The kappa values may be lower due to the prevalence and bias effect, because of the unevenly distributed ratings between attribute choices. For example, observers tended to rate root exposure in the 0 to 5 percent category for all sites, so the level of proportional agreement is high but the kappa value is low. It should be noted that kappa values associated with attributes subject to the prevalence and bias effect, such as root exposure, number of social trails, and the amount of development, should be viewed with caution.

The results of this study are particularly important for managers using this type of campsite monitoring program. Because this is the first study of the level of inter-observer agreement of a campsite monitoring program, additional research is needed to evaluate the level of precision of other types of campsite monitoring programs.

The fundamental question of this research has application beyond the field of recreation management. Due to the high rate of monitoring personnel turnover, the level of precision should be evaluated for all ecological monitoring programs. It is my hope that this research will act as an impetus for managers to evaluate the level of precision of their monitoring programs, which will result in a more effective administration of recreation resources.

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# Protecting the Protectors of Wilderness

Juan Carlos Gambarotta

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**Abstract**—Preserving the last remnants of wild country requires effective legislation, adequate finances, and appropriate policies, but in addition it requires the permanent presence of dedicated park rangers. For the International Ranger Federation, a ranger is a person who works in protected areas, and, among other tasks, is responsible for the protection of the natural and associated cultural resources. Within this broad definition are rangers with very different levels of formal education, and different levels of skills and experience, but all of them are on the frontline of protecting landscapes, seascapes and associated resources.

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## Duties and Dangers of a Park Ranger

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Fortunato Calacauqui, Eric Mota, Marco Antonio dos Santos, Aroop Ranjan, Henry Oram, Michael Pauling ... these are but a few of the names of rangers killed in the line of duty.

Many people are surprised to hear that rangers often face violent encounters, in the naïve belief that all we do is lead visitors along quiet and beautiful trails and play with children while teaching them to love the planet. But our profession has many aspects. The most popular of these seems to be providing interpretation to visitors and hands-on wildlife management. That visitors continue to be attracted to parks and that there are still natural resources to be managed, is because there were and there are rangers to take care of protected areas.

Poaching, in its many forms, is common, unfortunately, in many protected areas of the world. Because of the value and scarcity of the resources being stolen, poaching makes the job of the ranger very dangerous in many protected areas of many countries. A ranger may be confronted by violence any day, at any time. It could be gunshots, assault, physical violence, or even vandalism and destruction of his or the protected area's equipment and infrastructure. The observer could be forgiven for thinking that attacks on rangers are scarce, due to the lack of published data or publicity related to the problem.

There has been some recognition of this crisis, such as the Packard Awards of the World Commission on Protected Areas of the World Conservation Union (IUCN). Among 18 of these awards given at the 4<sup>th</sup> World Parks Congress held in

Caracas in 1992, one went to an Indian killed by a notorious poacher and another to two Guatemalan Rangers who were ambushed and injured. During the last World Parks Congress held in Durban in 2003, ranger John Makombo from Uganda, on behalf of the International Ranger Federation (IRF) and world's rangers, received a symbolic recognition of the dedication of all rangers who had lost their lives protecting protected areas. A dedication in the book by Shambaugh and others (2001) and the famous book by Adams and McShane (1996) with very specific stories on this matter, also provide some recognition. However, it is probable that neither the IUCN nor other protected areas specialists have a true idea of the actual scope of the problem. If we were to award every ranger injured, kidnapped or assassinated since the 4<sup>th</sup> World Parks Congress in 1992, the ceremony would probably last for 2 days.

Of all wild lands, only the largest remnants, such as the Amazon rainforest, Antarctica, and big taiga patches would maintain their integrity for more than a few weeks if rangers were to be taken away. However, human greed has impacted deep into unprotected tracts of the Amazon, where the indigenous people have rallied to protect their land and its natural and cultural resources, a wild land with which they have co-existed for centuries. The IRF was proud to accept the Associação dos Povos Indígenas Tiriyo, Kaxuyana e Txikuyana of the Amazon as its first indigenous community member. However, most wild lands of the world are part of established protected areas where, in the end, it is the rangers who are the on-the-ground defenders of wildlife and landscapes, confronting poachers, loggers, and other unscrupulous people without conscience. As wilderness and its resources become more and more scarce, the scope and extent of poaching into protected areas is escalating. The biggest problem occurs when poaching reaches a commercial scale. When this happens, offenders will fight to maintain their "job" and are far more dangerous than subsistence poachers. The commercial poacher does not hesitate to resort to violence, and for this reason many rangers are killed or seriously injured—and the world conservation community still does not recognize the true magnitude of this issue. In the United States, the Department of Justice reports that National Park rangers are the most assaulted of all federal law enforcement officers, including those working as agents for the Drug Enforcement Administration (DEA) and Federal Bureau of Investigation (FBI).

## Taking International Action

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The Zakopane Declaration, an outcome of the First World Congress of the International Ranger Federation which was held in Poland in 1995, gave voice to the fact that many rangers receive meager salaries, live and work under very poor conditions, often risk their lives and frequently fall in the line of duty. (Some of those deaths are due to accidents,

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but many are not). At that time, even the world's rangers did not understand the full extent of the violence, or that it would be so common. Today (in 2005) we are shocked by the frequency with which our colleagues are assaulted, kidnapped or killed. The difficulty in obtaining accurate data on these incidents makes us believe there are many more incidents around the world than even we, the rangers, are aware.

To begin to understand the magnitude of the problem, IRF conducted a survey of cases of physical violence against rangers, and of vandalism against equipment and infrastructure. The last was included as we consider it to be violence aimed at the ranger, intended to leave him or her without communication, transportation or housing when staying in the wilderness. To create a framework and facilitate the search, the study only targeted cases which occurred between 1998 and July 2005, and is based on requests to 27 countries, namely: Bolivia, Brazil, Colombia, Portugal, Czech Republic, Ecuador, Indonesia, Ivory Coast, Namibia, Perú, Spain, South Africa, Democratic Republic of Congo, Kenya, Uruguay, Zambia, Argentina, Philippines, India, Guatemala, Cambodia, Israel, USA, Venezuela, Vietnam, Ghana and Uganda.

During this time period, 120 rangers were murdered and 106 wounded, most of them shot. Three were kidnapped and seven ranger stations were seriously damaged (table 1). But this is only the tip of the iceberg, because it is very difficult to obtain accurate or comprehensive data on this matter. The IRF does not have member associations in many countries, and it is also common that governments are not willing to share the information regarding violence to rangers in the belief that the release of such information would not be in their interest and would deter tourism. With the exception of Australia, ranger deaths and injuries occur on all continents, contrary to what is often admitted.

## Potential Solutions to the Problem

The death or injury of a ranger is seldom made public knowledge or covered by the press, so on many occasions we do not receive even the names of the victims. No matter what they suffered or how fiercely they defended the integrity of a park, they commonly become merely statistics, such as in "seven park rangers were killed in ..." Violence against rangers has many different roots, and will not be stopped. We the rangers, and this Congress, can only hope to reduce it substantially. Common sense says that the occurrence of such cases would be greatly reduced if the rangers of the world could work under much improved levels of security. This security is based on three basic pillars.

First, there must be official recognition of the existence of the problem, with the political and institutional will to support rangers. Second, rangers must be provided with comprehensive and ongoing training. And third, rangers must be given the proper and appropriate equipment to carry out their vital role safely and efficiently. Both the training and equipment must be appropriate to the nature and level of the threats faced.

The level of integrity of protected areas and wilderness is in direct relation to the numbers, skills and equipment of the rangers responsible for that integrity. Can you imagine

the success we would have in conserving the biodiversity of the world if all rangers were fully supported, highly trained, and properly equipped?

Certain states or institutions believe that rangers should not be armed. This is an internal value judgment, but if it is taken in the face of a very real armed threat against rangers then such a decision is tantamount to sentencing the rangers to death. Others go further by passing the problem on to security forces, such as the police or army. Experience has shown that this route does not solve the problem, and often worsens the situation. Security forces for the most part do not have the skills, knowledge, ability or will to operate in "backcountry" where most poaching takes place, and are further notorious for complicity, or direct involvement, in poaching.

We do not wish to be the bearer of bad news, but this situation of violence against rangers has long since reached untenable proportions and the international conservation community is asked to recognize this and take action towards making the work of the ranger safer and thereby also more efficient. Violence exists in many protected areas and cannot be hidden.

We, the rangers, are the direct interface with the indigenous and local communities in and around protected areas, and much work is done on a day-to-day basis in community interaction and environmental education to reduce local and subsistence poaching threats. We do acknowledge that much more needs to be done at this level, and can be done with the proper training and resources. There will always be some level of subsistence poaching, of palm hearts, fish, skins, firewood, etc., and so there will always be some risk in the work of the rangers in many protected areas in many countries, but this is minimized through establishing sound relationships with communities.

All rangers of the world are potentially exposed to threats and physical violence. Inherent in the effective management of protected areas is the obligation to provide for the safety of rangers. Efforts to mitigate risks and resolve these issues should occur at many levels, from the individual ranger, supervisory and managerial personnel, institutional hierarchy, legislators, justice, and other stakeholders such as community leaders.

For this we ask governments, conservation agencies, and conservation NGOs to:

- Recognize their responsibility to train rangers in personal protection.
- Prepare threat assessments for their rangers to determine the appropriate types of training and equipment they need.
- Provide rangers with equipment that is serviceable and commensurate with the level of risk that might be encountered.
- Provide life insurance for all rangers.
- Pay the rangers commensurate with their responsibilities AND risks.
- Collect and disseminate information related to assaults.
- Promote the role of the ranger.
- Provide an adequate legal framework and basis to perform the protection duties.
- Properly punish those responsible for assaults and any other kind of physical violence toward the rangers.

**Table 1**—Results of a survey to 27 countries about attacks on Park Rangers (1998–2005).

<b>Country</b>	<b>Protected area</b>	<b>Killed</b>	<b>Injured</b>	<b>Other</b>	<b>Attacker</b>
Bolivia	Carrasco N.P.			Burned pick-up Burned ranger station Rangers threatened	“Sin Tierra” Movement
Bolivia	Apolobamba N.P.	Fortunato Calacauqui 2000			Vicuña poachers
Brasil	Serra dos Reis State Park	Eric Mota 13/8/02		Felled ranger Station 8/02	Illegal loggers
Brasil	Carlos Botelho N.P.	Marco Antonio dos Santos 14/3/98			Palm heart thieves
Colombia		Jairo Valbuena 11/01			Paramilitars
Colombia				Efraín Rodríguez Varón, Kidnaped, 20/8/02	Rebels
Czech Rep.	Mala Kotlina Nat. res.			Marek Banas Attacked	Group leader
Ecuador	Galápagos Is. N.P.			N.P. Headquarters and Rang. Station and equipment Destroyed, 17/11/2000	Illegal lobster fishermen
Ecuador	Galápagos Is. N.P.			Wilson Fuentes, Julio López y Palermo Castillo hit by Fishing vessel 26/6/02	Illegal fishermen
Ecuador	Galápagos Is. N.P.			René Freire y Julio Lucero Hit by fishing vessel 4/7/02	Illegal fishermen
Indonesia	Balí Barat N.P.		Komang Astika Shot in leg and attempt to kill, 31/1/02		Wildlife thieves
Ivory Coast			Four rangers Injured with Machetes, 2001		Farm encroachment

(continued)

**Table 1** (Continued)

Namibia	Erongo region			Rod Braby, Vandalism to caravan, signs and threatened	Off road Quad bikers
Peru	Pacaya-Samiria N.P.			Four rangers attacked, Canoe, engine, food and luggage stolen, 17/4/02	30 loggers
Portugal		Antonio Nabo Pires, 31/1/02			hunter
Portugal		Manuel Fonseca and Paulo Coelho	17 rangers injured in last 5 years		Hunters and poachers
Portugal	Arrabida N.P			shots	poachers
Portugal	Sintra Cascais N.P.			Shots and attempt to run-over by car	loggers
Portugal	Peneda Geres N.P			Shots to ranger station	poachers
Portugal	Sado N.Res.			Shots to ranger boats, Attempt to shoot	fishermen
Portugal	Tejo Estuary Res.			Attacks	Poachers And fishermen
Spain	La Robla, León		Salvador Ochoa, lost hearing, 28/11/99	threatened	Wild boar poachers
Spain	Córdoba		Two rangers Injured, 2000 and 2001		hunters
Spain	Near Madrid			Hanged by feet	poachers
Spain	Avila			Attempt to shoot Two rangers	poachers
Spain	Avila			Bullet almost kills Ranger at home	¿ ?
Spain	Andalucía		Two injured with heavy objects		Inspecting Illegal building
South Africa	Sta. Lucía N.P.	Henry Oram, 4/5/01			Shrimp fishermen
D.R. Congo	Virunga N.P.	Michel Safari 25/5/01			rebels
D.R. Congo	Virunga N.P.	Mambo 25/5/01			rebels
Kenya	Tsavo East,	Two rangers killed 15/5/03			poachers
Uruguay	El Potrillo,			Shots during law enforcement,	Capibara poachers

(continued)

**Table 1** (Continued)

Country	Protected area	Killed	Injured	Other	Attacker
				18/3/03 Two rangers and a policeman	
Zambia	Lunga-Luswishi G.Park,Zambia		Gideon Chembe (28) Wounded by shot 6/6/03		Game poachers (two arrested)
Argentina	Res. Bios. Yabotí Misiones,	Environmental police killed 22/5/03			Poachers
Argentina	Sanborombón Nat. Res. Bs.As			Daniel Mac Lean, Violence, risk of death May 03	Poachers
Philippines	Balayan Bay	Sixto Atienza (44) Killed, 3/5/03			Killed after public speech, Fishermen
D.R. Congo	Virunga N.P	Safari Sulubika (41) 27/5/03			Rebel group
Argentina	Sanborombón Nat. reserve	June/2003		Hit and menaced with knife	Poachers
DR of Congo	Virunga N.P	21/6/03 Kambale Binikere (25)			Elephant poachers
D R Congo	Virunga N.P.	Kamondo Mayele,1998			Rebels
“	“	Simba Ndianabo,1998			“
“	“	Kambale Kinda, 1999			“
“	“	Kanyamibwa J. de Dieu, 1999			“
“	“	Kambale Twitebo, 2000			“
“	“	Mambo Mwendapole, 2001			“
“	“	Masubaho Mubake, 2001			“
“	“	Muyalulimbo Idembe,2000			“
“	“	Paluku Jogoo 2002			“
Kenya	All country	1998,1 killed 1999,0 killed	4 inj.		Poachers

(continued)

Table 1 (Continued)

Country	Protected area	Killed	Injured	Other	Attacker
		2000,2 killed 2001,0 killed 2002,0 killed 2003,2 killed	1 inj. 1 inj. 0 inj. 0 inj. 2 inj.		
Argentina	Laguna Blanca N. P		Injured by shot, 21/10/03 Narciso Quilaqueo		Angry cattle owner
India	Kuklung Reserve Forest	Girindra Nath Borbhuyan Kidnapped and other killed nov.03			Rebels
Argentina	Laguna Salada grande Res.			Alejandro Leiss Threatened and vandalism,25/11/03	Users
España	Nicovan, Catalunya			Two shots at night 7/2/04	Duck hunter
Guatemala	P.A Punta de Manabique	Enrique Alcántara 11/2/04 3 shots			Unknown, while he was on leave
Congo D.R.	Virunga N.P.	Kwibesha Musekura Boniface 23/6/04			Rebels
Congo D.R.	Virunga N.P.	Ruvuzo 10/9/04	A ranger Injured (shot)		Rebels at gate
Argentina	Parque las Araucarias, Misiones		Daniel Kurday, Shot in back October 14, 04		Poachers while birding at night.
Cambodia	Bokor N.P.			Chey Yuthearith and 50 rangers, hand grenades	Loggers and poachers
Israel	Bet Guvrin Nat. Res.	Vladimir Rubin January 05			Terrorists
Peru	Andes	4 rangers 2000-2005 Associated Press, april 15/05			Vicuña poachers
USA	Hawaii	Steve Makuakane, 2000			Dog owner
USA	Organ Pipe	Kris Eggle,			Foreign

(continued)

**Table 1** (Continued)

Country	Protected area	Killed	Injured	Other	Attacker
	N.M.	9/8/02			criminal
USA	Texas	Michael Pauling, 2/8/01			Run-over by car
USA	Oregon		Two State rangers Shot		Cleaning a restroom
USA	Mississippi		Cons. Officer shot		Individual walking
USA	Ohio		State Park ranger shot		Investigating illegal fireworks
USA	North Carolina	Joe Kolodski, 22/6/98			
Uruguay	Rocha lagoon			Hector Caymaris attempt to run-over by car, Three times 2002	Off-road drivers
Uruguay	San Miguel N.P.			Station shot	Poachers
Venezuela			José Melchor,		Fishermen
Vietnam		12 rangers killed 1996-2000			
India,	Nanai Range	Deepak Bharali, 27/10/1988			Killed by extremist
India	Lakhimpur Range	Pranjit Kalita, 13/12/1998			By extremist
India	Dharamtul Range	Aroop Ranjan Pathak , 21/2/2001			Knocked down by truck
India	Valmiki Tigre Reserve	Bikhu Chowdhury 27/1/02			Murdered
India				2 Assistant Conservation kidnapped 21/6/03	Extremists
Ivory Coast				2 rangers missing 2/6/03	Civil war
India	Corbett Tiger Reserve	Bipin Chandra Pandey, 28/8/01			Poachers
Uganda	Bwindi N.P.	8 tourists, 1 staff, 1999		4 vehicles burnt in HQ, 4 tourists camp burnt	Interahamwe rebels
Uganda	Bwindi N.P.	Paul Wagaba 1999			Rebels
Uganda	Bwindi N.P.	John Barigira 1999			Communities
Uganda	Bwindi N.P.		Byarugaba		Communities

(continued)

**Table 1** (Continued)

Country	Protected area	Killed	Injured	Other	Attacker
			Ignatius 2002		
Uganda	Bwindi N.P.		Masinde Godfrey 1999		Rebels
Uganda	Mt. Elgon Cons. Area	Pte. Makayi Apollo, 2003			
Uganda	Mt. Elgon Cons. Area	Pte. Kundu Mathew, 2003			
Uganda	Mt. Elgon Cons. Area	Labourer Satya Stephen, 2003			
Uganda	Mt. Elgon Cons. Area		Pte. Musobo Sande Francis, 2001		
Uganda	Mt. Elgon Cons. Area		Pte. Iryema Raphael, 2002		
Uganda	Mt. Elgon Cons. Area		Pte. Kipsongi Rodgers, 2003		
Uganda	Mt. Elgon Cons. Area		Pte. Egessa Eronda James, 2002		
Uganda	Mt. Elgon Cons. Area		Pte. Makuyi Eric, 2002		
Uganda	Mt. Elgon Cons. Area		Pte. Okwanyang Paul, 2002		
Uganda	Mt. Elgon Cons. Area		Pte. Otto Jimmy, 2003		
India	Saranda Forest Div.	Luther Tirkey 17/12/02			Naxalite Attack
Uganda	Murchison Falls C. A.	Asiimwe Stephen, March 2001			Shot by rebels
Uganda	Lake Mburo N.P.	Begumisa H., 2002			Shot by poachers
India	Kottayam Forest Div.		P.J. Joseph 3/12/02		Poachers
India	Govind Wild. Sanctuary	Ram Bharose Dhobal 5/3/03			Murdered
India	Palamau Tiger Res.		Bhagwati Yadav 17/4/03		Naxalite Attack
India	Palamau Tigre Reserve	Tepeshwar Singh 30/6/03			Idem
India	Palamau Tiger Res.	Jetan Singh 30/6/03			Idem
India	Palamau Tiger Reserve	Baleswar Singh 28/8/03			Idem

(continued)



**Table 1** (Continued)

Country	Protected area	Killed	Injured	Other	Attacker
India	Dudhwa Tiger Reserve	Sesha Giri 5/3/04			Poacher attack
India	Valmiki Tiger Reserve	Harihar Yadav 2/1/05			Murdered
Uganda	Nyamusingiri	Robert Mugabe, 1997-2000			Shot by suspected rebels
India	Palamau Tiger Reserve	Daniel Khalkho and Sitaram Yadav 6/9/04			Naxalite rebels
Uganda	Queen Elizabeth N.P.		One ranger and one driver 15/8/2003		Shot by unknown rebels
Kenya	Private ranch	Samson Ole Sitima 19/4/05	2 other rangers		Killed by a big landowner
Ghana	Kyabobo Nat. Park	Paul Nyame and Ntim Obofor 11 July/05	A ranger shot 11 July/05		Ambushed by 25 poachers
D.R. Congo	Garamba N.P.	Mokilibé Atakuru and Likambo Masikini may 2004			Janjaweel militia
India	Debrigarh Wildlife Sanct.	Bhola Nath Dhal 4/6/05			Murdered

If we are not able to minimize this serious threat, many rangers will lose morale, and that is the first step to losing ground in protected areas. So, what can we do? The IRF believes that the risk to the ranger at work is lessened when staff are well trained, well equipped, supported, and when morale is high.

The conservation community has to recognize that, as stated by Carabias and others (2003), protected areas have not become national priorities either for governments nor society, and there are many problems that must be confronted urgently. I believe that the tourism industry centered in protected areas, which has been reported to have grown in recent years, could be the logical source of funding to back the work of rangers. Moreover, two World Parks Congress (WPC) Recommendations reinforce that idea.

Recommendation 5.08: Private sector funding of protected areas (point b): Develop appropriate legal, administrative and financial instruments which implement new partnership arrangements for the benefit of both the P.A. and its private sector partners.

Recommendation 5.12: Tourism as a vehicle for conservation and support of protected areas (item 1b): Make tangible and equitable financial contributions to conservation and to protected area management.

Jairo Valbuena, Manuel Fonseca, Joe Kolodsky, Safari Sulubika, Kris Eggle, Sixto Atienza, Kambale Binikere.... They did not want to be heroes, they simply enjoyed their jobs, they loved the animals, and had so much to live for and to contribute.

Most rangers are underpaid, and when they are killed or are injured on duty, very often they leave children and widows in a very precarious situation. The IRF asks the private sector working in protected areas to make a donation of 1 percent of their earnings for the purpose of training, providing proper equipment, or making donations to rangers who were seriously injured protecting our resources and are no longer able to work. It has to be seen that investing in ranger insurance is a direct investment in wildlife protection, more directly than most people can believe. This would help all rangers, who would feel supported as never before. How many days would the mountain gorillas last if all rangers would leave their positions? No more gorillas, no more bears, no more sequoias, please think about it and help us.

## Summary

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As natural resources become more scarce, poachers, loggers, anglers and other people tend to extend farther inside protected areas, reaching the most remote areas of wilderness. For that reason, rangers are increasingly confronting armed people inside protected areas who often menace, injure, kidnap or kill them. The problem is big and difficult to investigate. The IRF is very concerned about this fact and has decided to fight it to minimize the risk of being a ranger. It has collected data from 27 countries on all continents, and for the period of time from 1998–2005. The results are: 120 rangers killed, 106 injured, three kidnapped and seven ranger stations vandalized. Rangers have been assassinated on all continents.

The work performed by rangers is essential to maintain biodiversity and natural landscapes. Rangers in many countries are underpaid, lack institutional support, need training and feel forgotten. Rangers that feel supported, receive proper training, are well equipped and better paid are more effective. All governments should provide life insurance to the rangers. We ask the private sector working in tourism in protected areas to make a donation to the IRF to help us improve the ranger's profile in the world.

## Acknowledgments

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My most sincere thanks to the many rangers who sent in data about violence against rangers. They were many, but I need to specifically mention at least Jobogo Mirindi from Virunga National Park, in the Democratic Republic of Congo, who even in a time of armed conflict kept communication with us. Also, Augusto Atturo from Italy, who has been sending accurate information for years.

Vance Martin of the WILD Foundation, and UNESCO provided funding which made my attendance possible at this Congress. My colleagues, Deb and Jay Liggett, provided very pleasant accommodations and company.

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# Using the Minimum Requirement Concept to Manage Research in the Yosemite Wilderness

Mark Fincher

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**Abstract**—Ninety-five percent of Yosemite National Park is designated wilderness. More than 30 million people live within a day's drive of the park, and visitation to the wilderness is more than 400,000 people annually. Yosemite is also popular with researchers. In recent years the park has received about 100 research permit applications per year, of which about 75 percent are in wilderness. While the existing permit application system considers the impacts of such proposals, it doesn't necessarily do so in the context of wilderness character. In the last 4 years, Yosemite wilderness managers have applied the minimum requirement concept to wilderness research. The large number of applications has led to the creation of a screening tool to identify the relative impacts of proposals. A tracking system is now being created to consider cumulative impacts, both temporally and spatially. Ongoing issues include the lack of consideration of wilderness values during project design, and lack of incentive for removing scientific installations from wilderness.

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While Yosemite Valley is well known throughout the world, many people are unaware that beyond the valley stretches a vast mountain wilderness encompassing over 285,000 hectares (704,250 acres). Some are surprised to learn that 95 percent of the park is designated wilderness. Many Californians, however, are well aware of the "hidden Yosemite," and come to the wilderness in large numbers to hike, climb, ride horses, and ski. Over 35 million people live in California, most of them within easy driving distance of the park. Overnight use of the wilderness averages about 100,000 use-nights per year, while day use is conservatively estimated at 350,000 use-days per year.

Yosemite is also popular with researchers. The park receives an average of 100 research permit applications per year, with about 75 of them for research in wilderness. A research institute has just been established within the park, and these numbers will probably grow substantially as a result.

Our management of this area is guided by the Wilderness Act of 1964, which defines the values and conditions to be preserved. Given the popularity of the area, much of our effort goes toward limiting cumulative impacts, whether

they derive from recreational or administrative use. Much of our educational and regulatory focus is to convince people that certain impacts, which seem benign when considered individually, can have a significant deleterious effect on wilderness values collectively. This is as true for research as any other activity in wilderness.

The Wilderness Act stipulates that we manage for naturalness, wildness, freedom, and solitude, and lists scientific use as one of the public purposes of wilderness. It also prohibits certain uses: temporary roads, use of motor vehicles, motorized equipment or motorboats, landing of aircraft, other forms of mechanical transport, and structures or installations "except as necessary to meet minimum requirements for the administration of the area" (Section 4 (c)). While some may perceive scientific inquiry to be merely observational, virtually all research in the Yosemite wilderness involves one or more of these section 4 (c) exceptions or a violation of law (activities allowed with a research permit but illegal for the general public).

National Park Service (NPS) policy requires that, in addition to the screening provided by our research permit process, we must apply the minimum requirement concept to research projects in designated wilderness, whether or not a 4 (c) exception is proposed. In Yosemite, most of our proposals involve impacts to wilderness character in one of two categories: 1) installations, which primarily impact visitor experience and is a 4 (c) prohibition, and, 2) collecting, which is primarily a biophysical impact and is a violation of law: 36CFR 2.1, which prohibits "possessing, destroying, injuring, defacing, removing, digging, or disturbing from its natural state" virtually all natural and cultural resources in a national park.

The management of installations presents numerous challenges. While there is some policy guidance on administrative structures, most of it concerns installations built to manage recreation impacts such as bridges, trails, and signs. Policy specific to scientific installations is vague. Some fundamental questions are: How many installations are already in the wilderness? Should small markers like tree tags be considered installations? What is an acceptable number of scientific installations in a given area? What factors impact visitor experience when they discover such an installation? How does management ensure that installations are removed when they are no longer needed?

While the existing permit application process considers the impact of collecting and disturbance, it hasn't necessarily considered the cumulative impacts. Collecting and disturbance tend to target certain species and populations disproportionately: those that are rare, endangered, charismatic, and easy to access.

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In: Watson, Alan; Sproull, Janet; Dean, Liese, comps. 2007. Science and stewardship to protect and sustain wilderness values: eighth World Wilderness Congress symposium: September 30–October 6, 2005; Anchorage, AK. Proceedings RMRS-P-49. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

A perusal of scientific literature and the Yosemite Library files provides an example of what we are trying to avoid. The Mt. Lyell Salamander (*Hydromantes platycephalus*) is a species of special concern in California, existing in small, isolated populations at high elevations in the Sierra Nevada mountain range. One of the most accessible populations is on the summit of Half Dome. The suitable salamander habitat on the summit is less than 1 hectare (2 acres) in size. In the first 20 years after discovery in 1916, between 100 and 200 individuals were collected from this population (including 84 over 1 month), and many more since that time (Adams 1942). While this population has survived, it seems likely that such intensive collecting damaged the genetic health of the population.

## Wilderness Research Impact Class Assessment (WRICA)

To manage the large number of proposals, we developed the Wilderness Research Impact Class Assessment (WRICA) (fig. 1) and Cumulative Research Impacts Tracking System (CRITS). These tools attempt to quantify the impacts of research to the diverse components of wilderness character in a simple, streamlined manner. They necessarily require subjective, informed judgment, and can only provide an approximation of the overall effects of a given project. Information needed from researchers includes:

- Approximate person-field days and maximum party size.
- Type and amount of any resources collected or disturbed, by location.
- Any proposed use of motorized equipment or mechanized transport.
- Location, number, description, and removal date of all proposed installations, including plot markers.

Proposals identified through the WRICA score sheet as low impact are covered by a programmatic minimum requirement analysis. Approximately 75 to 85 percent of proposals assessed so far have been considered low impact. All others require a separate analysis, written collaboratively by the NPS Wilderness Specialist and the appropriate NPS scientist, who also serves as a liaison with the researcher.

The purpose of this assessment is three-fold:

1. To reduce the procedural burden in the research permitting process by identifying those studies that have minimal impacts and can be covered by a programmatic minimum requirement analysis.
2. To provide a quantitative assessment of impacts from research projects. Such an assessment gives us a better tool to weigh impacts against benefits, track cumulative impacts, and design mitigation measures.
3. To give research applicants a better understanding of the impacts of their research on wilderness values, and improve research design to mitigate or avoid such impacts.

The assessment divides proposals into three categories:

**Class 1:** Research involving simple observations or measurements made by small numbers of people.

**Class 2:** Studies that involve greater numbers of people, some limited impact to visitor experience, collecting small amounts of common resources, or some minor Wilderness Act section 4 (c) exceptions.

**Class 3:** Any proposal that includes significant section 4 (c) exceptions, including significant structures or installations, motorized equipment, or helicopter transport, or proposals that request an exemption from park regulations, including significant collecting, exceeding group size, etc. Research that does not include 4 (c) violations or an exemption from regulations but still poses a significant risk to wilderness values is included in this category.

Class 1 proposals are covered by a programmatic Minimum Requirement Analysis (MRA) and do not require specific approval from the Wilderness Management office; but the total number of such proposals is tracked by the Wilderness Manager. Class 2 proposals require communication with the Wilderness Manager but in most cases are covered by the programmatic MRA. Class 3 proposals require a separate MRA, including approval by the Wilderness Manager, Chief Ranger, and Superintendent.

## Cumulative Research Impacts Tracking System (CRITS)

Some of the most significant impacts to wilderness character are composed of many seemingly insignificant single actions. In order to make responsible minimum requirement decisions, the cumulative impacts of these actions need to be tracked. These impacts come from different categories of administrative activities in wilderness, making them more difficult to track.

The following cumulative impacts of scientific research will be tracked:

### Motorized Equipment and Motorized Transport Use

This will be tracked across all administrative use categories as part of the park's wilderness character assessment. 2005 will be the first time we have attempted to collect this data; no standards have been set.

### Collecting and Disturbance

While these impacts are usually short-term and minor, care must be taken that rare resources and species are not collected or disturbed repeatedly over time in a way that would cause long-term negative effects. For this reason all collecting and disturbance activities will be recorded in a geo-referenced database. This database will be checked by species and location for each new research proposal that involves collecting or disturbance.

### Structures and Installations

Structures and installations can present a significant impact to wilderness experiences. Such installations will be assessed for obtrusiveness and remoteness to develop an installation score for each research proposal. A standard (expressed as an installation density) will be developed for

## Instructions for WRICA Score Sheet

This form is meant to be simple and quick to complete. Good judgment is required, as impact classes for some variables are only broadly defined. A clarification on terms: “rare” includes, but is not limited to listed species, and should include species or other resources that are locally rare but otherwise common. All cultural resources would be considered “rare” abiotic resources.

Installations are divided into two categories: Items like inconspicuous tree tags, buried plot markers, and well-hidden miniaturized data loggers are considered “barely discernable” installations. All other structures and installations are considered separately based on their permanence and obtrusiveness.

**Unobtrusive installations:** Larger plot markers, installations that are small and well hidden; underground or under water. It would be highly unlikely for visitors to notice these unless they were very close; perhaps within 5 meters.

**Obtrusive installations:** Larger, harder to hide instruments and collectors, etc. These would be noticed by most visitors within 20 meters and virtually all visitors within 5 meters.

**Very obtrusive installations:** Larger stations/instruments, exclosures, “real-time” stations with solar panels and antennas. Visible from long distance.

Rate each impact according to the scores given. The impact class can not be lower than the highest score given. So if any impact rates a 3, for example, the impact class must be at least a 3 regardless of the total score. Then add the scores, and use the total to calculate the impact class as follows.

Class 1: 0-5

Class 2: 6-12

Class 3: 12+

The installation score is not included in the overall score but is calculated and used separately to track the cumulative impact wilderness wide.

## WRICA Score Sheet

### Experiential Impacts

Transport: Hiking (0) Stock (1) Wheelbarrow/cart (2) Helicopter or other Mechanized (8)

Peak season helicopter use (10) \_\_\_\_\_

Group size: Legal (0) Over legal (3) \_\_\_\_\_

Total person days in wilderness: Less than 50 (0) 51-150 (1) 151 or more (2) \_\_\_\_\_

Visitor surveys: Questioning visitors in wilderness? No (0) Yes (2) \_\_\_\_\_

Any motorized equipment? No (0) Yes (3) Peak season use (5) \_\_\_\_\_

Surveillance: Will visitors be observed? By: researcher (1) Counter (3) Camera (7) \_\_\_\_\_

Installations:

Barely discernable:

Number: 0 (0) 0-10 (1) 10-50 (2) 50+ (3) \_\_\_\_\_

Permanence: 2 weeks or less (0) 2 wks- 1 yr (1) 1 yr- permanent (2) \_\_\_\_\_

Larger installations:

Number: none (0) 1 (3) 2-5 (4) 6+ (5) \_\_\_\_\_

Obtrusiveness: unobtrusive (1) obtrusive (5) very obtrusive (15) \_\_\_\_\_

Permanence: 2 weeks or less (1) 2 wks- 1 yr (2) 1-5 yrs (3) permanent (10) \_\_\_\_\_

Installation score: See attached instructions.

Total: \_\_\_\_\_

Any other visible or audible effects of research? Short term (less than 1 year), Unobtrusive (1) Short term, obtrusive (2)

Long term (1 year +), unobtrusive (3) Long term, obtrusive (4) \_\_\_\_\_

**Figure 1**—Instructions for WRICA score sheet (continued on next page).

**Biophysical impacts**

Collecting:

Will any abiotic resources be destroyed or removed from the park?

None (0) Common (1) uncommon or rare (3) \_\_\_\_\_

Will any biotic resources be killed or removed from the park?

None (0) Common (2) Uncommon (3) Rare (5) \_\_\_\_\_

Amount killed or removed \_\_\_\_\_ Sm (1) Med (2) Lg (3) \_\_\_\_\_

Disturbance:

Will any abiotic resources be disturbed? None (0) Short term, common (1)

Short term, Uncommon/rare (2) long term, common (3) long term,

Uncommon/rare (4) \_\_\_\_\_

Will any biotic resources be disturbed? None (0) Short term, common (1)

Short term, uncommon (2) Long term, common (3) Long term,

Uncommon/rare (4) \_\_\_\_\_

Amount/number disturbed \_\_\_\_\_ Sm (1) Med (3) Lg (4) \_\_\_\_\_

Will there be any risk of unintentional destruction or disturbance?

Slight (1) Moderate (2) High (3) (x 2 for uncommon, x 3 for rare) \_\_\_\_\_

**Impacts to Wildness**

Will there be any deliberate change to natural processes or current conditions?

Area affected: Less than .4 ha (1 acre) (2) .4 ha-4.0 ha (1-10 acres) (5) Greater than 4.0 ha (10 acres) (8) Radiating effects (25) \_\_\_\_\_

Risk of unintentional changes: Slight (2) Moderate (4) High (6) (x 3 for radiating) \_\_\_\_\_

Total: \_\_\_\_\_

Impact Class: \_\_\_\_\_

Installation Score: \_\_\_\_\_

Please include map showing area of research, and specifically indicating the locations of all installations and collecting/disturbance.

**Calculating the Installation Score:**

Each installation is assessed and scored as one of four WRICA categories, Barely discernable (0.1), unobtrusive (1), obtrusive, (5), or very obtrusive (15). These scores are then multiplied by the following factors:

Distance from road (in air miles)

0-1.6 km (1 mile) (1.0), 1.6 km-8.0 km (1-5 miles) (1.5), over 8.0 km (5 miles), (2.0)

Distance from trail

0-0.4 km (1/4 mile) (1.0), over 0.4 km (1/4 mile) (3.0)

Adjacent to an existing obtrusive or very obtrusive structure such as patrol cabins, bridges, high sierra camps, or existing research installations? (Do not count trails or trail signs)

Yes (0.3), no (1.0)

Scores for all proposed structures are added together by zone, and for the entire wilderness. These numbers are used to track cumulative impacts.

The installation score used to track cumulative impacts is separate and different from the number, permanence, and obtrusiveness scores that are used to calculate impact class and impact score.

**Figure 1**—Continued

each wilderness zone, and wilderness-wide, to limit the impact of such installations at any one time. Removal requirements are included as part of each MRA and tracking will reflect reported removals. As a standard is approached, the permit committee will be notified so that those proposals that are park priorities are given preference.

**Overall Impact.** The WRICA worksheet provides a means of tracking overall impact of research in the Yosemite Wilderness. Standards (expressed as an impact density) will be developed to limit the overall impact by zone and wilderness-wide.

## Still to be Done

WRICA has worked well to screen proposals; combined with the programmatic minimum requirement analysis it has kept paperwork to a manageable level while focusing review on those projects with greater impacts. The cumulative impacts database has not yet been constructed, however. The current research permit database goes back 4 years; paper files cover another 30 years. The required information is not necessarily included in either data set, however, so the database will be incomplete.

Then comes the much harder task of setting standards. Standards for collecting may prove easiest; specialists should be able to make a pretty good estimate of what level of collecting would adversely affect a given population. Standards for disturbance may prove harder, as it involves both a physical risk to the individuals and an impact to symbolic values of wilderness. Is it acceptable to have every individual of a given population fitted with a radio collar? Installations may be the hardest standard of all. How many observations of scientific installations does it take to destroy one's sense of wildness? Does it depend on remoteness, size, or technical sophistication of the structure? A good topic for research!

## Challenges and Possible Solutions

### Lack of Communication During Study Design

Perhaps the most significant obstacle to reaching "minimum impact" science in wilderness is a lack of consideration of wilderness values during study design. Typically a study is designed, funding secured, and the permit application submitted with little or no consideration of such values. When aspects of the study design are questioned in an attempt to preserve such values, the wilderness manager often meets with resistance and intractability from the researcher. Education about wilderness values and the minimum requirement concept before studies are designed would reduce frustration on both sides. Communication between researchers and managers throughout the process would lead to greater understanding on the manager's part about the goals, requirements, and potential benefits of a study while keeping impacts to a minimum.

One aspect of this awareness is an understanding of NPS policy, which states, "Potential disruption of wilderness character will be considered before, and given significantly

more weight than, economic efficiency." Conducting research in wilderness with minimal impact sometimes involves more time, money, or effort than in non-wilderness. Unless these factors are included in study design and budget, conflict with the agency is likely.

The presence of a research institute in the park will allow us to communicate with some researchers earlier in the process, and partially mitigate this problem. The majority of researchers will continue to come from outside the park, however, and in these cases, no mechanism exists for managers to communicate with researchers prior to the permit application process.

### Failure to Remove Installations After Study Completion

The Wilderness Act is clear that permanent installations should be kept to an absolute minimum, and policy directs that devices be removed when they are no longer "essential," yet many researchers insist that their plot markers and/or instrumentation be permanent, because of some indefinable future value. Perhaps worse, evidence suggests that few among those who are permitted to install temporary structures bother to remove inexpensive ones. The park simply doesn't have the staff to follow-up, and incentive is lacking for researchers to spend time traveling to remote locations to remove inexpensive markers and devices. The result is that in the Yosemite Wilderness, there are thousands of tree tags, plot markers and other scientific litter, some of which is substantial (large stream gauging stations, remote enclosures, 20 foot [6 m] steel marker poles). While a fraction of these may still have some scientific value, most do not due to changes in technology, lack of provenance, deterioration of the installation, or plain lack of interest by the scientific community.

### Difficulty in Assessing Benefits

Benefits of research are often more abstract and therefore more difficult to quantify. Managers are put in the position of trying to assess benefits with little knowledge or training in the relevant field, and often resort to asking the researcher, who, of course, places a very high value on those benefits. NPS policy uses benefits as a standard, but that standard is ill defined. For instance, NPS Management Policies allow research and monitoring devices to be installed and operated in wilderness "when the desired information is essential for the administration and preservation of wilderness...." What does "essential" mean in this case? That the research answers a specific management question? That it contributes to a general understanding of the ecosystem? Or that it only contributes to a better general understanding of larger natural processes?

Despite these obstacles, there are situations in which the benefits should be carefully weighed against the impacts before proposals are approved: 1). When the impacts are significant enough to merit a separate Minimum Requirement Analysis; and, 2) When cumulative impacts approach standards, thereby limiting the amount of research that can be conducted in an area. For these situations, the benefits



matrix developed by Landres (2000) should prove to be a useful starting point.

## Conclusions

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During a recent discussion on this topic, an NPS scientist recited a litany of looming environmental crises and reached the conclusion that “nature is dying.” The implication being that in the face of such a crisis, benefits derived from research so greatly outweighs the impacts that any research in wilderness should be allowed. Yet it is the wildness of these areas, as defined in the Wilderness Act, that give them much of their value, both as core protected areas to perpetuate natural processes and preserve biodiversity and as areas that are valuable for scientific inquiry. Keeping these areas wild also maintains public support for designated wilderness.

Wilderness needs science, and science needs wilderness. But care is needed to safeguard the values that are embodied in the Wilderness Act. Better communication and understanding between the wilderness management and research communities can go a long way in preserving such values.

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# Measurement of Water Quality of High-Altitude Wilderness Streams: Cloud Peak Wilderness, Bighorn National Forest, Wyoming

Karen Ferguson

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**Abstract**—The measurement of water quality and stream health in wilderness areas is made difficult by the need to use non-motorized modes of travel. In Wyoming, data on streams in the high-altitude Cloud Peak Wilderness are scarce. The monitoring of stream health of the Tongue, Powder and Big Horn Rivers at lower altitudes can be made more meaningful by the collection of baseline data on chemical and biological factors upstream in the tributary creeks of the Cloud Peak Wilderness.

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## Introduction

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In the past 5 years, volunteers of the Cloud Peak Chapter of Wilderness Watch have sampled 21 streams within or just outside the Cloud Peak Wilderness. Methodology was supplied by employees of the Water Quality Division of the Wyoming Department of Environmental Quality (WYDEQ), and training was provided by WYDEQ volunteers. Cumulative assessment of habitat, water quality, benthic macroinvertebrate populations and general land use observations suggest that several of these wilderness streams should be candidate “reference sites,” while others are potential “reference sites” for stream health in Wyoming.

## Methods

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1. These chemical parameters of samples collected onsite were measured by a contract laboratory: turbidity, total suspended solids (TSS), total chloride, total sulfate, total phosphorus, alkalinity, hardness, total nitrate nitrogen.

2. These parameters were measured onsite: pH, conductivity, air and water temperature, dissolved oxygen, current velocity, discharge in cu ft/sec.

3. Samples of benthic macroinvertebrates (bugs) were collected in a Surber sampler and preserved in alcohol for identification by a contract laboratory.

4. Habitat assessment included responses to questions designed to illustrate the ability of the habitat to support fish

and other aquatic organisms, and the stability of the stream to erosion and other factors. The type of stream substrate (sandy, rocky, silted) was described quantitatively.

5. Photos and field notes documented the physical appearance of the area, and GPS positioning coordinates pinpointed the location for future resampling.

## Results

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As would be expected, these high-altitude streams showed none of the hallmarks of chemical pollution (chloride, sulfate, phosphorus, high nitrogen, high total suspended solids or turbidity). Fish were present, often in abundance; the pH ranged from 7.6 to 8.3 and dissolved oxygen was sufficient to support aquatic life. Even though some data were collected in the Wyoming drought years of 2000–2002, with correspondingly low discharge rates, these streams were generally healthy.

Benthic macroinvertebrates were identified from many expected taxa: Chironomidae (midges), Trichoptera (caddisflies), Ephemeroptera (mayflies), Plecoptera (stoneflies), Tipulidae (crane flies), Coleoptera (riffle beetles), and Acari (worms).

Many of the 115 taxa that were identified are restricted to cold streams that are low in pollutants. The presence of these organisms is a good indicator of the absence of significant pollution. Also, there was very little occurrence of pollution-tolerant organisms (leeches and oligochaete worms).

The studies of eleven creeks carried out from 2000–2002 have been published as a technical report by the Cloud Peak Chapter of Wilderness Watch, available to any interested group or agency by writing to Cloud Peak Wilderness Watch, P. O. Box 6773, Sheridan, WY 82834. Further data on ten creeks assessed in 2004–2005 will be published at a later date, after evaluation.

## Discussion

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Because of the increased need for scientific information about the National Forests and Wildernesses, and the decreased budgets of the agencies that administer these public lands, the volunteers of Cloud Peak Wilderness Watch have accepted a challenging role in collecting unique data. Volunteer teams transported field equipment by backpack and/or llama pack train into remote areas, conducted a series of assessments, and returned field samples for analysis by contract labs.

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Karen Ferguson, Cloud Peak Chapter, Wilderness Watch, Sheridan, WY, U.S.A.

In: Watson, Alan; Sproull, Janet; Dean, Liese, comps. 2007. Science and stewardship to protect and sustain wilderness values: eighth World Wilderness Congress symposium: September 30–October 6, 2005; Anchorage, AK. Proceedings RMRS-P-49. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

The need for volunteers in protecting wilderness values cannot be underestimated. One way we can contribute is by filling the need for information otherwise not accessible by traditional agency methods and personnel. Our project can fulfill the need for “good science” to support the decisions of land managers who are charged with protecting our resources. It is also important for those who need wilderness to be “out there” in the field, enjoying the resource that we

work to protect, so that we are stimulated to advocate for wilderness values.

## Acknowledgment

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We gratefully acknowledge the National Forest Foundation and Wal-Mart for their financial support of this long-term project.

# Shrinking Wild Lands: Assessing Human Intrusion in the Highlands of Scotland, 1870 to 2004, Using Geographical Information Systems

Steve Carver  
Mark Wrightham

**Abstract**—Wild land in Scotland has been subject to steady attrition due to various types of development. This paper explores approaches that might be used to describe this attrition in Scotland, in order to promote more informed debate and assist policy development. Current digital map databases showing roads, bulldozed trails, plantation forest and hydropower schemes were backdated using historic maps, allowing these developments to be quantified in the Affric-Kintail-Knoydart area in the late 19<sup>th</sup> century, the 1950s and at the present time using Geographical Information Systems. Accessibility modeling and viewshed analysis are used to assess the influence of these developments on remoteness, and the extent of land free of such visible features, at these indicative time points. Land considered remote from roads or bulldozed trails has decreased over the last 100 years, although estimates are sensitive to the chosen analytical method. Land without visible trails, plantations and hydro schemes has also decreased by between 30 and 39 percent over this period. This provides quantitative support to the widespread perception that the Scottish wild land resource has experienced progressive incursion by hydro schemes, afforestation and road/track construction over the last 100 years.

## Introduction

The uplands are highly valued hallmarks of Scotland, often combining spectacular landscapes with wildlife of high conservation importance, and providing a major focus for outdoor recreation. Against this general background, however, a number of areas are particularly remote and rugged, and have consequently experienced relatively little obvious human intervention. The distinctive aesthetic qualities of the Scottish hills are particularly strongly expressed in these areas, which are now widely referred to as 'wild land.'

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In: Watson, Alan; Sproull, Janet; Dean, Liese, comps. 2007. Science and stewardship to protect and sustain wilderness values: eighth World Wilderness Congress symposium: September 30–October 6, 2005; Anchorage, AK. Proceedings RMRS-P-49. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

The profile of wild land has gradually risen in recent decades because of several contributory factors. The total Scottish wild land resource has been subject to progressive attrition due to various types of development, including hydropower schemes, afforestation and the construction of bulldozed tracks. This trend has been paralleled by a steady growth in outdoor recreation and in turn, public awareness, with the emergence of active voluntary organizations that champion the importance of wild land.

Wild land is increasingly reflected in land use and planning policy in Scotland. National Planning Policy Guideline (NPPG) 14, published in 1999, highlights the value of wild land, indicating that local authority development plans should identify and protect such areas (Scottish Office 1999). In order to support this initiative, Scottish Natural Heritage (SNH) has recently produced a Policy Statement on Wilderness in Scotland's Countryside (SNH 2002).

Similar trends have been recognized in other countries, and mapping generated by the Norwegian Directorate for Nature Management has demonstrated the decline in 'encroachment-free countryside' in Norway during the last century (Brun 1986). There is, however, a lack of quantitative data on historic changes in the Scottish wild land resource. This report describes a pilot study of the use of Geographical Information Systems (GIS) and historical map data to assess changes that are likely to have affected wild land in a selected area of the western Highlands over the last 100 years.

Wild land is widely thought to have experienced historic attrition associated with various types of development, including afforestation, water impoundment for hydropower generation and the construction of bulldozed tracks and ski facilities (Aitken and others 1992). Development trends have altered over time and while some of these influences have declined, others, such as the construction of telecommunications masts and wind farms, have recently risen to prominence. Wild land is likely to be very hard, and perhaps impossible, to re-create, and it is therefore important to consider the cumulative effect of these developments on this finite resource. The incremental nature of such changes also implies that their collective impact can only be assessed with a relatively long-term perspective.

A number of previous studies have sought to map wild areas at different spatial scales, both in Scotland and elsewhere in the world. Aitken (1977) used a number of techniques,

including published maps and local knowledge, to identify wild and remote areas of the Scottish Highlands, while McCloskey and Spalding (1989) used basic GIS datasets on transportation and settlement derived from the Digital Chart of the World (DCW) to map wilderness areas at a global scale. Lesslie and Maslen (1995) used GIS to develop and map a wilderness continuum for Australia based on remoteness from settlement and mechanized access, absence of human artifacts and naturalness of the vegetation cover. The resulting maps have been used as the basis for the Australian Heritage Commission's (AHC) National Wilderness Inventory (NWI). Fritz and others (2000) used GIS-based multi-criteria evaluation (MCE) techniques and fuzzy-models to map public perception of wild land in Scotland at a local level within the Mar Lodge estate, and extended this methodology to a United Kingdom (UK) and European scale. Carver and others (2002) further developed the mapping of public perception of wild land by making GIS and relevant wild land datasets available on the web (see <http://www.ccg.leeds.ac.uk/wild/>). Finally, Sanderson and others (2002) have developed a 'global human footprint,' using recently available global datasets that map impacts on the natural environment from settlement, transport and agriculture. This analysis has been used to map the "last of the wild" where human influence is least pronounced.

Very few previous studies have attempted a quantitative assessment of historic trends in the extent of wild countryside. A notable exception is a study by the Norwegian Directorate for Nature Management (Brun 1986) that applied the simple methodology of tagging features on a GIS database according to their dates of origin, as a basis for retrospective mapping of 'encroachment-free countryside' at particular dates. Encroachment-free countryside was primarily defined on the basis of remoteness, as land more than 5 km (3 miles) from the nearest road, railway line or regulated water course. The total extent of such land in Norway is shown to have been greatly reduced over the past 100 years. In Scotland, Watson (1984) documented the expansion of bulldozed tracks in the Cairngorms area between 1960 and 1982. Within this study area, such developments collectively resulted in a 77 percent reduction in the extent of land more than 3.2 km (2 miles) from the nearest vehicular track or road.

The Scottish Natural Heritage commissioned this current study to explore approaches that might be used to assess the collective impacts of a wider range of developments on wild land throughout Scotland. This analysis was intended to stimulate more informed debate and assist policy development. The perception of wild land varies between individuals, reflecting a wide range of cultural and environmental factors, and is consequently very difficult to assess by hard quantitative measures. It is therefore important to note that this study merely investigates the cumulative effects of certain types of development on the extent of remote countryside, and on the visibility of features that are of obvious human origin. These attributes are commonly linked to the perception of wild land, but do not exclusively define such areas. These parameters are compared by similar methods at different time points, which should lead to valid estimates of their *relative* effect on the wild land resource before, during and after the 20<sup>th</sup> century.

## Methods

The study was based on the subtraction of features from present-day GIS datasets by visual comparison with archived Ordnance Survey (OS) maps, to obtain directly comparable datasets corresponding to indicative dates of pre-1900 and the 1950s. These were used to compare the extent of remote areas, and land without visually obvious human developments, at these times and at the present day. The analysis focuses on roads and tracks, hydropower schemes (and associated overhead power lines) and plantation forestry. The effects of more recent developments such as telecommunication masts and wind farms have not been considered, owing to a lack of suitable datasets. All analyses were carried out using ArcGIS.

The pilot project was based on the Affric, Kintail and Knoydart area, which has been subject to a variety of land use and development during the 20<sup>th</sup> century. The study area was defined as the block of land bounded by the Kyle of Lochalsh–Loch Carron–Achnasheen–Muir of Ord–Cannich–Drumnadrochit–Fort William–Mallaig roads, with the mainland coast forming the western limit (fig. 1). The study area covers approximately 4,189 km<sup>2</sup> (1,617 square miles), including several large inland lochs (lakes).

A number of contemporary datasets provided the starting point for this analysis. Roads and tracks were derived from OS 1:50,000 vector data, OS 1:50,000 color raster data, and SNH data on private roads, which were also of OS origin.

a

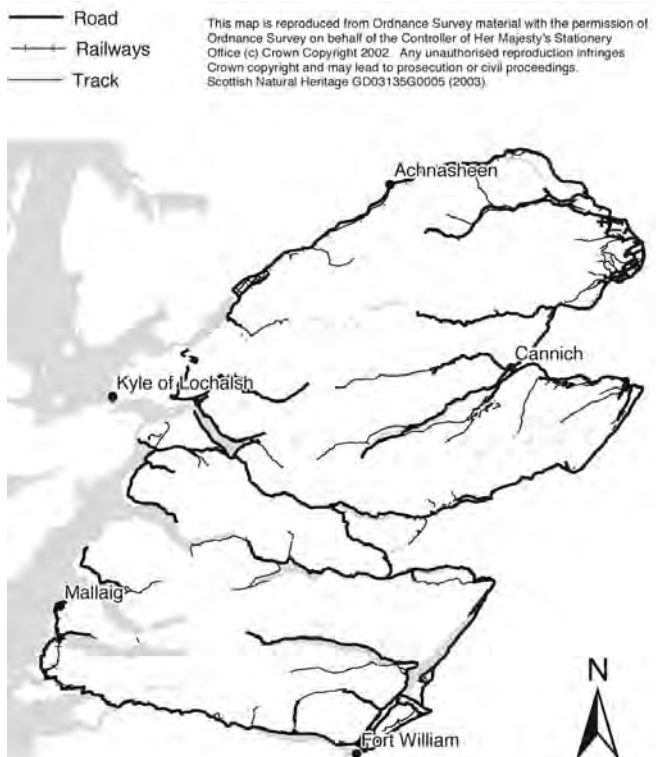


Figure 1—The study area: Affric, Kintail, and Knoydart areas, Scotland.

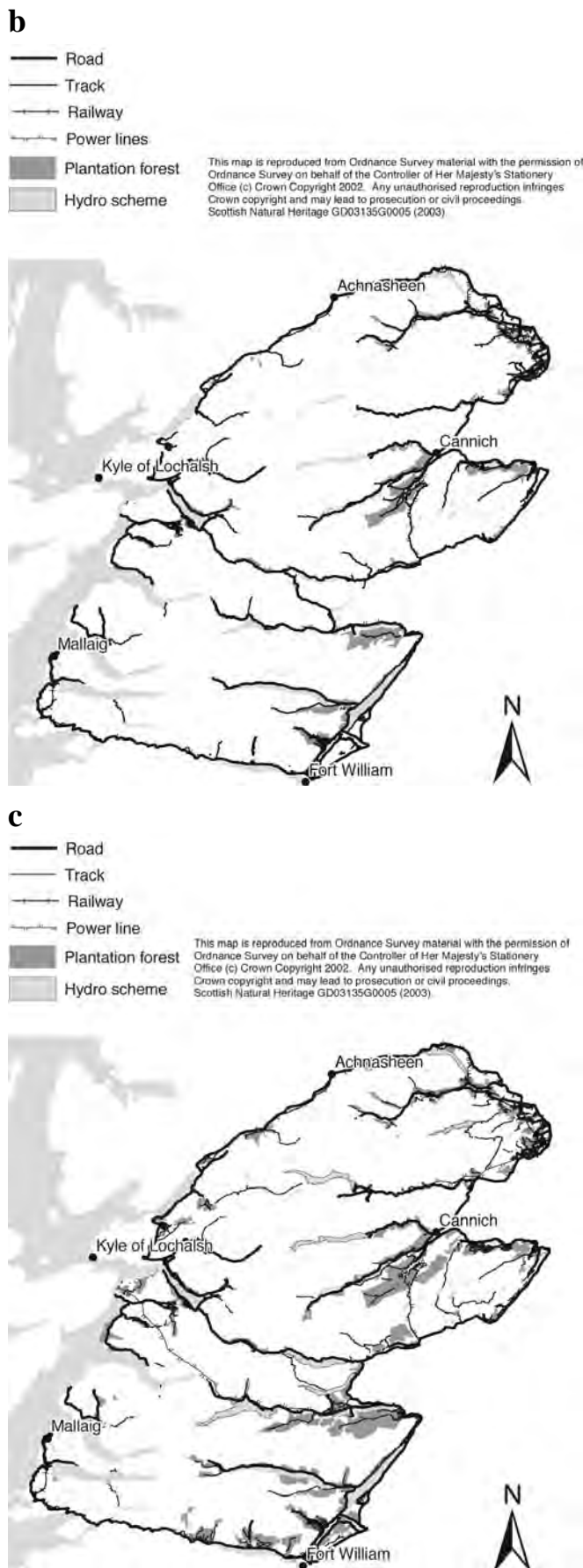


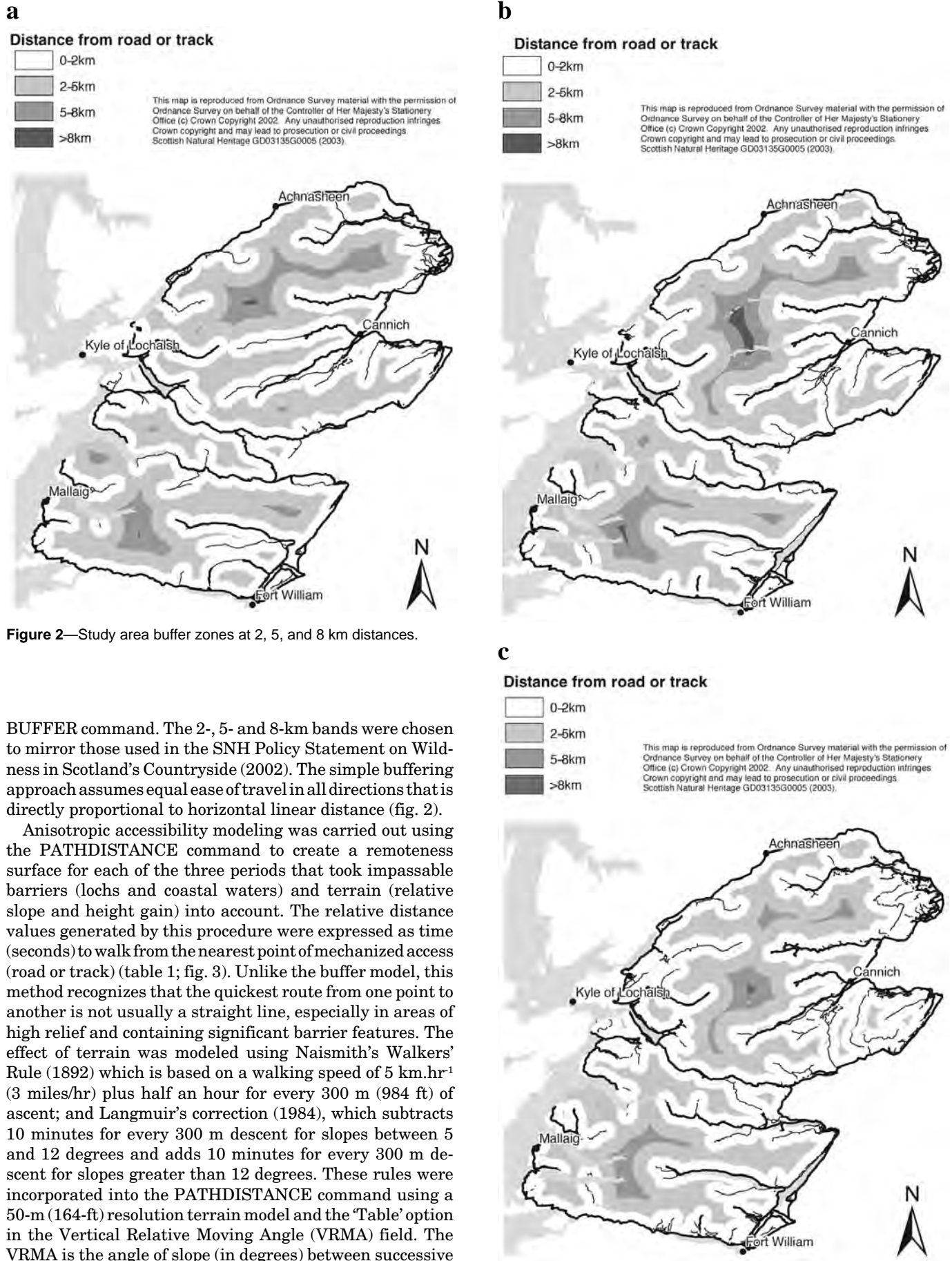
Figure 1—Continued.

Lochs and conifer plantations were derived from SNH loch data of OS origin and the Caledonian Partnership Woodland Inventory (CPWI), respectively. The latter features were defined as the CPWI woodland categories with at least 80 percent planted trees. The indicative dates of pre-1900, 1950s and the present day were chosen to encompass a period of considerable social, economic and technological change in convenient 50-year intervals, and to reflect the availability of archived maps. Data corresponding to the pre-1900 and 1950s time points were derived from the above datasets by visual comparison with Victorian OS 1 inch to 1 mile (1:63,360 scale) maps dating from the 1870s to 1890s, and 1954 to 1955 OS 1 inch to 1 mile (1:63,360 scale) Seventh Series maps. The present day dataset was also refined by checking the original GIS data, where possible, against more recent maps, and some features known to exist as a result of very recent development were added by onscreen digitizing. Examples include the upgrading of some paths to bulldozed tracks where this was known to have occurred. There were no complete or readily available data for other types of development, but overhead power lines were readily identifiable from current mapping and were also therefore digitized and included in the analysis. Certain types of features sometimes disappeared from the map record over time, including roads or tracks that have fallen from use or that have been “drowned” by hydropower schemes. These features did not appear in the present-day GIS data and were therefore digitized onscreen, using the OS 1:50,000 color raster maps as a backdrop guide.

Individual features (line segments or polygons) in map layers corresponding to each type of development were individually tagged with a start and end date according to their occurrence at the three indicative time points. Maps showing the location of roads/tracks, railways, plantation forest, hydro schemes and overhead power lines at each of the three periods (pre-1900, 1950s and present-day) were then obtained by simple reselection from the date-tagged GIS data layers (fig. 1). These can be used to assess overall trends by simple visual comparison.

A key characteristic commonly associated with wild land is remoteness or inaccessibility (SNH 2002). Remoteness can be defined geographically as the distance from the nearest point of mechanized access and, more specifically, the time taken to walk into a roadless area (Carver and Fritz 1999). Three methods of mapping remoteness were used in conjunction with the date-tagged GIS data layers for roads and tracks, to assess the attrition of this key wild land value over the last 100 years and determine the feasibility of further analyses of this type. The methods used include simple buffer zones and a more complex accessibility model that may be described as ‘anisotropic’ (in other words, assuming variable direction and speed of movement). The simple buffering method assessed remoteness in terms of distance from the nearest point of mechanized access, and did not take terrain variables into account. The anisotropic accessibility model, by contrast, was based on an application of Naismith’s Rule in conjunction with a detailed terrain model, to produce more realistic time/access surfaces that took account of barrier features, relative slope and typical walking speeds (Carver and Fritz 1999).

Simple linear buffer zones were drawn around the roads and tracks in the GIS database at 2-, 5-, and 8-km (1-, 3-, and 5-mile) distances for each of the three periods, using the



**Figure 2**—Study area buffer zones at 2, 5, and 8 km distances.

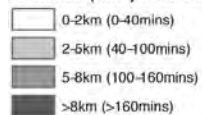
BUFFER command. The 2-, 5- and 8-km bands were chosen to mirror those used in the SNH Policy Statement on Wilderness in Scotland's Countryside (2002). The simple buffering approach assumes equal ease of travel in all directions that is directly proportional to horizontal linear distance (fig. 2).

Anisotropic accessibility modeling was carried out using the PATHDISTANCE command to create a remoteness surface for each of the three periods that took impassable barriers (lochs and coastal waters) and terrain (relative slope and height gain) into account. The relative distance values generated by this procedure were expressed as time (seconds) to walk from the nearest point of mechanized access (road or track) (table 1; fig. 3). Unlike the buffer model, this method recognizes that the quickest route from one point to another is not usually a straight line, especially in areas of high relief and containing significant barrier features. The effect of terrain was modeled using Naismith's Walkers' Rule (1892) which is based on a walking speed of 5 km.hr<sup>-1</sup> (3 miles/hr) plus half an hour for every 300 m (984 ft) of ascent; and Langmuir's correction (1984), which subtracts 10 minutes for every 300 m descent for slopes between 5 and 12 degrees and adds 10 minutes for every 300 m descent for slopes greater than 12 degrees. These rules were incorporated into the PATHDISTANCE command using a 50-m (164-ft) resolution terrain model and the 'Table' option in the Vertical Relative Moving Angle (VRMA) field. The VRMA is the angle of slope (in degrees) between successive

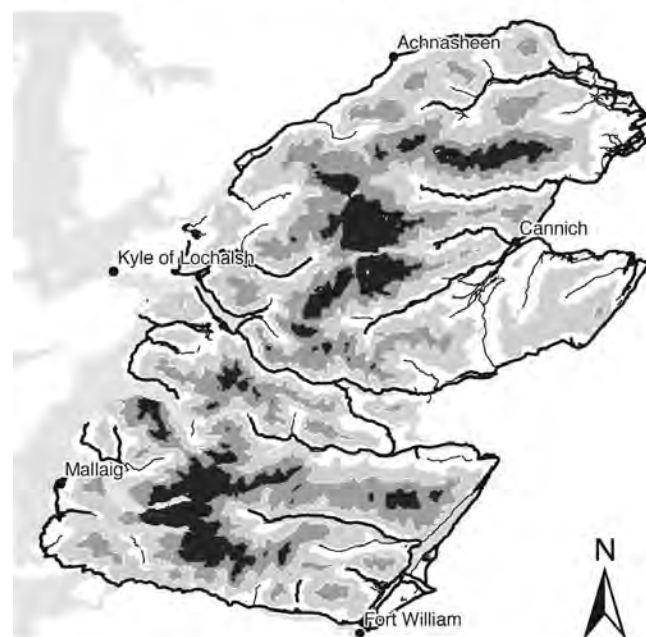
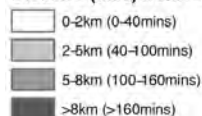


**Table 1**—Naismith's Rule as expressed in the vertical relative moving angle (VRMA) field.

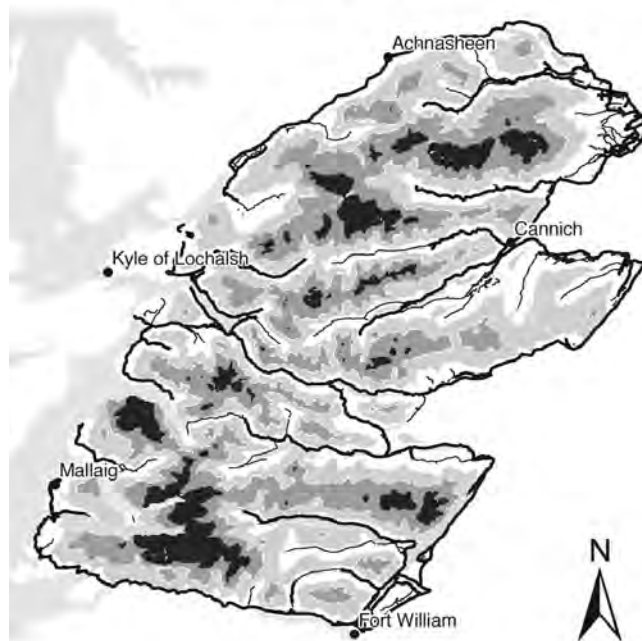
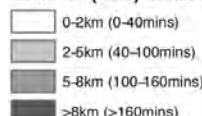
Vertical relative moving angle	Vertical factor
(degrees)	(VF)
-40	2.21
-30	1.83
-20	1.53
-12	0.69
-11	0.72
-10	0.75
-9	0.72
-8	0.8
-7	0.82
-6	0.85
-5	1.0
0	1.0
10	1.76
20	2.57
30	3.49
40	4.62

**b****Distance (time) from road or track**

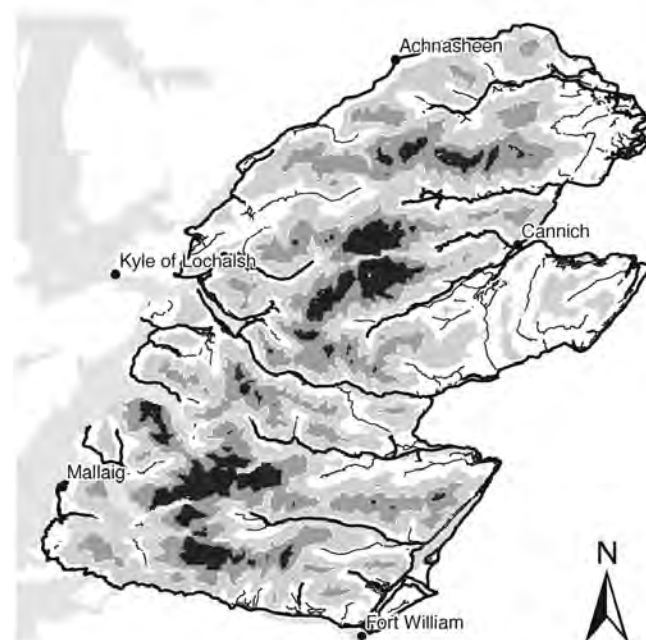
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**a****Distance (time) from road or track**

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**c****Distance (time) from road or track**

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**Figure 3**—Anisotropic accessibility modeling.

points along a route and was translated into a correction factor (referred to as the 'vertical factor') to indicate relative walking time as shown in table 1. Barriers to travel on foot (coastal or inland waters and slopes in excess of 40 degrees) were included by incorporating these as 'no data' values in the cost surface (the GIS data layer which describes the relative walking time between different points), so that the time taken to negotiate such an obstacle is effectively based on walking around its edge. The surfaces generated were then reclassified into three bands similar to those used in the simple and advanced buffering methods, on the basis of the equivalent time taken to walk 2, 5 and 8 km on flat terrain (assuming 5 km.hr<sup>-1</sup>).

The potential visibility of human developments can be estimated using a terrain model and the GIS to derive maps of the areas from which roads, tracks, railways, plantation forests, hydro schemes and associated overhead power lines can be seen (referred to as a "viewshed"). A variety of other features could also result in adverse visual impacts on wild landscapes, but the scope of this exercise was limited by the availability of suitable datasets, as noted above. The viewsheds of date-tagged features were calculated using the VISIBILITY command for each of the three periods (fig. 4). This model was applied using two alternative distance thresholds, assuming the maximum distance at which any feature has a noticeable impact to be either 3 or 5 km (2 or 3 miles). These values were chosen

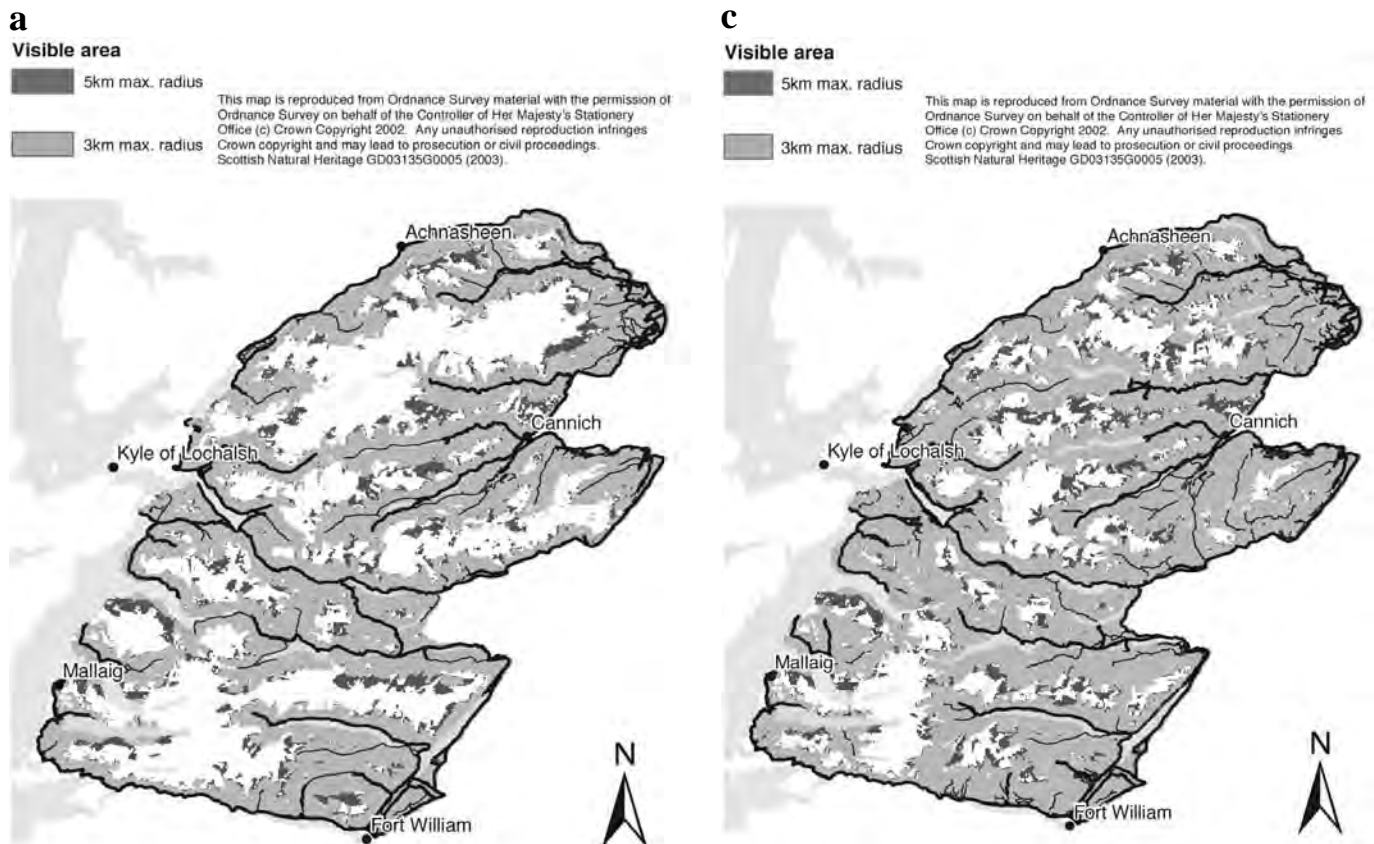


Figure 4—The viewsheds of two alternative distance thresholds.

for illustrative purposes and were judged to represent reasonably conservative, and hence robust, estimates of the distance from which such features would be visually prominent in the landscape of the study area. The 3-km threshold is roughly equivalent to the 2-mile buffer used by Watson (1984) to assess the visibility of bulldozed hill tracks in the Cairngorms. Input features were generalized to a 250 m (820 ft) resolution point dataset (each point representing the presence of a human feature every 250 m interval) and viewsheds were calculated using a 100 m (328 ft) resolution terrain model, assuming a viewing height (eye level) of 1.8 m (5.9 ft).

Changes in the visibility of these types of development can be assessed by comparing the output maps resulting from the above analyses (fig. 4). These changes were also quantified using map overlays to derive comparative statistics for successive time periods.

## Results

Figure 1 indicates the extent and location of roads/tracks, hydro schemes and forestry plantations at the three indicative time points, based on the date-tagged GIS data. Comparison of the maps from each of the different periods suggests that a number of tracks which might have been present in the late 19<sup>th</sup> century have subsequently been lost through disuse, although this conclusion is complicated by the difficulty of interpreting the Victorian maps; this point is considered further below. This apparent trend has, however, been more than offset by increased construction of bulldozed tracks and, very locally, public roads, in the post-war period. Significant sections of new bulldozed track include the recent upgrading of 10 km (6 miles) of former path from Bendronaig Lodge, Attadale to Pait Lodge on Loch Monar, in the north of the study area. Many smaller sections of new track have been associated with plantation forestry in various parts of the area. New road developments between the 1950s and present-day periods include the A890 along the side of Lochcarron, at the northwestern edge of the area, and a new section of the A87 Fort William–Kyle of Lochalsh road, which was constructed to replace the old route after the development of the Loch Loyne dam and hydro scheme. Overall, the total length of roads in the study area (including the boundary roads) increased by only 3 km (2 miles) between pre-1900 and the 1950s, but by 28 km (17 miles) between the 1950s and the present-day, an overall increase of 31 km (19 miles) over the whole study period. For tracks, the total length increases by only 5 km (3 miles) between pre-1900 and the 1950s, and by 309 km (192 miles) between the 1950s and the present day, an overall increase of 314 km (195 miles) over the whole study period. These net figures mask the apparent losses due to disuse between pre-1900 and the 1950s.

A comparison of the 1950s and present-day data shows the expansion of plantation forest in the post-war period, particularly around Glen Garry and Loch Eil in the southeast of the study area. There is only limited evidence of scattered plantation forestry in the pre-1900 maps, and it was not possible to definitively distinguish semi-natural woodland from long established plantations on this basis. Plantations are therefore excluded from the pre-1900 map. The area of

plantation forest in the 1950s was 156 km<sup>2</sup> (60 square miles) and this increased by 235 km<sup>2</sup> (91 square miles) between this date and the present-day, to a total of 391 km<sup>2</sup> (151 square miles).

A significant amount of hydro scheme development can be seen in the post-war period within the study area. Major developments at Loch Mullardoch and Loch Luichart, in the northern part of the area, are indicated on the 1950s maps. An additional six large hydro developments were completed in various parts of the area between the 1950s and the present day, at Lochs Quoich, Garry, Loyne, Cluanie and Monar and the Orrin Reservoir. One reservoir (Loch Beinn a'Mheadhoin) was excluded from this analysis as the level of this loch is maintained by transfer from other reservoirs and there is consequently no visible draw-down zone. In area terms, the 1950s water impoundments total 17 km<sup>2</sup> (7 square miles) and the further six schemes developed after the 1950s total 73 km<sup>2</sup> (28 square miles) an area increase of 56 km<sup>2</sup> (22 square miles). Some overhead power lines were also added to the distribution network in conjunction with these developments. The total length of these features in the 1950s maps is 108 km (67 miles), increasing to 167 km (104 miles) by the present day.

The analysis of remoteness indicators all suggest that the extent of remote land has generally decreased within the study area over the period from pre-1900 to the present day, due to a net increase in the extent of roads and tracks. This overall picture does however encompass much variation between individual methods, in different geographic areas and in different time periods. The results described below represent increasingly realistic estimates of remoteness as a result of applying more sophisticated models.

Table 2 provides a quantitative summary of historic trends using the simple buffering method, based on areas greater than 2, 5, and 8 km (1, 3, and 5 miles) from the nearest road or track (fig. 2). This analysis shows a net decrease in remoteness over the entire study period in the 2 to 5 and 5 to 8 km distance bands, although there is no net decrease in the >8 km category. These changes are reflected by a corresponding net increase in the extent of land that lies within 0 to 2 km of a road or track. Table 3 provides a quantitative summary of historic trends in the extent of remote land using the anisotropic distance measure (fig. 3). The accessibility surfaces and subsequent reclassification into walking-time equivalents of the 2, 5, and 8 km buffers used above demonstrate the strong effect of mountainous terrain on predicted remoteness. While the overall historic pattern is of reduced size of remote areas, this modeling approach results in the allocation of a greater proportion of the land area to the more remote distance bands, by comparison with simple buffering methods.

Results from the visibility analysis for all the features included in the date-tagged GIS data are shown in tables 4 and 5 and figure 4. The areas outside the viewsheds of one or more such features lack visible development of the types included in the study. The overall pattern is of increasing visibility of such features, with net change appearing relatively small between pre-1900 and the 1950s because of the apparent loss of 19<sup>th</sup> century tracks in some areas during this period. This apparent trend is considered further below.

**Table 2**—Areas greater than 2, 5, and 8 km from the nearest road/track based on simple buffering (km<sup>2</sup>). (Figures in brackets indicate percentage values with respect to the pre-1900 “baseline.”)

	Pre-1900	1950s	Present-day	Change: pre-1900–1950s	Change: 1950s–present-day	Change: pre-1900–present-day
0–2km	2411 (100)	2361 (98)	2689 (112)	–50	+328	+278 (+12)
2–5km	1533 (100)	1505 (98)	1330 (87)	–28	–175	–203 (–13)
5–8km	242 (100)	297 (123)	168 (69)	+55	–129	–74 (–31)
>8km	3 (100)	26 (867)	3 (100)	+23	–23	0 (0)

**Table 3**—Equivalent walking-time areas greater than 2, 5, and 8 km equivalent on flat terrain from the nearest road/track based on anisotropic accessibility modeling (km<sup>2</sup>).

	Pre-1900	1950s	Present-day	Change: pre-1900–1950s	Change: 1950s–present-day	Change: pre-1900–present-day
0–2km	1314 (100)	1308 (100)	1573 (120)	–6	+265	+259 (+20)
2–5km	1443 (100)	1421 (98)	1362 (94)	–22	–54	–76 (–6)
5–8km	1015 (100)	968 (95)	840 (83)	–47	–128	–175 (–17)
>8km	293 (100)	357 (122)	237 (81)	+64	–120	–56 (–19)

Note: Figures in brackets indicate percentage values with respect to the pre-1900 “baseline.” These area figures exclude lochs, which are included in the analysis as barrier features and therefore as “no data” values. The pre-1900, 1950s, and present day columns do not therefore add up to a consistent total area, as the overall loch area has increased due to impoundment.

**Table 4**—Trend in area with visible human features (km<sup>2</sup>).

Maximum view distance (km)	Pre-1900	1950s	Present-day	Change: pre-1900–1950s	Change: 1950s–present-day	Change: pre-1900–present-day
3	2069 (100)	2072 (100)	2705 (131)	+3	+633	+636 (+31)
5	2517 (100)	2529 (101)	3166 (126)	+12	+637	+649 (+26)

**Table 5**—Trend in area without visible human features (km<sup>2</sup>).

Maximum view distance (km)	Pre-1900	1950s	Present-day	Change: pre-1900–1950s	Change: 1950s–present-day	Change: pre-1900–present-day
3	2120 (100)	2117 (100)	1484 (70)	–3	–633	–636 (–30)
5	1672 (100)	1660 (99)	1023 (61)	–12	–637	–649 (–39)

## Discussion

Subject to technical limitations, the maps of different classes of development at the three indicative time periods (fig. 1) have a clear, objective foundation. The maps of remoteness and visibility embody a number of assumptions that are more open to alternative interpretation. These assumptions have therefore been kept relatively simple in order to maximize the robustness and transparency of the analysis.

The simple buffering approach leads to contrasting estimates of the extent of remote land, which are most noticeable in the >8 km distance bands (table 1). These differences are primarily attributable to the inability of simple buffering to adequately represent the true remoteness, in practical terms, of much land in Morar and Knoydart, in the southeast of the study area. The coastline hereabouts is indented by long fjord-like sea lochs, and the effective remoteness of much

land is greater than would be suggested by simple assessments based on linear distance from access points.

The second approach to the assessment of remoteness was, by contrast, based on modeling of walking times in conjunction with terrain, with reclassification of the resulting data into notional distance bands that reflected equivalent walking times on level ground. The benefits of this more sophisticated approach do not necessarily outweigh the simplicity and transparency of the advanced buffering method, although omission of the final reclassification step would perhaps make the output easier to interpret. This method was only applied to land beyond the extent of vehicular tracks, allowing a more direct comparison with the simple and advanced buffering approaches. This method could, however, be applied to all land beyond the roadside access points commonly used by hill walkers, thus including the effects of the tracks themselves on approach walks through the glens concerned. This type of analysis would reflect actual patterns of use,

and the impact of such tracks on remoteness as perceived by recreational users, and could strengthen the case for modeling approaches based on walking time rather than distance. It is perhaps worth noting that both the advanced and anisotropic approaches assumed that lochs present an impassable barrier. This assumption is not universally true, as kayaks or other boats are occasionally used to approach the more remote hills, but the number of recreational users involved is thought to be very small.

The analysis of the visibility of human features included plantation forestry and water impoundment in addition to vehicular tracks. This analysis did however exclude certain types of development and land management activities that can have significant visual effects on land of otherwise wild character. These include isolated buildings, telecommunications masts, deer fences, aquaculture, smaller scale hydro schemes and the effects of grazing, drainage and muirburn, all of which occur to varying extents within the study area. The resulting assessments are therefore likely to significantly underestimate the extent of visible human features at the present day.

The lower 3-km distance threshold adopted for this analysis is comparable to the 2-mile threshold used by Watson (1984) in his study of the impact of hill tracks in the Cairngorms. This value, and the higher 5-km (3-mile) threshold, are nonetheless relatively conservative with respect to certain types of development, and some features, such as strongly linear tracks, angular conifer plantations or reflective pipework associated with hydro schemes, can be highly visible from much greater distances. This consideration would also suggest that the increase in the visibility of human development is, if anything, underestimated by this analysis.

## Conclusions

The results of this pilot study provide quantitative support to the widespread perception that the Scottish wild land resource has been eroded over the last 100 years due to incursion by hydro schemes, afforestation and road/track construction. With the exception of the unrepresentative analysis based on simple buffering, these results suggest that the extent of remote land within the study area has decreased over the last century, with an overall reduction of 30 percent in the area of land more than 5 km (3 miles) from a road or track, by the nearest practicable route. The extent of land without visible development of any of the above types has also decreased by between 636 km<sup>2</sup> (246 square miles) (30 percent) and 649 km<sup>2</sup> (251 square miles) (39 percent) over this period, depending on the distance thresholds applied. The scale of change has been much greater during the latter half of the 20<sup>th</sup> century.

The parameters included in this analysis do not define wild land when considered in isolation, and this quality also depends on a number of other physical attributes, such as terrain and vegetation, and perceptual responses, including a sense of solitude or physical challenge. There is, however, widespread agreement that these parameters are closely associated with wild land (Aitken and others 1992; NTS 2002; SNH 2002), and much land in Affric, Kintail and Knoydart is highlighted as a search area for wild land in the

SNH Policy Statement of 2002. Numerous mountaineering guidebooks also highlight the presence of these qualities in this part of the western Highlands, and particularly in Knoydart and adjoining areas (for example, Bennet 1983; Murray 1987). The development trends considered in this report have therefore almost certainly influenced the extent and quality of important wild land areas.

Taken at face value, these results suggest that the overall increase in vehicular tracks could conceal complex local trends, and that some former tracks may have contracted or disappeared during the early 20<sup>th</sup> century. This may well be the case in some areas, where former tracks could have been linked to pre-Clearance settlements, reflecting the complex land use history and cultural heritage of many areas which are now valued for their wild character. In practice, however, some apparent Victorian tracks may be map interpretation artifacts resulting from the difficulties noted above.

The overall trends in development identified in this study area highlight certain differences with respect to other parts of the Scottish uplands. Some new tracks within this area have been associated with sporting estates, but most of these developments have been linked to new forestry schemes. This situation contrasts with the position in the Cairngorms, where a considerably greater increase in new tracks occurred during the 1960s, 70s and 80s alone (Watson 1984). The construction of new tracks in the latter area was much more strongly associated with stalking and grouse shooting, although a small proportion was linked to other built development, or to forestry. The historic increase in water impoundment within the present study area is, by contrast, likely to represent the upper end of the range of variation within Scotland, as few other upland areas have experienced such concentrated large scale hydro development during the 20<sup>th</sup> century. The extent of afforestation in this area is relatively modest by comparison with other parts of the Highlands, such as Argyll, and the Southern Uplands. In broad terms, the combined net impact of human developments within this area is therefore likely to reflect wider trends affecting wild land throughout Scotland.

The many large hydro schemes within this area represent a legacy of earlier development trends that have now almost ceased. A range of present day developments continues, however, to exert pressures on wild land. Most recent hydro development has been relatively small scale in nature, but such schemes can nonetheless result in significant detrimental effects on the wild qualities of such areas. The construction of vehicular tracks continues sporadically, and new tracks have recently appeared in the Monar-Pait area. Vehicle tracks are not always deliberately constructed, and have developed in some areas due to repeated use of all-terrain vehicles. The balance of new afforestation has shifted to new native woodland schemes across much of upland Scotland, but the associated deer fencing and ground preparation sometimes creates new and highly visible features on the short-medium term. Relatively recent innovations such as aquaculture development, telecommunications masts and wind farms could also contribute to the attrition of wild land if sited inappropriately. This study highlights the cumulative erosion of wild land over a long period of time, emphasizing the need to safeguard this resource from a wide range of incremental development.

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# Wilderness Recreation Participation: Projections for the Next Half Century

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**Abstract**—This paper explores the influence of demographic and spatial variables on individual participation in wildland area recreation. Data from the National Survey on Recreation and the Environment (NSRE) are combined with GIS-based distance measures to develop nonlinear regression models used to predict both participation and the number of days of participation in wilderness and primitive area recreation. The estimated models corroborate previous findings indicating that race (black), ethnicity (Hispanic), immigrant status, age, and urban dwelling are negatively correlated with wildland visitation; while income, gender (male), and education positively affect wildland recreation participation and use. The presence of a distance or proximity factor mitigates some of the influence of race and ethnicity. The results of the cross-sectional models are combined with U.S. Census (2004) projections of total population, changes in population characteristics, and with estimates of current National Forest Wilderness visitation estimates

to give some insight into pressure that might be expected on the nation's designated Wilderness during the next half century. Results generally indicate that per capita participation and visitation rates will decline over time as society changes. Total Wilderness participation and visitation will, however, increase but at a rate less than population growth.

## Introduction

According to some, visits to Wilderness and primitive areas are increasing in the United States (Taylor 2000). Recreational use of the original 54 Wilderness areas, as designated by the Wilderness Act of 1964, increased by 86 percent between 1965 and 1994 (Cole 1996). Participation monitoring has demonstrated that Wilderness use was increasing faster than outdoor recreation use in general (Watson and others 1989). Recent trends indicate that visitor use of Wilderness is still increasing and will continue to increase with additional designations (Watson and Cole 1999). Recreation use of National Forest (NF) Wilderness grew 9.6 percent annually between 1965 and 1974 and by 10 percent annually between 1975 and 1985. After 1985, as designation leveled off, the increase in use grew more slowly with an increase of 8.4 percent by 1993. The same pattern was seen in National Park Service (NPS) Wilderness use following designation (Cordell and others 1999a). Cordell and Teasley (1998) conservatively estimated 40.4 million visits to Wilderness or other primitive areas for 1995. Future estimates show increased use per acre and an increase in the number of people who want to experience the opportunities afforded by Wilderness (Cordell and others 1999b).

Alternatively, recent and continuing changes in the ethnic fabric of U.S. society raise questions about culturally induced shifts in outdoor recreation preferences and a subsequent decline in Wilderness visitation (Johnson and others 2004; Murdock and others 1990; Taylor 2000). In-depth analyses and understanding of shifting social, spatial and economic variables, as well as impacts of growing demand for Wilderness or other primitive area recreation are needed to inform

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Wilderness and other public land managers about potential user conflicts and pressures on the resource. Moreover, information about the number of future users can serve as a potential barometer for societal support for maintaining recreation access to the NWPS, though not necessarily as a measure of support for its other statutory purposes.

In this study, statistical models for individual participation in Wilderness and primitive area recreation are explored and developed. The influence of socio-demographic and spatial factors on people's decision-making process whether to participate in Wilderness recreation, and if so how often, are also tested. Lastly, estimated models are combined with Census projections of expected changes in total population and population composition over the next half century and NF Wilderness visitation to forecast recreation participation and use on NF Wilderness and the National Wilderness Preservation System (NWPS) overall.

## Data and Methods

This study uses data from a variety of sources. Statistical models were based on data from the National Survey on Recreation and the Environment (NSRE). The NSRE is the eighth of the U.S. National Recreation Surveys started in the 1960s. The current survey started in 2000 and continued through 2004 (Cordell and others 2002). The NSRE is a random-digit-dialing telephone survey of more than 90,000 households nationally. The survey gathers information on a number of outdoor recreation and environmental topics, including outdoor recreation participation, environmental attitudes, natural resource values, attitudes toward natural resource management policies, household structure, lifestyles, and demographics. The data are weighted using post-stratification procedures to adjust for non-response according to age, race, gender, education, and rural/urban strata (Cordell and others 2002). Data for this study were taken from the eighth of eighteen versions of NSRE. This version, containing the relevant participation and use questions, was conducted between March and June, 2001. The total sample size was just under 5,000 observations.

To examine the impact of spatial factors on participation from different areas of the United States, zip code points (ESRI Data & Maps 2000 <http://www.esri.com/>) were matched with respondents' zip codes to create a base location map for respondents. These points were placed at the delivery-based centroid representing 5-digit zip code areas. Zip codes with few or no delivery locations were assigned a single business in the area. The *Wilderness Areas of the United States* boundary map (USGS 2004) was used to locate designated Wilderness areas in relation to respondent zip codes.

Data for participation and use forecasting were primarily obtained from U.S. Census Bureau data from 2004 and were used to determine interim projections by age, gender, race, and Hispanic origin. Woods & Poole, Inc. (2003) data were used to determine metropolitan population projections. National Visitor Use Monitoring (NVUM) survey data (USDA Forest Service 2005) were used to determine the number of NF Wilderness days and NF Wilderness visitors for 2002. These base numbers were used to create an index to project future use.

## Regression Models

Logistic regression was used to describe recreation participation behavior. Participation was based on the probability of a visit to a wildland area in the past year and was modeled as a function of various socio-demographic and spatial explanatory variables. The general form of the logistic equation is:

$$\text{Probability (participate)} = 1/(1+\exp(-XB)) \quad (1)$$

where  $\exp$  represents the exponential function,  $X$  is a matrix of explanatory variables, and  $B$  is a vector of parameters. This type of model is commonly used in recreation and social science research examining individual choice behavior (Bowker and others 1999; Johnson and others 2001; Johnson and others 2004; Miller and Hay 1981).

The binary (yes/no) dependent variable in this model was drawn from the NSRE question, "Did you visit a wilderness or other primitive, roadless area (within the last 12 months)?" Socio-demographic independent variables included in the  $X$  vector were the age of the respondent, gender, whether a person was born in the United States, education level, and household income. The relationship between ethnicity and participation was examined by using three categorical variables for Hispanic, black, and other (American Indian, Asian, Native Hawaiian). Additional variables were used to describe population density of the county of residence (metro or rural) and whether a respondent belonged to an environmental organization. This variable served as a proxy measure for environmental support of Wilderness and other primitive areas. All of the above variables are listed and defined in table 1.

**Table 1**—Variables used in the empirical models.

Independent variables	Definitions
AGE	Age of respondent in years
SEX	Gender; 1 if male; 0 otherwise
HISPANIC	1 if Hispanic; 0 otherwise
BLK	1 if Black; 0 otherwise
OTHER	1 if other; 0 if Black or White
BORNUSA	1 if born in the U.S.; 0 otherwise
EDUC	1 if BS or above; 0 otherwise
URBAN	1 if metro; 0 if rural
INCOME	1. \$4,999 or > 2. 5,000–9,999 3. 10,000–14,999 4. 15,000–19,999 5. 20,000–24,999 6. 25,000–34,999 7. 35,000–49,999 8. 50,000–74,999 9. 75,000–99,999 10. 100,000–149,999 11. 150,000 or <
MEMBER	Member of an environmental/conservation group; 1 if member; 0 otherwise
MILES	Distance to the nearest wilderness area in miles
WILDERN	Willingness to visit wilderness or other primitive areas; 1 if interested; 0 otherwise

An important addition to the NSRE data was the inclusion of a distance or availability proxy variable. The respondent's zip code was used to calculate the distance to the nearest Wilderness area. ArcView 8.3 was used to calculate the distance from each zip code point to the nearest Wilderness area by joining zip code points with the Wilderness areas based on spatial location. This calculates the distance from each point to the nearest Wilderness area. Because the zip code points are delivery based centroids and the distance calculated falls on the nearest point of the closest Wilderness area, these distances are not meant to be exact. They do, however, provide a proxy for availability of a wildland setting. In order to calculate exact distance, more precise information on the respondent's location and the exact location of the Wilderness entrances would be needed. With this information, a network analysis could be performed using the cost weighted direction function, which used road maps to determine the route along the least-cost path that the respondent could take to the closest Wilderness area. Other types of calculations that could be performed with more specific information include straight line distance from the respondent's home to the nearest Wilderness entrance or the cost weighted distance which modifies the straight-line distance by some other factor (for example, elevation).

A negative binomial regression model was used to determine intensity of participation or the number of participation days. Negative binomial models have been used extensively in recreation visitation modeling (Betz and others 2003; Bowker 2001; Zawacki and others 2000). Following Yen and Adamowicz (1993), the negative binomial probability distribution can be represented as:

$$\text{Prob}(Y_i = y_i; y_i = 0, 1, 2, \dots) = \frac{\Gamma(y_i + 1/\alpha)}{\Gamma(y_i + 1)\Gamma(1/\alpha)} [(\alpha\lambda_i)^{y_i} (1 + \alpha\lambda_i)^{-(y_i + 1/\alpha)}] \quad (2)$$

where,  $\lambda_i = \exp(\Omega, X, u_i)$ , with variables as listed for Equation 1,  $\Omega$  is a parameter vector,  $\Gamma$  represents the gamma function, and  $\alpha$  is the over-dispersion parameter. The expected value for the number of days,  $E(Y_i)$  is  $\lambda_i$ , and the variance,  $\text{Var}(Y_i)$  is  $\lambda_i (1 + \alpha\lambda_i)$ . An asymptotically significant  $\alpha$  indicates the presence of over-dispersion, making the negative binomial model appropriate. When the over-dispersion parameter  $\alpha$  is zero, both  $E(Y_i)$  and  $\text{Var}(Y_i)$  are equal to  $\lambda_i$  and the Poisson model is appropriate (Yen and Adamowicz 1993).  $\text{Exp}(u_i)$  is assumed to follow a gamma distribution with mean 1.0 and constant variance (Greene 2000). The dependent variable for this model, also obtained from NSRE data, was the individual's response to, "On how many days did you visit a wilderness or primitive area in the past 12 months?" Those not answering affirmatively to the participation question were assigned zero days. The same explanatory variables that were used to describe participation probability in the logistic regression were used to estimate and project the amount of use (number of days).

## Results

Table 2 contains sample means, both post-sample weighted and unweighted, for data used in the analysis. These means indicate the presence of some response bias according to certain demographic variables. The post sample weighting procedure brings these variables in line with Census values.

**Table 2**—Weighted and unweighted means for explanatory variables.

Variable	Weighted	Unweighted
AGE	42.8	43.7
GENDER	0.474	0.438
BLACK	0.138	0.076
HISPANIC	0.152	0.067
OTHER	0.048	0.038
BORNUSA	0.882	0.945
MEMBER	0.229	0.259
INCOME	6.92	7.09
EDUCATION	0.208	0.320
URBAN	0.793	0.658
MILES	75.7	76.7

The logistic participation and negative binomial days regression models were estimated using LIMDEP 7.0 (Greene 1995). Results of the logistic participation regression are presented in table 3. Quantitative interpretation of the logistic regression parameters is not transparent; hence the last column in table 3 displays the change in probability of participation with a 1-unit change in the relevant explanatory variable. For example, with other factors set to sample means, a male is 12.2 percent more likely than a female to have visited a wilderness or primitive area in the past year. Similarly, a black is 19 percent less likely than a white to have visited this type of site.

Past studies have shown that the typical outdoor recreation participant is white, male, able-bodied, and well educated, with an above average income (Cordell and others 1999; Cordell and others 2005; Johnson and others 2004). The average age among Wilderness visitors is increasing (Watson 2000), but for the general population the likelihood of participation in Wilderness recreation decreases with age (Johnson and others 2004). Also, while the proportion of female participants appears to be increasing (Watson 2000), women are still less likely to visit a wilderness or primitive area (Johnson and others 2004). Past studies have indicated that blacks, Latinos, and Asians are less likely to say that they have ever visited a Wilderness area and that immigrants are less likely than native born respondents to visit Wilderness (Johnson and others 2004). The estimated

**Table 3**—Logistic regression parameter estimates, n = 4400.

Variable (weighted)	Parameter	Std Error	Pr>ChiSq	Change in visit probability
Intercept	-1.99	.291	.0000	-.386
AGE	-.019	.002	.0000	-.003
GENDER	.634	.070	.0000	.122
BLACK	-.986	.122	.0000	-.19
HISPANIC	-.824	.176	.0000	-.159
OTHER	-.585	.182	.0013	-.113
BORNUSA	1.31	.211	.0000	.254
MEMBER	.768	.078	.0000	.148
INCOME	.088	.021	.0000	.017
EDUCATION	.101	.086	.2363	.019
URBAN	-.139	.085	.1039	.026
MILES	-.002	.0006	.0003	-.0004

models corroborate previous findings indicating that income, gender (male), immigrant status (born in the United States), and environmental awareness are all factors positively correlated with wildland recreation participation; while race (black and other), ethnicity (Hispanic), age, and urban dwelling negatively affect wildland recreation participation and intensity. Education does not have a significant impact on the probability of participation.

Although not included in the literature cited above, another factor that is negatively correlated with wildland recreation participation is distance, with the chance of participation decreasing as distance increases. The presence of a distance or proximity factor tends to mitigate some of the influence of race and ethnicity (for example, 5 percent decrease in the black coefficient). Studies indicate that visitors are generally from the state in which the Wilderness area is located and from the closest region in the state (Roggenbuck and Watson 1989). Part of the negative correlation between race and visitation could be due to the geographic distribution of black populations (Johnson and others 2004), hence the importance of including both distance and race in participation models.

Results of the negative binomial regression are presented in table 4. Results indicate that the explanatory variables have similar qualitative effects on wilderness and primitive area visitation days as on the probability of participation. Unlike the logistic regression, interpretation of the parameter estimates for the negative binomial is more transparent. With expected days specified in a semi-log form, parameter estimates can be interpreted as the percentage change in days per a 1-unit change in the explanatory variable. Hence, other factors constant, males can be expected to spend about 42 percent more days per year visiting Wilderness and primitive areas than females. Education has a positive correlation with the number of days that a person visits, but has a more significant impact than on participation. This indicates that the level of education a person has may not significantly impact whether or not a person visits a wilderness or primitive area, but if a person does visit then the number of days increases with amount of education. The only other ambiguity between the results for the logistic and negative binomial regressions was that the variable for other races was not significant in determining the number of days on-site. Other races are less likely to participate than whites,

but more likely than blacks or Hispanics. However, days of participation for other races is not statistically discernable from whites.

## Projections

In order to assess future participation and use of Wilderness, the estimated regression models are combined with projections of explanatory variables from other sources. U.S. Census projections were used to estimate total population and means for age, gender, race (black), ethnicity (Hispanic), other race, native born, and urban dwelling. Projected means for these variables at 10-year intervals are combined with the parameter estimates for the respective participation and days models to develop an index of per capita rates through 2050. These per capita indices are combined with projected population growth to yield indices for total participation and total days on-site for the same time periods. It should be noted that the regression models and consequent indices are based on NSRE responses to "wilderness and other primitive areas," not just designated Wilderness. Nevertheless, given the potential for substitution across such areas in filling recreation preferences, this is arguably a good first approximation for future participants and users of Wilderness.

The participation index is reported in figure 1. The estimated logistic model combined with projected changes in the composition of the U.S. population indicates that potential Wilderness participation per capita will decrease by 15 percent nationwide in the next half century. This result is primarily driven by increases in population proportions for categories that are currently negatively correlated with participation in wilderness and primitive area recreation. Over the same time period, the general population is expected to increase by 49 percent. The growth of the population will accordingly dominate the decrease in participation per capita leading to an overall increase in potential Wilderness recreation participants by 26 percent.

Wilderness day indices are reported in figure 2. Here the pattern is similar to the predicted trend in participation. For example, the potential annual per capita days spent in Wilderness will decline by 19 percent out to the year 2050. However, the 49 percent increase in population growth during the same time will offset the per capita decline resulting in a net increase in potential Wilderness visitor site-days of about 21 percent.

The projection indices can be combined with estimates of annual participants and days to describe the potential magnitude of future Wilderness use. In spite of the difficulties associated with counting Wilderness users, a number of estimates exist for visitor days to the NWPS and various components thereof. For example, Cole (1996) estimated nearly 17 million visitor days of use throughout the NWPS for 1994. Loomis (1999), using Cole's data, subsequently estimated 12 million visitor days for NF Wilderness and 14 million visitor days for NF and NPS Wilderness combined. Cordell and Teasley (1998), using household data for the same time, estimated between 15.7 and 34.7 million trips to the NWPS annually. Finally, using a different approach, Loomis and Richardson (2000) estimated 26.7 million visits annually to the NWPS. These estimates present a range of annual use somewhere between about 14 million and 35

**Table 4**—Negative binomial parameter estimates,  $n = 4357$ .

Variable	Parameter estimate	Std. Error	P-Value
Intercept	0.046	0.280	0.0939
AGE	-.009	.002	.0000
GENDER	.42	.071	.0000
BLACK	-1.39	.085	.0000
HISPANIC	-1.40	.189	.0000
OTHER	.037	.171	.8269
BORNUSA	1.72	.151	.0000
MEMBER	.751	.088	.0000
INCOME	.057	.018	.0015
EDUCATION	-.359	.100	.0003
URBAN	-.721	.079	.0000
MILES	-.003	.0004	.0000

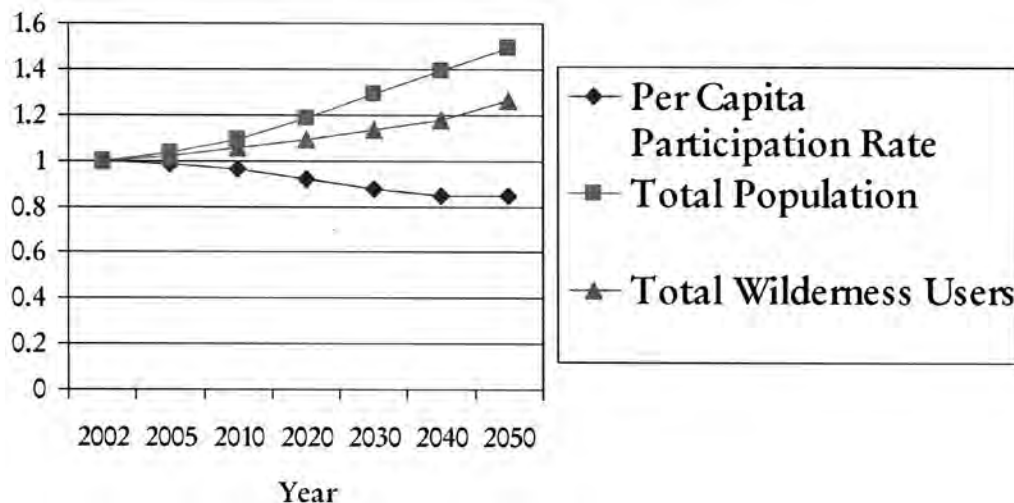


Figure 1—Participation index 2002 to 2050.

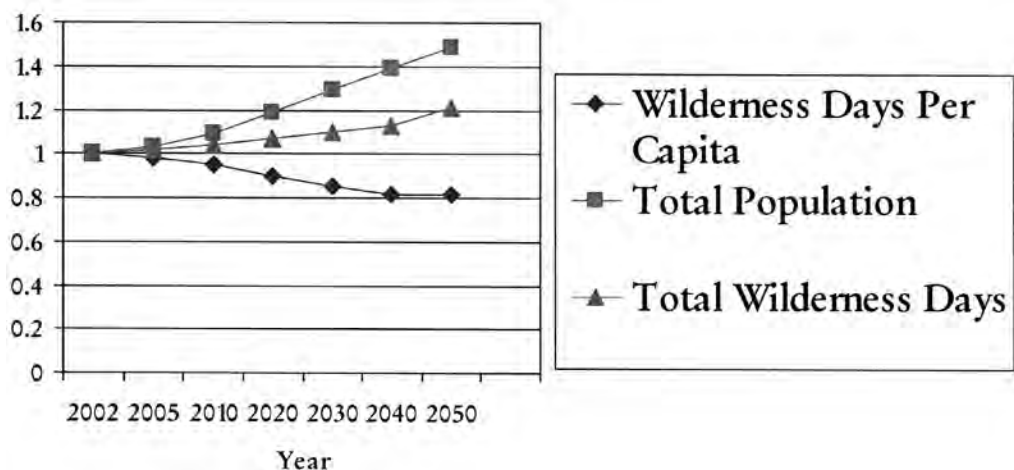


Figure 2—Wilderness visitor days index 2002 to 2050.

million days per year, while providing no estimate of the number of unique participants.

Alternatively, preliminary estimates of NF Wilderness site visits from the National Visitor Use Monitoring Project (NVUM) (English and others 2002) indicated about 10.5 million site-visits to NF Wilderness in 2001. This estimate has been subsequently revised to 8.8 million site-visits and 12.4 million site-days, annually, based on the complete 4-year cycle of NVUM data collection (USDA Forest Service 2005). Using estimated visitor shares among the four federal agencies managing the NWPS as reported in Bowker and others (2005a), we estimate annual recreation use for the NWPS at 10.7 million visits per year. Using a multi-day average trip length computed from NVUM Wilderness visitors (2.52), this translates to approximately 16.3 million on-site days system wide. This is considerably lower than the 26.6 million day reported in Bowker and others (2005a). However, their estimate is based on the preliminary NVUM visit estimate

and an average trip length derived from previously published site-level Wilderness studies of over four days per visit.

Table 5 presents estimates of current NF and NWPS Wilderness days for 2002 and 2050 based on the day index in figure 2. The 21 percent increase in Wilderness use predicted by the negative binomial simulations translates to 15 million and 19.7 million site-days, respectively, on NF Wilderness and the NWPS by 2050. This amounts to annual increases of 2.6 and 3.4 million days, respectively, on the 35 million acres of NF Wilderness and 106 million acres for the NWPS; over half of which are in Alaska.

An estimate of the number of unique individuals annually visiting the NF Wilderness (2.27 million) and the NWPS (2.77 million) is reported in table 6. The estimates for 2002 are derived using the NVUM estimate for Wilderness site-days (USDA Forest Service), day-use and relative agency share estimates from Bowker and others (2005a), and an NVUM-based weighted estimate (3.88) of individual NF Wilderness

**Table 5**—Number of wilderness days (millions).

	2002	2010	2020	2030	2040	2050
NF Wilderness	12.40	12.88	13.21	13.63	14.05	15.00
All NWPS	16.28	16.91	17.34	17.89	18.43	19.69

**Table 6**—Number of wilderness participants (millions).

	2002	2010	2020	2030	2040	2050
NF Wilderness	2.27	2.39	2.47	2.57	2.68	2.87
All NWPS	2.77	2.91	3.01	3.14	3.27	3.50

visits per year (Bowker and others 2005b). Also reported are projections through 2050 based on simulations of the logistic participation models and Census projections. By the middle of this century, it is estimated that NF Wilderness will be used by 2.9 million unique visitors, while the NWPS will see about 3.5 million unique visitors annually.

Discussion

Essential Wilderness attributes include relative naturalness, lack of development, and solitude (or low visitor density) (Freimund and Cole 2001). With an increase in total U.S. population of almost 50 percent by the year 2050, the amount of pressure on Wilderness is expected to increase, threatening these Wilderness attributes. Past experience shows that with an increase in population growth there will be an increase in total recreation use including the density of recreation use in most Wilderness areas (Freimund and Cole 2001). The issue of use levels in wildlands is not a new concern. In fact, as early as the 1930s there was concern expressed over this matter (Freimund and Cole 2001). Since that time, there have been major developments in monitoring and managing for use levels.

Our models, combined with Census projections for population growth and expected structural changes in the U.S. population suggest that Wilderness use and Wilderness users will increase at less than half the rate of the general population increase. Nevertheless, the amount of pressure on these wildland resources is still increasing. Moreover, as more wildlands and rural areas are developed the remaining lands will come under increasing pressure. Between 1982 and 1997, 3 percent of natural range was converted to agricultural or developed uses and 11.7 million acres of natural forest cover was converted to developed uses (Cordell and Overdevest 2001). In this study it was determined that distance to a Wilderness area was an important factor in determining the probability of participation and amount of participation. Populations surrounding areas with abundant natural scenery and opportunities for outdoor recreation are increasing. This is especially true for Wilderness areas proximal to rapidly growing cities in the West and Southwest.

Another factor potentially increasing Wilderness use at a rate faster than we predict is the possibility of Hispanic and Asian-American acculturation, resulting in stronger preferences for Wilderness on the part of these groups in the future (Johnson and others 2004). For the general population,

greater mobility, growing interest in health and physical activity and the environment, as well as new technological developments in outdoor recreation equipment (Hendee and others 1990), are all factors contributing to increased use.

In order to effectively manage Wilderness over the long-term, an orderly planning process is needed to develop strategies necessary to meet specific management objectives (Hendee and others 1990). Studies like this one can help with developing goals, objectives, and plans to help deal with increased pressures that Wilderness and primitive areas will be subjected to in the future. Hendee and others (1990) outline a framework for Wilderness management planning that can be flexible and adapted to individual Wilderness areas and needs. This framework can be used to develop goals and objectives and to assess current conditions and make assumptions about future trends, pressures, and problems related to each objective (Hendee and others 1990). Results from this study can be used to help make assumptions about future trends and pressures on wild and primitive areas based on projected population and socio-demographic changes. With projected increases in visitation pressure, managers may have to limit use levels to provide “outstanding opportunities for solitude” as legislated by the Wilderness Act (Freimund and Cole 2001) and to protect the naturalness of the land.

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# Visitors' Experience and Lack of Knowledge of Minimum Impact Techniques in the Highlands of Brazil's Itatiaia National Park

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**Abstract**—This work focuses on the issue of public use management in protected natural areas, based on shared responsibility between management and visitors and the potential for development of environmental ethics to inspire respect for those areas, help protect them, and reduce the need for restrictive control interventions. Based on the premise that responsible, well-informed visitors will act to minimize impacts, allowing regulations in protected areas to be less restrictive, we worked with the following hypotheses: (1) visitors have no knowledge of appropriate minimum impact techniques to be used in natural areas; (2) the greater the experience level in visiting natural areas, the greater the knowledge of appropriate minimum impact techniques, and (3) there are impacts to campsites and trails which can be traced back to visitor behavior and may be minimized through minimum impact practices and techniques.

Generally, results show that previous experience, referred to as “number of trips,” does not reflect an increase in the knowledge of appropriate minimum impact techniques. Furthermore, frequent visits do not add to visitors' learning, due to the fact that the highlands of Itatiaia National Park are not prepared to receive them, as there are no visitor education programs underway. Thus, those people who visit the park several times during a year or many times through several years exhibit unchanged knowledge of visitor impacts and techniques to minimize them.

## Introduction

### Visitor Education

Many natural area administrators and researchers consider environmental education a fundamental component for the long-term survival of natural areas. It can educate people on the benefits of natural areas and increase their awareness of nature's cultural, environmental and experiential values. In addition, it can help in the construction of human behavior toward the natural environment (Gunderson and others 2000).

Visitor education has been regarded as the most appropriate approach to public use management in natural areas,

both in Brazil and abroad (Indrusiak 2000; Lucas and others 1985). According to Gunderson and others (2000), administrators of protected natural areas in the United States tend to prefer educational programs that influence visitor behavior over other management techniques as education preserves personal freedom and the opportunity of choice that other alternatives do not provide. Sixty percent of protected natural area administrators in the United States have indicated that they use educational strategies to cope with several problems associated with management (Washburne and Cole 1983).

The educational approach presents several advantages, including relieving the administrator and staff of the role of “police,” which can develop in an approach that places regulations first. Taking into account the high educational level verified among most Brazilian visitors (Kinker 1999; Takahashi 1998), the educational approach is more prone to success because visitors can use the information, handle concepts and their interrelations and understand the reasons behind a specific management strategy.

In a study carried out at Eagle Cap Wilderness Area (Watson and others 1996) in which visitor attitudes and codes of behavior in the same area in 1965 and in 1995 were compared, visitors were seen to demonstrate greater support for preserving the area's natural character and were also more restrictive as to what they considered appropriate behavior in 1995. Researchers concluded that both the educational programs used by the area's management and some general changes in society's values contributed to those attitudinal changes. According to Cole and others (1997), often much more impact is caused in natural areas due to inappropriate behavior than to too many visitors.

The main premises that support an educational strategy to achieve management objectives are: (1) many impacts and problems are caused by careless and ill-advised behavior; (2) visitors, once educated, are commonly willing to adopt appropriate behavior; (3) through the education of visitors about which behaviors are adequate, many problems are minimized, thus eliminating the need for other more expensive or regulating strategies (Hammit and Cole 1998).

Visitor education is an important tool among the management alternatives available when one faces certain types of problems. Further study is necessary to identify what type of information is essential and is to be given to visitors, the best way to compile and make that information available, how to determine whether education is reaching the expected goals of behavior and, finally, how to assess the performance of the different educational strategies combined with the other management strategies.

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## Education for the Practice of Minimum Impact Techniques

According to Cole (1989), programs aimed at educating visitors must seek beyond merely teaching what visitors should do. Programs must aim at changing the way people think and evaluate their behavior. Simply changing what visitors do would be effective if there was such a thing as a definite set of practices and techniques appropriate to all situations. Unfortunately, there is not. The best practice for a certain situation could very well be the worst for another circumstance. For instance, when a group is on a trail, hiking single file is the best recommendation whereas spreading out is the best practice when hiking off trail, to avoid creating a new trail. The author points out that visitors should be taught and motivated to evaluate and judge a series of factors so as to choose the action(s) which will cause the smallest impact. They must therefore use their judgment along with knowledge about appropriate techniques to minimize impacts.

Teaching the visitor to assess different situations also generates additional benefits such as helping the visitor develop a favorable structure to which new knowledge and experiences can be attached. Commitment to minimum impact practices should also be greater once the visitors have a structure to evaluate their own behavior. And the feeling of satisfaction is greater when visitors decide what is the most appropriate behavior/practice in lieu of simply following the rules. The reasons to act one way or another and the importance of the chosen behavior also should be more evident (Cole 1989). According to that same author, visitor education programs tend to supply few justifications for their recommendations. For example, visitors are usually forbidden to camp near rivers, but the reasons for that restriction are not usually made explicitly clear. When visitors do not understand why a certain action is important, they often conclude it is not relevant.

Educating the visitor on minimum impact practices should lead to the development of an environmental ethic if it is to reach its full potential. More than a set of rules and regulations, it is a matter of attitude and conscience. Visitors need to know about management's major problems and challenges and what they can do to minimize those problems. They need to learn and evaluate a variety of factors, such as soil, vegetation, wildlife, climate, type and intensity of use of an area, and then combine that analysis with their previous experience to select practices which are most adequate. This requires respect for and trust in the visitors, who will not be seen as potential troublemakers, but as capable and responsible for their own choices and actions. Moving in that direction will make it possible to count on the visitor as an ally in managing the area. In contrast, if the visitor is uncooperative, few choices are left which are not based on regulations and enforcement. However, according to Cole (1989), setting up a visitor education program with those characteristics is a difficult task that calls for a significant amount of time and effort and is a long-term objective.

It is also very important to study the factors related to non-adoption of recommended minimum impact practices. What leads the visitor to not act accordingly when knowledge of minimum impact practices is not a limiting factor? According to Harding and others (2000), several factors

may play a role in preventing the use of minimum impact practices, among them, the interpretation of the situation, the storage of information and lack of judgment. A clearer understanding of those limiting factors should lead to more effective strategies to accomplish behavioral change.

In Brazil, although environmental education is a well-developed field of study and practice, as described by Sorrentino (1997), visitor education in protected areas involves mostly activities of interpretation of nature through which the visitor is encouraged to develop appreciation for and expand knowledge about the natural environment.

As for visitor education on minimum impact practices in natural areas, there have been some initiatives since the 1990s, through which information on the topic has been compiled and disseminated. Nevertheless, there is no scientific research to date aimed at generating data and information on more adequate techniques for the Brazilian context and ecosystems. Practices and techniques diffused in Brazil are basically those thought up in other countries such as the United States, Australia and New Zealand.

## Methods

This study was carried out in the highlands of Itatiaia National Park (PNI), Brazil. Data on visitor and visit profiles were obtained by means of interviews of visitors to the park's upper lands. Historical data on public use management for the area were obtained from the park's administration, through interviews with employees and by perusal of available documents.

## Visit and Visitor Characteristics

The data on visit and visitor profiles were gathered by means of a questionnaire comprising close-ended questions, developed after studies carried out by Cole and others (1997), Kinker (1999), and Takahashi (1998). The questionnaire sought to obtain information on (1) characteristics of the visit: attributes such as group size, activities developed by the visitors, duration of visit; and (2) characteristics of the visitor: attributes such as visitor experience, preferences and demographic data. A visitor's behavior in a natural area is influenced by the type of activities undertaken as well as his/her origin, background and perceptions of the area and of its management. The attributes of a particular target public will determine certain management priorities, methods to communicate information on management and relative effectiveness of educational programs. The specific visitor attributes gathered in this study include socio-demographic characteristics—educational level, previous experience in that particular area, in natural areas in general and in camping.

## Knowledge of Minimum Impact Techniques

Data on knowledge of minimum impact techniques were obtained through a series of tests developed after studies by Confer and others (2000) and Ramthun and others (2000). Visitor behavior is partially influenced by his/her knowledge

of appropriate minimum impact practices, of an area's regulations and of the reasons for management decisions which eventually restrict public use.

Considering the information collected from PNI's administration, that is, that peak visitation occurs on holidays starting at Carnival and on dry-season weekends (usually between May and September), it was established that data collection on visit and visitor characteristics would start at Carnival and end by August, 2002.

During that period, data were collected on all long holiday weekends as well as during six regular weekends between February and August. Questionnaires were applied from midday to 6 p.m.

During the study period (February to August, 2002) the park's administration registered 6,700 visitors. The questionnaire was answered by 605 people throughout ten interview sessions on holidays and weekends.

## Findings

### Characteristics of the Visit

Group visits predominate among users in the park's plateau, probably due to the area's difficult access and the wild environment. Only 2 percent of all interviewees declared being alone, 53 percent said they were part of a group of two to four people, 29 percent were in a group of five to ten people and 16 percent were part of a group of more than ten. One of the main recommendations in minimum impact programs is to travel in small groups; although large groups are a small percentage of the total number of visitors, they may cause significant impacts on the quality of the experience of other people they run into in the park and may also add to some ecological impacts such as trampling of sensitive areas.

But what is a small group? According to Hampton and Cole (1995), any "optimum" number is arbitrary, though most visitors consider groups of more than 10 or 12 as large groups. Thus, 84 percent of interviewees visited the park in small groups of no more than ten people, although the plateau eventually receives groups of up to 100 people. This is probably due to the fact that it is easier to find accommodation for small groups in the park's highlands and visiting that area's attractions is more agile and safer if done in a small group. In addition, group sizes encountered were possibly related to the fact that at the time the study was carried out, the park required an accompanying guide for all groups unfamiliar with the area at a ratio of one guide for every 12 to 20 visitors.

### Visitor Characteristics

One relevant characteristic of visitors interviewed in the study is their high educational level. Those with a post-graduate degree represented 20 percent of the total and another 19 percent had completed basic college. Undergraduate students represented 33 percent while 16 percent either were attending or had completed secondary school; 11 percent were either attending or had completed elementary school. This distribution was much above that of either the national average or for the states neighboring the park. Such high level of education could greatly contribute

to the public's acceptance of a visitor education program as a better-educated visitor is more likely to understand the importance of appropriate actions in natural areas. Roggenbuck and Lucas (1987) found that trust in the success of a visitor education program largely derived from the visitors' high level of education.

### Previous Experience

While 51 percent of the people said they were visiting the park's highlands for the first time, 40 percent mentioned they visited the area up to three times a year and 72 percent stated they usually visit other natural areas. The latter was considered a high level of previous experience by Roggenbuck and Lucas (1987). Meanwhile, 9 percent of users said they had been visiting the area for two years, 10 percent for the past two to four years, 12 percent for the past four to ten years and 18 percent for more than ten years.

As to previous camping experience, 41 percent of interviewees said that when they visit other natural areas they sometimes camp, 29 percent said they always camp, 23 percent said they never camp and 7 percent did not answer. However, when one considers that 70 percent of visitors have some previous camping experience though there are extensive impacts found in a detailed survey of the highland's campgrounds, it is clear there is a need for a visitor education program which would include appropriate minimum impact techniques, particularly those related to fires, social trails, damage to trees and bushes and disposal of human waste.

### Knowledge of Minimum Impact Techniques

The questionnaire included a series of tests on minimum impact techniques that were most appropriate for situations frequently found in the highlands of Itatiaia National Park.

The appropriate distance of at least 60 m (200 ft) between a campsite and water or trails was correctly mentioned by only 21 percent of visitors. For 13 percent of interviewees, there were no techniques known for choosing a campsite. The remaining visitors chose distances smaller than 60 m or did not answer the question. This is a very important result because it demonstrates the relevance of a visitor education program on minimum impact techniques in case wild camping in non-designated areas is eventually authorized in the Park. It is clear that visitors do not know the appropriate techniques for this particular situation and would not know how to act accordingly in choosing a campsite that would minimize impacts to water sources, to the fauna and to other visitors.

Appropriate disposal of trash, taking it back home in plastic bags, was the option selected by 92 percent of interviewees. Only 2 percent of people answered that trash must be buried in a hole and 6 percent did not answer the question. This result confirms what was observed in the survey of impacts to trails and campsites, where little trash was found.

Although building fires is currently forbidden in PNI, one of the questions dealt with the issue, since numerous remnants of campfires were found in old campsites. For 77 percent of visitors, a campfire should be built on the remnants of a

previous fire, while 5 percent replied that it should be built with large branches cut from nearby vegetation. Eighteen percent did not answer, in many instances because they did not support building fires. This result was not in accordance with the survey of impacts to campsites, which pointed to two old fires for each glade or clearing inspected.

Although users of natural areas have a certain fascination for fires in campsites and therefore offer great resistance to its prohibition, there are management strategies that can be used in this case. One of them is for the park to assume its position of banning fires and invest in a well-conceived visitor education program focusing on the issue. It would explain to the visitor the reasons for the ban, therefore improving on the current strategy through which a pamphlet is handed out along with a plastic bag upon the visitor's admission into the park. Results have not been satisfactory and call for more active surveillance to enforce the ban.

A second strategy would be to allow fires in designated areas specially built in established campsites. In this case, visitors would have to bring their own firewood, thus avoiding the use of local vegetation. Education and surveillance would also play an important role in this strategy.

Eight affirmative statements were presented on basic knowledge of the principles and techniques of minimum impact. Results are shown in table 1.

According to Hampton and Cole (1998), most damages to vegetation in a wilderness campsite occur on the first days of use, though there is a popular tendency to believe that permanence in a certain area is proportional to the impacts caused to vegetation (66 percent of respondents agreed that remaining in one spot for more than four days may harm vegetation.) For 20 percent of interviewees, the construction of benches and temporary structures in a campsite utilizing rocks and logs is an acceptable practice. This demonstrates the need for educating visitors that a good campsite is found as such, not built into one.

Finally, 17 percent of users responded that when camping in an impacted area, one should scatter the activities onto places that have not yet been damaged. These visitors

were unaware of the recommendation that one should concentrate the impact when using heavily impacted areas to avoid expanding the damages, whereas in remote, seldom used areas, use should be dispersed to avoid new impacts such as new trails and campsites.

In spite of the relatively easy questions, only 36 percent of respondents answered all true/false questions correctly and 7 percent had the correct answers for all the questions related to minimum impact techniques in natural areas. This result is much lower than those found in two surveys carried out in the United States, which utilized similar tests; for one, 48 percent of respondents had all the correct answers (Confer and others 2000) and an average of 5.79 correct answers out of nine questions in the survey by Ramthun and others (2000). In order to test the validity of the hypothesis that more frequent visitors to natural areas would have more knowledge of minimum impact techniques, analysis of the correlation between frequency of correct answers and visitors' previous experience was carried out by means of the chi-square ( $\chi^2$ ) test. Results are shown in tables 2 and 3.

The categories of previous experience in the analysis are associated with the frequency of correct answers to the questions on minimum impact to the level of 5 percent of significance. Fisher's test was applied to identify which categories of previous experience presented significant differences in relation to the other categories (table 4). Frequencies of correct answers observed in table 4 are not associated with previous experience.

The category of interviewees who have visited the park's plateau for more than ten years (11Y) presented a significant difference in relation to categories "first time," "for 2 years" and "for 4 to 10 years" and the highest percentage of right answers as compared with the other categories of previous experience. That possibly reflects visitors' age-related maturity and their awareness of the importance of their responsibility for the quality of the environment during their visit. The remaining categories did not show a significant difference among frequencies of correct answers.

**Table 1**—Results for knowledge of minimum impact techniques in natural areas.

True or False		T <sup>a</sup>	F <sup>a</sup>	NR <sup>a</sup>
		.....percent.....		
1.	Where there are no restrooms, feces should be buried or a latrine should be built at least 60 meters from trails, water sources and campsites.	82	9	9
2.	To cook in natural areas, it is better to build fires than to carry a small stove.	3	88	9
3.	Remaining in the same area for more than four days may cause damage to local vegetation.	66	24	10
4.	When hiking on an established, well-trodden trail it is better to walk in a single file and stay within the main path to minimize impacts.	88	2	10
5.	When camping in an impacted area you should scatter your activities to places not yet damaged.	17	73	10
6.	Before visiting a park or natural area you should obtain information on weather, periods of intense visitation, possible risks to your safety and activities permitted in the area (such as hiking and camping).	90	1	9
7.	Building benches and temporary structures in your campsite, moving logs and rocks, is an acceptable minimum-impact practice.	20	71	9
8.	Collecting and carrying plants, rocks and other natural objects does not cause impacts because there are large quantities of those materials in nature.	2	88	10

<sup>a</sup> T = true; F = false; NR = did not respond.

**Table 2**—Frequency of correct answers to questions on minimum-impact techniques, according with the level of previous experience and result of the chi-square test.

Visitor's previous experience	No. of right answers	Wrong answers	Right answers percent	X <sup>2</sup> observed	p-value <sup>a</sup>
How long have you visited PNI's plateau?					
First visit	21	287	6.8		
For 2 years	1	55	1.8		
For 2-4 years	5	54	8.5		
For 4-10 years	3	68	4.2		
For more than 10 years	15	94	13.8	10.2259	.0368 <sup>a</sup>

<sup>a</sup> Significant to the level of probability of 5%, p-value between 0.01 and 0.05.

**Table 3**—Frequency of correct answers to questions on minimum-impact techniques, according with level of previous experience (number visits/year) and result of chi-square test.

Visitor's previous experience	No. of right answers	Wrong answers	Right answers percent	X <sup>2</sup> observed	p-value <sup>a</sup>
How often do you visit the park?					
First time	21	280	7.0		
Up to 3 times/year	21	224	8.6		
4 to 10 times/year	2	29	6.5		
More than 10 times/year	1	16	5.9	.6267	.8903 <sup>a</sup>

<sup>a</sup> Non-significant

**Table 4**—P-value and significance level in comparison of categories of previous experience (Fisher's Exact Test).

How long have you visited PNI's plateau?	FT	2Y	4Y	10Y	11Y
First time (FT)	-	-	-	-	-
For 2 years (2Y)	.2221	-	-	-	-
2 to 4 years (4Y)	.5869	.2068	-	-	-
4 to 10 years (10Y)	.5908	.6282	.4671	-	-
More than 10 years (11Y)	.0450*	.0119 <sup>a</sup>	.4547	.0430 <sup>a</sup>	-

<sup>a</sup> Significant to probability level of 5%, p-value between 0.01 and 0.05. Value highlighted in bold type in the table.

As a whole, the results demonstrate that previous experience refers to the number of trips and does not reflect the increase in the knowledge of appropriate minimum impact techniques. In addition, it is possible to observe that the fact that a user visits the park's plateau does not contribute to his/her learning. This stems from the fact that the plateau is not prepared to receive visitors as it does not offer interpretative trails, a visitor center, information panels and signs, trained personnel or an ongoing visitor education program. Therefore, people visit the park several times during the year or many times during several years, but their knowledge of the impacts of visitation and existing techniques to minimize them remains unchanged.

## Conclusions

The data obtained in this study represent one more step towards understanding use-impact relations as well as the aspects of management related to educating the visitor. If the management actions put to use from now on result in

changes in use level, spatial distribution or type of activities performed by the users, the analysis contained in this study will be of significant help in determining the changes in resources and in visitors' perceptions. The potential of the park's highlands to offer several options of outdoor recreation is not being fully harnessed. People limit their visit to hiking to the two most famous peaks and fail to know other attractions such as Aiuruoca Falls, Mt. Altar and Couto Peak. One of the reasons for this is the lack of information available at the plateau: no visitor center, no trained employees, no interpretative trails, no information panels and signs. Other activities such as rock climbing and camping are not being practiced by visitors as the park's public use management does not view them as priorities. As a consequence, there are no studies of feasibility, planning, implementation, publicity or access.

The educational level of the visitors to the park's highlands is high, with 72 percent of people either attending or having finished college, an important factor towards acceptance and success of a visitor education program. The fact that 90 percent of visitors mentioned that the public use management

actions currently underway in the highlands did not affect or improve the quality of their visit is also an indication that visitors are receptive to a larger presence of management actions.

Only 7 percent of the total of visitors surveyed gave a correct answer to all of the questions on appropriate minimum impact practices. This result demonstrates the need for a visitor education program that focuses on minimum impact techniques because, although many ecological and recreational impacts result from inadequate management, there are impacts that can be minimized through visitors' behavior.

The hypothesis that visitors with more experience in natural areas would show better knowledge of appropriate minimum impact techniques was not confirmed. Although 40 percent of visitors had visited the park for more than two years and 48 percent more than once a year, their knowledge level of minimum impact techniques had not changed, which demonstrates that visitors do not learn about this topic when they visit the park's highlands, as there is no educational initiative underway except the campaign, "Montanha Limpa" (Clean Mountain).

A visitor education program that focuses on minimum impact practices in Itatiaia National Park should include techniques related to the following topics: deterioration of established trails, proliferation of campsites, trash and human waste disposal. It is important that further research be done in Brazil to seek the understanding of the relation between the impacts of public use and user behavior and management strategies. It is equally important to develop research on planning, design, application and effectiveness of visitor education programs aimed at promoting changes in the level of knowledge of attitudes towards and beliefs about natural areas.

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# Tracking Progress: Applying the Forest Service 10 Year Wilderness Stewardship Challenge as a Model of Performance Management

Liese C. Dean

**Abstract**—The USDA Forest Service applied a performance management/accountability system to the 407 wildernesses it oversees by defining and tracking critical work. Work elements were consolidated and packaged into the “10 Year Wilderness Stewardship Challenge.” The goal of the Challenge is to have 100 percent of wildernesses administered by the Forest Service managed to a defined level of stewardship by 2014, to coincide with the 50<sup>th</sup> Anniversary of the Wilderness Act. Positive results for wilderness have included greater visibility and improved competitive advantage in a time of tight budgets, increased awareness and involvement both within the agency and with public partners, improved stewardship and interdisciplinary involvement, and the development of new tools to facilitate success. It is important for managers to note several cautions before adopting a similar strategy: the elements selected for the performance management/accountability system should include disciplines outside of recreation but may not represent the entire job of wilderness management; “minimum stewardship” is not the ultimate goal for wilderness stewardship; the system should not be considered a “ticket punched”—planning for continued stewardship is vital; and consistency is key. An outline for applying this approach to other wilderness systems is presented in this paper.

## Introduction

The USDA Forest Service is given the responsibility of managing 407 wildernesses, spread across 35 million acres of land—comprising approximately 18 percent of the entire land base managed by the Forest Service. These designated lands contain some of the most ecologically diverse and recreationally valuable lands the Forest Service is responsible for managing. As wilderness managers, we also know that these lands are beloved by the American public for more than recreation—they provide important resources like clean air, clean water, wildlife habitat, a refuge for endangered species and a legacy for future generations (Cordell and others 2003). However, 40 years after passage of the Wilderness Act, the Forest Service had not been able to clearly articulate:

- What the job of wilderness management entails
- How well we’re doing
- If current funding and staffing is adequate for doing the job of wilderness management

The Forest Service believes that these items can and should be addressed through a properly designed performance management/accountability system. Here are a few of the benefits that we see in implementing an accountability system:

- Increases the likelihood of funding: as stated by Tom Peters, “what gets measured, gets done” (Peters 2002).
- Improves accountability: in a time of tighter and tighter funding and oversight it is important to demonstrate what is being accomplished.
- Levels the playing field: wilderness is playing by the same rules as other programs in the agency.
- Communication tool: provides a mechanism to visually present our story—helps to make the case for additional resources.
- Provides a common framework: provides a structure for understanding and communicating the job to be done—from workers in the field, to managers in the office, to administrators at the national level.

In 2002 the Wilderness Advisory Group (WAG), a team of Forest Service wilderness managers, scientists, educators and others sanctioned by the Chief of the Forest Service to provide recommendations on key issues related to wilderness stewardship, was challenged to develop a workable performance management/accountability system. The WAG identified the following tasks, adopted from the 1999 Forest Service Wilderness Agenda, *Thinking Like a Mountain* (USDA 1999) to facilitate the development of this system:

1. Clearly define the critical work to be accomplished in each wilderness to assure appropriate stewardship of the wilderness. “Critical work” was defined as those activities necessary to maintain or enhance wilderness values, as intended by the Wilderness Act, and prevent degradation of the wilderness.

2. Identify critical work that is being done and not being done due to current constraints on field funding and staffing levels.

3. Current staffing—use 2001 staffing levels as a base to determine the current level of wilderness field staffing. Develop some comparable scale of indexing, such as wilderness acres, number of visitors, number of wildernesses on a Forest, etc.

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4. Proposed staffing—identify appropriate field staffing levels necessary to accomplish critical work in wilderness. Develop criteria for proposed staffing for a variety of wildernesses.

Over the next 18 months the WAG addressed these tasks, culminating in the “10 Year Wilderness Stewardship Challenge” (10YWSC). This Challenge has since become the standard for wilderness management within the Forest Service.

The difficult task of defining the job of wilderness stewardship is not unique to wilderness management agencies in the United States. The approach taken by the Forest Service could possibly be used as a model to apply to other wilderness systems.

## Defining Critical Work

The Forest Service’s Wilderness Information Management Steering Group (WIMSG), through an earlier budgeting and accountability process, had undertaken the hard job of defining critical work necessary for wilderness management. The initial task list was comprised of over 200 elements that fell into five broad categories.

- Ecological integrity
- Wilderness values
- Public use
- Special provisions and administration
- Program management and effectiveness

The WIMSG had also consolidated this list into a smaller set of elements, representative of the critical work necessary to manage wilderness and applicable to the majority of wildernesses in the Forest Service system. The WAG helped to further refine these 10 elements and established “baseline workforce” numbers based on complexity ratings for each wilderness and input from field level managers. These elements were then packaged into what is now known as the “10 Year Wilderness Stewardship Challenge.”

## 10 Year Wilderness Stewardship Challenge

The 10 Year Wilderness Stewardship Challenge was presented to the Chief and National Leadership Team of the Forest Service in late 2003, for initiation in 2004, the 40<sup>th</sup> Anniversary of the Wilderness Act. The goal of the Challenge is to have 100 percent of wildernesses administered by the Forest Service managed to a defined level of stewardship by 2014, to coincide with the 50<sup>th</sup> Anniversary of the Wilderness Act.

Some of the key components of the 10 Year Wilderness Stewardship Challenge are:

- The Challenge consists of 10 elements—60 percent accomplishment is required to meet the “minimum stewardship” standard.
- Local units choose what 60 percent they want to accomplish.
- Each element provides different point levels for incremental accomplishments.

- An integrated approach with other resource management programs is required for success (moves wilderness beyond recreation management).

The following were identified as the 10 essential elements of Forest Service wilderness stewardship:

1. Direction exists in the Forest Plan or supplemental direction, which addresses the natural role of fire in wilderness and considers the full range of management responses.
2. This wilderness was successfully treated for non-native, invasive plants.
3. Monitoring of wilderness air quality values is conducted and a baseline is established for this wilderness.
4. Priority actions identified in a wilderness education plan are implemented.
5. This wilderness has adequate direction, monitoring, and management actions to protect opportunities for solitude or primitive and unconfined recreation.
6. This wilderness has a completed recreation site inventory.
7. Existing outfitter and guide operating plans for this wilderness direct outfitters to model appropriate wilderness practices and incorporate awareness for wilderness values in their interaction with clients and others. Needs assessments are completed for new operations or for major changes to existing outfitter programs.
8. This wilderness has adequate direction in the Forest Plan to prevent degradation of the wilderness resource.
9. The priority information needs for this wilderness have been addressed through field data collection, storage and analysis.
10. The wilderness has a baseline workforce in place.

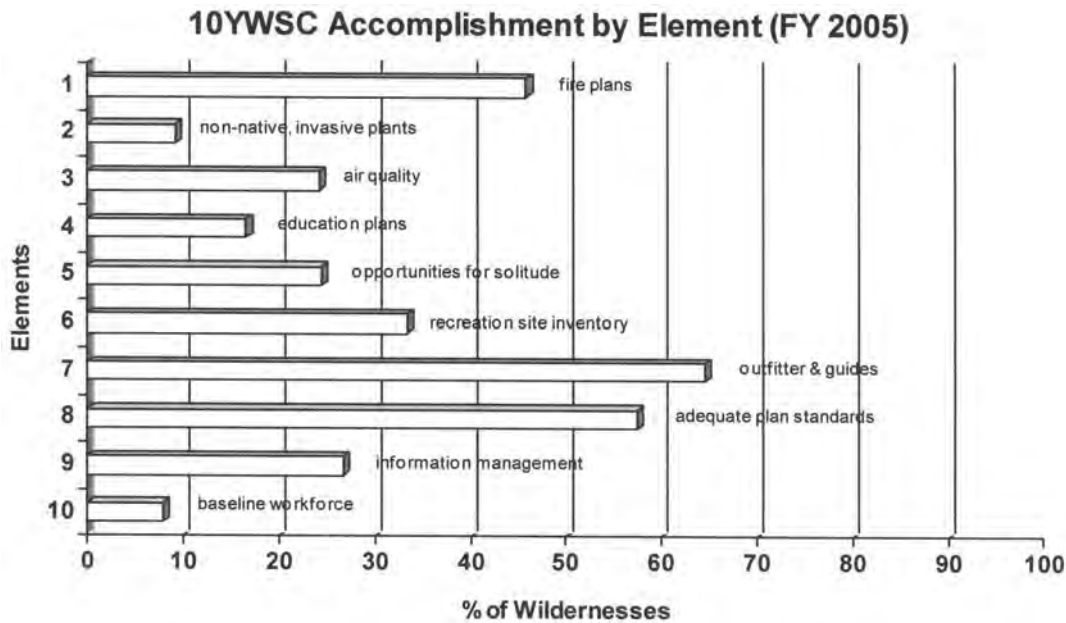
While the goal of the Challenge is for all 407 wildernesses managed by the USDA Forest Service to meet a minimum score of 60 percent, progress can be tracked by individual elements. Figure 1 displays the relationship of these elements allowing management to target those elements, such as non-native, invasive plants, needing the most attention.

## Incremental Scoring

Initially these elements were graded by a simple yes/no scoring system where a wilderness manager either claimed success for fully implementing an element or failure for not fully implementing. However, managers wanted (and deserved) to be able to claim credit for partial accomplishment. These incremental steps would provide the foundation for eventually fully meeting that element. In 2005 reporting, a system was initiated that allows for “partial accomplishment” for each of the 10 elements within the 10YWSC (USDA 2005).

For example, using Element 2 (This wilderness was successfully treated for non-native, invasive plants.) as shown in table 1, a manager can claim anywhere from two to 10 points depending on the work that has been accomplished: a completed inventory, a management plan, management actions, evaluation of success. Each of the 10 elements of the Wilderness Stewardship Challenge has a similar incremental measure.





**Figure 1**—2005 National Status—Percentage of wilderness units reporting minimum 60 percent accomplishment for each 10 Year Wilderness Stewardship Challenge element.

**Table 1**—Incremental scoring for Element 2, non-native, invasive plants.

Score	Accomplishment level
2	An inventory <sup>a</sup> is completed in wilderness and/or prevention program and targeted management actions have been implemented without a non-native, invasive species management plan.
3	A non-native, invasive species management plan has been prepared or direction is provided in the forest plan and includes direction for addressing invasives in wilderness.
5	Management actions have been implemented (e.g., treatments, regulations, education, etc.) in highest priority areas.
6	Management actions taken in highest priority areas have been evaluated and determined to be successful.
10	Management actions for all non-native, invasive plants inventoried in wilderness have been implemented and these actions have been evaluated for effectiveness and treatments adjusted as necessary.

<sup>a</sup> Note: if the inventory is current (in other words, has been conducted within the monitoring cycle) and no non-native, invasive plants are found, count 10.

### Key Definitions:

- *Non-native, invasive plant*: a plant, including its seeds, spores or other biological material that is non-native to the ecosystem under consideration and whose introduction causes, or is likely to cause, economic or environmental harm.
- *Successfully treated*: the treatment was part of a Non-Native, Invasive Species (NNIS) management plan and the treatment met the objectives in the plan, whether it's eradication or control. This includes direct management actions in the field.
- *Non-native, invasive species management plan*: an integrated plan developed to address the control or eradication of non-native, invasive plants and/or animals on a national forest or other land unit.

### Counting Instructions:

Note: this element specifically addresses non-native, invasive plants. However, if non-native, invasive plants are not of issue in this wilderness, and other non-native, invasive species are (insect, disease, etc.), you may substitute efforts to address these concerns under this element.

### Element 10: Baseline Workforce—Current and Proposed Staffing

In 2002, the WAG took on the task of developing baseline workforce staffing targets for each wilderness, helping to define Element 10. The WAG accomplished this assignment by developing “wilderness complexity ratings” for each wilderness. These ratings evaluated 12 measures for

which data were nationally available such as wilderness size, organizational complexity and amount of use. Each of these measures was weighted based on a subjective determination of how each contributed to workload complexity and an initial wilderness complexity rating was calculated for each wilderness.

Individual wildernesses were categorized into four arbitrarily defined complexity classes (A-D), from Low to Very High, for the purpose of conducting telephone interviews with a sample of wildernesses regarding the baseline work force needed to steward wildernesses with varying complexity. A stratified random phone survey was conducted with wilderness managers during April 2003. Survey participants were asked a variety of questions, including what level of staffing they would need to “manage their wilderness to standard” by 2006. A total of 56 wilderness managers were surveyed.

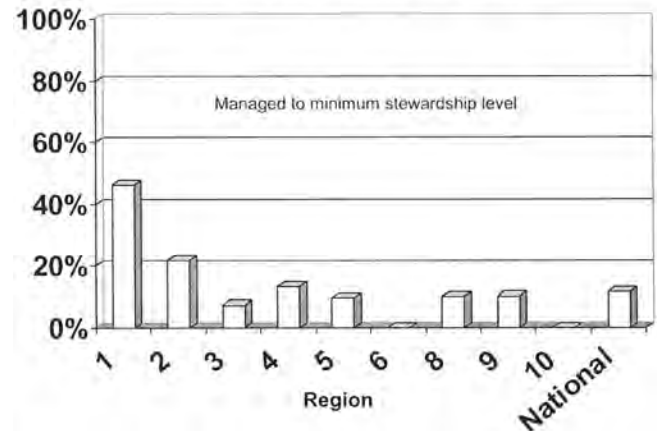
The results from the phone survey were subjected to data cleaning and verification, and then were analyzed and arrayed by complexity class. Targets were based on the **median** workforce value within each complexity class to minimize the effects of data outside of the normal distribution. A single target was assigned to all wildernesses of the same complexity class.

The workforce targets for each wilderness were further refined in 2005 to more clearly reflect the range of complexity ratings within each class and to avoid the “stair step” effect of only calculating a single target for each complexity class. Because complexity varied among wildernesses within each of the four complexity classes, work force targets were calibrated to reflect this variation (for example, the least complex wilderness in a complexity class had a smaller work force target than all other wildernesses in that class, but a larger target than all wildernesses in a lower class).

## Identifying Work Being Done Versus That Not Being Done

Because none of the 10 elements are new to the work being performed in wilderness, a data management system, Infra-WILD, was already in place to capture actions and accomplishments in individual wildernesses, but not all wildernesses had reported their accomplishments. In 2003, existing data were analyzed and reported to Forest Service leadership. For the first time, a picture was painted that clearly showed what was and what was not being accomplished in Forest Service wilderness stewardship. At that time it was estimated that 8 percent of the 406 wildernesses under Forest Service management were meeting a minimum level of stewardship. It was argued that an increase of 10 percent a year would bring that level to 100 percent in 2014, the 50<sup>th</sup> Anniversary of the Wilderness Act. The national baseline for the Challenge established in 2005 is 12 percent of wilderness managed to a minimum stewardship level. The data from the 2005 baseline shows we have a long way to go to achieve our goal with the 10 Year Wilderness Stewardship Challenge (fig. 2). However, that is not to say that we have not experienced several significant successes with the Challenge.

### 10 Year Wilderness Stewardship Challenge Regional Status (FY 2005)



**Figure 2—2005 National Status—**Percentage of wilderness units reporting minimum 60 percent accomplishment for the 10 Year Wilderness Stewardship Challenge by USDA Forest Service regions.

## Success

The 10 Year Wilderness Stewardship Challenge has been in place for 2 years. Some of the positive results include:

### Greater Visibility

The 10 Year Wilderness Stewardship Challenge provides a mechanism to visually present the wilderness management story. As a result, at a time where many high profile recreation programs [Off-Highway-Vehicle (OHV) Management, Recreation Facility Master Planning] are competing for funding out of the same dwindling national appropriations, wilderness has become more than something we “leave alone because it will take care of itself.” In a period of tighter funding and oversight, the 10YWSC is helping make a case for additional resources by displaying what is and what is not being accomplished.

### Increased Awareness and Involvement

This is occurring at very high levels in the Forest Service, as well as across other programs with wilderness stewardship responsibilities and our external partners. A very successful partnership with the National Forest Foundation (NFF) has been developed based on the 10YWSC. The NFF has dedicated funding to match Forest Service partners who are helping to achieve the Challenge. An example of these partnerships includes Wallowa Resources and their Hells Canyon and Eagle Cap Wilderness Weed Survey and Control project. This project focused on reducing the threat of weeds to the Hells Canyon and Eagle Cap Wilderness areas, in partnership with the Tri-County Cooperative Weed Management Area, through inventory, treatment with integrated pest management, monitoring and restoration.

Another successful project funded in partnership with the NFF was the Northwest Connections White Bark Pine Forest Restoration project in the Mission Mountains Wilderness, Flathead National Forest (MT). This project is assessing the declining white bark pine forests across the Mission Mountains Wilderness Area and helping the Forest Service in changing the current fire management plan to accommodate prescribed burns.

These are just two of the many projects supported through the National Forest Foundation that are directly related to the 10YWSC.

## Improved Stewardship

A common definition of what good stewardship means is in place and the minimum bar has been set. All units are moving towards a common goal. Resource programs such as fire management, fish and wildlife and others are getting involved—from workers in the field to managers in the office to administrators at the national level. The 10YWSC serves to highlight the need for more effective wilderness stewardship through interdisciplinary involvement and partnerships.

## Development of Tools

To help facilitate success of the 10YWSC the Arthur Carhart National Wilderness Training Center developed management toolboxes covering implementation guidelines and examples for many of the 10 elements and the WAG helped to facilitate a Guidebook for managers. These tools have been posted on Wilderness.net, a multi-agency wilderness management website accessed by over 150,000 individuals each month. The Guidebook can be downloaded at: <http://www.wilderness.net/NWPS/documents/guidebook.doc>

## Cautions

There are several cautions to consider if adopting a management tool like the 10YWSC. First, it is important to note that the 10 elements only represent *part* of the job of managing wilderness—be careful not to represent this subset as the *entire* task of wilderness stewardship. The elements should be representative of all wilderness values, not just recreation. Second, is the concept of a “minimum stewardship level”—in most situations 60 percent is barely a passing grade. This should not be the ultimate goal for wilderness stewardship. Third, the system is not a checklist—one in which you get credit and then move on. The elements need continued attention and “maintained to standard” must be a sustained objective, not a ticket punched for that year’s accomplishments. Annual accomplishment reporting must be combined with some sense of direction for the next year.

Furthermore, clear definitions are necessary to ensure consistent counting. Without consistent counting, you’ll be unable to meaningfully interpret the results. And as much as possible, the elements and their descriptions should be relatively stable. If and when changes are made, you become open to accusations of a changing goal.

## Conclusion

In conclusion, the USDA Forest Service has had some success in defining and marketing their accountability system for designated wilderness, the 10 Year Wilderness Stewardship Challenge. The Challenge has increased the awareness of wilderness stewardship throughout the agency and has helped to more clearly define what the actual job of wilderness stewardship entails. Other wilderness management agencies could replicate the Challenge by following a similar approach.

## Outline of Approach

- Brainstorm a list of critical work elements—this list should include all wilderness values (not just recreation).
- Boil list down to key elements applicable to all wildernesses. This set should be relatively small—we limited ourselves to 10 elements.
- Attempt to fit into systems (for example, accountability and data management) already in place (if applicable).
- Consider marketing potential—(for example, our tie to the 40th and 50th anniversaries of the Wilderness Act of 1964). Package and communicate in every possible venue.
- Provide tools to help field managers meet the Challenge (toolboxes, templates, guidebook, etc.).

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## 6. Encouraging Stewardship Through Education



*Pre-Congress training allowed students an opportunity to enjoy Alaska (photo by Till Meyer©, used with permission).*



# Wilderness Education: The Ultimate Commitment to Quality Wilderness Stewardship

Gregory F. Hansen  
Tom Carlson

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**Abstract**—The effective planning, implementation, and monitoring of a wilderness education program will ultimately produce measurable results that can be instrumental in achieving wilderness management goals and objectives. This paper will provide a simple step-by-step overview of how to develop and maintain a successful wilderness education program through planning, implementation, and monitoring. It may also serve to help build “consistent wilderness education program standards” for wilderness managers around the globe.

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## Benefits of Wilderness Education

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The obvious benefits of a wilderness education program are typically a reduction in physical impacts to the resource and higher compliance with regulations. But, many other benefits can result from effective education efforts (Hendee and Dawson 2002). Increasing visitor awareness of misunderstood wilderness programs, such as natural fire or non-native invasive species eradication, can be achieved by blending pertinent information on such topics into more general wilderness educational programming. Promoting non-recreational values, like scientific research or maintaining air and watersheds, can be accomplished by integrating education messages related to these values into more typical wilderness education functions such as in-town outreach efforts and backcountry visitor contact programs. In addition, legislation establishing wilderness or protected areas may include special provisions for non-conforming uses like livestock grazing, mining, or water developments and education can be instrumental to help the public understand that under certain circumstances these exceptions are part of the management of wilderness (Hansen and Carlson 2005).

Furthermore, wilderness education can serve to build and maintain lasting partnerships that benefit wilderness as well as other non-wilderness management functions. Educators can extend themselves through outreach efforts in a posi-

tive and professional manner, thus working to establish and build contact with prospective partners or maintain existing relationships with established user groups, nongovernmental organizations, and other cooperative land management agencies. Proactive managers understand the significance of building a foundation for proper land use in future users such as school children, and innovative education programs work well when attempting to plant the seed of environmental awareness in the minds of future wilderness users (Hansen 2003).

The process of utilizing the indirect methodology of education is consistent with the wilderness ideologies of freedom, escape, and discovery. Education can also reduce the need for direct management and resource restoration. It can help to broaden support for wilderness, increase wilderness managing agency credibility and trust, and serve to strengthen the overall image of the managing agency by having positive professional educators out working in the community (Hansen 1989).

Education is invaluable in building a wilderness constituency, as it provides a proactive human approach to solving problems. The indirect method of educating the public often far outweighs direct heavy-handed regulatory approaches when attempting to improve visitor behavior or make the public more aware of the purpose behind legally designating wilderness. When regulations are necessary, education helps gain compliance by explaining the necessity for restricting visitor activities to protect the wilderness resource. Education must be supported by proficient law enforcement, but ultimately, it is unyielding in its efficiency if it is well laid out, implemented appropriately, carefully monitored, and supported by the managing agency leadership.

## Wilderness Education Planning

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Wilderness education and information is a basic, fundamental, and essential part of an overall wilderness stewardship program. Most administrative actions implemented as part of wilderness stewardship are focused on management of human-caused impacts and providing opportunities for wilderness dependent recreation or solitude. Without an adequate education and information program other types of management actions, like regulations or backcountry restoration, are far less likely to succeed.

Wilderness Education Plans can be prepared for an individual wilderness or for a group of wildernesses with similar issues and audiences. The objective is to comprehensively address all wilderness management issues for a multi-year period.

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New or updated National or Regional Wilderness Education Strategies or Emphasis Items will mandate incorporation of certain items into the wilderness education plan. An annual Wilderness Education *Action or Implementation Plan* may be prepared to determine which portions of the multi-year education plan will be implemented each year and allow for consideration of new or emerging issues. Alternatively, annual wilderness education action items could be incorporated into a Wilderness Implementation Schedule or annual action plan that incorporates all wilderness projects. The Wilderness Education Planning and Implementation Cycle (see fig. 1) portrays how national, regional, and unit wilderness education strategies and needs are incorporated into a planning, implementation, and monitoring process. For more information on creating and implementing a wilderness education plan, see the Existing Agency Guides, Processes, Templates, and Handbooks section in the Education Planning Toolbox at: [www.wilderness.net/toolboxes/](http://www.wilderness.net/toolboxes/).

A key component of any wilderness education program is monitoring during and after implementation. Monitoring is necessary to determine if the prescribed education actions are effective and also for reporting, work planning, and budgeting purposes. If it can be shown that an education program is having a direct effect on reducing human caused impacts then support for future emphasis and funding should follow.

Examples of monitoring might include campsite and other resource inventory and re-inventory work done over time to show a trend in physical and/or social conditions, litter, social trails or short-cutting of trail switchbacks. Another example of monitoring might be wilderness ranger reports or journals of observations and public contacts that document visitor contacts and resource conditions to indicate if the education message reached the visitors and what methods were most effective. Formal surveys done by research scientists or university graduate students may also be effective forms of education plan monitoring. For more information, see the Monitoring Template and Monitoring Checklist at: [www.wilderness.net/toolboxes/](http://www.wilderness.net/toolboxes/).

There is no size guideline for a wilderness education plan. Examples provided on the Education Planning Toolbox at: [www.wilderness.net/toolboxes/](http://www.wilderness.net/toolboxes/) range from a few pages to dozens of pages. The objective is to include the key elements of what is needed for a wilderness education plan (see the Wilderness Education Plan Template) and create a plan that is complete but concise and easy to pull off the shelf and implement (Meyer and Thomas 1989).

An environmental analysis (in the United States, typically a documented analysis and decision making process that involves public input and disclosure of effects required by the National Environmental Policy Act or NEPA) is probably not required to prepare or implement an education plan. Any new ground-disturbing activity that might be connected to the education plan, for example, construction of a new visitor contact station, can be done through a site-specific NEPA analysis for that project. The education plan should be incorporated into an overall wilderness management plan, which may amend a forest plan, as an appendix or addendum if desirable.

The wilderness education plan should be approved by the local agency administrator, or formal decision maker. The approval process not only documents and justifies the

basis for work planning and expenditures, but provides an opportunity for the agency administrator to become involved and increases their understanding of the importance of wilderness education in an overall wilderness stewardship program.

A *Wilderness Education Plan Template* has been prepared as a guide for preparation of a multi-year wilderness education plan. It is available in the Education Planning Toolbox at: [www.wilderness.net/toolboxes/](http://www.wilderness.net/toolboxes/). This template was developed by identifying common successful items found in examples of existing wilderness education plans solicited from all agencies. The template is not part of agency policy but can be used as a tool to help identify the key issues, audiences, messages, and monitoring necessary to prepare and implement a successful wilderness education plan. A key part of the implementation and success of a wilderness education plan will be preparation of subsequent annual action plans for wilderness education that describe realistic projects that will be implemented each year.

A sample of current wilderness education plans are provided in the Education Planning Toolbox at: [www.wilderness.net/toolboxes/](http://www.wilderness.net/toolboxes/). The example plans provided vary in detail, format, and length but serve to demonstrate various approaches to wilderness education planning and implementation.

## Implementing Wilderness Education

The primary goals for implementing wilderness education programs are to:

- Solve problems
- Resolve conflicts
- Improve user behavior
- Reduce physical and social impacts
- Make the public or agency more aware of wilderness values.

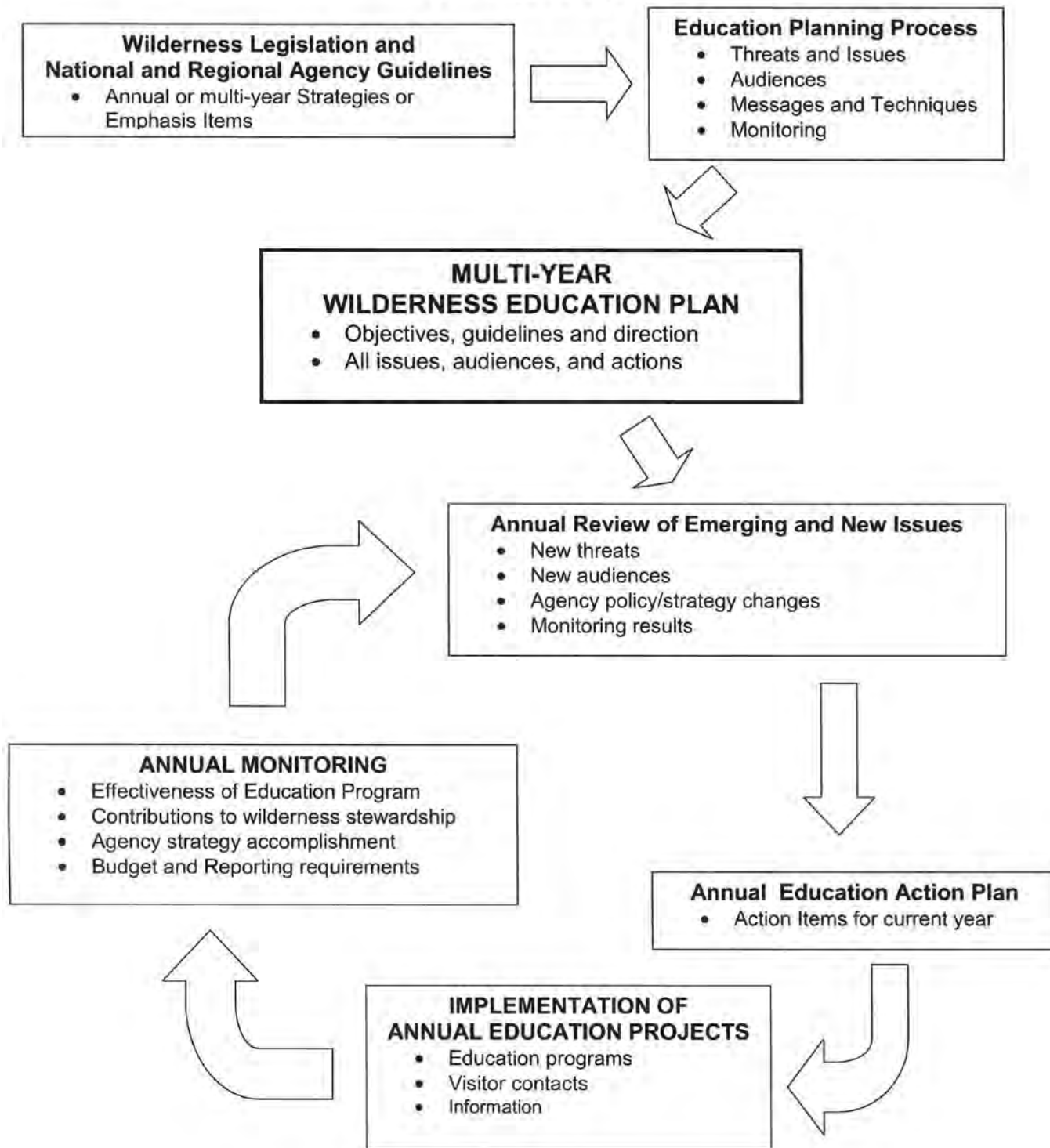
A few key concepts should be considered when implementing any type of wilderness education program. When first starting out, it is imperative to focus educational efforts on one or two priority issues. If the top priority issues are successfully resolved, move on to the next set of priorities. Administering wilderness is a never-ending cycle of management challenges. Expect that there will be a crossover of issues to deal with as management of the area proceeds over time.

Managers must continually monitor and evaluate their education success and be able to modify their education program in order to keep up with the inevitable reality of change. Monitoring helps managers focus on one or two priority issues that help meet long-term management objectives while identifying needs for modification and possibly expansion of the education program.

If the primary goal for implementing a wilderness education program is more generic in nature, such as making the public more aware of wilderness benefits, then a more general means of educational messaging should be instituted. Avoid falling into the trap of trying to contact the general public using a shotgun-style approach, unless this technique is truly merited, as it will result in vague and inefficient messaging, and your overall attainments will be limited.



## WILDERNESS EDUCATION PLANNING, IMPLEMENTATION, MONITORING A Proactive Cycle



**Figure 1**—Wilderness education—planning, implementation, monitoring: a proactive cycle.

An endless number of techniques are available to managers who are interested in implementing a wilderness education program (Doucette and Cole 1993). Outreach or in-town education is substantially more efficient than all other wilderness related education methods. Educating users before they visit wilderness can help better prepare them for their trip, as these users will now have a clear understanding of what is expected of them and what to expect from the area they are visiting. This effort results in higher compliance with regulations and can serve to reduce negative effects on the social and biophysical values of wilderness.

Most people visit a managing agency office before entering wilderness and this is an opportune time to educate. Although the majority of office visits do not exceed a total of five minutes, a great deal can be accomplished if front desk personnel understand both wilderness and the information they are asked to share with the public. Training office personnel to communicate the most pertinent information to visitors is well worth the effort, as these front liners can be very influential with the large numbers of people they contact.

Wilderness entry points can be used to promote responsible wilderness use, especially if an area is limited to a few main access portals, as your audience is funneled in and out of semi-controlled locations. But managers should be cautious not to force education contacts on visitors, as this can be interpreted by some as being in conflict with the very philosophy behind the ideal of primitive and unconfined wilderness recreation. If visitors are receptive to having agency personnel at trailheads, or management problems exist that dictate such action, education stations can be set up throughout the year or during high-use times. Although education might be the main objective at wilderness entry points, other management duties, such as visitor use data collection and law enforcement patrol, can be accomplished simultaneously.

Volunteers can be extremely valuable for bringing wilderness educational messaging to their own peer groups. For example, a minimum impact message can be much more easily accepted and understood by a well-seasoned equestrian group if the information is being conveyed by members of that or another equestrian group, as compared to an unfamiliar, uniformed land manager. People relate better to folks they know and trust and for this reason volunteers can truly be an asset when attempting to educate well-established organizations or groups that are more difficult to work with.

Individuals and groups who are willing to volunteer their time and skills towards the quality management of wilderness can make excellent wilderness educators because they truly want to be doing the work or they would not have volunteered their services. Existing partnerships can be a source for recruiting wilderness educators. Volunteer associations, local hiking or equestrian clubs, and other outdoor enthusiast organizations are all excellent resources for acquiring wilderness educators, especially if the organization regularly visits wilderness, as they already have a vested interest in wild places.

Success in using volunteers as wilderness educators can be enhanced if they are selectively recruited, trained, properly managed and supported. Volunteers should be carefully matched up with the particular tasks that they are asked to perform according to their interests, educational and

experiential backgrounds. Often volunteers that have backgrounds as teachers or land management agency employees can become effective wilderness educators if managers can support the program with the necessary amount of time, funding and effort. The volunteer screening process should determine if volunteers who have a long-term or strong interest in an area are territorial or not able to be as unbiased as a land management agency volunteer or educator needs to be.

Information boards and signs can be used to pass educational information along to users at access points. Signs are certainly not as effective as a human presence, as most people are in a hurry to get their trip started and pass by without even stopping. Message boards that include some type of "hook," such as a cartoon or one or two well-designed color pictures, can help to draw the visitor (Cole 1998), but the amount of time actually spent reading text can be less than five minutes, according to some research studies.

Traditionally, much of the education conducted in wilderness occurred along the trail or in backcountry settings, such as campsites. Although not as effective as educating visitors in town before they arrive, backcountry education is useful and should be an integral element of any wilderness management program. Contacts made along trails are typically more successful than speaking with users in their campsites because educators have the opportunity to discuss issues such as proper camp selection and fire restrictions before the user sets up camp and creates impacts that may be completely unintentional. Education duties can be combined with normal backcountry tasks, such as trail maintenance or resource monitoring work, by simply training all field employees to educate and by making it a formal part of their position description.

Visitor contacts in wilderness can be a challenging opportunity for conveying the wilderness education message, particularly if the visitor is exhibiting behavior that is causing impacts or in violation of regulations. Often an approaching ranger in uniform is seen as a "wilderness cop" rather than a wilderness steward. An education technique called *The Authority of the Resource Technique* (ART) (Wallace 1990) is helpful in getting across the need to alter the practice that is causing the impact rather than focusing on the ranger's authority, uniform, badge, etc. The ART utilizes a "shoulder to shoulder" approach where the ranger and visitor view and discuss the impact and identify the adverse effects on the wilderness resource before addressing the behavior of the visitor that is causing the impact. Alternative, less impacting techniques are then identified, explained, and, if necessary, demonstrated using an informative and educational approach, rather than a regulatory, enforcement approach. ART works well for non-uniformed volunteer wilderness stewards also.

Written materials are another means of disseminating educational information. Text can be added on the back of a wilderness map, covering topics such as group size limits and other pertinent land ethic information. Brochures that cover a few specific problem areas are most efficient, but more general pamphlets can also be developed and disseminated. The general messages may not be as effective in causing a change in visitor behavior as issue-specific leaflets.

Today, electronic communication is an extremely useful mechanism for disseminating wilderness educational

materials to a very large audience. Online wilderness education websites can take the viewer on a computerized wilderness education experience that is fun and interactive. Many wilderness areas provide education information via their agency-based website. To access these sites, go to <http://www.wilderness.net/nwps/> and click on the state and wilderness area of interest. To view a quality wilderness education website, visit the National Park Service's Wilderness Views website at: <http://www2.nature.nps.gov/synthesis/views/#>. The *Celebrate Wilderness Education and Interpretation Handbook* can be found at: <http://www.wilderness.nps.gov/toolbox21.cfm>. Another example is the Central Sierra Wilderness Education website at: <http://wildlink.wilderness.net/>.

Credibility with the public is essential to any manager's success; therefore, all education efforts must be consistent. For example, if office personnel are informing the public that campfires are not allowed due to high fire danger, and field personnel are giving citations for campfires justified by a lack of down and dead material, the message is inconsistent and could be lost in the visitor's frustration. Therefore, it is vital that managers make every effort to ensure that all education information is consistent across the board, and must be diligent in their efforts to update educational messaging as issues and management actions change or are modified.

Wilderness education can and should be integrated into all aspects of wilderness management and involve all resource specialties. This is a progressive process that takes time, commitment, money, and support at various levels of the organization. It may be useful to engage interdisciplinary specialists by beginning with a simple plan that focuses on priority issues, and expand only when these issues are resolved or can be managed at an acceptable level. Many wilderness education implementation techniques exist, and managers must take the most desirable and integrate these into a program that best meets the specific needs of each component of the wilderness resource.

## Funding Wilderness Education \_\_\_\_\_

Funding wilderness education out of the managing agency's annual budget will always be a challenge. Typically there is no hard target for accomplishment of wilderness education, little accountability for not doing it, and difficulty in attracting funds or gaining support within the agencies. The case must be made that wilderness education sets the foundation for nearly all other types of wilderness stewardship activities and can be far more cost efficient, visitor friendly, and effective at addressing many issues than other techniques. Building on this philosophy, every opportunity must be sought to develop partnerships internally within the management agencies and to share scarce education resources with other departments, and externally, to identify and expand upon partnership opportunities.

Compensation of some type is almost always necessary for people involved in any type of wilderness education and/or management work. Even volunteers are not free. It will take a manager a considerable amount of time and effort to recruit, screen, and train prospective educators and then manage and monitor their work and recognize their efforts on a regular basis.

Grants can be an excellent source for procuring wilderness education funding. Internal agency, NGO, State or Provincial agency grant programs and Universities are all good grant resources. Although many grants will not pay actual salaries, funds can be used to fund a variety of other educational program components such as curriculum development and testing, program evaluation, development of educational materials, copying, and distribution of information, and volunteer expenses. See the Volunteers and Partnerships Toolbox at: [www.wilderness.net/toolboxes/](http://www.wilderness.net/toolboxes/) for more information.

## Monitoring Wilderness Education \_\_\_\_\_

Monitoring is documenting and keeping track of information such as number of programs implemented or number of program participants. Monitoring is the overall tracking of how an education program is running in a general sense.

Evaluation is systematically measuring the effectiveness of educational programming and/or program delivery. These two components obviously complement one another and both can be conducted independently or simultaneously, when assessing wilderness educational programming.

Although monitoring and evaluation are separate processes, the term monitoring will be used throughout this paper to refer to both program topics, unless otherwise noted.

## Factors to Consider When Developing Wilderness Education Monitoring

1. Has a wilderness education plan been completed?
2. If a wilderness education plan exists, does it closely coincide with larger Forest or Park Plans, and do both carry consistent management goals and objectives?
3. Is education effectiveness monitoring included in the wilderness education plan?
4. Why does education programming or educational delivery need to be monitored?
5. What aspect(s) of the wilderness education program need(s) to be monitored?
6. What monitoring method(s) will be used?
7. Are there prospective partnering opportunities to assist in the development, implementation, and funding of education monitoring?
8. Is there a need to secure external-agency technical assistance due to the complexity of the monitoring?
9. Who will accomplish the monitoring?
10. What is a realistic timeline for completing the monitoring?
11. How much will it cost to conduct monitoring?
12. How will monitoring results be recorded and reported?

Short- and long-term monitoring goals, measurable objectives, and detailed implementation actions should all be included as a part of any Wilderness Education Plan. The planning process of designing goals, objectives, and actions should be followed when developing a monitoring program. These will then parallel the larger Wilderness Education Plan format as shown below:

1. Goals—Goals describe general outcomes that are not easily measured and do not include methods or techniques.
2. Objectives—Objectives define what will actually be measured and carry definable outcomes. Solid objectives consist of conditions, criteria, persons and measurable behavior.
3. Actions—Actions drive the achievement of objectives and include details such as whom will do the monitoring, how long it will take, and how much monitoring will cost. Action items should directly coincide with monitoring goals and objectives and describe in detail, exactly how monitoring will be carried out. They should be comprised of personnel conducting the action, a timeline for accomplishment, and a total cost.

Not all wilderness education monitoring systems have an obvious and/or easy to monitor effect. The length and complexity of monitoring should fit each specific monitoring job. Simple and effective is the best, as monitoring does not have to be lengthy and complex. Using a straightforward monitoring process will not only make monitoring easier, but will also serve to keep overall monitoring costs down. Therefore, it is essential to take the time to identify the best monitoring method for each monitoring task, realizing that some techniques will show immediate results while others will be more long-term in nature.

## Accomplishing Monitoring

- Look for opportunities to incorporate wilderness education monitoring into new and/or on-going monitoring of social, biological, and physical components of the wilderness resource to gain efficiency.
- Make a strong effort to match personnel skills, interests, and availability with monitoring needs, as this will provide higher quality, more consistent results.
- Assign individuals to specific monitoring programs and tasks, as this will keep folks engaged and motivated, and will ultimately produce more consistent accomplishments.
- Empower people involved with monitoring to be creative, just as creativity is expected in program development or implementation.
- Identify outside sources such as Agency Research Stations or Universities that are looking for projects relating to education monitoring.
- Seek outside expertise if monitoring cannot be technically accomplished by existing staff and/or other agency personnel.

Recognize the limitations of people and the limitations of the program itself. Make a solid attempt not to over-plan. It is much better to set attainable goals and over-achieve, than to over-estimate and underachieve. Divide monitoring tasks by identifying those that carry easy measurable steps, and those that will take more time, effort, and financial support. Envision unplanned situations and conditions, as they will most certainly occur. Developing a successful monitoring program is challenging but the rewards are well worth the effort.

## Summary and Conclusion

Over the past 40 years, wilderness has become a place where solitude and primitive recreation opportunities can be found and a place that allows for the natural healing to offset today's relentlessly fast-paced society. Wilderness education and information is a basic, fundamental, and essential part of managing wilderness for future generations. Most administrative actions implemented as part of wilderness stewardship are focused on management of human-caused impacts and providing opportunities for wilderness-dependent recreation or solitude. Without adequate education, these types of management actions are far less likely to succeed.

A complete wilderness education program should include a realistic plan, attainable implementation projects, and effective monitoring. The successful wilderness education program will be an integral part of a comprehensive wilderness stewardship program that incorporates indicators of change in natural conditions and wilderness character, resource inventory, monitoring of program results, visitor information and contact programs, law enforcement, and partnerships with other wilderness stewardship organizations. By incorporating field-tested concepts and techniques, managers can realistically improve and correct user behavior, increase regulation compliance, and foster strong public support for designated wildlands; all resulting in a more pristine resource and a higher quality wilderness experience for the visiting public.

Wilderness education is the ultimate commitment to quality wilderness stewardship. The future of protected wildlands will depend upon managers' abilities to educate the public on how to responsibly enjoy these unique areas, thus understanding the natural integrity and value that the enduring resource of wilderness provides to all people...for seven generations...and beyond.

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# Nature is the Home of Culture—*Friluftsliv* is a Way Home

Nils Faarlund  
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**Abstract**—*Friluftsliv* is a unique Norwegian cultural heritage, which is believed to be of great importance to modern society. A brief introduction to the cultural roots of this Nature caring tradition is given. *Friluftsliv* is a legitimate child of European Romanticism—said to be a “protest movement” against the Age of Enlightenment. Artists and philosophers were the leaders of an offensive against the philosophy of the French founding father of the natural sciences, René Descartes, reducing free Nature into *res extensa* (having only measurable dimensions and no value in itself). The European middle-class profited by the revolutionary technology developed on the basis of Cartesian methods to start the Industrial Revolution. The same middle-class was charmed by paintings, poetry and music of the “protesters.” They left the crowded and polluted cities for the Alps to adore the great wonders of free Nature. Giving themselves the name tourists, they enthusiastically sought out the sublime places and admired the natives of the Alps—“the noble savages.”

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## Introduction

In Scandinavia, at the beginning of the 18<sup>th</sup> century, a small bourgeoisie struggled for freedom for Norway after almost 500 years under Denmark and Sweden. The creative middle-class of the few cities in a “backward” country were keenly interested in the focus on nationality in the Romantic Movement. They saw the importance of the “noble savages” living throughout the extended “land of the midnight sun” in building a national identity. At the beginning of the 19<sup>th</sup> century, Norway made its way to independence, having convinced continental *tourists* of a unique national culture at home in a sublime landscape. The national hero was not a general, but the curly-headed poet Henrik Wergeland (1808 to 1845)—the first hippie the world had seen. The nation builders were left with only one enigma. How could they acquire the unsurpassed status of the “noble savages” of the mountain regions during the Age of Romanticism?

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Serendipitously, they followed the lead of the continental *tourists* by becoming wanderers. In Norwegian this movement was called *friluftsliv*, Henrik Ibsen (1826 to 1906) being the first to use the word in print.

Due to a fortunate course of European history for Norway these years, a unique tradition for identification with free Nature came about. The features and values of this tradition can be established beyond doubt, thanks to the connectedness to the Norwegian national breakthrough. Thus the values orientation of *friluftsliv* is given by the paradigm of Romanticism: Free Nature, as well as humans, has intrinsic value. To bring about a change in the modern affluent societies our philosophy is to help re-establish cultures where:

*Nature is the Home of Culture.*

There are many ways to stimulate this process. Efforts are already made to enforce laws, impose taxes and negotiate international agreements. Democratic processes are practiced, using political and scientific channels. We suggest that free Nature may speak for itself:

*Friluftsliv is a Way Home.*

Since the Norwegian tradition of *friluftsliv* is about identity, expensive equipment, long approaches, arenas and indoor training are not needed. It is about touching and being touched by free Nature and thus the threshold for taking part is low. What is needed does not cost money nor has it any impact on free Nature. Leave no trace, make no noise and choose your way according to your experience!

*Silence is a way free Nature speaks by keeping quiet.*

## A Norwegian Tradition Called *Friluftsliv*

Three Norwegian *conwayors* of *friluftsliv* (Faarlund 2005) went the long way from the high North of Europe to Alaska on the occasion of the 8<sup>th</sup> World Wilderness Congress (8WWC). Yes, we were reluctant to travel by plane—and that far—but our wish was to make Congress participants from around the world aware of the Nature caring tradition of Norwegian *friluftsliv*. Being convinced that our unique cultural heritage of free Nature (Faarlund 1993) encounter might be of great importance to any modern society, we decided to seize the opportunity given in Anchorage. Instead of more or less vain attempts to gather a group of people from around the world in Norway, the least evil as to misusing the air and the fossil fuel it appeared to us, was to make a presentation for attentive members among the WWC participants.

*Friluftsliv*? Unfortunately the Norwegian word for a nation-wide beloved Nature encounter (Bollnow 1968) cannot easily be translated into a foreign language. That is of course so due to the said uniqueness. For more than 30 years we have been trying hard in dialogue with naturalists and scholars throughout the Western hemisphere without arriving at a satisfactory solution. Reed and Rothenberg (1993) writing in English about “The Norwegian Roots of deep Ecology,” decided that the word *friluftsliv* is not more strange than *ski* and other words of Norse origin. To be able to explain why “outdoor life,” “outdoor activities,” or “environmental activities” do not convey the proper meaning, we invite you to take part in a search of the cultural roots of *fri-luft-s-liv*.

By consulting a dictionary of the Norwegian language you are soon ascertained by the ending *liv*, meaning life, that we do well to follow a cultural approach. You need hardly ponder for a long time to find the fitting translation of *fri*. Norwegians write *i* for the English *ee*. Only *luft* is more of a mystery (if you are not familiar with German). The English translation is *air*. As “free-air-life” was everyday life at the stage of our cultural history when we were hunter-gatherers, we obviously must try to trace the cultural roots of *friluftsliv* in an era of “un-free” air. The times of the Industrial Revolution in Europe comes to mind—the times when cities were crowded with poor people and the air was heavily polluted—high chimneys only a protection for the west end population.

## In Search of the Cultural Roots of *Friluftsliv*

The leading philosopher of the Age of Enlightenment, René Descartes (1596 to 1650), opened up nature for an unlimited exploitation, declaring that free Nature was nothing more than *res extensa* (having measurable dimensions) and thus had no value in itself. He went on to put forward the basics of the natural sciences, which later made possible the Industrial Revolution. To make his position clear to people who were not able to follow his discussions on method, Descartes left a “short summary” in French: “L’homme est maître et possesseur de la nature” (Man is Ruler and Owner of (free) Nature).

The conditions in industrialized Europe caused by applying Descartes’ reductionism provoked a passionate “protest movement” against the ugly consequences of the Age of Enlightenment (Stoerig 1985). The protesters launched Romanticism, which is not always offered much attention today in the study of the history of ideas in countries where modernity now is the dominating paradigm. The protest movement was led by artists and philosophers, using the full palette of the arts to insist on the intrinsic value of *free* Nature—Nature in possession of the natural rhythms, that is diurnal rhythms, the rhythms of the seasons and the growth of the abundance of organisms of the biosphere.

Although the 18<sup>th</sup> century protesters were armed with nothing but manuscripts and scores, brushes and colors, violins and flutes, they successfully influenced the world view of the middle-classes, which had come to economic power following Descartes’ thinking by rules to exploit

Nature. The “west enders” thus enthusiastically left the filthy cities to adore the grandeur of the alpine landscapes. The bourgeoisie also discovered “the highlanders” (in Switzerland called “Oberlaender”), who these days were declared to be “noble savages.” They were at home in free Nature, having been brought up in places, which in the vocabulary of the new cultural leadership in Europe were categorized as sublime. The visiting city dwellers, naming themselves *tourists* (from French *tour-ist*—they were traveling around), soon discovered the mastery of the natives of the Alps in traveling in a terrain, which to “lowlanders” seemed inaccessible. The literary tributes to the montagnards were thus soon confirmed by their abilities as mountain porters and guides.

## *Friluftsliv* and the Enlightenment-Romanticism Conflict

We are not at all claiming that the inspiration behind *friluftsliv* came from Norway. What we do say is, that the economic and political situation in Europe as well as in our country, was favorable for a unique cultural development in Norway in the 18<sup>th</sup> century. Even a strong driving force was at hand, which turned out to be nationalism. It cannot be denied that the idea of the nation was also part of the philosophy of the Romantic Movement. To start with, while tracking down the origins of the Norwegian *friluftsliv* tradition, this was a frightening discovery. To try to keep secret that there had been a struggle for political independence of Norway since the time of the French revolution was not in our minds. A democratic constitution, which was established in 1814 when our country went from being a province of Denmark and into a union with Sweden, is a milestone in this process. Norway was only preceded by the United States and France in this respect. The struggle to fulfill the process of establishing a free nation gained more and more momentum as the century passed (Faarlund 2007).

Gifted Norwegian artists attracted the attention of the European middle-class—first among them the painters I. C. Dahl (1788 to 1857) and Peder Balke, later on the musicians Ole Bull (1810 to 1886) and Edvard Grieg. *Tourists* from the continent and from Great Britain came to see for themselves. Soon the word went around that Norway was not only the home of wild mountains and glaciers, but also of the fantastic fjords and the exceptional midnight sun. Even as sensational was the population of “noble savages” in a vast country still lagging behind in industrial development. Less than a hundred years after the establishment of the 1814 constitution, Norway proclaimed its status as a free nation.

There had been conflicts, but there had been no military action. The national hero of the struggle was not a general, but the first hippie ever, the curly-headed poet Henrik Wergeland (1808 to 1845)—even wearing hippie spectacles. Norway had succeeded in establishing a national identity in accordance with the values of the Romantic Movement due to the magnificent free Nature, the “noble savages” and a selection of talented artists from a population of less than 3 million people.

## What About the Norwegian *Friluftsliv* Tradition?!

One question, however, is still open. What has the history of the national breakthrough to do with the Norwegian *friluftsliv* tradition? It is offering a unique opportunity to determine the features of the tradition, which is not at hand in other European countries. The clue is the small but creative Norwegian middle-class, assisted by the before mentioned painters, composers, poets and writers. This well educated and well-traveled group was aware of and worked hard to establish the status value of the Northern “noble savages” abroad. Unfortunately, they did not themselves belong to this admired group of people. Proving that they were conversant with the rich Norwegian treasure of fairy tales in the spirit of the Ash-lad (Kvaloy Setreng 2005), in English better known as the talent of serendipity, they set off for the mountains. In company with the “natives” they familiarized themselves with the mountain landscape and soon “qualified” as “noble savages.” Although the first organization to support these visits referred to the continental category *tourist* (“Den norske Turistforening,” established 1868), *friluftsliv* was the word most frequently used. The later world-famous playwright Henrik Ibsen (1828 to 1906) was the first to put it in print in his poem “Paa Viderne” 1861 (Wilson 1988)—a word that is still so powerful that in a poll from the year 1993, altogether 87 percent of the population declared their participation (Vaagboe 1993).

This report from tracing the roots of the Norwegian *friluftsliv* tradition has been condensed to a few pages for the Proceedings of the 8<sup>th</sup> WWC. But our research work to establish the qualities of the tradition went on for some 20 years (Faarlund 1986). We have put so much effort into this project to avoid misuse of a precious word in contemporary Norwegian by commercial interests (Jensen 2000). The struggle for influence in clubs, schools and Universities has been going on throughout Norway for more than 30 years. The marketing and media efforts are increasing in volume and in hard-hitting approaches. Thus it is important to establish what our unique tradition is about (OBS, OBS!):

- *Friluftsliv* is a legitimate child of the Romantic movement of Europe.
- The values orientation of *friluftsliv* is given by the paradigm of Romanticism: Free Nature, as well as humans, has intrinsic value.
- *Friluftsliv* is an encounter with free Nature (in the sense of Martin Buber's *I and Thou*, German: “Begegnung”)—not to be mixed up with the use of free Nature as an arena for competitive sports or the commercialized, contemporary “risk taking” activities.
- *Friluftsliv* was in the beginning a project of the middle-class, which since the 1920s was not only accepted by the working-class, but enthusiastically embraced (in contrast to the development on the continent).
- Whereas in the continental *tourist* tradition the mountains were the preferred landscape, Norwegian *friluftsliv* is at home where free Nature is found.

## But Is not Tradition Obsolete Today?!

By studying the development of cultures, using different perspectives (anthropology, philosophy, economy, etc.) we have been able to make out the characteristics of the Norwegian *friluftsliv* tradition. But for which use—in modernity around the world today tradition is obsolete (!). Of course we are aware of this point of view. Albert Einstein (see Paulus 2005)—the brilliant master of the most advanced natural science, physics—reminds us that our ability to discover is limited by the theories we adhere to. The Descartes-based worldview of modernity has led to the belief that in the future anything goes—a belief that, by the way, is not in keeping with the principles of the natural sciences. Two hundred years after the first protest movement against the *maître-et-possesseur*-thinking started, it is obvious that a change is urgently needed. By practicing the Cartesian methods, cities of affluent countries are now less affected by pollution compared to two centuries ago. The price paid however is that the burden on once free Nature is transported worldwide and has grown by factors of thousands and millions.

As free Nature never becomes obsolete our philosophy is to help bring about a change in the affluent societies to re-establish cultures where:

*Nature is the Home of Culture.*

There are many ways to stimulate this process. Efforts are already made to enforce laws, impose taxes and negotiate international agreements. Democratic processes are practiced, using political and scientific channels. For many years efforts are made in developed countries to change industrialized agriculture into Nature-friendly working methods. Small-scale, self-subsistence farming, fishing and hunting in accord with the natural rhythms, in Norway named “Nature-life,” is an alternative way to bring about a change of lifestyle. We want to remind you that:

*Friluftsliv is a Way Home.*

As the Norwegian tradition of *friluftsliv* is about identity, expensive equipment, long approaches, arenas and indoor training are not needed. It is about touching and being touched by free Nature and thus the threshold for taking part is low. What is needed does not cost money nor has it any impact on free Nature. Leave no trace, make no noise and choose your way according to your experience! And remember—*friluftsliv* also has a value in itself! Depending on the landscape or seascape in your neighborhood you may choose to be a wanderer, maybe a mountaineer (in the alpine tradition, Faarlund 1975) or take to the paddle or the oars. Your way of travelling, however, is not the most important. Every other Norwegian (Vaagboe 1993) still values “the mystique of free Nature” and nine out of 10 enjoy the silence:

*Silence is a way free Nature speaks by keeping quiet.*

**Farewell!**



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# Restoring Youth: Restoring Relationships to Wildlife and Wild Places

Linda Moon Stumpff

**Abstract**—American Indian tribes recognize the most important resource for protecting the values of wild places is within youth. The Nez Perce Tribe, the San Carlos Apache Tribes and the Warm Springs Tribe are among many who have long emphasized the importance of initiating youth by providing experiences, activities and education in remote locations and carried that practice into modern day youth practicums. In addition, the USDA Forest Service has partnered with tribes through various federal training and youth programs. The Native American Fish and Wildlife Society continues to sponsor an annual national youth program for native youth and some regions have programs. The Los Padres National Forest in California also sponsored such a program in cooperation with the Santa Ynez Tribe for many years that provided a wilderness backcountry trip to complete restoration projects in the summer. The National Park Service joined the partnership one year to facilitate the program on the Channel Islands, bringing Chumash youth from the Santa Ynez Tribe back to the islands for the first time in many years. Access to federal lands is key in areas where tribes have small or fragmented land bases. This paper will focus on the intertribal native youth practicum that has been held for youth from multiple tribes in the Southwest region of the United States for the last eight years.

## The Ladder Ranch

A consortium of government employees and educators created a partnership with the Ladder Ranch in New Mexico, part of Turner Enterprises. Long-term leadership of the program rests with John Antonio (Laguna Pueblo), of the Southwest Region of the U.S. Fish and Wildlife Service and co-founder of the Native American Fish and Wildlife Society. Norman Jjoba (Islet Pueblo) of the Bureau of Indian Affairs (BIA) Northern Pueblo Agency, Jeannie Lubbering of Southwest Indian Polytechnic Institute, Steve Dobrott Ranch Manager of the Ladder Ranch in New Mexico, and Linda Moon Stumpff (Apache) of The Evergreen State College and USDA Forest Service (retired), have long-term roles in the intertribal youth practicum held annually in July. Many agencies, including the USDA Forest Service, U.S. Geological Survey, tribal government employees and nonprofit organizations and granting institutions have played important roles in producing a quality experience each summer.

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The Ladder Ranch offers a unique opportunity for students to participate in a restored landscape that encompasses the values of wild places on a reclaimed cattle ranch. It is a virtual laboratory for restoring more natural and sustainable ecosystems. Bison are currently on the ranch and create a more harmonious relationship to the natural ecosystem. Active and passive restoration processes are in place. Such activities may be contemplative such as developing a long-term vision for a restored landscape, or active such as restoring riparian and wetland areas to support a population of threatened Chiricahua leopard frogs. Sometimes cautious intervention occurs, such as participation in a project that brings captive-bred wolves back into the natural ecosystem.

## Indigenous Origins for a Concept of Restoration-Based Learning

Restoring human relationships with the wild requires continuous study and learning that can only take place on lands that reflect natural processes and ecosystems. This has been understood by many cultures. The original purposes of the Wilderness Act captured the importance of wild areas for science and learning. From traditional initiation ceremonies to contemporary youth wilderness experiences and practicums, the introduction of youth into a special relationship with wildlife and the ecosystems on which they depend is an integral portion of growing up indigenous. This creates a special kind of wilderness education that encompasses a life orientation based in values as opposed to detachment and objectivity. Cultural values aim for education that achieves comprehensive understanding within a landscape rather than the capacity to apply fragmented analytical tools. Finally, indigenous knowledge and science is connected to reciprocal relationships and responsibility to other forms of life. This aspect is expressed through gaining an understanding of policy and planning where objectives point to a quality of life rather than the win/lose propositions of politics and economics. The concept of renewal, of body, mind and spirit in its relationship to the world is applied in the work of restoration that may be passive through limiting use, or cautiously active by integrating actions with ecosystem processes. This active practice of restoration is connected to an ethic centered on reciprocal relationships with all living things as a community that exists in natural places.

The idea of movement and activity is integral to learning in this model of indigenous wilderness education. Motion becomes a metaphor that is expressed in four ways through the Southwest Native Youth Practicum. In this paper, movement is characterized by first “spinning” to recalibrate perceptions by removing students from modern technology to a wild place. The second part of the journey includes the

bending of mind and body: physical activity, responsibility and community values are combined as students explore the systems and relationships of life in a unique restored landscape. The protected environment itself teaches an environmental ethic to those who live in it, even for a short time. Third, the students move the knowledge up and down the scales of western science as they learn applied scientific methodology for a variety of tasks from habitat assessment to water quality analysis. Finally, students come together in community to assess their learning in the round. They return to the recognition and application of cultural values and knowledge as they analyze current and potential future issues and concerns through a National Environmental Policy Act (NEPA) workshop and problem resolution exercises.

The nature of the relation between humans and the environment is continuous, thus the importance of the prefix “re” on the word restoration. The endless cycle of life is expressed through restoration and the related relationships of respect and reciprocity. Activities of renewal, recycling, rebuilding emphasize the “re” of life as students engage in the activities of restoration—recycling, rebuilding, and research through the science of wild places. The impacts of the last 500 years and the current speed at which global development is occurring give further depth to the meaning and task of restoration. Important goals for the Native Youth Practicum include involving youth in applied science in the context of wild places, integrating education with applied work and transforming the work into a community experience as the youth rediscover and reclaim their powerful relationship to the environment. Youth practicums, perhaps more than any other kind of program, provide an opportunity to share cultural perspectives on wild places, for in them youth and instructors walk backwards from where we are now and find a place where origins can be remade and a new journey begun.

Wild places today are even becoming more tied with the idea of restoration, due to the damage inflicted by the three Cs: colonization, commercialization and commodification. In many cases, tribal lands were severely damaged by a long history of federal management for “the public good” that neglected the federal trust to provide healthy homelands that reflected tribal values and needs. The concept of restoration takes on increased importance in this context. Today, tribes may need to look for alternative facilities for the practicums on public and private lands that exist outside reservation boundaries. The practicums are important because they can give youth purpose and vision as well as the technical skills to continue their education and continue the work of restoring, planning and enhancing tribal lands.

Besides provoking understanding of relationships from the natural laboratory of wild places and places that retain wild values through the process of restoration, these youth programs often combine modern science with traditional values and native science. They promote this way of “two-eyed seeing”—that is, one eye focused on the strength of indigenous knowledge and science and the other eye being on the strengths of modern science. Other common components of learning experiences in native youth practicums are collaborative group learning, interdisciplinary learning, and respect for diverse tribal traditions. A traditional approach to ecosystems includes an appreciation and respect for all of its gifts, from wildlife to clean water to natural beauty.

The combination of the idea of respect with the idea of a gift from the Creator leads to behavior change. Students begin accepting responsibility to protect and restore wild ecosystems through recognition of their reciprocal relationships with wildlife. Thus, throwing litter into a wild place becomes a rejection of one’s basic relationship to the universe and to the local community of living things. The idea of general interconnectedness with the universe and all life translates down into the connectedness of living in a particular place and a particular community of living beings.

Much of the training and education in the practicum is built up around this sense of connectedness that is translated into action through the ideas of continuous learning and restoration. Students must gain enough knowledge to assess water purity and be able to follow up with techniques to ensure its maintenance. Due to heavy human impacts, both within and around the perimeters of wild areas, the restorative approach is critical today. In addition, reservations whose location was once considered remote are now watching cities and developments coming over the horizon and up to their borders and are preparing for potential impacts.

Youth come to understand the traditional and scientific values of wildlife and wild places: they are the means to assure the continuance of wild places. In earlier times, Indian youth received instruction in a day-to-day manner from elders and from interactions with the natural world and through traditional cultural activities. Today, change is occurring. Some families do not live on their home reservations; others include dual working couples or single parents with limited time. Children are bussed to school far from their language, their culture, and their elders, and they are exposed to the modern world of technology through education and entertainment. Yet in-depth knowledge of wildlife and wild places is transmitted through the generations and is vitally needed as well as the tools of modern science if we are to sustain them into the future. Although youth programs cannot replace traditional cultural learning and activities, they can teach respect, good values and knowledge that leads youth to “see with both eyes.” It is important for them to learn how to do scientific analysis while providing opportunities for reaffirming cultural perspectives. In this way, the youth practicum replicates native science learning by creating a primarily native community of students and instructors who express similar values. Within this framework, not outside it, western scientific methodology is introduced as a useful tool.

Cosmology, philosophy, education, action and wisdom through planning and developing strategies for restoration are key components of the weeklong program. The environmental ethic here is based on respect and participation with a view to restoration. Considering vast damage to the land base over the last 500 years, wild or restored places offer the last models from which to learn. Through the practicum experience, students create a beginning, an origin story where western science meets native science to make new models for science and action that can connect actions to sustainability through participation. Students are encouraged to use creativity to interpret the experience of their participation with place while they also learn applied scientific techniques, methods and tools.

Story is extended through memory and continuing relationships: instructors and students come back year after year,

even after students go on to new levels in their education. Science is approached as a means to understand the processes; explanation and respect are embedded in cultural activities. By combining instruction in science with a place for students to learn values, a time and place is created where everyone has a part to play in the future strategy for a land base. By living in the framework of a camp set in a restored landscape, students learn to replicate the model of respect for life and land, understand ecological processes and their role in the distribution of energy.

One perspective on the collaborative learning process is to look at learning in wild places as movement. Active learning takes shape through spinning to recalibrate for a new perspective; bending as learning and reforming through practicing an ethic; holding, through listening and respectfulness; moving up and down to understand empirical and factual data through science. Finally, learning moves in a circular manner to incorporate an understanding of ecosystem processes and human relationships to restored lands.

## Transformation: Spinning to Recalibrate

First, students are moved out of their day-to-day environments and steady-state activities. This creates a kind of spinning of the senses and a need to recalibrate and gain a new vision. They move to a new point of origin where stories, relationships and learning extend far beyond the week of the practicum. How the students and instructors got there, the events that occurred, and the experiences that make up a story of place begins an evolution of adapting and learning through culture and community. The methods of native science and the methods of western science coexist. The story is interpreted through their own experiences and activities. The journey of learning draws from experience and adds information, interpretation and understanding. The journey includes learning about responsibilities to each other and to all other creatures inhabiting the world with them. The story does not end, but passes through the stage of interpretation as students tackle tough issues of science and policy affecting tribes today. Finally, students write and reflect about their experience on the last day to gain understanding.

The Ladder Ranch has specific values: no snakes can be killed here, no unneeded development occurs. This underlines the sense of place, a place that is both sacred in a practical kind of way through its restoration and bounded. Students need to have such places to see in both new and old ways, because the modern technical society creates blindness to the natural world that would “deny the spirit and intelligence of nature.” There is a need to reconfigure perception. Students come from many tribes in the Southwest Region.

The student selection portion of the program is critical. Their participation is voluntary; they fill out detailed applications that present their reasons for participation. Parental support and consent is required. Parental involvement is encouraged through contact with instructors; they are greeted when they transport their youth to the staging site and any program details they have questions about are answered. Students are transported to the ranch in rental vehicles and spend the first day at the turn-of-the century lodge where

they are given an orientation to practicum values and expectations. Once at the ranch, all electronic devices must be turned in. Without electronic entertainment, students begin to relate to each other and the practicum instructors. Initial activities emphasize introductions, values and basic ecological concepts. They continue on to a discussion on ecological understanding. These activities are basic to transformative thought, which places science into a broader philosophy and cultural context.

## Bending to Learn

The concept of bending extends to living with others, relating me to the community of learning to extend one's mind and understanding. When the group begins the first evening with a program centered on understanding the nature of relationships in the ecosystem, they begin to think in new terms. Often, a wildlife restoration project is also presented on this occasion. Students particularly enjoy the presentation on the Wolf Recovery Project, a model project that takes place on the Ladder Ranch. Mexican wolves are acclimated to the environment on the Ranch so that they can be released into wilderness areas on adjoining National Forest lands. Learning from wolf behavior, a technique of “soft release” where the wolves are allowed to escape from temporary enclosures has been shaped through the program. Students learn about the importance of the wolf's role in the ecosystem and they have the opportunity to observe and interact with a variety of wolf artifacts.

The next day students are transported via vehicle to the base camp along a remote stream with huge, beautiful sycamore trees. As students pack and prepare for their trip to a remote riparian ecosystem tucked away between the hills and mesas of the arid Southwest, they learn appropriate and respectful behavior. Skipping stones is not acceptable. They move away from activities that are direct linear extensions of self to activities that integrate them into the group and community of learners. These activities “bend students” in such a way as to instill a group ethic of “leave no trace.” Instructors begin to introduce the idea of responsibility to group and to landscape. Social and individual responsibility is cultivated rather than individualistic autonomy. The students explore individuality and liberty at the same time that they build relationships. This is a far cry from traditional science education where students work in isolation with a fragmented independence of action. This context celebrates human community as part of nature rather than separate from it.

Once in camp, group activities, like eating together, early morning bird walks or morning runs, wildlife observation, learning about healthy native foods, and making camp provide opportunities to learn together. A formal presentation on native foods also creates understanding of the great contributions of indigenous agriculture to a healthy diet and to medicine. An ethic of active restoration work is practiced. Students get up early in the morning. One might say the Apache saying “Chi igona' ai' nitis dahlsol ees hela,” or “Don't let the sun step over you” becomes a major theme. Rules and expectations are clearly defined by instructors and students are responsible for specific roles in cleaning, setting up camp and food preparation. A spiritual sense permeates

the program and students share prayers before meals and frequently give thanks.

Instructors teach by telling their stories to students as well as more formal presentations. John Antonio shared his childhood story of playing by the Rio Grande at his home in Laguna Pueblo in New Mexico. He and his small friends believed tadpoles came from the sky. They went to the river and caught them, throwing them up in the air so they might fall down like rain. However, they were observed by elders. Since John is a member of a family group that has special responsibilities for aquatic life, the elders made it eminently clear to him that this behavior should never be repeated. Other instructors shared stories about contact with snakes, an activity that is avoided by some tribes in the Southwest. Some of the stories demonstrated the adaptation of indigenous practice to modern scientific study. Some found they were able to maintain the ethic of not disturbing animals but were able to allow actions that help the animal. Students who practice cultural beliefs that do not allow touching or even viewing snakes and some amphibians are not required to participate in the herpetology work, but they may have a separate discussion of their beliefs along with some scientific discussion with an alternative instructor.

Throughout the practicum, students have the opportunity to express themselves in their own way. Some draw, some write more, and some are more verbal than others. Most of all, the skill of attentive observation is practiced.

Along the way to the remote campsite, the participants take in a landscape level view of the land as they observe a series of restored areas. They observe herds of American bison (buffalo in common terms) on the highland grass areas, getting their first lessons in quiet observation and respect for wild animals. These American bison are part of a herd with the purest genetics of the wild bison of the plains. The impressive nature of this animal speaks louder than words. The bison is a symbol of the foundations of an indigenous cosmology where all living things have rights begins. Another stop at a pond reflects the work of the ranch's herpetologist: the pond has been enlarged to create a habitat for the endangered Chiricahua leopard frog. The buffalo has already taught the lesson of respect; no stones are thrown, nor loud noises heard. The road leads deep into a hidden arroyo where a healthy riparian ecosystem functions. Finally, the group arrives at the camp area and the vehicles leave. The campsite area was a historical use area for many tribes, as evidenced by the Anasazi petroglyphs and historical accounts of campgrounds used by Victoria and the Warm Springs Apache. The place, with its high values and functioning ecosystems, provides a wild outdoor laboratory for learning. This is one of the few areas in the Southwest that is free of cattle permits and public hunting, both activities are permitted on many of the designated wilderness areas in the Southwest.

The holding in place mode can also be connected to activities. Camp etiquette is built around "Leave No Trace Indigenous." Students share their cultural practices and knowledge to clear campsites so they will not be observed by others. They help build efficient campfires, practice careful wood gathering and other techniques they may have learned at home. In addition, they dig latrines, pick up all trash, and cover the camp area with leaves and sticks. The value of respectfulness is key. The teaching is culture-based

and value-based, students help to reinforce these values with other students. Since students are given roles and responsibilities for serving food, cleaning and setting up tents, so distributed power distributes energy. They gain a clearer understanding of what they are taking and what they are giving from the landscape. The restored landscape highlights respectfulness since littering can be understood as an offence against respectfulness and even operationalized sometimes through understanding the consequences to animals that the Ladder Ranch is trying to restore. Science is demonstrated through litter pick-up, behaving as to avoid disturbing wildlife, burying the campfire and removing traces of our short-term habitation.

Instructors lead a nature walk soon after camp is made. Again, activity is a part of holding in place and maintaining through symbolic actions and attentiveness to cultural values and observation. Holding in place is not static, but rather a constant shimmy, whether walking, observing, or discussing food gathering or hunting, enjoying stories around the campfire (especially those around traditional hunting and fishing), and responding to the constant stimulus of living things in a restored landscape. These create a special timbre of holding in place in restoration. This component provides a platform for the applied science of restoration through work, play, ritual, food gathering, and stories related to natural resources, hunting and fishing.

## Moving Around the Circle: Understanding Analysis and Interpreting Our Future

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The process of learning in a circular motion through walks that integrate knowledge and learning with experience is translated into analysis through activities involving policy analysis and the National Environmental Policy Act (NEPA). Students analyze practices for managing activities in wild places and the process of making decisions. They experience the interconnection of ideas as they develop visions and strategies, solve problems, communicate, and understand ecosystem processes and analysis. The talent show and the application of humor provide relief from the intensive work. Work and play are balanced as students get to know each other and communicate their ideas and talent.

In problem solving exercises, they demonstrate understanding alternatives and outcomes and their ability to resolve conflict. They role-play through the issues to understand threats to tribal lands, especially wildlife, wild places and sacred lands. These activities are especially humorous and instructors actively join in the role-play, often challenging the student players and occasionally dissolving the activity into laughter.

## Moving Up and Down the Steps: Rational Science

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Students participate in a series of science practicums while they are camped out. They test empirical data against principles and scientific practice. Water testing is a significant component. Students provide data to the Ladder Ranch and over the years have established a long-term database to help

with water quality, wild fish restoration and the improvement of stream and riparian areas. They have the ability and the knowledge to affect the value of a reciprocal relationship with the environment through restoration. Chemical water quality testing is supplemented by stream and flow measurement, identification of insects and other activities that help create a whole picture of the health of the stream. The practicum goes on to assess range health and the learning of applied methodology for assessing grasslands, forests and other ecological areas with an eye to their health in relation to the total ecosystem and the animals that exist there, with special regard for restored and threatened animals.

Campfire nights provide special opportunities for students to learn and have fun as a community. Storytelling is popular and brings forth the opportunity for students and instructors to share appropriate cultural stories and experiences. One instructor has specialized knowledge of bats and his science-based presentation is particularly amazing because the Ladder Ranch and the camping area is home to several types of bats. He brings the bats in from a net and students have a rare close-up view of the animals before he releases them.

## Moving Knowledge Around the Circle

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The return to the Ranch's lodge is celebrated with a talent night that reflects cultural talents including language, music and fun. Social relationships bloom in the community as students and instructors come to know each other in new ways.

The process of learning in a circular motion through walks that integrate knowledge and learning with experience is translated into analysis. The next day, students take a big step in applying their knowledge to reveal values and cultural perspectives in a mock-policy process set within the National Environmental Policy workshop. A specially designed exercise where students explore their own impacts on the land over the last few days prepares them for larger environmental policy challenges. The next day, students divide into three groups to vie with three scenarios that encompass science, values and ethics. Students analyze practices for carrying out restoration activities and making decisions. They experience the interconnection of ideas

as they develop visions and strategies, solve problems, and communicate. Work and play are balanced on this day as students get to know each other and communicate their ideas and talent.

They develop amazing and creative positions as they engage with resolving issues and integrating scientific information with tribal cultural and political perspectives. They make presentations to the full group and offer alternatives. During this component practicum students communicate, deal with conflict resolution, and implement tribal perspectives to natural resource challenges. In this final exercise, they weave in the knowledge and practical skills they have gained in their experience of living in a restored landscape.

## Rites of Passage: Here, Now, and Always

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By the end of the Youth Practicum on the Ladder Ranch, students have built a common identity around the concept of respect and the ethic of restoration. Instructors, counselors and ranch staff all join in for a graduation ceremony. Students' achievements in science, fishing, the talent show, or as group leaders, are heralded and sometimes special presentations are made. Students often form long-term relationships with other students and instructors. Some return as student counselors in a few years, others cross paths in college or natural resource conferences as they proceed in their careers. Parents have called instructors later to note that the Youth Practicum functioned as a turning point in their children's lives. Memories are made and shared in understanding ecosystem restoration and cherished album pictures are shared with the Ladder Ranch.

## Acknowledgments

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This work has been supported through the efforts of multiple educators and tribes, the Ladder Ranch and Turner Enterprises and some nonprofits. As a model for other regions, continued support is needed. Ideas for a youth education center, better science equipment and outreach must eventually be met. The need to restore each other and create sustainable restored landscapes engages the future, the present and the past.

# Paddling the Big Sky: Reflections on Place-Based Education and Experience

Phil Mullins  
Patrick T. Maher

**Abstract**—Paddling the Big Sky began as many expeditions do: out of past trips and in the stories, banter and daydreams of a group of friends. The journey, by canoe, departed from the foothills of the Rocky Mountains, stretched over 2,800 km (1,740 miles), crossed prairie, the width of the boreal forest, and then the “barren lands.” It included a 29-day university outdoor education program, lasted 100 days, and ended at Kugluktuk on the shores of the Coronation Gulf in Canada’s Eastern Arctic territory of Nunavut.

Seven people participated, one member left the expedition in Yellowknife and there the seventh, a student from the first month, joined the team. The expedition members, being athletes, guides, and educators, were pursuing various levels of post-secondary education related to outdoor recreation, tourism, education, and/or socio-cultural perspectives on physical education. Degrees ranged from a first undergraduate degree to doctoral studies. Experience levels also varied from having grown up canoeing and having led international environmental education and adventure programs to those on their first-ever canoe trip. An overarching interest among participants was the past, present, and future role of outdoor recreation and education as a mode of personal, social, and environmental learning.

## Introduction

During the winter of 2004 and 2005, the daydreams gave way to long hours of planning and preparation. Food was dried, equipment procured, sponsorship arranged, and courses planned. The first leg of the journey began on May 9<sup>th</sup>, 2005 in the foothills of the Rocky Mountains with three instructors and a group of 12 undergraduate students. This group of 15 traveled for 29 days on the Athabasca River from Hinton to Fort McMurray, Alberta. There, the students returned home and the three instructors were met by three additional members of the expedition. Together, this team of six completed leg two: paddling the remainder of the Athabasca River, across Lake Athabasca, and down the Slave River to Great Slave Lake in 21 days. Low on time, unsure if the weather would hold, and wanting to complete our journey to the ocean, we made our way around Great

Slave Lake—from Fort Resolution to Yellowknife—by truck where we adjusted the team for the third, final, longest, and most difficult leg of the journey. The 50-day long third leg of the expedition had us leaving from the docks of Yellowknife, traveling slowly North against the current of the Yellowknife River, over the Canadian Shield, and into the barren lands of the Arctic tundra. Lake-hopping and portaging heavy loads occupied nearly four weeks until we finally crossed the height of land, into Starvation Lake, down the Starvation River, into Point Lake, the headwaters of the Coppermine River. This famous river took us to Kugluktuk, Nunavut, on the shores of the Coronation Gulf, part of the Arctic Ocean. We arrived August 16<sup>th</sup>, 2005, 100 days after leaving Hinton, Alberta. The full route can be seen in figure 1.

## Why?

The research was directed by the first author’s interest to explore, during our expedition, some of the foundation ideas within his Master’s thesis (Mullins 2005). This previous research involved a critique of dominant Western conceptions of nature and culture—wilderness and civilization—as foundations for outdoor recreation and environmental education. Moving beyond a critique, and in response to Beringer’s (2004) call for a relational or ecological approach to adventure education that can account for the role of landscape in human change, the research looked at the theoretical implications of Ingold’s (2000) anthropological approach to environmental perception and learning.

Informed by rigorous analysis of various conceptions of relatedness seen across Indigenous peoples’ worldviews, Ingold (2000) strongly critiques dominant Western conceptions of indigeneity, selfhood, culture, and “the environment.” Furthermore, he shows how experience and skill development allow humans to make sense of, act within, and connect to their world. Ingold (2000) begins with the assumption that each human is always already immersed in and encounters—from his or her unique position—an environment at once natural and social. We use the term *socio-environmental* to denote the combination of social and non-human environments.

The skills humans learn in dealing with our environment influence the formation and expression of personal and social identity. For Ingold (2000), skill involves an organism-person—indissoluble mind and body—acting with care, judgement, and dexterity, as part of a system of relations, in order to perform a particular function within a richly structured environment. Skills, learned through hands-on experience, taught to us by others, and afforded by one’s surroundings and creativity, also influence our milieu (Ingold

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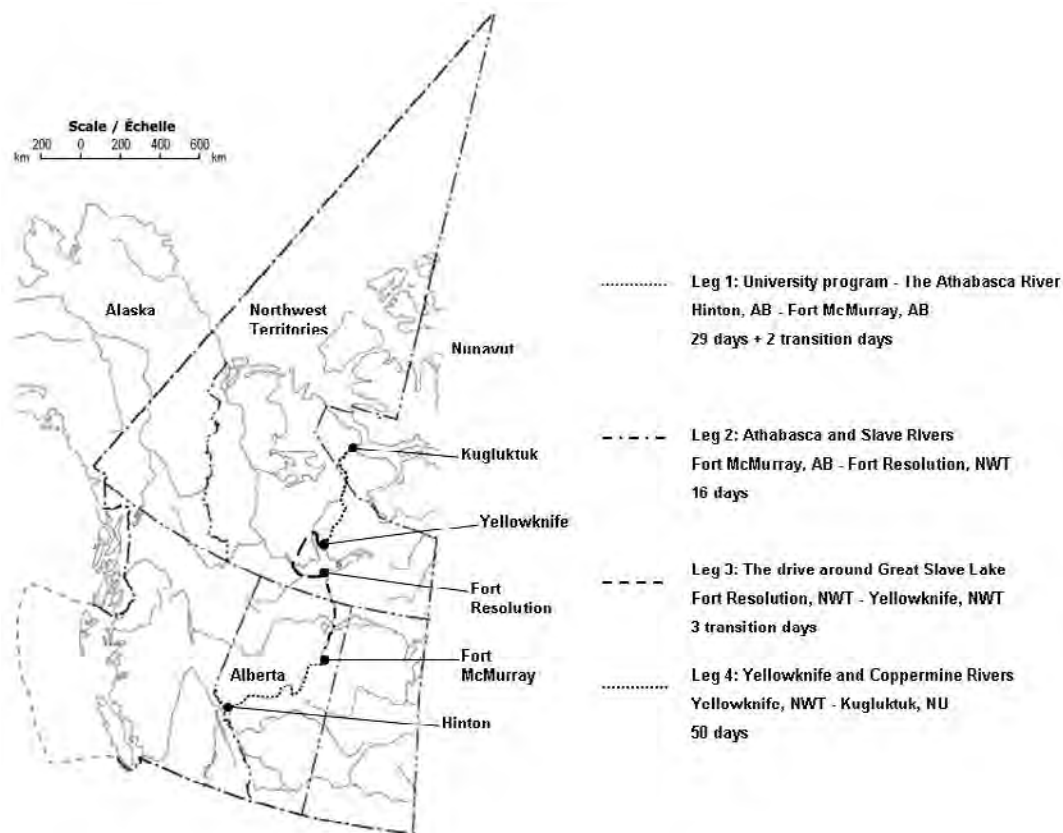


Figure 1—Route from Alberta to Nunavut.

2000). Landscape, according to Ingold (2000), is temporal; that is, its shape is constantly changing and in flux given the processes at work in the local environment. Through the practice of skills, we shape and change our environment as it shapes and changes us. Thus the identity of persons and meanings of places are relative to what we do in our lives and where we do it. It follows, then, that the activities and landscapes in which we engage influence who we are. Each human and each place comes to embody a unique position relative to other people and places as well as certain skills and non-human environmental processes such as the flow of a river, the weather patterns, and changing seasons. Dwelling in the world, Ingold (2000: 348) tells us, “is tantamount to the ongoing, temporal interweaving of our lives with one another and with the manifold constituents of our environment.” The members of the expedition wanted to explore if and how this process works through outdoor recreation and education activities and learning, specifically within our university program and larger expedition. We focused on our understanding and experience of identity, place, and skill.

Outdoor recreation and education have been shown to impact identity development and self-concept (Beringer 2004; Haggard and Williams 1991; Klint 1999). Hanna (1995) and Haluza-Delay (1999) assert that shifts in identity-related environmental thinking and attitudes require specific attention and focused educational programming. Despite this, Hanna (1995), and more recently Beringer (2004), contend that outdoor recreation and education research,

ensconced in traditional dominant Western individualism, has not attended to the role of context and relations in the development and expression of identity. Wearing and Neil (2000) have made significant strides in connecting identity with the settings and structures of recreation experiences through dynamic and dialectic interactions. Payne (2000) argues that environmental education research has paid little direct attention to identity and its development, especially related to embodiment and place, as a creative process.

Notions of place, and/or sense of place, have also garnered significant attention in the outdoor recreation and education literature. Stokowski (2002: 368) defines sense of place as “an individual’s ability to develop feelings of attachment to particular settings based on combinations of use, attentiveness, and emotion.” Other authors (Fishwick and Vining 1992; McAvoy and others 2003; Raffan 1991; Walker and Chapman 2003) explore place, and various levels of attachment to it, as resulting from interactions of persons within their environment over time that lead to cultural meaning and environmental values.

Environmentally-oriented skills abound in outdoor recreation and education: students learn travel and navigation, weather prediction, and interpretation of “natural” and “cultural” history. Little has been written on possible connections between learning and practicing skills, and changes in participants’ environmental perception and values. Haluza-Delay (1999) argues that an ‘activity focus’ in adventure education detracts from students’ environmental learning; whereas Thomas (2005: 39) argues this tension can be ne-

gotiated by using adventure activities to “explore particular regions, communities, and their histories.” Surely, we argue, it is important to recognize that all skill is contextual and cannot be performed in a vacuum. Making a hard distinction between setting- and activity-focus is problematic, as skill performance requires attention, in some way and to some extent, to one’s environment.

The notion of ‘weaving’ people and places together sparked desires to share the expedition. We shared, and continue to share, it in three ways: first, through the inclusion of an academic program that had students join the full first leg of the journey; second, through actively engaging local people and places we encountered during the trip; and third, to a larger social setting through presentations and publications in both academic and non-academic forums. We wanted to share the trip for two reasons. First, to connect the expedition to aspects of our personal and professional lives as a challenge to dominant notions of wilderness and nature as “out there,” distanced, and separated from “culture” and “every-day” life. Second, to understand the ways outdoor recreation could establish and maintain relationships with people and places. Putting this into practice meant the members planned and taught five university-level classes that included basic and instruction-level canoe tripping skills, introduction to outdoor environmental education, leadership in adventure education, and environmental philosophy of outdoor education and recreation. Furthermore, we began our trip a short drive from the university. Throughout our journey we sought out and made time to visit with locals and attend community events, we tried to open ourselves to the various lifestyles taken up in the landscapes through which we traveled, and reflected on our impressions of and on them. Instead of flying, we paddled north to watch the changes in landscape, weather, lifestyles, and environment between our starting and finishing points.

## How?

In order to explore the relevance and applicability of Ingold’s (2000) work to our situation, members of the expedition and leaders of the university program were asked to journal about their experiences given the core concepts of place, identity, and skill. Journaling was prompted by these themes along with the happenings of our journey. As co-investigators, we read and discussed Ingold’s (2000) elucidation of the themes in order to come to some understanding relative to our various experiences. Weekly, we gathered to discuss if and how the prompts and Ingold’s (2000) work resonated with the various members based on what each of us had done, seen, discussed, heard, and thought as we traveled together and shared the experience of life on the river from different perspectives. We attempted to place Ingold’s (2000) research and theory of environmental perception in dialogue with our lived experience on the river in the context of outdoor education and recreation to see how each informed the other.

## Insights

An analysis of the taped discussions and written journals, as they relate to the main themes, has not yet been completed. Our reflective practice, however, led to realizations and

questions, as well as alternative approaches to and implications of theories and practices that we feel are relevant to those interested in outdoor recreation and education provision in ‘wilderness’ areas. In what follows, we describe cursory impressions, observations, thoughts, and examples derived from the entire trip. These certainly require further analysis and research.

## Education of Attention

In many Indigenous societies as well as Western “hands-on” learning environments, the student learns through what Ingold (2000) calls an “education of attention” by working through an apprenticeship in a richly structured environment. For the student, such an education reveals salient processes and elements in his or her environment and allows for the development of the skills necessary to work with these aspects to accomplish particular tasks. The mode of travel and activities we undertook influenced our perception and the meaning of aspects of the environments that were significant to our daily life. The skills needed to navigate a canoe through the river required an education of attention to currents, wind patterns, the size and location of rapids, and a partner’s actions. While discussing the river with jet boat operators, for example, we found they could tell us little about the relative location of rapids, and they perceived features in the river such as rocks, ledges, and shoals at a scale applicable to their activity and mode of travel, but often misleading to our group of canoeists.

While the students worked hard to learn navigation skills, they struggled much more while learning to see, hear, and feel the river. Instead of relying on and practicing their perceptual skill to make decisions about route, campsites, and lunch spots, our students often deferred to the map as a crutch, even when the information it provided was of little practical use. Much later on, when we found ourselves on the big lakes in the barren lands, we had to learn to look at the landscape differently to find our way. The expanse of water and land, combined with a lack of trees, made parallax difficult to observe and distance hard to judge (see fig. 2). Discerning points, bays, and islands from the background into which they “disappeared” required great concentration and attention. These moments of learning brought the difference between navigation and wayfinding into bold relief. Navigating meant finding our location and plotting a course on a map-grid in relation to the landscape as space (fig. 3) (Casey 1996). Wayfinding required our students and us to learn how to see, hear, and feel our way through our environment from our particular place (see fig. 4).

Attention to canoeing was facilitated through “formal” instructor-student relationships and working one on one with students while sharing a canoe. Furthermore, it continued through informal relationships as well. During outdoor recreation or education expeditions, life often occurs in a group context that complicates the mentor-apprentice relationship. We noticed various layers of “learning relationships” that shifted in time and space based on interpersonal associations and one’s role in “the group.” Students often commented that their need to attend to environmental and social processes increased dramatically when they moved from a follower into a leadership role. As an assignment, teams of students assumed the leadership of the group over



**Figure 2**—The expanse of water and land combined with a lack of trees made distance hard to judge.



**Figure 3**—Navigating meant finding our location and plotting a course on a map-grid in relation to landscape as space.





**Figure 4**—Wayfinding required students to learn to see, feel, and hear their way.

a period of six days. The instructors of the program noticed that the “leaders in training” practiced and commented on an increased need for attention to the state of the group, group members, and environmental factors such as weather patterns, river morphology, and navigation. While students varied in their ability to perceive and respond to various subjective or objective factors, their leadership role required them to learn more about their socio-ecological environment, make sense of it, and respond in order to accomplish daily leadership and group tasks.

Good group dynamics facilitated perspective sharing and learning, poor group dynamics and power struggles stifled or channeled it. Education of attention did not necessarily follow lines of designated “authority” in the group, from official leaders to the followers but, rather, from those with more to those with less experience and knowledge in a topic, skill, or location. This was particularly evident during informal peer-teaching that happened between students on the university program. Such learning happened in many directions between various members of the group depending on their experience, role, and life history. An older student who had lived and worked in the Athabasca area brought much to the group by way of attuning our attention to the influences of local and international industry on a landscape many students had perceived to be “wilderness.” Further, his interest in local plants and bush craft prompted learning about properties of plants and techniques to create everyday products such as baskets, bowls, and spoons. Enabling students to share

skills through peer-teaching helped the whole group become more familiar with the places they visited, landscapes they traveled through, as well as the identity, skills and personality of the group members. Following the university program, expedition members made a conscious decision to use consensus leadership. The six group members were able to engage in sharing of skills and knowledge, and explore complementarily, without the formal leader-follower power structures. In this way, each person’s skills, biography, and style contributed to the nature of the group—for better or worse—creating more complex lines of authority based on various skills and knowledge contained within the group.

The changing landscape provided further opportunity for various learning relationships to develop that spoke to members’ past trips, skills in other activities, and family history. One member’s knowledge and experience with arctic cotton allowed the group to avoid a particularly wet campsite, and presaged the coming barren lands; another’s childhood botany lessons enabled the collection and use of blueberries and various other edible wilds present in specific regions through which we traveled, while a third’s experience as a competitive sailor allowed for greater perception of, and strategy in negotiating wind, weather, and water currents on some of the large open lakes.

As the expedition wore on, the group became increasingly aware of how apt the name “Paddling the Big Sky” was to our journey. We were, indeed, in “big sky country,” but more to the point, we were traveling in relation to the sky just

as much as – if not more than – the river. Our daily lives, temperament, campsites, and energy levels, for example, existed in relation to the flux of the wind, air temperature, cloud cover, and rain relative to the movement of the river and what it offered in terms of current strength and direction, rapids, portages, bank material, wind breaks and the like. We lived, and live, in relation to a world of movement, which we attended to as we performed our daily chores and accomplished our goals.

Members of the expedition expressed feeling “in place” and “at home” when they could more easily relate to, and operate within, the pattern of movement afforded by particular landscapes. A favorite in the group was the Canadian Shield;

our time there was reminiscent of many past trips and leant a sense of familiarity (see fig. 5). Even though we had never before been to this part of the shield, we felt comfortable finding camping and clean water, while anticipating travel conditions and requirements. This was not the case for most of the Athabasca River and sections of the Slave River, on which we felt less comfortable dealing with the heavily silted water that ran on and on past very wide banks of deep, sticky mud (see fig. 6).

Education of attention, then, appeared to occur in formal and informal learning relationships during outdoor recreation and education. Our experience suggests that the meanings of aspects of the environment that were revealed



**Figure 5**—Time in the Canadian Shield landscape leant a sense of familiarity.



**Figure 6**—On sections of the Slave River, heavily silted water ran past very wide banks of deep, sticky mud.

depended largely on the confluence and interplay of the activities pursued and landscapes encountered, as well as the participants' biographies and interpersonal relationships. Is it through an education of attention and enskillment that outdoor recreation and education participants come to understand and establish connections that reaffirm their position within a more-than-human environment? Is this a way that adventure activities can teach students something about their environment? What, then, are the pedagogical implications?

## Place, Self, and Community

The conceptual place of humans relative to their environment is a central issue in the urban-wilderness or nature-culture dichotomy. Instead of "leaving culture behind" in urban areas and traveling into a supposedly pristine wilderness devoid of human presence, we tried to understand ourselves, and those around us, as part of our environment. By traversing diverse landscapes we recognized a continuum of human presence in the environment; we moved with the rivers in, out, and through densely populated urban areas, hamlets, rural farm land, fishing, trapping and hunting lands, and very remote areas in the boreal forest and barren lands used for mining, subsistence, tourism, and recreation. The variety of human settlement eased the difficulty of our journey by allowing for re-supply and the likes, but also provided more- and less-experienced paddlers with rest, distraction, and degrees of reassurance, which enabled us to continue our journey. Furthermore, the continuum provided personal experience with, and examples of, alternatives to urban lifestyles that we feel are important if, as outdoor educators, we are trying to teach for socio-environmentally sustainable lifestyles.

Human influence was present in all landscapes through which we traveled. The people, trails, and artifacts allowed us to learn more about our surroundings. Opening our programming and recreation beyond the geographical and ideological boundaries of "wilderness" allowed members of the expedition and our students to connect remote areas to our everyday lives and home environments while wrestling with outdoor recreation and education's influence on, and involvement of, rural communities. Furthermore, traveling through this continuum of settlements opened our eyes to the various ways people are currently living lifestyles—sustainable or not—that create places and landscapes that include and exist in-between the urban and the remote wild.

In our practices as outdoor educators and canoe trippers we have contributed, and continue to contribute, to the construction and understanding of wilderness that has lasting effects on local environments, communities, economies and ways of life. While significant places have been "set aside" by and for those participating in recreation, the creation/preservation of "wilderness" has also seen the removal and relocation of local peoples and done violence to Indigenous connections to the land (Cronon 1996; MacLaren 1999). As Haluza-Delay (1999) and Hull (2000) have suggested, "leave no trace" ideology can reinforce the idea that humans are alien to, and without influence in, the wilderness landscape. Instead of encouraging such an ideology, we struggled diligently to consider the traces we left (always a mix of good and

bad) to ensure that we left *our* trace, and took responsibility for our journey. We tried to think of and use practices that were as socio-environmentally sustainable as possible given our location, the larger context, and the resulting aesthetics of the place. We tried to reconcile our practices with our unavoidable involvement in shaping our environment. We saw this as an opportunity for education and action in the reality of place-making.

There are towns along our route. At first we struggled with how to approach them given the mission of our expedition. They greatly shaped our attention, our patterns of activity, and our relations. Large and small towns opened our relations outward beyond our immediate environment and allowed us to communicate with friends and family while sending and receiving gifts, stories, and other goods. In smaller towns and hamlets, we met many outgoing and interesting locals who not only provided guidance and local knowledge for the journey ahead, but also helped us glimpse the history of the area and become aware of local social and environmental concerns. For example, the W.A.C. Bennett Dam has caused extensive damage to the Peace-Athabasca Delta, part of which is designated as a wetland of international significance by the Ramsar Convention and is protected by Canada's Wood Buffalo National Park, also a UNESCO World Heritage Site (Macmillan 1996). The Delta is of major importance to the subsistence practices of the First Nations who live in and around Fort Chipewyan, Alberta. Our stop allowed us to realize the damage done, and the changes occurring to the people, places, plants, and animals of this environment.

The number of people in cities and large towns seemed to encourage anonymity and a measure of isolation that was not present or available during travel with a smaller group or even in a small town where news of our arrival spread quickly. Urban space seemed to distance us from persons and things geographically close to us. We became more self-aware and felt more individuated as we were surrounded by strangers. Yet, when we were surrounded by members of our group, with whom we were very familiar, our identity seemed to be more relational, influenced by our daily interactions, and behaviors. Identity, we found, came less from an image or imagination reflected back at us in a mirror or choice of clothing (we did not have a lot of options), but more from our role in the group, our performance, and how we interacted with others. In a conversation about body-awareness during such times, one group member commented that, "it's like I have no face."

We found community where there were no towns. Many locals lived along and spent time on the river, some for work, and others for play. They directed our path, put us in touch with a friend down the way, told us of other groups on the river, and opened their homes and cabins to us. Facilitated by parties' relative speed and our interactions with the local river community, we came to recognize a community of paddlers spread along the river through space and time. As paddlers, we were connected through stories told from one group to another, left on the landscape and found scrawled in old abandoned cabins, at a portage trail, in green- and red-paint left on the rocks by canoes before us, or boot prints in the almost-dry mud.

Leaders and groups make decisions regarding these types of community, who to interact with, for how long, and when. We encountered some parties on the river who chose not to



engage with reports from past trips, lodges, or fishing guides and to focus on “the group” and the “wilderness experience.” Reflecting on this, our group discussed how the choices we make as leaders and members of a group influence the type of socio-environmental learning, sharing, and knowledge we have access to, and the way in which we understand and represent people and places. Many of the encounters we had in towns, in new friends’ homes, and along the way would challenge some of the staunchest stereotypes of the North and racist attitudes about the people who live there. We can choose to engage or ignore. While these choices are open to leaders of groups or members of private expeditions, they are also made available or constrained through the institutional structures that rationalize and help facilitate outdoor recreation and education. A relational perspective allows recreation practitioners and participants to see, at least in part, how their activities influence local people and places, and make decisions about how to proceed.

Bloody Falls, only 16 km (10 miles) from Kugluktuk at the mouth of the Coppermine River, was the last of our many portages. It gained significance as an end-marker, as well as a point at which the group split up in order to allow members with over-use injuries and fatigue to finish more quickly. While our current situation gave the place—and others—much meaning, stories from the past also influenced place-meaning and perception. Reading Samuel Hearne’s abridged diary (Mowat 1990), for example, as well as the interpretive signs posted along the portage trail, directed our attention to features in and around the falls. Hearne’s story of the battle that gave Bloody Falls its name drew our attention to specific features he mentions as well as to the continuing importance of the falls for local Inuit subsistence. Other stories, such as reports from past trips and accounts of river-running attempts, strongly influenced how we moved, where we paddled, scouted, and walked. Not only did we read and follow others’ stories, we created many of our own. Furthermore, the group discussed the use of slideshows as a way to share stories, place-meanings, personal achievements, and identity attributes with larger audiences. Perhaps the “institution” of the slideshow holds, or could hold, a significant role in outdoor recreation and education as a tool for environmental activism that deserves further attention and research.

## Conclusion

Paddling the Big Sky was a three-and-a-half month journey through 2,800 km (1,740 miles) of northern Canadian landscape. The seven expedition members tried to share this journey in numerous ways, prominent was the inclusion of a month-long outdoor and environmental education program for 12 undergraduate students. We traveled through an ever-changing landscape that included urban centers, towns, hamlets, lodges, and remote wilderness areas. Reflecting on our travel and activities, we used research journals and group meetings to interrogate Ingold’s (2000) ‘dwelling perspective’ and its implications, applications, and adaptations to outdoor recreation and education described by Mullins (2005).

Insights were gained regarding the main themes of place, identity, and skill. We found that our personal histories and the activities we chose or were required to undertake influenced our perception of the landscape and the meaning of

places in that landscape. Furthermore, the skills we brought into the expedition, and those we developed along the way, shaped our personal and group identity. As the banks of the river eroded and the buildings of abandoned communities faded into the brush, while portage trails were cleared and industry prospered, we were able to see, and start to understand our involvement in, an ever-changing landscape. These processes, of which we were a part, also contributed to the making and meaning of places along our route. In our experience, education of attention to particular aspects in our environment coalesced around the activities, landscapes, and participants’ biographies and relationships.

Questioning the dominant nature-culture and urban-wilderness dichotomies present in outdoor recreation and education practice and theory, and guided by Ingold’s (2000) perspective on, and interpretation of, various Indigenous worldviews, we came to further realizations regarding the interrelation of self, place, and community throughout the continuum of human presence, from urban to ‘remote.’ We tried to reconsider the role of outdoor recreation and education as an escape from culture. We have begun to see it as a creative experience that allows educators, students, and participants not only to reflect on, and/or escape their normal routine, but also to build and maintain relationships with people and places and to share those relationships as stories in a broader socio-environmental context. This raises questions regarding the ethics of practice and storytelling, which stories should be told, which not, when, and how? The insights presented herein require further analysis and empirical research if generalizations are to be made beyond our experience of Paddling the Big Sky.

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# Comparing the Wilderness Message of U.S. Land Management Agencies

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**Abstract**—Websites from three U.S. agencies that manage wilderness were examined to determine what type of message is being communicated to the public about wilderness. Some websites contain almost no information about wilderness while others discuss it extensively. Most of the references to wilderness are in administrative documents. The second most common audience is prospective wilderness visitors. These messages were analyzed in detail. The dominant value of wilderness appears to be recreational rather than ecological, geological, educational, or scientific. Many websites talk about wilderness as being scenic, wild, natural, primitive, or pristine. As the likelihood of injury rises, agencies focus on the increased need of visitors to these wildernesses to be responsible for their own safety. There are many positive things being said about wilderness. For some websites, the wilderness message is highly compartmentalized and may not be in a place a recreational visitor would access. Agencies' wilderness messages are often rule-based in an effort to modify visitor behavior. More extensive use of agency websites to communicate the values and uniqueness of wilderness could help influence visitor attitudes as well as modify their behavior, which could help preserve wilderness character.

## Introduction

People visit wilderness for spiritual, inspirational, scientific, and educational reasons, but most commonly they visit for the recreation opportunities. Recreational visits to wilderness areas continue to increase, despite the aging population in the United States (Cole 1996). One of the greatest management challenges for wilderness managers

is to simultaneously allow recreational use, which is allowed by the Wilderness Act, while still leaving the wilderness resource unimpaired. In the United States, wilderness is managed by the Bureau of Land Management (BLM), Fish and Wildlife Service (FWS), Forest Service (FS), and the National Park Service (NPS).

The main internal threat to wilderness is caused by recreational users (external impacts such as air pollution can be more significant, but they are frustratingly beyond the control of the wilderness manager) (Cole and Hammitt 2000). Managers focus most of their efforts on either regulating or educating wilderness campers. There are impacts associated with the much more numerous day-use hikers but since managers believe campers to have the greatest impact, most management efforts are directed at these overnight users (Papenfuss and others 2000; Watson 2000).

Managers try to avoid regulating use in wilderness areas in an effort to provide recreational visitors with more freedom as required by the Wilderness Act (areas should allow an "unconfined type of recreation"); thus, they tend to rely on education as the preferred technique to minimize impacts (Hendee and Dawson 2002). Wilderness visitors also prefer this approach (Manning and Lime 2000).

If the wilderness resource is being impacted or is fragile (for example, alpine areas), managers may have to use regulatory measures to reduce or prevent impacts. Rules focus on locations of campsites, party size limits, stove-only areas, and even designated campsites and quotas in heavily used areas. In some cases, visitors must obtain permits (free or fee-based) to camp in the backcountry or wilderness. Hiking in wilderness remains a fee-free activity although fees may be charged for camping, access to public land, or parking (Griffin 2004). The use of permits varies widely by agency with the National Park Service utilizing it the most. Permit systems can be used to regulate the number of users, to provide users with information about their upcoming trip, or to determine use levels. Regulatory messages are communicated in many of the same ways as educational efforts.

One of the pitfalls associated with rules is there is seldom an accompanying explanation as to why they are necessary to protect the natural resource or the social conditions that visitors expect, despite the fact that research shows the

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increased effectiveness of regulations if there is an accompanying rationale explaining the basis for the rule (Manning and Lime 2000). Regulations, particularly those without the accompanying rationale, are designed to modify behavior rather than visitor attitudes.

Several wilderness researchers have emphasized the need to evaluate the information communicated to potential wilderness visitors (Cessford 2000; Stankey 2000; Watson 2000). Either official (agency) or unofficial sources of information can be examined. Official ways to communicate with users include one-on-one communication with visitors, printed brochures, trail signs, maps, and Internet webpages. Prospective wilderness users also obtain information from unofficial sources such as friends, clubs, books, magazines, and the Internet.

To be most effective in reducing impacts, some wilderness messages must be communicated prior to arrival (for example, use of cook stoves or avoiding times of peak usage). One of the most easily accessed pre-trip sources of information for potential wilderness visitor is the website of the agency managing the wilderness. Manning and Lime (2000) found that the effectiveness of a land management agency's message is high because visitors judge the agency to be a credible source of information. Additionally, Burgess (2000) predicts the increasing importance of the Internet in communicating information about wilderness. Hiking and climbing magazines, books about specific areas, and recreational websites are commonly consulted during pre-trip planning, but we would not expect these communication venues to focus on the unique aspects of wilderness.

Most educational efforts focus on changing behaviors of individuals that can cause resource impacts in wilderness areas rather than changing attitudes or instilling a sense of appreciation for wilderness (Hammit and Cole 1998). The Leave No Trace program (LNT 2005), adopted by a Memorandum of Understanding with all four agencies, seeks to instill both behavior and attitude changes. Their recent name change to Leave No Trace Center for Outdoor Ethics clearly indicates their interest in changing attitudes.

At the 2001 George Wright Conference, Dick Ring, Chief of National Park Service Operations noted that the NPS focuses on what one cannot do in a wilderness; they seldom say what wilderness is "for." His concern is that the NPS, and by extension the other three wilderness-management agencies, will not be able to maintain long-term support for wilderness unless they can generate a positive impression in both wilderness users and non-users alike. Similarly, Wright (2000) notes that a popular wilderness education curriculum needs more emphasis on what wilderness is "for" instead of what it is against. Some authors argue that without an increased emphasis on educating people about the uniqueness and value of wilderness, long-term preservation is likely to be unsuccessful (Manning and Lime 2000).

This research focuses on analyzing what public land managers in the United States say about wilderness on their agency websites. Specifically this research was designed to answer three questions. First, do wilderness messages focus on what wilderness is against, rather than what it is for? Second, do public land managers present information about the uniqueness of wilderness? Finally, do wilderness regulations have any accompanying explanation as to the necessity of such regulations?

If a positive message about the uniqueness of wilderness is not portrayed and if regulations are used but not explained, the following results may be expected: Compliance with existing wilderness guidelines and regulations may be low, biophysical impacts may persist or increase, social impacts may persist or increase, more management actions may be needed which may lead to less primitive and unconfined recreation, and the enduring resource of wilderness may be eroded.

## Methods

This research focuses on three of the four public land management agencies in the United States: the Bureau of Land Management, USDA Forest Service, and the National Park Service. The FWS was not examined because their websites were created in a way that would not allow us to download them in their entirety. The complete website for all NPS units with wilderness and a random sample of 18 BLM and 11 FS websites were downloaded during the summer of 2004 using Adobe Acrobat. A search was made for the word "wilderness." Since the context where we found the word wilderness was important, information in paragraphs preceding and following the word "wilderness" were copied and pasted into MS Word. Each time wilderness was mentioned it was hand-coded into various categories. The categories come directly from the Wilderness Act. Information that was administrative in nature was placed in a separate document and not analyzed. Administrative documents included Environmental Assessments, Environmental Impact Statements, Fire Management Plans, Wilderness or Backcountry Management Plans, Annual Reports, Monitoring Reports, and other reports.

## Results

The results of this research are reported qualitatively rather than quantitatively due to the volume of material and the widely differing format of websites. Each agency uses a similar system to organize its website; thus, it is easier to analyze differences among units of the NPS and it is far more difficult to compare information between agencies, at least quantitatively. Previous work focused exclusively on NPS units, which made it possible to produce both quantitative and qualitative data (Griffin 2003).

Information found on agency websites varied widely in part due to agency mission, resources allocated to maintaining the website, importance managers place on the website, how much wilderness exists, how long ago the wilderness was designated, and visitation, among other things.

Rather than produce a census of material gleaned from our research, a sampling of information is included to show the types of information contained on agency websites. The information is broken down into categories according to language contained in the Wilderness Act.

### Ecological Values

...attributes...associated with wilderness, such as clean air and water (Petrified Forest NP).

Preserving Wilderness and wild places may someday be seen as the most important contribution human society has

made to the health of the global environment—our home (Yosemite NP).

### **Geological Values**

Wilderness ... precludes any development and human intervention, thus ensuring the preservation of the geological formations for future generations (Chiricahua NM).

### **Scientific Values**

... wilderness areas are key places to conduct scientific studies because of their relatively pristine state (Lassen Volcanoes NP).

### **Historical Values**

...visitor stops at a row of fieldstone—mute testimony to a cultural past (Shenandoah NP).

### **Scenic Values**

Spectacular scenery awaits the visitor (Rio Grande NF).

### **Solitude Values**

Trails...in this wilderness and most other wildernesses are heavily used. You may not find solitude on them (Grand Mesa-Uncompaghe NF).

Hikers, backpackers, horseback riders and others venturing into the wilderness are rewarded with solitude (Arizona BLM).

### **Structures in Wilderness**

... wilderness cabins are available in the summit area (Haleakala NP).

This cabin ... is in the Stikine-LeConte Wilderness (Tonagass NF).

### **Safety in Wilderness**

In order to enhance wilderness, any obstacle that can be stepped over, ducked under, or walked around without unacceptable damage to the environment or reasonable risk to safety is left in place (Monongahela NF).

### **Wilderness Areas Have Rules**

Motorized and mechanical equipment...is not permitted... This comes directly from the Wilderness Act of 1964 and we cannot change it, no matter how much you may want us to (Monongahela NF).

### **Wilderness Is Wild or Pristine**

Here, nature is the dominant force (Sequoia KNCN).

In wilderness, preservation of the land, its natural processes, native vegetation and wildlife is the first priority . . . (Los Padres NF).

Wilderness provides...the highest level of protection for some of the most pristine and least manipulated wildlands in the U. S. (Olympic NP).

## **Discussion**

At first glance, the material listed above indicates that a lot is being said about wilderness. In fact, it should be pointed out that the information comes from 73 websites. If each website contained the volume and diversity of

information listed above, then this would cease to be an interesting research topic.

Another caveat is in order when analyzing the results. Based on the volume of NPS references noted above, it appears that the NPS is doing a better job of communicating information about wilderness. This may or may not be true. Our dataset is skewed by the fact that 44 NPS websites were available to choose from and only 18 BLM and 11 FS websites. Since this is part of an ongoing research project, all of the wilderness areas represented in the NPS system were downloaded and analyzed because they had the smallest number of wilderness areas.

We expected the NPS wilderness message to be more clearly and positively articulated than other land management agencies because they have the luxury of not being a multiple use agency like the FS or the BLM (wilderness designation precludes traditional resource-extraction activities such as logging, and new mining or grazing). A larger sample of BLM and FS sites must be analyzed before it can be accurately claimed that the NPS has more wilderness information or "better" wilderness information than other agencies. Although the FWS has historically not been viewed as a recreational organization and we might expect them to devote less space on their website to wilderness, it should be remembered that recreation is only one of the values of wilderness. We need to develop an alternative procedure to evaluate what is on FWS websites.

In general, as we stepped back and looked at all the material we had analyzed, the following highlights were gleaned from the material. Some websites have no information, some have a lot, but most have something in the middle. Without analyzing each website in detail and comparing it to visitation level and size, it is not possible to draw many conclusions about why some sites have more information than others.

Most of the messages about wilderness are contained in administrative documents. This is not unexpected given the volume of material contained in these legal documents. Increasingly, agencies are putting these public documents on their websites, particularly for the NPS and FS. The target audience for these documents is not the recreational visitor; instead it is individual citizens, user groups, or other agency personnel. The target audience of the non-administrative references to wilderness is mainly the potential recreational visitor. There are a couple of websites that contained material for teachers or students.

Based on our analysis of websites, the dominant value of wilderness communicated appears to be recreation. Although the NPS and a smaller number of BLM and FS websites list recreation and wilderness separately on their home pages, many of them combine them into a single page. Some of the best verbiage about the value of wilderness is contained on pages entitled "wilderness." It is good that the information is contained on the website—anywhere—but its placement on a page dedicated only to wilderness may mean that potential recreational users don't get a sense of the uniqueness of wilderness.

Wilderness information found on many websites includes the name of the wilderness, size, and to a lesser extent the date of creation. Previous research focusing on the NPS found that only 57 percent of their homepages contained information that their NPS unit even contained wilderness (Griffin 2003).

If a permit is needed, how and when a visitor can acquire one is described. When quota systems exist, there is seldom an explanation for their use despite the fact that the Wilderness Act contains verbiage about providing visitors with an opportunity for an unconfined recreational experience. There are compelling reasons for the use of quotas and permits but websites could help users better understand wilderness and the reason quotas are needed.

Wilderness is almost universally described as being scenic. Certainly a goal of many recreational visitors is to recreate in a scenic area; thus, it makes sense for agencies to note a wilderness area's scenic qualities. An additional problem of linking scenic and wilderness in a potential visitor's mind is the fact that it may make it more difficult to create new wilderness areas if they are not scenic. Hendee and Dawson (2002) point out that the biological diversity of wilderness areas in the National Wilderness Preservation System is limited. If proposals to designate new wilderness areas focus on biologically significant attributes rather than scenic qualities, it may be hard to engender public support.

The ecological values of wilderness tend to focus on wildlife. Many areas list wildlife a visitor might see. They often highlight rare (typically on the Threatened or Endangered species list), charismatic megafauna such as bears and cougars. Some websites focus on the value of wilderness as providing one of the last habitats for these large animals. Fishing opportunities are also discussed. Less emphasis is placed on ecological services wilderness provides such as clean air and water, and soil development.

Some websites use specific language from the Wilderness Act, but very few specifically mention the Wilderness Act. That is probably less important than the fact that very few websites mention that it is part of the National Wilderness Preservation System.

Wild, natural, pristine, undeveloped, and primitive are often used to describe wilderness. Wild, natural, pristine and primitive are evocative words whereas undeveloped seems much less inspiring. Although the Wilderness Act talks about primitive in terms of recreation, its use on most websites is usually not in relationship to primitive recreation. Instead the focus is on a primitive landscape.

Visitor safety is stressed in large wildernesses or where the perils due to weather and other biophysical factors are large (for example, in Alaska). Many websites emphasize that visitors need to be personally responsible for their own safety. In some cases, websites are explicit about the kinds of things you won't find in their wilderness (for example, no or few trails, trails maintained to a lower standard, no facilities) and they invite the potential visitor to determine if that is the experience they want and if they have the skill necessary to be successful in their trip. If bears exist in the wilderness, visitors are often given explicit instructions as to how to avoid bear encounters. As the area becomes more remote, websites discuss the time it will take to be rescued and the likelihood of cell phone reception.

There is little focus on historic, geologic, or scientific values. A few administrative documents discussed how to get a permit to do research, but otherwise research is discussed rarely. When it is mentioned it is in terms of wilderness providing an environmental baseline.

Most of the visitor-directed messages are designed to influence user behavior rather than attitudes. The messages

designed to affect user attitudes or to explain the values of wilderness, if they exist at all, tend to be in a single section separate from recreation.

Messages designed to influence behavior, either as a guideline or a rule, fall into two categories—either there is a listing of some or all of the Leave No Trace principles along with varying degrees of explanation for their use or they simply state a set of activities that are not allowed (no pets, no fires, etc.). Due to their more preservation-oriented mandate, recreational visitors to NPS wilderness areas are likely to encounter more restrictions than to FS or BLM wilderness areas. Some areas include accompanying explanation as to why the rules are in place—either due to biophysical or social impacts, but most do not. Most websites clearly indicate that motorized vehicles are not allowed; to a lesser extent they mention banning mechanized transport such as bicycles.

Unless the wilderness contains rare geologic features such as volcanoes, geology is seldom mentioned.

Where structures exist in wilderness, particularly ones usable by a visitor as opposed to historic structures, there is almost never an explanation of why they exist despite the fact that the Wilderness Act bans structures. Historic resources such as structures or Native American artifacts are rarely mentioned. Occasionally websites indicate it is illegal to remove historic artifacts.

Many websites mention the possibility of achieving solitude in the wilderness. Several are explicit that in their wilderness, solitude is seldom achievable. Although the actual loss of one of the defining features of wilderness character is discouraging (see Landres and others, 2005, for an explanation of other criteria that can be used to define wilderness character), the agency should probably be commended for providing an accurate account of the experience a visitor is likely to have. Even in many of these wildernesses a visitor might find solitude by recreating during non-peak times or traveling off-trail, but these create their own sets of problems.

In summary, wilderness messages focus more on rules that seek to modify behavior, rather than on changing attitudes. It is seldom presented as a unique and valuable resource.

## Conclusion

Many good things are being said about the uniqueness of wilderness and the positive attributes of it. It is clear from even a cursory analysis of websites that the wilderness message being communicated is incomplete. Preservation of the wilderness character of existing areas and efforts to designate new areas can be more effective if the public can accurately describe what wilderness is and the values it has. For much of the public, the sociological definition of wilderness—any forest or park—dominates their understanding. At the very least, recreational visitors to wilderness areas should gain a deeper appreciation of the unique and positive attributes of wilderness, in part because of their potential impact. Additional efforts are needed to increase the amount and type of information on agency websites. Most of the messages about wilderness are directed at these potential and actual recreational visitors, but efforts could be expanded to reach other audiences as well. Most wilderness messages

are designed to influence user behavior rather than their attitudes. While changing behavior may be necessary, it is not sufficient. Agencies must also focus on changing visitors' attitudes if they want to preserve wilderness character and the enduring resource of wilderness.

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# Outdoor Programs and Environmental Beliefs: Investigating the Stability of Outcomes and Levels of Salience

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**Abstract**—The effects that outdoor programs have on participant feelings about the outdoor environment and wilderness areas are often assumed to be both powerful and positive. Moreover, it is believed that participation in outdoor or wilderness-based programs usually results in participants who have more pro-environmental and pro-wilderness beliefs, values, and attitudes. This study identified and measured changes in environmental attitudes and beliefs after participation in an outdoor leadership program. In addition, the strength or salience of these beliefs and changes in levels of salience was also investigated. The results of this study suggest that environmental beliefs and attitudes were relatively “durable” over the three testing periods. That is, there was little change in reported values over the three measurement times (beginning of the semester, just prior to a three-week expedition, and immediately after the expedition). In addition, participants in the treatment group consistently reported higher levels of pro-environmental beliefs and attitudes when contrasted with a comparison group. Finally, there was a strong association between levels of agreement toward selected environmental attitudes and beliefs, and their concurrent levels of reported salience surrounding those beliefs.

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## Introduction

Numerous outcomes have been ascribed to participation in wilderness-based programs with many of these outcomes being focused around self-systems, such as self-concept, self-esteem, or personal confidence (Gillet and others 1991; Hazelworth and Wilson 1990; Marsh and others 1986). More recently, participation in these types of programs has been linked to changes in levels of communication, trust, group cohesiveness, and team development. In reviewing the literature, four major outcome categories were found

including: *interpersonal skills* (concern for others, group problem-solving, communication); *intrapersonal skills* (self-awareness, -efficacy, -assertion, locus of control); *technical skill development*; and *environmental awareness* (connection, sensitivity, respect, stewardship).

Thus, one of the underlying assumptions of many programs utilizing wilderness areas is that direct experience in a wilderness environment will promote a more pro-environmental set of values and beliefs, initial stewardship, environmental advocacy, and the development of pro-wilderness attitudes.

Despite the many claims of effectiveness, however, questions remain as to whether the actual outdoor program or some other factor(s) is the primary agent of change. For example, does the self-selection voluntary process for participation inherent in many wilderness-based programs significantly alter the reported outcomes from these programs? That is, are the participants of these programs biased in some systematic way, and is this bias the primary agent that creates the impression of change (for example, pro-environment beliefs), regardless of program effectiveness or type of program? This current study investigated the effect of course participation upon environmental attitudes and beliefs by comparing outdoor program participants with non-outdoor program respondents, within a pre/post/post-post comparison group design.

In addition, while the literature is fairly robust relative to studies investigating the attitudes and beliefs individuals hold toward the environment, much less is known regarding the importance or *salience* of those beliefs. For example, do all environmental beliefs held by individuals ascribe to the same level of salience (importance), or are there systematic differences based on other variables, such as type of belief or demographic-related factors? Accordingly, this study also investigated the relationship between stated environmental belief and the salience of that belief.

## Environmental Attitudes and Beliefs

Rokeach (1979) suggests that beliefs, attitudes, and values are all organized, however loosely, within an individual, in order to form a partially integrated cognitive structure. Beliefs tend to emulate or manifest themselves as inferences about states of expectations, and have more or less levels of centrality attached to them. For example, the more central a belief is, generally the more value is placed on that belief,

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and this value orientation is often closely linked to congruency with an individual's philosophy and attitudes (Jurin and Fortner 2002). In addition, situational and dispositional attitudes, such as personality, can influence belief structures, developing attitudes, and behaviors (Corraliza and Berenguer 2000).

Moreover, how an individual perceives the world and environmental issues often involves a multitude of factors including family and friends, religion, education, cohort groupings, the media, and extant regulations and laws (Ewert and Baker 2001; Stern and others 1993). In addition, two emerging factors that are now increasingly thought to influence attitude formation include: (1) understanding consequences from behaviors impacting the natural environment (Stern 2000), and (2) direct participation in outdoor recreational activities, which is discussed in the following section.

## Direct Participation in Outdoor and Wilderness Recreation

With respect to direct participation, past research has suggested that the outdoor experience can be an influential agent in the development of environmental attitudes (Palmer 1993; Tanner 1980). Three factors may help explain how participation may influence attitude. These factors include:

- A heightened appreciation of the natural and wilderness setting;
- Enhanced knowledge regarding natural processes; and
- A greater acceptance and agreement with pro-environment beliefs and attitudes.

In general, the literature suggests that there is a positive relationship between environmental attitude and participation in outdoor recreation (Dunlap and Heffernan 1975). For example, Palmberg and Kuru (2000) report higher levels of moral judgment and the development of empathic relationships with nature. It should be noted, however, that there is still ambiguity in our understanding of the relationship between outdoor activity and environmental concern. For example, Nord and others (1998) found that the connection between outdoor activities and environmental concerns and/or behaviors is often nebulous or weak. Another area that has received little attention in the literature regarding individuals' attitudes or beliefs about the environment is the degree of importance, or salience, of those beliefs.

## Environmental Attitudes and Salience

The environmental-attitudes literature has predominantly focused on attitude formation and identification. Much less work has been devoted to the issue of *importance* of beliefs regarding those attitudes. Do individuals ascribe the same level of importance for all environmentally related attitudes and beliefs, or are there systematic differences as the result of some predictable or unknown variables? In order to approximate answers to these questions, the concept of salience

and its relationship to environmental attitudes, should be defined.

## Salience Defined

In its basic conceptual meaning, salience refers to a belief or value that stands out in an individual's cognitive field; it is something that a person attaches a sense of importance to (Krech and Crutchfield 1948). When one is referring to a "salient" feature or characteristic, it is something that is set apart from other features within a similar context. In other words, when a person perceives a phenomenon to be salient, he/she regards this phenomenon as something that particularly resonates within the individual. This may be due to prior experience or exposure to the phenomenon or feature (for example, setting) and consequently, it has been internalized as having significance in a person's life. Salience may also resonate with an individual's cognitive or affective psyche if the person regards the phenomenon to be new, different, or significant information heretofore not acknowledged or experienced. In essence, the interaction, information or exchange registers as a "salient" part of the person's cognitive or affective alchemy.

Salience of beliefs can be specifically related to outdoor settings and the meaning they evoke for an individual. For persons visiting a natural resource environment for the first time, it may become a "salient" experience for the visitor, where he or she may attach deep meaning to the area. The resulting salience of meaning ascribed to a specific outdoor setting may also constitute the reason a person will return to that area, or harbor a more protective feeling about that setting (Ewert and others 2004).

MacCannell (1989) describes the salience or importance a visitor ascribes to a particular attraction (for example, outdoor place or region) as a "marker." This marker becomes significant to a visitor based on his/her personal psychological ideologies and past experiences. Other literature regarding the salience or meaning a person associates with a particular setting is described in various forms. Lew (1987) proposed that a person's attachment to a particular setting may be regarded from three varying characteristics, including: (1) *Ideographic*—indicating the uniqueness of a site that attracts a person; (2) *Organizational*—the spatial or temporal nature of an area, or (3) *Cognitive*—which fosters a particular feeling or attitude as a visitor. Gunn (1972) described a specific attraction of a place as the "nuclei," and this nuclei in turn, must be encompassed by an "involute belt" which maintains the significance of the attraction for a person.

As the literature indicates, the "importance" of meaning, or salience a person ascribes to a particular (environmental) setting must be experienced within a certain context in order to give the experience its significance. This paper addresses the concept of salience and its relationship to a person's belief system. In particular, it examines the relationship between varying beliefs a person may possess toward the environment and the salience (in other words, strength, importance) of those beliefs.

Finally, salience can be thought of as having a dynamic quality relative to environmental attitudes and beliefs. That

is, an individual may attach differing levels of salience on specific environmental attitudes. Hence, a person might express agreement with two different environmental-based attitudes or beliefs but have differing levels of salience or importance ascribed to these attitudes. This study investigated the relationship between levels of agreement toward selected environmental attitudes and the levels of importance, or salience, placed on those attitudes.

## Research Questions

The following questions provided the research framework for this study:

- **RQ<sub>1</sub>:** Will the level of agreement with selected environmental attitudes and beliefs and the salience of those beliefs change after participation in an outdoor adventure program?
- **RQ<sub>2</sub>:** Will the self-selected voluntary nature of the treatment group used in this study reflect the same level of agreement and salience with selected environmental attitudes when contrasted with a comparison group?
- **RQ<sub>3</sub>:** What is the relationship between levels of agreement toward selected attitudes and the levels of salience of those attitudes and beliefs?

## Methods

The sample consisted of 38 students from a large Midwestern university. The treatment group included 18 students enrolled in a semester-long, 17 credit-hour outdoor leadership program. This semester program occurs in the spring of each year and entails a number of experiential learning components including a three-week expedition to Wilderness areas in Colorado and Utah. The comparison group entailed 20 students from a mid-level academic course regarding leisure program development.

The questionnaire utilized in the research was a modified version of the original New Environmental Paradigm (Dunlap and van Liere 1978). The survey instrument included 25 questions that utilized a four-point Likert scale to record responses. Responses measured participants' environmental attitudes and beliefs, and levels of salience toward the environment, and used the following types of statements; *bio-centric*, *anthro-centric*, *pro-environmental attitude*, *con-environmental attitude*, *pro-environmental behavior* and *con-environmental behavior*. Table 1 provides examples of the statements. Demographic information such as age, gender, and place of residence, was also obtained (table 2).

## Findings

The reported mean scores of environmental attitudes and beliefs were compared over three periods. Time 1 data were collected at the beginning of the semester. Time 2 data were collected just prior to the three-week wilderness expedition. Time 3 data were collected just after returning from the three-week expedition. As figure 1 indicates, both scores of agreement with the environmental attitudes and beliefs, as listed in the instrument, and the level of salience regarding those beliefs were relatively stable over the period in both the

**Table 1**—Sample items of the questionnaire.

Bio-centric statements:
Humans must live in harmony with nature in order to survive.
Anthro-centric statements:
Humans have the right to modify the natural environment to suit their needs.
Pro-environmental attitude statements:
The effects of pollution on public health are worse than we realize.
Con-environmental attitude statements:
We don't need to worry much about the environment because future generations will be better able to deal with those problems than we are.
Pro-environmental behavior statements:
I would/have sign a petition in support of tougher environmental laws.
Con-environmental behavior statements:
I would take a job with a company I knew was harming the environment.

**Table 2**—Demographic information.

Group	Sample size	Age (mean)	Place of residence
Treatment	N = 18 (F = 5; M = 13)	22.2	Urban = 9; Rural = 9
Comparison	N = 20 (F = 9; M = 11)	21.7	Urban = 14; Rural = 6

treatment and the control groups. This suggests that these attitudes are relatively stable and not amenable to change as either a function of visitation to a wilderness location or as a function of time (RQ<sub>1</sub>).

Table 3 shows the mean score differences between the treatment group and the comparison group over the three periods. The results suggest that in terms of the pro-environmental-type statements (bio-centric, pro-environmental attitudes and pro-environmental behavior), the scores of the treatment group (which was a self-selected group) were significantly higher than those of the comparison group. Also, relative to many of the con-environmental type of statements (anthro-centric, con-environmental attitudes and con-environmental behaviors), the scores of the level of salience ascribed to these items from the treatment group were lower than those of the comparison group. This may once again imply that respondents from the treatment group are more pro-environment, both in terms of their responses and in the salience of those responses (or lack of salience for con-environment items), than their counterparts in the comparison group.

This finding points to the possibility that the self-selected nature of the treatment group (in other words, the members of the treatment group voluntarily chose to participate in the semester program) may present a systematic bias toward environmental issues and questions. Indeed, if present, this bias may be a contributing factor to how respondents answer environmental-based questions regarding their attitudes and beliefs about the environment (RQ<sub>2</sub>).

As for the third research question (RQ<sub>3</sub>), the correlations between scores of agreement and belief were examined at the

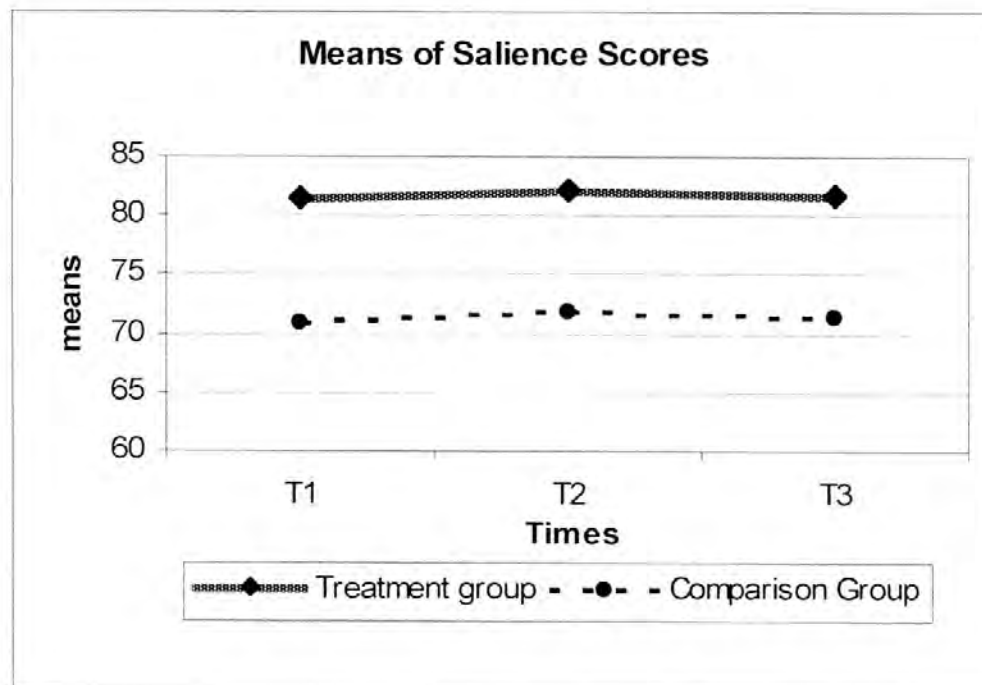
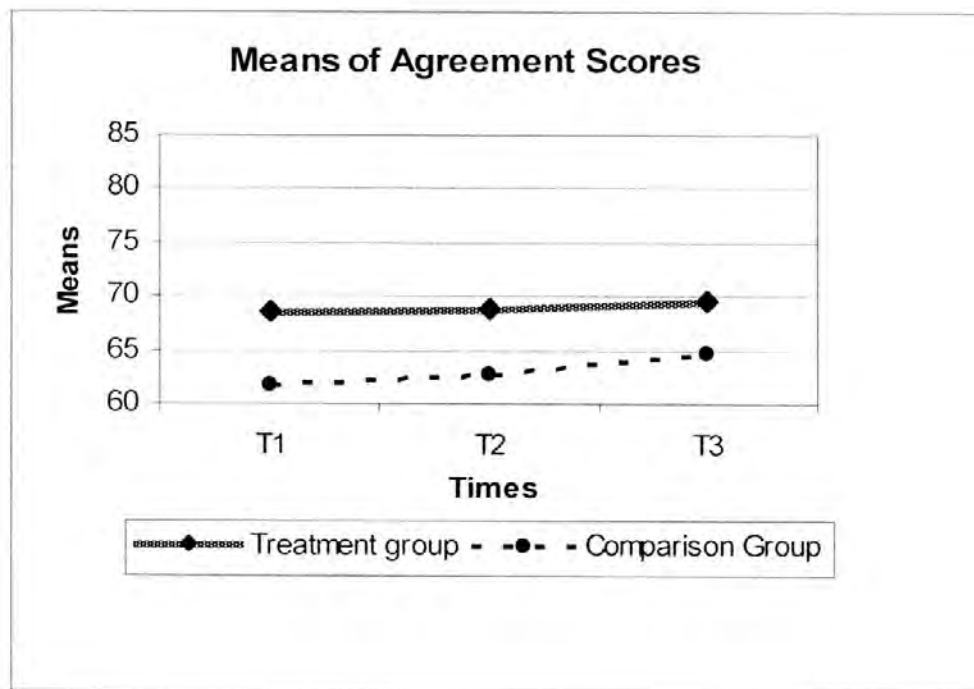


Figure 1—Stability of scores.

**Table 3**—Mean scores differences between treatment and control groups.

Belief	Time 1				Time 2				Time 3			
	Treat	Control	dif	<i>t</i>	Treat	Control	dif	<i>t</i>	Treat	Control	dif	<i>t</i>
Biocentric	3.37	2.73	.64	3.96 <sup>a</sup>	3.35	2.85	.50	4.52 <sup>a</sup>	3.33	2.78	.56	3.80 <sup>b</sup>
Anthrocentric	3.03	2.85	.18	0.78	3.22	2.81	.42	2.25 <sup>c</sup>	3.15	2.90	.25	1.46
Pro-environmental attitudes	3.47	3.04	.43	3.01 <sup>b</sup>	3.41	2.94	.47	3.39 <sup>b</sup>	3.56	3.00	.56	3.60 <sup>b</sup>
Con-environmental attitudes	3.17	2.85	.32	1.28	3.09	2.79	.31	1.35	3.11	2.84	.27	1.15
Pro-environmental behavior	3.20	2.73	.47	2.13 <sup>c</sup>	3.39	3.08	.30	1.62	3.15	2.75	.40	1.84
Con-environmental behavior	2.67	2.85	-.18	-.75	2.83	2.65	.18	.74	2.72	2.9	-.18	-.65

**Salience**

	Time 1				Time 2				Time 3			
	Treat	Control	dif	<i>t</i>	Treat	Control	dif	<i>t</i>	Treat	Control	dif	<i>t</i>
Biocentric	3.31	2.73	.57	4.68 <sup>a</sup>	3.26	2.79	.47	3.83 <sup>a</sup>	3.36	2.82	.54	4.96 <sup>a</sup>
Anthrocentric	1.68	2.14	-.46	-2.45 <sup>c</sup>	1.74	2.13	-.4	-2.49 <sup>c</sup>	1.81	2.21	-.4	-2.2 <sup>c</sup>
Pro-environmental attitudes	3.51	2.95	.56	4.32 <sup>a</sup>	3.43	2.84	.59	4.11 <sup>c</sup>	3.42	2.94	.48	3.02 <sup>b</sup>
Con-environmental attitudes	1.53	1.94	-.41	-2.28	1.75	1.99	-.24	-1.44	1.76	2.17	-.41	-2.09 <sup>c</sup>
Pro-environmental behavior	3.39	2.28	1.11	4.89 <sup>a</sup>	3.27	2.52	.76	3.78 <sup>b</sup>	3.06	2.48	.57	2.65 <sup>c</sup>
Con-environmental behavior	1.67	1.93	-.26	-1.21	1.94	2.15	-.21	-.96	1.94	2.3	-.36	-1.31

<sup>a</sup> *p* < 0.001<sup>b</sup> *p* < 0.0<sup>c</sup> *p* < 0.05**Table 4**—Correlations between levels of agreement toward environmental attitudes and beliefs and the levels of salience.

	Treatment group		Control group	
	Time 1	Time 3	Time 1	Time 3
Biocentric	0.844 <sup>a</sup>	0.772 <sup>a</sup>	0.767 <sup>a</sup>	0.816 <sup>a</sup>
Anthrocentric	-.217	.007	-.460 <sup>b</sup>	.247
Pro-environmental attitudes	.873 <sup>a</sup>	.860 <sup>a</sup>	.293	.738 <sup>a</sup>
Con-environmental attitudes	-.268	-.075	-.200	.292
Pro-environmental behavior	.835 <sup>a</sup>	.648 <sup>a</sup>	.556 <sup>b</sup>	.360
Con-environmental behavior	.118	-.116	-.129	.043

<sup>a</sup> *p* < 0.0<sup>b</sup> *p* < 0.05

first test and third test (table 4). It was found that scores of bio-centric, pro-environmental attitudes, and pro-environmental behavior were highly correlated between agreement and belief; and this level of salience remained relatively durable over the period for both groups. In particular, the salience for the bio-centric attitudes and beliefs was very high and consistent. On the other hand, scores of anthro-centric, con-environmental attitudes, and con-environmental behavior were not significantly correlated between attitude and level of salience.

## Conclusions

As evidenced by the findings in this paper, participants of outdoor programs tend to be generally more pro-environment in their attitudes and beliefs than the general population. This could be attributed to a number of reasons, including a desire to be a part of outdoor programs and increased exposure to outdoor environments, as well as the participants' educational background.

The findings also indicate that these pro-environmental attitudes are relatively stable and not very amenable to change, which may be based on experience in the outdoors. In addition, it should be noted that outdoor programs may be relatively ineffective in altering attitudes and beliefs, and that outdoor programming may better serve as an information tool rather than strictly an attitudinal change mechanism.

Outdoor programs may be more effective in *reinforcing* attitudes and beliefs of participants who already show a positive disposition toward pro-environmental concerns.

Finally, the results of this study indicate that the strength of belief is much more consistent with bio-centric statements than anthro-centric statements. In other words, persons who believe in protecting the environment exhibit a more salient disposition of their beliefs, where anthro-centrally disposed individuals may not show as strong or as salient a belief either to protect or *not* to protect the environment. In general, salience of belief follows bio-centric statements. This may suggest developing more bio-centric outdoor programs for bio-centric participants. It should be noted that the outdoor program used in this study was a leadership training program, not an environmental education/land stewardship experience, per se. Further improvement regarding the measurement for outdoor programs should also be examined.

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# Historic Voyage as a Catalyst for Inspiring Change

Ann Melinda Bell

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**Abstract**—Navigator Nainoa Thompson for *Hōkūleʻa*, a replica of an ancient voyaging canoe, coined the phrase, “Navigating Change,” to implant inspiration in the hearts and minds of Hawaiʻi’s youth to take better care of their island home. Ultimately, it was about instilling hope and a cultural based value of responsibility in our younger generation. In 2001, the Navigating Change Educational Partnership (NCEP) was formed and began to develop tools to complement *Hōkūleʻa*’s voyage, based on the Navigating Change vision, to the Northwestern Hawaiian Islands. During the voyage, over 1,800 students were involved via satellite teleconferencing conversations with crewmembers. The voyage generated almost 2,500 column inches of newspaper coverage and nearly two hours of television news coverage. For the past three years, over 200 teachers have been directly involved in implementing a comprehensive Teacher’s Guide to Navigating Change. The end of the voyage turned into a new beginning for Navigating Change: A student-driven community day was held in May 2005 with over 5,000 people in attendance as *Hōkūleʻa* sailed into Kailua Bay to honor the cumulative conservation learning and work of hundreds of students. In addition, the Harold K. L. Castle Foundation funded a half-time NCEP position to help steer the vision of Navigating Change into the future.

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## Recognizing Change

When Nainoa Thompson was a boy growing up in Hawaiʻi, the reefs were teeming with pāpio (juvenile Jack fish), goat-fish, and ʻāholehole (Hawaiian flagtail). Mullet drifted in so thickly they looked like the reflection of dark clouds on the water. Nainoa’s keen sense of the ocean world around him sharpened as he dove for lobsters, surfed the waves, and learned to fish beside men who filled their boats full to feed all the community. Back then, Maunalua Bay provided islanders with a critical lifeline, connecting them directly to the teeming source of their livelihood. Both nursery and spawning ground, the bay gave shelter and food sources to millions of native fish that in turn nourished the bodies and souls of the islanders who lived in the lee of the bay’s ahupuaʻa (a traditional land and community division running from mountain to sea). It also served as outdoor classroom, and the lessons Nainoa learned there guide him to this day

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as he navigates *Hōkūleʻa*, the replica Polynesian voyaging canoe, through the ocean waters of the 21<sup>st</sup> century.

“Whether people want to recognize it or not, we are connected to our natural environment,” Nainoa says. Many people living in Hawaiʻi today don’t understand how their disconnection from their surroundings affects their well-being. “What we do to the land and sea we do to ourselves. So, if we take care of even the smallest portion of land or ocean or the smallest creature, we take care of ourselves.”

Today, only 50 years later, things have changed drastically. A private marina, shopping centers, and condos line the adjacent shoreline of what was once an enormous ancient fishpond feeding into the bay. While natural tidal flows brought in fish that provided sustenance for the entire community, today this passageway is a dredged, silt-covered thoroughfare that provides access for boats of all kinds, including every imaginable kind of boat or water toy. The adrenaline rush from fast boats and video games has replaced that gained from exploring and experiencing the natural world. No longer can you teach a child how to find lobsters. Lobster populations have dwindled to the point that diving is not worth the effort. Although patches of coral in deeper areas are still alive with sponges, algae, and invertebrates, the overall biomass of fish has dropped by 80 percent during the last 50 years. The large schools of reef fish are gone and the sizes of individual fish are greatly diminished.

While natural resource agencies and organizations and community-based initiatives have struggled for years to protect the remnants of our native ecosystems, they have had little success in gaining much political support for the importance of their efforts. The total state funding for natural resource protection remains tragically low—less than 1 percent of the state budget. Degraded resources are accepted as “normal,” alien species are often accepted as Hawaiian, more and more native species are threatened with extinction, and the potential for negative impacts on human health are increasing. “A child today sees a world that is substandard and degraded,” says Nainoa. “Through the eyes of a child, this picture is the picture of what is healthy.”

Nainoa’s passion is to reconnect people to their world. He believes that learning to care about “place” requires teaching children healthy traditional values and demonstrating that actions have real solutions. “When a child loses the capacity to understand or care about place, a disconnect occurs,” Nainoa says. “If the gap is present now, it is only going to get bigger in the future. We must help students reconnect by providing opportunities that reawaken their observational skills and help them understand the value of nurturing their own spirituality and physical well-being through taking care of their place.”

## Navigating Change

Navigator Nainoa Thompson envisioned reconnecting people with place by sailing the *Hōkūleʻa* among the wild and protected Northwestern Hawaiian Islands (fig. 1). Calling his idea “Navigating Change,” he wanted to “bring the beauty of the Earth’s rare wildlife to living rooms and classrooms to create an awareness of the difference between where nature is protected and what happens when it is not.”

Primarily an educational program echoing his father’s vision, Navigating Change was designed to inspire people to *mālama*, take care of, their native land. Thompson wants people to understand that to live well and be healthy, your ocean must also be healthy, and that for your ocean to be healthy, it must mirror a healthy land. Navigating Change provides an opportunity to show people what they have lost and what they need to do to reverse the damage. At the core of Navigating Change is *Hōkūleʻa*, a modern-day reincarnation of a double-hulled sailing vessel that has accomplished almost inconceivable navigational feats, using science built upon a foundation of ancestral knowledge.

### *Hōkūleʻa* and Hawaiian Wilderness

A thousand years before Columbus approached North America, Polynesians were sailing across the Pacific. They voyaged to Hawaiʻi first from the Marquesas around 1,900 years ago. Then around 1200 A.D., a second group of Polynesians

headed north from Tahiti, which lies approximately 1,000 miles (1,609 km) to the southwest of the Marquesas (Wilder 2004). These long-distance voyages were perhaps made to seek more abundant island resources, to escape oppression due to societal conflicts, or perhaps for exploration purposes. Over long days and nights on the open sea, Polynesians continued to hone their traditional practice of wayfinding by implementing their vast knowledge of the stars, winds, birds, and waves that guided them to Hawaiʻi.

In the late 1970s, several hundred years after such long-distance voyaging activity ceased, a group including anthropologist Ben Finney, artist Herb Kawainui Kāne, and waterman Tommy Holmes, designed and facilitated the construction of a modern-day voyaging canoe modeled after ancient, double-hulled sailing vessels that had platforms lashed to the crossbeams. The canoe was named *Hōkūleʻa* after the star of gladness, which is the Hawaiian name for Arcturus, the zenith star that marks the islands of Hawaiʻi (Wilder 2004). To find a navigator skilled in the ancient ways was no easy feat, but eventually Mau Pīailug, from the tiny island of Satawal in Micronesia, agreed to share his ancestral knowledge. His teachings inspired young Hawaiians like Nainoa Thompson, Bruce Blankenfeld, Shorty Bertlemann, and Chad Babayan, to spend years learning the ways of waves, wind, and stars.

Over the last 30 years, *Hōkūleʻa* has sailed more than 100,000 miles (160,934 km) across the Pacific. On its last long-distance voyage, in May 2004, *Hōkūleʻa* followed in the



**Figure 1**—*Hōkūleʻa* sails past Nihoa Island in the Hawaiian Islands National Wildlife Refuge (photo by Naʻalehu Anthony ©, used with permission).



wake of Hawai'i's ancestors to the Northwestern Hawaiian Islands. These islands, all but one of which are within the Hawaiian Islands and Midway Atoll National Wildlife refuges, extend along the northern half of the Hawaiian archipelago, reaching over 1,200 miles (1,931 km) northwest of the main Hawaiian Islands. This string of atolls, reefs, and islets embodies the definition of wilderness, and in 1974 most of the emergent land in this area was proposed as wilderness under the U.S. Wilderness Act. Further protection was afforded the surrounding state waters when the Governor of Hawai'i signed legislation creating the State Marine Refuge in October of 2005.

Extending out 50 miles (80 km), the marine ecosystem is being studied for a potential designation as the country's largest National Marine Sanctuary. This coral reef ecosystem is believed to be one of the last of its kind, alive with vestiges of marine and island wildlife that have long since disappeared from the main Hawaiian Islands. It is also one of the last places of its size on the planet in which dominant large marine predators live in concert with a diverse entourage of coral, fish, and birds, indicating a healthy, balanced system. The numbers and varieties of species are exceptional—thousands of species exist in the Northwestern Hawaiian Islands and nowhere else on the planet.

But because of their remote location and fragility, the Northwestern Hawaiian Islands will rarely be able to accommodate visitors seeking to enjoy their solitude and primitive recreational opportunities. Instead, the Fish and Wildlife Service is working with staff from the National Oceanic & Atmospheric Administration (NOAA) and the State of Hawai'i to, "bring the place to the people, rather than the people to the place." The challenge is to infuse in their audiences the spirit of wilderness found within these islands.

## Navigating Change Educational Partnership

*Hōkūle'a's* 18-day voyage through the Northwestern Hawaiian Islands was the culmination of almost three years of preparation. In the winter of 2002, Nainoa Thompson pulled together a partnership of agencies to create educational projects and products that coordinate with and support the Navigating Change voyage and vision. He directed the partnership group on a course that would impact the lives of hundreds of students and their families. The partnership included key educators from the Polynesian Voyaging Society, Bishop Museum, Hawai'i Department of Land and Natural Resources, Hawai'i Department of Education, Hawai'i Maritime Center, National Oceanic and Atmospheric Administration (NOAA), National Fish and Wildlife Foundation, U.S. Fish and Wildlife Service, and the University of Hawai'i. The group was soon labeled as the Navigating Change Educational Partnership (NCEP).

In September 2002, Nainoa Thompson and several NCEP educators sailed on the NOAA vessel *Rapture* as part of the Northwestern Hawaiian Islands Reef Ecological Assessment and Monitoring Program. Concurrently, the Bishop Museum's Hawai'i Maritime Center opened a permanent Navigating Change interactive exhibit. The exhibit, funded by the National Aeronautics and Space Administration (NASA) and highlighting the research expedition, allowed NCEP

educators to transmit almost real-time video segments via cutting edge satellite technology to students visiting the museum. A regularly updated interagency website ([www.hawaiiatolls.org](http://www.hawaiiatolls.org)) created on board the vessel, along with significant media coverage, generated increasing interest in these far-flung islands. During this time, *Hōkūle'a* was in dry dock undergoing extensive restoration as volunteers repaired dry rot, sanded, varnished, and carefully pulled lines taut.

By the spring of 2003, NCEP had developed a package of teacher resources, a Northwestern Hawaiian Islands map/poster, and a series of five video modules focused on specific Navigating Change educational themes. In April 2003, *Hōkūle'a* departed on a seven-week statewide sail in which the canoe would visit most of the main Hawaiian Islands, allowing students to meet the canoe and learn about voyaging and Navigating Change first hand. A series of nine teachers' workshops were held in conjunction with this trip.

## *Hōkūle'a's* Voyage

*Hōkūle'a* was scheduled to set sail to the Northwestern Hawaiian Islands in late summer of 2003. Unfortunately, two weeks before departure a threatening hurricane and a broken mast on the escort vessel delayed departure. With winter weather approaching, *Hōkūle'a's* voyage was rescheduled for May 2004. Although disappointed, NCEP took advantage of the time to fine tune its educational products. In the fall of 2003, the State of Hawai'i's Department of Education, with assistance from NCEP, aired on Public Television a three-part series on Navigating Change via an interactive distance-learning science program. The teacher's guide was updated to incorporate the Department of Education's content and performance standards in science, social studies, language arts, and Nā Honua Maui Ola (Hawai'i guidelines for culturally healthy and responsive learning environments), so that teachers could easily incorporate the guide into their standardized curricula. This updated guide was reworked into a framework of digestible topical units that coordinated with the existing poster-sized map, video segments, photographs, Power Point presentations, the Hawai'i Maritime Center exhibit, and websites.

On May 23, 2004, *Hōkūle'a* set sail for the Northwestern Hawaiian Islands. To improve interaction with the public, the 12-member crew included a journalist, Jan TenBruggencate from the *Honolulu Advertiser*, and an education and ecological protocol officer, Ann Bell of the U.S. Fish and Wildlife Service. During the voyage, more than eighty classrooms and approximately 1,800 students were connected to the canoe's crew via satellite telephone (fig. 2). During the first two weeks of the voyage, daily 45-minute conversations allowed students from across Hawai'i, as far east as Maryland, and as far south as Samoa, to ask questions and learn about the Northwestern Hawaiian Islands. TenBruggencate reported on day-to-day life on board the canoe, often in front-page articles, instilling a greater awareness in adults of the traditional Hawaiian value of *mālama*, caring for our land and sea. Three websites followed the voyage ([www.pvs-hawaii.com](http://www.pvs-hawaii.com), [www.hawaiiatolls.org](http://www.hawaiiatolls.org), [www.navigatingchange.org](http://www.navigatingchange.org)), posting extensive information along with journal articles by Dr. Cherie Shehata, and the public could track the canoe's daily position via a satellite tracking system. The voyage



**Figure 2**—Navigator Nainoa Thompson on satellite phone while U.S. Fish and Wildlife Service employee, Ann Bell, helps coordinate communication with students back home (photo by Dr. Randall Kosaki).

generated almost 2,500 column inches of newspaper coverage and nearly two hours of television news coverage.

## Results

The true measure of success is perhaps best told by the participants themselves. LaTitia A. McCoy, an 8<sup>th</sup> grade teacher at Labadieville Middle School in Thibodaux, Louisiana, wrote:

I cannot say enough about the resulting experiences that these students had the opportunity to be a part of! By integrating the Navigating Change project into all subject areas, the students were actively engaged in the connections that were being made. In Science, the students learned about the ocean currents, trade winds, and navigation using the constellations above. In Mathematics, tracking of the vessel was done using the longitude and latitude coordinates daily. In Social Studies, the geography of the islands was taught and students learned in-depth information about the North-western Hawaiian Islands that most of them never knew existed before this project. (Most students didn't even know that the 50<sup>th</sup> state of Hawaii consisted of more than one island when we began this project!!) The English/Language Arts teachers even became involved by exploring new vocabulary words that the students were exposed to. In the midst of the project, every eighth grade student could tell you what the *Hokule'a* was, where and what the NWHI were, and how this event was to make an impact on their lives.

I'm sure that the impact of this event will continue far longer than any of us can imagine, but some immediate signs that these young people absorbed the information that was

being presented to them were evident in their responses to any question that was asked of them about the project. They responded with quick connections being made from Hawai'i being surrounded by water, and Louisiana being a coastal state. The erosion that takes place at an alarming rate is a concern for most South Louisiana residents and these young people are aware of the problem and hope to slow the process in their lifetime. Protecting the ecosystem is a concern also, and hearing first-hand about endangered birds that were encountered through the voyage of the *Hokule'a* brought the vision of a harmonious ecosystem to life for them.

"Cultural harmony is another issue that most young people here in Louisiana deal with on a daily basis. Hearing with their own ears (from Bruce) during one of the teleconferences that people of *all* races and ethnic backgrounds work together toward one common goal is an important asset for all crewmembers. It doesn't matter what the color of your skin is or where you were raised only that we are all human beings and together we can make this world a better place to live in for the future. This was the overall feeling that the students at L.M.S. left with after completing their last teleconference. The feeling was overwhelming for me as a teacher to see these students absorbing this 'real-life' connection that was being made. This entire experience is one that no one at Labadieville Middle School will soon forget!"

You have impacted over 120 students' lives in our school alone, not to mention all of the adults who read the local reports from our reporting media.

From Kilauea E. School on Kaua'i, Richard Larson said:

...the experience of having the children speak with you on the canoe was the most significant event from the whole

year and it happened the day before school was out. It was a fitting celebration for the year.

“For many years I have used the voyaging canoe as a symbol for the year, the cooperation, the bringing together the knowledge of the past and the present; the unseen and the seen... With so much focus on standards and assessment, I have been able to integrate what I believe to be important into the daily activities, and the curriculum. The values of ‘ohana (family), aloha (compassion), kuleana (responsibility) are just some of the cultural aspects that we use as part of the tapestry of our day, our year together.

The end of a voyage turned into a new beginning for Navigating Change. A student-driven community day, organized by Learning Education Technology Academy, was held in May 2005 with over 5,000 people in attendance as *Hōkūle‘a*

sailed into Kailua Bay (fig. 3) to honor the cumulative conservation learning and work of hundreds of students. Seven teachers who were previously involved in developing and field testing the Navigating Change Teacher’s Guide in their classrooms were chosen to set sail in August 2005 on a NOAA ship to explore and produce lesson plans about the Northwestern Hawaiian Islands. In addition, the Harold K. L. Castle Foundation funded a half-time NCEP position to help steer the vision of Navigating Change into the hearts and minds of Hawai‘i’s children.

More than 60 students spent the night on *Hōkūle‘a* during the fall of 2005 as it anchored in Maunalua Bay, a bay that nourished local families for hundreds of years and inspired Nainoa Thompson as a child. With *Hōkūle‘a* acting as a floating laboratory, students created their own baseline studies of the coral reef (fig. 4), searched the night skies and learned



**Figure 3**—*Hōkūle‘a* arrives in Kailua, Hawai‘i, in the main Hawaiian Islands to celebrate the work of students engaged in learning about their local bay and offshore islets (photo by Katie Laing).



**Figure 4**—La Piʻetra—Hawai‘i School for Girls Environmental Science Class discovers the difference between native and non-native algae in Maunalua Bay, Hawai‘i (photo by Jessica Carew).

the art of wayfinding from Thompson, and experienced the human lessons learned by working and sailing a voyaging canoe together. In these acts, the values of culture and science combine to show students that to help their crewmembers, their families, and the ocean is to help *all* life become sustainable and healthy. As Thompson explains it, “No longer do we seek only the knowledge of how to voyage between islands. We seek lessons to carry home to our children—ways

to inspire the present generation to love and preserve our Earth as a sanctuary for those who will inherit it.”

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## 7. Place and Spirit: Commitment to Wilderness



*The 8th World Wilderness Congress recognized Steve McCool for lifelong commitment to science at the Bob Marshall Wilderness (photo by Claudia Sellier).*





# Spiritual Revelation in Wilderness Under Down-Under

Peter Ashley

**Abstract**—People may well be attracted to wild places in pursuit of deeper meanings. There is an increasing body of western literature emphasizing people's loss of spiritual relationship with the Earth, and an emerging body of literature on the importance and role of spirituality in protected area management. However, little work has been done linking the two, particularly work utilizing empirical methodology. There is a challenge for wilderness managers; the integration of spiritual values into wilderness planning and management processes. Filling a knowledge gap in Australia, this exploratory research uses a predominantly quantitative research design to: (1) help recognize and understand people's spiritual relationships with, and sense of spiritual attachment to, the Tasmanian Wilderness World Heritage Area; (2) assist future management planning and operational decisions in Tasmania; and (3) inform wilderness management practices more generally. A self-reporting, mail-back questionnaire has been developed and a pilot study of a random sample of the general population conducted. The survey instrument included a psychometric scale, qualitative and other questions, and photographs. Preliminary results confirm respondents have a spiritual affinity with the Tasmanian wilderness. A larger survey using a stratified sample is planned.

What is the point of preserving wilderness? The values that warrant its preservation have been listed innumerable times: ecological sanctuary, genetic storehouse, tourist drawcard, recreational resource. And at the end of the list we may add something about the spiritual values of wilderness. Why don't we put spiritual values first? Is it because we consider them less important than economic and practical values? Is it because we cannot explain them in purely rational terms? Are we afraid that if we say what we feel, we will be accused of being irrational? (Hawes 1996: page 1).

## Introduction

Are wilderness areas more than just a recreational opportunity? People may well be attracted to wild nature in pursuit of deeper meanings. There has been an increasing body of western literature lamenting the loss of spiritual relationships and connection with nature and the earth in recent time (for example, Berry 1990; Driver and others 1996;

Gottlieb 2004; Kaza and Kraft 2000; Kellert and Farnham 2002; Lines 2001; Washington 2002). Additionally, there are calls for a 'spiritual renewal' (Orr 2002: 1459), a 'spiritual renaissance' (Christie 2002: 1466), or the embracing of the 'spiritual imperative' (Kumar 2004) in order to manifest true environmental sustainability. There is also an emerging body of literature on spirituality as a theoretical framework within public land, national park and wilderness management processes (for example, Hamilton 2000; IUCN 2004; Magary 1996; Maller and others 2002; Perschel 2004).

While there have been numerous theoretical and practical quantitative and qualitative studies into wilderness spirituality in countries such as the United States (for example, Brayley and Fox 1998; Fredrickson and Anderson 1999; Heintzman 2002; Heintzman and Mannell 1999; Johnson 2002; Stringer and McAvoy 1992; Trainor and Norgaard 1999), research into the spiritual values of wilderness are seemingly still in their infancy in Australia—Australian studies are few (but see for example, Fox 1997; the forest studies of Lamb and Morris 1997; and Williams and Harvey 2001). There are not too many countries other than the United States that have had the good fortune to be blessed by the Emersons, Thoreaus, Muirs, Leopolds, Adams and Zahnisers of this world, their collective prose, philosophy, photography and wilderness advocacy culminating in one way or another with the passage of the U.S. Wilderness Act. Although the word "spiritual" may not be specifically referred to in this Act, the often-used term "wilderness character" is seen as an analogue (Kaye 2002).

## The Australian Context

Unlike the United States, Australia does not have a federal act protecting wilderness, with only sections of the Environment Protection and Biodiversity Conservation Act of 1999 relating to wilderness and then only to Commonwealth and not state reserves. In Tasmania there is no specific wilderness legislation although the Tasmanian Wilderness World Heritage Area (TWWHA) represents 20 percent of the land area of that state. The 1.3 million ha (3,212,370 acres) TWWHA was first inscribed on the World Heritage list in 1982, and extended in 1989. The TWWHA contains a diverse mosaic of landscapes from mountainous, alpine environments, to wild ocean beaches, to calm, inland lakes. Visits from Australia and overseas are consistently about half a million annually. Visitor opportunities include bushwalking, whitewater rafting, climbing, aesthetic appreciation, and participation in commercial tourism operations, such as scenic cruises and aircraft overflights and landings.

Management of the TWWHA is vested in the Tasmanian Parks and Wildlife Service. While the declared objectives of the 1999 TWWHA management plan mandate management

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for the full diversity of wilderness values, the mandate is more implicit than explicit. Spiritual values and their management have not been specifically addressed to date. A search of the TWWHA management plan revealed three occurrences of the use of the word 'spirit'—two in a descriptive sense (cultural perception or cultural landscape), and methylated spirits in the Fuel Stove section (Parks and Wildlife Service 1999). While spiritual values are not specifically mentioned in the plan, the caption to a photograph included in a major review of management effectiveness in the TWWHA may be indicative of change: "For many visitors, wilderness areas offer a place for relaxation, reflection and spiritual renewal" (Parks and Wildlife Service 2004: page 186).

Despite the paucity of spiritual values research in Australia, these values have been recognized for at least thirty years. For example, writing about Tasmanian national parks Sharland (1972: page 71) said: "These refuges [for protection of wildlife, but also as refuges for human life] are essential to maintain the mental and spiritual balance of the people. That is a generally accepted fact. And it's a role being played by the national parks among many kinds of people and with a variety of interests." Later, Davis (1980: page 9), delivering an academic address in 1979, confirmed that perhaps the most important purpose of national parks are "as oases of spiritual and aesthetic refreshment." And a 1992 Australian government wilderness discussion paper states: "The spiritual value of wilderness is an essential part of its cultural value" (Robertson, Vang and Brown 1992: page 33).

In order to fill a knowledge gap in Australia, the exploratory research I am currently engaged in investigates the values of the TWWHA from a spiritual perspective, discussed in the context of wilderness management processes. The work has a pragmatic intent, with results intended to assist future management planning and operational decisions in Tasmania, and inform wilderness management practices more generally. The purpose of this paper is to provide an overview of the research, describe the study methodology, and present a brief summary of the results of my preliminary study.

## Spirituality

To lay some of the groundwork for further discussion, we need to distinguish 'spirituality' from 'religion.' As Kumar (2004: page 3) says: "Sometimes the words spirituality and religion are confused, but spirituality and religion are not the same thing." Elkins and others (1988) agree, saying that in the past a spiritual person was thought of as being a religious person, but a change—possibly because of the perceived failure of traditional religions to cater to the spiritual needs of people—is now being recognized.

The distinction also needs to be made between two streams of spirituality. One stream refers to the spirituality of indigenous and traditional peoples and is related to cultural customs and sacred sites (see, for example, the extensive and comprehensive United Nations Environment Programme sponsored report, *Cultural and Spiritual Values of Biodiversity* (Posey 1999)). The other is the modern, western conception that extends beyond the particular. It is this latter stream that I am engaged in. The spiritual and cultural connections and associations indigenous peoples have with nature—in Australia, particularly with 'country'—

is acknowledged with respect. However my research limits itself to western spirituality.

## Difficulties in Operationalizing 'Spirituality'

People's spiritual relationship with the natural world is an abstract topic, dealing with higher order emotions and thought; spiritual values themselves are "ethereal and intangible and, therefore, hard to define and measure" (Driver and others 1996: 5). Barnes (2003: 271) agrees, referring to spiritual values as "fuzzy" values. Even if spiritual experiences are measurable, people may either not recognize them as such, or find it difficult to verbalise such experiences (McDonald, Guldin and Wetherhill 1989; White and Hendee 2000). Survey methodologies "are not well-suited to delving into spiritual experiences" (Magary 1996: 292). However, despite these difficulties, the Spiritual Orientation Inventory, "a measure of humanistic spirituality," has been proposed (Elkins and others 1988: 12).

## Research Design Issues

Researchers seeking to explore people's spiritual connection with wilderness using quantitative methods face challenges because of the difficulties associated with defining spirituality, and the articulation by people of their spiritual experiences. Consequently, it is not uncommon for researchers to use qualitative research techniques. Qualitative research methods seem best for examining the *genius loci* of place (Moore 1997). However, spirituality may be "assessed and even 'quantified' when sensitively pursued" according to Elkins and others (1988: page 12). Quantitative results are more easily communicated (Moore 1997), accessed and usable by managers and other decision makers. Political reality confers precedence on calculable values that "count" (Putney and Harmon 2003). Importantly, quantitative results can be generated from a representative sample of a target population. While quantitative and qualitative methods are distinct approaches, Stynes and Stokowski (1996: 451) perceive:

... these techniques as more complementary than competitive. Both sets of methods have important contributions to make to our understanding of values, nature, public land management, and the human spirit. Multiple perspectives are as valuable in the research arena as in matters of public policy.

The research reported here uses both quantitative and qualitative methods and thus is a mixed-method design.

## Study Methods

In order to determine whether Tasmanians value the TWWHA from a spiritual perspective, and address how spiritual values could be managed should they be confirmed to exist, a self-reporting, mail-back questionnaire has been developed and a pilot study undertaken. The questionnaire booklet used in the pilot study has four parts. First, there are a series of questions on TWWHA visitation. The main body of the instrument comprises a psychometric scale, qualitative and

other questions and forms the second part. The third part is a photo gallery and questions, with demographic questions making up the final section. Details of the second and third segments follow. The visitation and demographic sections adopted standard approaches and are not reviewed here.

## Psychometric Scale and Other Questions

An item pool of 60 questions was assembled under several sub-domains or themes (table 1). The themes are a structural device and serve an explanatory purpose. The majority of questions are informed by the literature (table 1). Fifty-six questions (numbered from 1–56 in the pilot study booklet) utilize a seven-point Likert scale continuum for each statement—from ‘strongly disagree’ to ‘disagree,’ ‘slightly disagree,’ ‘undecided,’ ‘slightly agree,’ ‘agree,’ and ‘strongly agree.’ Simple weights of 1, 2, 3, 4, 5, 6, and 7 are applied for scoring purposes, respectively. Fifty-two of the 56 statements (numbered from 1–52 in the pilot study booklet) form a psychometric scale. The remaining four statements (numbered 53–56 in the pilot study booklet) are contingent upon respondents having prior experience of wilderness in Tasmania or elsewhere. To maintain completeness, these four statements are not included in the psychometric scale because some respondents are likely to skip them. However, these statements have meaning in their own right.

Specifically, a battery of 21 statements is used to establish the spiritual predisposition of respondents (table 1). These statements are drawn from the 85-item, nine-dimensional Spiritual Orientation Inventory (SOI) developed by Elkins and others (1988) to measure humanistic spirituality. Of the 21 statements, 12 are from the ‘Transcendent’ and nine are from the ‘Sacredness of Life’ dimensions of the SOI.

The perceived effect of aircraft noise intrusion on the peace and quiet of the TWWHA is explicitly measured (Question 58 in the pilot study booklet) by the ‘noise awareness/annoyance response scale’ adapted from Cessford (2000). Question 59 in the pilot study booklet asks respondents to choose between

management infrastructure reductions (closing roads, closing walking tracks, removing boardwalks, removing huts, removing signage and ‘other’—specified by respondents) to improve the spiritual values of the TWWHA. Two questions (57 and 60 in the pilot study booklet) provide the opportunity for respondents to answer in their own words and thus allow a qualitative response. Question 57 enquires: “Some people find a spiritual value in wilderness. This means different things to different people. If you find spiritual value in wilderness, what does it mean to you?” Question 60 asks: “Do you think the Tasmanian Parks and Wildlife Service, which manages the TWWHA, could improve spiritual opportunities in the TWWHA? If so, how?”

In a pre-test to the pilot study, opinion on the survey statements was obtained from two independent reviewers (national park manager, part-time national park staff member and wilderness enthusiast), and statements and questions revised accordingly.

## Photographs

A qualitative design aspect of the research, the survey instrument uses photographs of the TWWHA to gauge respondents’ perceptions of spirituality. In a process of photo-elicitation, photographs have been used to elude people’s responses to them in natural values studies (for example, Hocking 1995 and Williams and Cary 2001 in Australia; Kalltenborn and Bjerk 2002 in Norway). Prosser and Schwartz (1998: page 124) define the term:

Although not a homogenous set of practices, in its conventional form ... photo-elicitation can be described as a single or sets of photographs assembled by the researcher on the basis of prior analysis and selected with the assumption that the chosen images will have some significance for interviewees. The photographs are shown to individuals or groups with the express aim of exploring participants’ values, beliefs, attitudes, and meanings.

**Table 1**—Survey themes, the number of questions in each theme, and example references contributing to the development of the pilot study instrument.

Theme	Number of questions	Examples of informing references
Importance of solitude and quiet	4	Hammitt 1982; Riley 1996
Qualitative question: meaning of the spiritual value of wilderness	1	Trainor and Norgaard 1999
Spiritual landscapes (some questions with management implications)	6	Hamilton 2000; Magary 1996; Taylor and Geffen 2004
Spiritual predisposition scale	21	Elkins and others 1988
Spiritual values of wilderness	14	Johnson 2002; McDonald, Guldin and Wetherhill 1989; Perschel 2004
Spirituality and sacredness of nature	5	Berry 1990; Maller and others 2002; Metzner 1995
TWWHA Management: Policy—aircraft activities—noise impacts	3	Cessford 2000; USDA Forest Service and NOAA 2002
TWWHA Management: Policy—infrastructure and naturalness nexus; solitude and visitor numbers	2	USDA Forest Service and NOAA 2002
TWWHA Management: Policy and practices—provision of spiritual opportunities	1	
Understanding of spirituality	3	Fredrickson and Anderson 1999; Kumar 2000
<b>Total questions</b>	<b>60</b>	

Two methodological issues were considered relevant to research using images. First, it was recognized that a significant methodological problem was the potential for photo quality to influence perception. There were also different axes of perception or axes of variation to be taken into account. In the TWWHA, these include a diversity of landforms (coast, inland plains, high country, alpine), a diversity of water bodies (sea, inland lakes and rivers, wild rivers), a mosaic of vegetation types, distinct seasonal variation, and variation in photographic style.

An image bank of candidate color images for the survey was created from two sources. Images from various published media, such as Tasmanian wilderness calendars, diaries, postcards, and books, were reviewed and scanned. Experienced Tasmanian wilderness photographers also collaborated by contributing images. The primary criterion for contributing photographers was that images needed to be of the TWWHA. A more subjective criterion for the majority of photographers was the presence of spiritual evocation in the images, in their opinion.

Expert opinion (primary research supervisor) was obtained on the pool of approximately 250 images, and images not of the TWWHA, or adjudged unsuitable for the study, discarded. The resulting 143 color images were attributed to six photographers. The rationale for using more than one photographer was to avoid the possibility of the photographic style of one photographer influencing respondents' perceptions. The photographers gave permission for the use of their images for research purposes, and copyright provisions were made.

In an informing process, the 143 images were trialed with 16 people (student colleagues, academics, national park manager), casting votes for those images eliciting a spiritual response in their opinion. General information on the topic of the research accompanied the trial. The votes were converted to simple frequencies and summed. Any voluntary qualitative comments were recorded at the time of the trial. Twelve images were then chosen for the pilot study. These 12 were the 11 images with the highest number of votes, and another image thought useful for the research because it was the only one of the 12 to include a human presence. The score for the latter image was in the lower one third of votes. The 12 images conformed generally with the physical setting attributes for a spiritual experience reported in the literature (for example, McDonald, Guldin and Wetherhill 1989). More than half the images featured mountains, and three quarters featured water in all its guises.

Factors considered in limiting the number to 12 color images for the pilot study were possible survey completion demands on respondents, presentation quality, production cost, and a trade-off between image numbers on the one hand, and keywords and phrase numbers on the other. Because a more thorough response was aimed for, it was thought more important to obtain the fullest representation of spiritual suggestions possible. Therefore, the number of keywords and phrases was emphasized and the number of images limited.

Two options for presenting the images to respondents were considered. One was for the images to stand-alone, with respondents being asked to write their own words should the images elicit any response. Alternatively, a list of spiritually indicative and other descriptive words could be provided,

with respondents selecting from a list. Because of the difficult and abstract nature of the research, a compromise between the two methods was trialed in the pilot study. A list of 38 keywords and phrases (table 2) was provided in the pilot survey instrument, together with space for respondents to write their own words as well, if they felt so inclined.

The 38 keywords and phrases (table 2) were determined from the literature (for example, Harmon and Putney 2003; Hawes 1981; Magary 1996; McDonald, Guldin and Wetherhill 1989; Perschel 2004; Read 1996; Stringer and McAvoy 1992) and the results of the trial. The keywords were checked for logical grammatical expression by prefixing each of them with either the term: "This image produces (in me) a sense of [keyword or phrase]"; or "This image produces (in me) a sense of being [keyword or phrase]." All keywords and phrases satisfied either of these criteria.

Pilot Study

Prior to the pilot study, the draft survey instrument was pilot tested with members of the Tasmanian World Heritage Area Consultative Committee. This 15-member panel acts in an advisory role to the government on TWWHA management matters and includes representatives from the scientific and Aboriginal communities, recreational interests, local government, conservation interests, industry and tourism (Parks and Wildlife Service 1999). The pilot test resulted in useful changes being made to the instrument.

In preparation for the printing of the pilot survey as an A4-sized booklet, the 52 statements comprising the psychometric scale and 12 color photographs were randomly ordered (Deville 2004). The photographs were numbered "Photograph 1" through "Photograph 12." Large-scale versions of the images were printed in color on A3 size paper and folded in half to create an A4-size insert to the survey booklet. Smaller "thumbnail" versions of the images were printed in color in the survey booklet to aid identification by

Table 2–The alphabetically sorted keywords and phrases list as printed in the photographic section of the pilot study survey booklet.

Term	Term
a compelling presence	joyful
a manifestation of the Holy Spirit	lonely
aesthetically beautiful	mystery
ancient	not doing much for me
austere	old
awe	omnipotent
bleak	oneness
connected with all of existence	powerful
delightful	reflective
divine	reverence
dreadful	sacred
fearful	sanctuary
foreign	serene
God's country	something beyond myself
homage	spiritual
humbling	the Garden of Eden
immersed in the landscape	timeless
inspiring	transcendent
isolated	wonder

respondents. The 38 keywords and phrases were alphabetically ordered, a value-neutral technique.

In mid-2005, the survey booklet was delivered by mail to a random sample of 190 people residing in the Tasmanian electoral division of Denison who could understand English and were not incapacitated due to ill health. Dillman (2000: page 146) suggests that: "For a pilot study, a sample of 100 to 200 respondents is generally drawn, but may be larger if resources allow." The constraints of a postgraduate research budget restricted the sample size to anything larger. The survey package contained a personally signed cover letter, survey booklet, color photograph insert, and a stamped return envelope. The procedures of the mail-out generally followed that recommended by Dillman (2000).

The purpose of the pilot study was as indicator of a response rate, as a trial run of administrative procedures (for example, survey booklet preparation, mailing out, follow up, analysis), and to check the validity and effectiveness of the survey questions, in particular the identification of items in the scaled questions not contributing to explanatory power.

## Summary of Pilot Study Results

A response rate of 35 percent (67 returned surveys) was achieved after one postcard reminder follow-up (Dillman 2000), suggestive of a final response rate greater than 40 percent if further follow-up measures had been implemented. A summary of some results from a preliminary analysis of the pilot study data follows.

- Respondents plainly value the TWWHA from a spiritual perspective.
- The scaled questions exhibit a homogenous structure from exploratory factor analysis. Four latent variables or factors were extracted although the loading on the first factor was very high (eigenvalue of 25), effectively swamping the other factors.
- The 52 scaled questions show a Cronbach's alpha score of 0.975, indicating a high level of internal consistency of the instrument.
- The photographs show promise in displaying underlying factors and sensations responsible for producing what might be described as a 'spiritual response' from wilderness landscape elements.
- The top three choices from the photograph keywords and phrases list across all 12 images were 'aesthetically beautiful,' 'inspiring' and 'serene' in that order. The word 'spiritual' ranked 22 out of 38.
- Of the 67 respondents, 36 were female (54 percent), 27 male (40 percent), and four unreported (6 percent).
- The 'Spiritual Predisposition Index' of respondents overall was 4.8/7 (n = 63), a moderate score.
- The qualitative question asking respondents to define what wilderness spirituality meant to them, was very well answered in terms of the depth of feelings expressed. A content analysis of the narratives revealed the word 'peace' was most often used.
- Fourteen of the 25 respondents (56 percent) completing the question on hypothetical infrastructure reductions said closing roads would improve the spiritual values of the TWWHA.

## Discussion and Summary

To researchers pursuing the qualitative research paradigm, the measurement of the spiritual values of wilderness is possibly an anathema. However, the research reported above is seeking to provide the wilderness management agency in Tasmania with objective data.

The pilot study confirms a spiritual relationship with the TWWHA among respondents. This is especially significant because the pilot study was directed to a random sample of the general population. However the difficulties of such an undertaking, of survey questionnaires arriving without notice in the letterboxes of an unsuspecting public, should not be underestimated. The response rate of 35 percent, considered by some researchers as low, was satisfying in view of the topic and the nature of a random sample.

It is acknowledged that the number of questions in the pilot study may be considered to be too many by some researchers. The length of the pilot instrument was intentional, on the basis that questions not contributing to explanatory power would not be included in the main study. Nevertheless, the large number of questions coupled with the small sample size may contribute to the homogenous structure of the data set.

While the next stage of the research involves a survey of a larger, stratified sample in Tasmania (members of conservation groups, Parks and Wildlife Service staff, general public), more work is needed to refine the survey instrument, especially the management type questions. In this latter vein I pose two questions to myself: "How do you manage for spiritual values?" and "How do managers maintain and enhance spiritual values?" These questions could turn out to be unanswerable. It might transpire that looking after the biodiversity aspect of wilderness will suffice, and the rest will follow. The default condition is that the research may be a consciousness raising exercise for managers not already cognizant of the existence of the spiritual values of wilderness.

An adaptive mechanism, the spiritual dimension of wilderness has evolved, is evolving, and will continue to evolve in response to changes in ourselves and our relationship to the natural world. The manifestation of spirituality in the wilderness concept both reflects the unmet needs of our urban, commodity-driven culture, and reveals some archetypal part of us that this culture has obscured (Kaye 2002: page 45).

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# Crossing The Divide

Florence Rose Shepard

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**Abstract**—“This is a divide.” Dad delivered this proclamation with the verve of a discoverer. This memory from childhood frequently surfaces as I struggle to interpret the topology, the complicated relationship between the topography and cultural history of my home, the Green River Basin, that great expanse of sagebrush/bunchgrass steppe crowned with wilderness.

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On a morning many years ago, dad announced that he was taking us to a very special place. We were camped near our sheep allotments on Labarge Creek in the Bridger National Forest in the central Rocky Mountains of Wyoming. It was late summer, after haying and before shipping and school had begun, when our family escaped to the mountains. After breakfast, my mother and elderly uncle got into our truck with dad. My two sisters and I climbed onto the flatbed and stood behind the cab to monitor our progress up the dusty road. We were following the Lander Cut-off of the Oregon Trail, a path forged by settlers in the mid-1800s en route to gold, religious freedom, and settlements west.

The old truck bumped its way down into Labarge Meadows into a cool pocket of air smelling of damp soil and growing grass. In this willowed, riparian basin immigrants staked their horses and cows to graze as they themselves rested, bathed in the cool stream, and regrouped.

The truck climbed out of the meadows, dad parked on a narrow, elongated sagebrush knoll, and we followed him to a point where we could look down at seeps of springs on either side. This saddle, he explained, divided the watershed of two rivers. Grey's River to the west, a tributary of the Snake River, would eventually join the Columbia River and flow to the Pacific Ocean. LaBarge Creek, beside which we were camped down below, began right here, he said. It flowed to the east into the Green and thence the Colorado River and finally to the Sea of Cortez.

Although enthralled with this discovery, I doubt that my father, a poor Italian immigrant, caught up with paying debts encumbered during the Great Depression, understood the importance of divides to western imperialist expansion (Worster 1985). Unfortunately, he and the loggers, whose trucks passed us in a cloud of dust, were following that imprint by reaping the benefits of the natural wealth of this public land while destroying wilderness and degrading the ecosystem. Although sheep allotments and clear-cutting have been curtailed in this region, the new threat is the

drive for gas and oil. And ecosystems are being shattered and designated wilderness threatened in many irreversible ways.

As luck would have it for me, my late husband, Paul Shepard, took to my home territory and the fishing it provided. We bought a few acres on an old homestead in the tiny Hoback Basin, geologically the apex of the Green River Basin.

Although there are many ways to get from my winter home in Salt Lake City to our cabin, I invariably follow the same route each spring. John McPhee reminds us that the “surface appearances [of the land] are only that; topography grows” and constantly changes and “is composed of fragments of other scenes” (McPhee 1994: 29). As the scene unravels on this yearly pilgrimage, albeit in fragments, I retrace the geology and the footsteps of explorers followed by six generations of my family. When I turn off the interstate onto a broad, strike valley—Fossil Basin to geologists but the Cumberland Flats to locals—I breathe deep. This is home.

I can be selective in my vision, carried away by magnificent vistas and fascinating creatures: ridges of slanting sedimentary rocks lined with junipers bordering the sagebrush-bunch grass steppe, herds of antelope and deer grazing along the road; golden eagles tumbling in the sky or picking at road kill; sand hill cranes disoriented by a sudden snow squall planing down; clusters of “drop herds” of sheep and newborn lambs.

Notwithstanding the natural beauty, I can't entirely ignore the signs of “progress.” Pump stations pock the landscape, and newly laid pipelines and mazes of roads and fences crisscross the sagebrush steppe. Recently, fields of wind generators appeared on the horizon. The strike valley I drive through is part of the great Overthrust Belt that runs 5,000 miles (8,047 km) from Mexico to Canada, a great reservoir of gas and oil that has been the impetus for massive extraction in recent years.

As I pass a little knoll near the blackened remains of an old mine, I think of my mother born near there at the turn of the century in Cumberland, a company mining camp. In response to the Industrial Revolution, dozens of coalmines opened in this region in the latter nineteenth century, influencing the selection of the route chosen for the transcontinental railroad. My grandfather, a peasant from the Italian/French Alps, was one of many foreigners who responded to the call for miners to this “new country.” The deep coalmines lasted less than a century and were replaced by a strip mine that continues to eat its way along a seam high on a ridge. At its base a smoke stack rises above a power plant surrounded by ponds of toxic effluent planted with fish that can't be eaten.

The highway descends into the small towns of Kemmerer, Diamondville, and Frontier, built along the Hamsfork River and then climbs a circuitous route out of the little valley. At Willow Springs, a dirt road heads west to my grandparents' old homestead where they moved to sell milk and goat cheese

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in the mining camp of Sublette. One summer my blue-eyed father, a foreman for a sheep company, on his way on horseback to check on the flocks on the summer range, met my brown-eyed mother who was working in a hay field. They fell in love, were married, and later bought our ranch on the lower Hamsfork River.

The road levels off as it enters the upper Green River Basin; gray-green sagebrush steppe stretches on all sides. At an elevation of about 6,000 ft (1,829 m), this is considered a cold desert, and rightfully so with limited precipitation and only a month or two of frost-free days in summer. Ramparts on the horizon—the Uintas, Wind Rivers, Gros Ventres, and Wyoming Mountain Ranges—circumscribe the horizon from southeast to southwest.

For most of geological history, the Green River Basin was part of an inner continental trough and inland sea. Cycles of emergence and submergence continued for millions of years depositing layers of sand and silt and burying organic matter accumulated during the lush, semi-tropical Cretaceous period that started 100 million years ago.

The Laramide Revolution, a massive continental disturbance, occurred about 65 million years ago. The crust was thrust to the east and sedimentary layers sheared and piled up on top of each other like shingles, forming the Wyoming Range, a part of the Overthrust Belt.

Organic matter, trapped under tremendous pressure of crustal movement, was converted to hydrocarbons and remains trapped in pools in rock layers deep in the crust. Since the 1940s, oil and gas companies have been thumping and drilling the region, buying up leases, and planning for this moment when reserves are as precious as gold and extraction reasonable in cost.

During an era of mountain building, the front range mountains to the east rose separately but successively to incredible heights out of the inland sea, the Wind Rivers to an estimated 60,000 ft (18,288 m) (McPhee 1994). A period of massive erosion and deposition followed this upheaval burying the basin and leaving only the tips of the mountains, protruding 1,000 to 4,000 ft (305 to 1,219 m) above the sediments. Then came another exhumation of the mountains when the entire region was uplifted. Glaciations followed and ice and water formed the present landscape, a broad sedimentation basin with meandering river and tributaries arising in the surrounding mountains.

The road descends into the Green River Valley along the Seedskeedee Dam, misconceived in Reclamation days. Colorful Eocene sandstone and shale cliffs frame the water that on sunny days is robin egg blue and on cloudy days, steel gray. As the valley widens into extensive hay fields and large cattle ranches, my mind shifts from geological history to the souls who passed this way before me.

Long before the immigrants entered in the nineteenth century, the mountains were inhabited by the Sheep Eaters who subsisted here year round, primarily on mountain sheep. They were ancestors of the modern Shoshones whose migratory routes to the mountains in summer and to valleys in winter followed herds of ungulates. Bison no longer roam here but elk, antelope, and deer continue a migratory pattern from mountains to steppe. Although fences and ranches have interrupted their movement, antelope from the Tetons track the longest migratory route of any animal in the lower states: 150 miles (240 km) to the Red Desert

to the east. Waves of immigrants, from explorers to entrepreneurs followed these first people. In the beginning, most travelers were just passing through, crossing the divide to points west, or like trappers and guides, were here for the short-term.

The great immigration from the east began 200 years ago following the Louisiana Purchase. President Thomas Jefferson saw the necessity of competing with the French, English, and Russians for fur trapping territories and for finding a crossing to the Pacific to establish trade with the Orient. A waterway, at that historical moment, seemed the only feasible alternative over the mountains. He commissioned Lewis and Clark's Voyage of Discovery (DeVoto 1953) to try to find that waterway.

John Jacob Astor understood the value embodied in the little fur-bearing beaver in this rocky barrier (Ronda 1990). His plan was to monopolize the fur trade in a global venture. Beginning with furs trapped in the Rockies and exchanged for other goods at a high profit at markets in Asia and Europe, he would return to New York loaded with booty to trade with tribal people for passage, protection, horses, and buffalo meat, thus completing the circle.

Astor commissioned two parties, one led by Wilson Price Hunt (1810 to 1812), who would follow Lewis and Clark's route. Hunt, however, was advised to avoid Indian trouble along the Missouri and to head southwest. A meticulous planner, but notoriously off in timing, he remained wedded to the idea of a waterway to the Pacific. He crossed the Wind River Mountains and followed the Hoback River to the Snake, convinced that this west flowing river would take him to Astoria on the shores of the Pacific. After great tribulations and loss of life along the Snake, his party arrived in Astoria almost two years after heading out, proving one thing. A navigable waterway through the mountains had still not been found.

After arriving in Astoria by sea, John Stuart awaited Hunt's party. Undoubtedly benefiting from his miscalculations, Stuart started with a small party of men and in ten months (June 29, 1812 to April 30, 1813) arrived in St. Louis without loss of life. He had found his way over the Wind Rivers at South Pass, a broad flat divide, counter intuitive to the clefts cut by rivers that others sought (Rollins 1935). This route would become the Oregon Trail. By the time ruts were cut deep in the Oregon Trail, the beaver had been exterminated from the Rocky Mountains and the army was occupied with solving the Indian problem by killing off the bison and trading their hides. Although Astor's venture failed, he had provided the template for global trade.

Great waves of gold seekers and immigrants to the West continued until after the Civil War. The Industrial Revolution and the subsequent building of the trans-continental railroad drastically changed this region. Timber was cut to build the railroad and shipped to the treeless plains states. Coal and oil were extracted and sent east to fuel power plants and steam engines. Small homesteads were established and consolidated into workable ranches. The designation of Yellowstone National Park attracted tourists, and hunters and anglers flocked to the region.

By the turn of the century, foresighted conservationists began seeing the results of unmitigated use of resources. In due time, governmental agencies were established to regulate timber harvesting, livestock grazing, and mineral

extraction, and set aside wildlife refuges. In the mid-twentieth century, due once more to the heroic work of conservationists and naturalists, the Wilderness Act was passed. The only conceivable reason for passing this legislation, given the past proclivity for exploitation, was that lawmakers saw greater value in experiencing wilderness than in utilizing its resources.

Unfortunately, the protection of wilderness seemed to give carte blanche permission to the rape of non-wilderness lands for profit. Even with limitations on mineral extraction on national forests and designated wilderness, which under present policies may be removed, the rate of degradation of adjacent lands threatens the health of wilderness.

In marginal lands such as this, with short growing seasons and limited precipitation, no matter how well land and resources are managed, sustainability is impossible. Trees do not grow as quickly as they are harvested. Extracted oil, gas, and coal cannot be replenished. Large tracts of overgrazed land are impossible to restore. Although rewilding and restoration of lands and reintroduction of endangered species are absolutely necessary, devastated wilderness can never be replaced. And when territories of animals are usurped, they face extinction or captivity. The only renewable natural resource is water that is becoming increasingly over-appropriated and eyed by states downriver. We are naively exploiting irreplaceable reserves produced over eons. For those familiar with Jared Diamond's recent book (Diamond 2005), this region seems to be, in the worst scenario, a collapsing ecosystem and civilization, or, in the best, with closely controlled and mitigated extraction, a totally domesticated landscape.

After struggling for years for the preservation of wilderness, I no longer want to argue for wilderness as an inherent human value. I take this as a given, as do most thoughtful people who see the relationship between wilderness and the ecological health of the Earth.

Those who live in the Green River Basin enjoy the recreation offered or draw from its wealth and proclaim high stakes in the region. But the ineffable mystery and sacredness of wildness cannot be divvied up like so much cash or stocks in a company. Wilderness can provide a much more important non-utilitarian function. At an experiential level, whether being in it or just knowing that it exists, wilderness can be the common grounding that unites people of different persuasions. No matter who we are or what ideology we lean toward, we all experience wilderness in the same way. Divides and boundaries that set aside wild, untrammelled lands can become points of crossing over of many cultures and many perspectives.

As my late husband, Paul Shepard advised, we are Pleistocene beings, and are genetically conditioned to the wild landscape (Shepard 1998). Edward Casey elucidates this further: "If it is true that 'we can never have enough of Nature'—as Thoreau says toward the end of *Walden*—this is because we are already at one with nature itself through a luminous wildness held in common" (Casey 1993: 246). Perhaps it is time for crossing over to this new consciousness that acknowledges our common affinity for wilderness and the consequences of our present course away from it.

We can, of course, continue the present trend of unreasonable economic growth and proceed to domesticate and utilize every inch of this planet. Or we can take seriously the energy crisis, develop non-fossil fuel technologies, and reform our economic system and our own lives by limiting consumption and population commensurate with the health and limitations of the land (Krall, this proceedings). And we should ask ourselves, as Mardy Murie often cautioned: Do we have the generosity of spirit to leave some of this land untouched?

The users of this Earth are diverse with various claims to its resources. But in the name of prudence we should recognize the most important stakeholders, those who cannot speak for themselves. Those future generations of humans, along with the wild flora and fauna, should also be given the opportunity to live and evolve in healthy ecosystems with intact wilderness as the reference point for a sane and life-giving world.

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# The “Wilderness Knot”

Haydn G. Washington

**Abstract**—The word “wilderness” is beset by a tangle of meanings. This “knot” is made of five strands: philosophical, political, cultural, justice and exploitation. Wilderness has a unique philosophical position—being disliked by both Modernism and Postmodernism. Eight key criticisms of wilderness are identified, and two different meanings discussed—“wasteland” and “large natural intact area” (here shortened to “lanai”). Participatory action research (PAR) is used with the Blue Mountains Wilderness Network near Sydney. Eleven in-depth interviews with scholars and critics of wilderness fed into the PAR. All interviewees agreed that lanais should be protected, though some did not call them wilderness, but used other terms (for example, quiet country, core lands). This study has shown that much confusion is a smokescreen when you find out what people really mean. The project has demonstrated the delicacy needed to gain meaningful dialogue over an issue that raises real passions about social and environmental justice. Insights and three “mind-maps” on the knot are presented. Clearly some scholars do not understand the formal definitions of wilderness (in other words, lanai), preferring to use their own personal definition. The political naivety of academia in regard to wilderness is discussed, considering increasing pressures to exploit lanais. It is suggested that confusion can be decreased by concentrating on the definition of wilderness as large natural areas, and secondly promoting recognition that wilderness is in fact a tribute to past indigenous land practices (not a disregard of indigenous history). The idea of shared custodianship or stewardship is suggested as a way forward.

## Introduction

Wilderness has become a knot—a tangle of confused meanings. To some it is the original and best of planet Earth, to others it is just a Western construct. Many meanings and associations are attached to this word. This confusion has reached the stage where, despite the IUCN definition of wilderness being a “large area of unmodified or slightly modified land, and/or sea, retaining its natural character,” some scholars can argue to protect large natural areas, yet be highly critical of “wilderness.” Where does this confusion come from? What can be done about it? This has been the focus of my thesis at the University of Western Sydney, Australia. In order to introduce the “wilderness knot,” it is necessary to discuss its component strands, as well as some criticisms of wilderness from the literature.

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There are at least five strands that make up the wilderness knot. These are: philosophical, political, cultural, justice and exploitation. Wilderness occupies a unique position *philosophically* in that it is disliked by Modernism as well as some strands of Postmodernism. It is also a key nexus of anthropocentrism/ecocentrism (in other words, whether humans or the whole ecosystem are placed center stage), and the question of humans being part of nature (and whether belief in a human/nature dualism is somehow related to wilderness). It is not surprising that Modernism (Oelschlaeger 1991) cannot understand wilderness. For modernists, wilderness has no intrinsic value, it is just a resource for human use. However, Postmodernism revolted against Modernism, so one might hope it would support intrinsic value and the right of wilderness to exist for itself. This hope was expressed in Oelschlaeger’s 1991 book, *The Idea of Wilderness*, yet the opposite has occurred, with a number of postmodernists being highly critical of wilderness.

Postmodernism is in fact a *geography of ideas* that developed in opposition to Modernism. The term “Postmodernism” is poorly defined or resistant to being defined (Butler 2002; Docherty 1992; Heartney 2001), but a key postmodernist criticism of wilderness seems to lie in the importance given to *language*, (for example, Derrida 1966). A second source appears to be a fixation with *dualisms* (Butler 2002), and that all dualisms are inherently bad (Adams and Mulligan 2002; Cronon 1996). A third source is the intense skepticism about the *real*, and the claim that we live not inside reality but inside our representations of it (Baudrillard 1987; Butler 2002; Massey 1994). A fourth source is the suspicion of the influence of Romanticism and the *sublime* on the conservation movement and wilderness (for example, Cronon 1996). A fifth source is the suspicion that wilderness was itself a *grand narrative* that needed to be broken down (Cronon 1996). A sixth source is the suggestion that wilderness ignores the history of native peoples, and is not only a Western, but also a *colonialist* concept (Adams and Mulligan 2002; Langton 1996).

Postmodernists Callicott and daRocha (1996) argue that, “the concept of wilderness ... is obsolete.” Gare (1995) is critical of aspects of Postmodernism, stating that while it has demonstrated problems with Modernism, it has been powerless to oppose them. Several areas of concern are summarized by Gare (1995) and Butler (2002) including, the opposition to grand narratives, a failure to take action (thus increasing alienation and “rootlessness”), the fixation on dualisms, problems with reality, and an inability to understand science. Gare (1995) concludes that Postmodernism is consumerist, stops opposition to mainstream modernist culture, and has a tendency to “nihilistical decadence.”

However, there are other strands beside philosophy. The *political strand* also tends to isolate wilderness. Politics is generally seen as a spectrum between the Left (Socialism/Marxism) and the Right (Capitalism). However, *both* these

political ideologies are based on *resourcism* (Eckersley 1992). Marx himself wrote of "first nature" (unimproved nature = wilderness) and "second nature" (nature given value by humans *transforming* it) (Hay 2002). Soulé (2002) has pointed out that, "Extremists at both ends of the wilderness debate promulgate myths to further their political goals. Both the far Right and far Left hate wilderness on the grounds that it excludes human economic uses." The Left/ Right spectrum is quite inadequate to understand wilderness.

There is also the *cultural strand*. Soper (1996) has observed that, "It is only a culture which has begun to register the negative consequences of its industrial achievements that will be inclined to return to the wilderness." Wilderness is a word of Anglo-Saxon/Celtic origin (Robertson and others 1992) and has no strict equivalent in other languages. There is no word for wilderness in Spanish (Rolston 2001), nor, it seems, a strong tradition of protecting such places. In Aboriginal cultures, however, there were *sanctuaries* where there was no hunting or gathering (Rose 1996). Wilderness (where humans visit but do not remain permanently) has come into conflict with the Aboriginal idea of "caring for country," where one needs to *live on country* to look after it. Wilderness is often lumped in with other Western concepts as being exclusively a European idea. Callicott (2003) states that wilderness is an ethnocentric concept, and that Europeans saw the New World as "a pristine wilderness." Part of the difficulty in this debate is *distinguishing* between the fact that the term, wilderness, *does* derive from a European culture, and the reality of large natural areas (and how they should be managed). For example, Rolston (2001) notes, "But the trouble is that such critics have so focused on wild as a word taken up and glamorized in the term wilderness, that they can no longer see that wild and wilderness do have reference outside our culture." Large, natural areas exist on all continents of the world, irrespective of the culture that lives there. Their existence is thus not culturally relative or a cultural creation—but their perception, and the values ascribed to them, *are*.

There is also a strand concerned with the tension between *social justice* (justice for oppressed human groups) and *environmental justice* (justice for the non-human world). Cronon (1996) and Langton (1996) appear to argue that we should allow development of wilderness to help the poor, or to create an economic base for dispossessed indigenous peoples. Langton (1996) states, "It is difficult for an indigenous Australian to ignore the presumption and arrogance in the arguments of many environmentalists ... It seems to us that they are usurping the Aboriginal right of stewardship of the land." Soulé (2002) has argued for a unity of *both* types of justice—"People must have food and shelter, yes, but a world where material welfare is the only acceptable value will be a lost world, morally, spiritually and aesthetically ... We need a broader compassion—an ethic that makes room for the 'others.' We should reject the common accusation that untrammelled wild places, free of human economic exploitation, are 'misanthropic' or 'racist.'"

Exploitation is the fifth strand. It must be recognized that there are strong interests who wish to exploit wilderness. Logging, mining and grazing interests all have lobbyists seeking to exploit wilderness economically. To what extent are the criticisms of wilderness (and the confusion surrounding it) a product of such lobbying? It is difficult to document the

extent of this influence, as it is easy to slip into conspiracy theories. However, the "Wise Use" movement in the USA is a key critic of wilderness, and has strong links to the mining lobby. Luoma (1992) notes that the Wise Use movement has produced a book, *The Wise Use Agenda*, which demands, among other things, that all "decaying" forest (meaning old growth) be logged immediately and that all public lands, including wilderness areas and national parks, be opened to mining.

Of 20 criticisms of wilderness found in the literature, there are eight key ones. The first portrays wilderness as a *dualism*, which is more valued than other natural areas (Adams and Mulligan 2002; Gomez-Pampa and Kaus 1992). Cronon (1996) argues wilderness is a dualism that actually *stops* humans from discovering an ethical sustainable place in nature. Callicott (2003) also sees wilderness as a *myth* that separates man from nature. Neither explains just why wilderness *must* be a dualism rather than part of a naturalness spectrum, nor why identifying wilderness *devalues* other non-wilderness areas. The *human exclusion zone* criticism is a common claim (Cronon 1996; Gomez-Pampa and Kaus 1992), even though no wilderness definition today *actually* excludes humans (just roads, settlements and mechanized transport). Rolston (2001) points out that neither the Wilderness Act nor meaningful wilderness designation requires that no humans have ever been present, only that any such peoples have left the lands "untrammelled." Soulé (2002) explains that, "With rare exceptions, such as in the former Soviet Union ... wilderness areas do not exclude human uses. Fishing, bushwalking, and low impact recreation and camping are usually permitted in wilderness."

The third key criticism seeks to suggest that wilderness ignores that most areas were (or are) the homelands of indigenous peoples (Cronon 1996; Langton 1996). Cronon (1996) says the myth of the wilderness as "virgin" uninhabited land had always been especially cruel when seen from the perspective of the Indians who had once called that land home. This criticism in Australia also suggests wilderness is linked to the ethically bankrupt doctrine of *terra nullius*. Soulé (2002) says the "skeptics myth" is the idea that hunter-gatherer people perceive of wilderness as *home*, as humans today now farm, log and mine using an unprecedented powerful technology. The fourth key criticism is one that wilderness is a concept and not a place (Cronon 1996; Nash 2001; Lowenthal 1964). This has strong links to the postmodernist skepticism of reality and its arguments for cultural relativism. Lowenthal (1964) states, "The wilderness is not, in fact, a type of landscape, but a congeries of feelings about man and nature."

The fifth criticism, that wilderness is a *human artifact* (Adams 1996; Gomez-Pampa and Kaus 1992; Graber 1995), is much discussed in the Australian context (for example, Benson 2004; Flannery 2003). A major problem here is the distinction between *influencing* a landscape (as all indigenous peoples did) and *creating* it, which is anthropocentric as it places all the emphasis on *human* creation. If wilderness is *our* artifact, then can we do what we like with it? The sixth criticism is *multiple use*—that wilderness is a resource that is "locked up" (Cronon 1996). A related theme to this is that if wilderness is not being *used* then humans won't *value* it. This ignores not only the *ecosystem services* of such areas, but also the artistic, spiritual and recreational uses

wilderness already provides. Multiple use can be many things—sustainable traditional hunting and gathering, but also logging, mining and grazing.

The seventh criticism argues that wilderness is *not* in fact essential for nature conservation (Gomez-Pampa and Kaus 1992; Recher and Lunney 2003). This seems to discount the importance of biogeography in favor of protecting fragments, but also highlights the fact that species loss can still occur in wilderness, largely due to invasion by exotic species. The final criticism is also scientific—that wilderness reflects the outdated idea of a *balance of nature* based on the idea of equilibrium ecology (Adams and Mulligan 2002; Gomez-Pampa and Kaus 1992). Callicott (2003) argues that conservationists try to “freeze-frame” nature and that conservation is in defiance of “nature’s inherent dynamism.” Noss (2003) points out that no ecologist interprets wilderness in the static, pristine, climax sense that Callicott caricatures it and notes that human generated changes must be constrained because nature has functional, historical and evolutionary limits. These strands and associated criticisms make up the wilderness knot.

## Methods

This project used qualitative research to seek insights into the knot. The key methodology is *participatory action research* or PAR (Reason and Torbert 2001) with the Blue Mountains Wilderness Network near Sydney, Australia. This is a group of a dozen scientists, walkers, activists and artists interested in wilderness. We have carried out four cycles of different types of action. In PAR, the group directs what actions are to be taken on an issue. PAR allows one to *act to do something* to address the issue with a group of colleagues, whereby we all learn as we try to work through aspects of the knot. As part of the most recent cycle of PAR, 11 two-hour interviews were conducted with a variety of scholars (philosophers, Aboriginal people, scientists, conservationists), some of them critics of wilderness. These were fed into the PAR group via tapes and transcripts. We then met to distill insights gained.

## Results and Discussion

The first PAR cycle was a planned overnight campfire in Wollemi NP with traditional custodians. The second was a Wilderness Resurgence seminar. The third cycle was about four forays into the public sphere (articles and seminars). The fourth was the interviews, and gaining insights from these. The first three cycles met major problems in terms of *dialogue*, as the invitees did not come to the first, a key indigenous speaker did not attend the second, and the third demonstrated intensely polarized positions around wilderness. The project has thus shown just how difficult it can be to gain *meaningful dialogue* on this issue, one that arouses strong passions. University of California professor, Mary Clark, in a speech to University of Western Sydney Social Ecology Residential (February 2004) related the need for profound attentiveness and mutual respect in dialogue. This may appear obvious—but faced with a nexus of social and environmental justice, and where the modern term “wilderness” has (wrongly, I believe) been linked to the colonial

doctrine of *terra nullius*—it is impossible to overestimate the difficulty of gaining meaningful dialogue. An important part of this dialogue is to recognize that the past history of wilderness campaigning in Australia may not have given *explicit* recognition to social justice and the rights of indigenous peoples. Conservationist Penny Figgis (interview 3/22/2005) points out that this was largely an oversight, but one that has left an unfortunate legacy of division—given that conservationists and Aboriginal communities often *do* share many aims in common. The wilderness knot is thus in part about meaning and communication.

The PAR work in the fourth cycle was around interviews with 11 selected scholars, indigenous people and activists, asking them about their understanding and experiences of the wilderness debate. It generated valuable dialogue and insights. Much of the confusion can be shown to be a smoke-screen, once one gets down to what people *really mean*. It is essential to recognize that there is a poor understanding of the *formal definitions* of wilderness (= a large natural area). There are many associations attached to wilderness, and it is some of these that are being criticized, rather than large natural areas *themselves*. Of my 11 interviewees, *all* deplored the clearing and fragmentation of native vegetation over the last 215 years in Australia, and *all* valued large natural areas. However, some did not call these areas wilderness, rather preferring terms such as wild country, quiet country, core conservation lands, large flourishing areas, or **large natural intact areas** (here abbreviated to **lanais**, a short-hand I find useful, as it is also a Polynesian word for an outdoor living area). It became apparent that even when scholars *knew* the formal definition, they often tended to use their *own* definition of wilderness—for example mammologist Tim Flannery quotes the IUCN definition in his book *The Future Eaters* (1994), yet in his 2005 interview defined wilderness as “someone else’s country” (interview 4/20/05).

The wilderness debate intersects centrally with larger debates around the land as a whole. One of these is whether humans are part of nature. Philosopher Val Plumwood (interview 12/14/04) points out that while humans are a part of nature, we are not an *indistinguishable* part. One can thus still acknowledge the *difference* of humans without subscribing to dualism (Deborah Bird Rose, interview 3/2/05), and one can see wilderness as the wild end of a *spectrum* of naturalness. Similarly, wilderness cuts across the nexus between the idea of human possessive *ownership* of the land, versus custodianship or *stewardship*. There is also the issue of the past history of wilderness literature, and the perceived emphasis on the *absence of humans* and on *purity*, which has dominated some literature (Plumwood interview 12/14/04), despite recent improved definitions. This led to a view that wilderness did not acknowledge indigenous history of occupation, and was somehow linked to *terra nullius*. The need for an unlinking of *wilderness* from *terra nullius* is one key insight. In regard to the human artifact debate, there were two differing views, one that humans literally did *create* the land, and the other that the *human history of the land* is created by generations of Aborigines or that landscape is socially (not physically) constructed *in our minds*. The term “cultural landscape” is much used in Australia, but a number of interviewed scholars agreed that *any* landscape is a mixture of the cultural *and* the natural. Could this be called a *geobiocultural* landscape?

Another insight is the understanding that both *wilderness* and *wild* are words that each have two key but very different meanings. For wilderness, there is the older Biblical negative meaning of a "wasteland"—a place to be feared—versus the newer positive meaning of a "lanai" that is valued for itself. The wasteland meaning (to varying extents) is linked to *terra nullius*, to dualism, to human exclusion, to the human artifact idea, and to resource exploitation. The newer idea of a lanai is *not* really linked to any of these. Until we acknowledge these two key but very different meanings of wilderness, and point out *what we mean* when we say "wilderness"—then much of the confusion will remain. Similarly the word "wild" has two key but differing meanings. On the one hand it means "natural," as in *wildlife*. However, it also has the meanings of "savage," and "lawless." It is this meaning that has been highlighted by Rose (2004). The meaning of wild as *lawless* has an impact on Aborigines who believe the land must be managed according to Aboriginal law. Calling an area "wild" can thus be understood to mean it has been degraded by modern technological society, and is no longer natural or flourishing. We approach *meaning reversal* here, depending on which meaning of "wild" is used. This certainly adds to the confusion. Another insight is the recognition of the extent of anthropocentrism throughout academia, which impinges on management, on the meaning of "responsibility," and on belief in intrinsic value.

While much of the confusion may be apparent rather than real, there *are* some sticking points that need to be recognized. One is the issue of roads and settlements. In most wilderness areas, roads are closed and permanent settlements are banned. Yet in Aboriginal communities, "caring for country," has traditionally meant living there. Some people seek to *stretch* the wilderness definition to include small sustainable indigenous settlements, while others suggest that such areas should be called by another name. Is "peopled wilderness" a contradiction in terms? Another issue is that of "the land needs people." This goes *beyond* arguing there is great value in a deep human/nature connection. In its extreme form it claims that the land *dies* without its human custodians. This is clearly somewhat anthropocentric, but has received emphasis from recent history, where Aboriginal people have moved out of some lands, the fire regime has changed, and some native species have then gone extinct. What this *actually* shows is that certain species need a particular fire regime. Related to this idea are different meanings around "responsibility" in regard to the land. This can range from an ecocentric idea of "obligation to protect and care for," to an anthropocentric idea of a senior looking after a junior (where the junior is the land). Another insight is in regard to Aboriginal law—that this can *change* in response to the changing world, so the "law" is not always static. Perhaps the law may need to evolve to protect wilderness?

Another point is that of conservationist Rosemary Hill (interview 4/29/05) that Aboriginal communities *primarily* see the human history rather than the nature in the land. This is queried by anthropologist Deborah Bird Rose (personal communication, 7/19/05). However, it would not be surprising (given their long history with the land) if the human stories attached to the land gained special significance in indigenous societies, compared to conservationists, who mainly see natural values. In this regard, the term "storied wilderness" raised by Cronon (2003) may be worth

developing. It is thus essential to recognize the importance of the stories (or "song-lines") that have been attached to lanais. Another related aspect is the question of what "management" and "looking after" land really means. There is one view that if land is managed it must be *controlled* by humans, while another view sees the land as independent, and not under human control, even if influenced by management. Nash (2001) points out that "pastoralism is a form of control." Plumwood (interview 12/14/04) refers to a stream of "nature devaluing" in our society that seeks to overplay the contribution by humans and eliminate or render invisible the contribution by nature.

One unforeseen tension is that between fundamentalism and evolution in regard to wilderness and Aboriginal communities. This fundamentalism (and literalism) may be both Christian and from Aboriginal Dreamtime religion. Taken literally, they both espouse *creation* and refute evolution as "just another story." Evolution, I believe, acts to give humans perspective and humility, and reduces our human-centeredness. To refute it tends to align one with the view that humans are *central*. This issue was highlighted by paleontologist Mike Archer (interview 1/31/05), who at one site reported that some local Aboriginal people insisted that these pre-human deposits came from the Great Flood, and wanted to know, "what are you doing with the human skulls you are finding?"

The above may be described as sticking points, but are not so extreme as to prevent conservationists and indigenous people working together for the protection of lanais. Certainly, in Australia today, where modernist resourcism is still considered the "Australian way," the two groups have more in common than most other groups.

I used a mind-map to grapple with the many issues involved in the knot. It soon became clear that many aspects related to the land in general, of which wilderness is a subset. Figure 1 thus shows a mind-map of the aspects involved in how we think about the land, and the 11 spectrums of thought involved. This is not a diagram about dualisms, but of the "middles" in the spectrums of thought, nor is there necessarily a "right" or "wrong" side to the diagram. It is the "electron cloud" of positions in the middle that make up the tangled knot of meanings around how we see the land. Arguably, activism seeks to shift thinking more towards the top part of the diagram. Figure 2 is a mind-map specifically for wilderness as a subset of the land. There are some seven spectrums of thought tied into the wilderness knot here. In general, it can be said that activism seeks to shift the mind-set towards the top part of the diagram, which uses the positive definition of wilderness, one that focuses on the presence of the non-human (or more-than-human) (Abram 1996), sees wilderness as the end of a spectrum, acknowledges indigenous history and focuses on wilderness as being a lanai.

So, how do we unravel the wilderness knot and reduce the confusion? Figure 3 suggests a way forward to protect wilderness as lanai. Part of it lies in recognition of the various associations that have been attached to the word "wilderness." We need to focus on the *reality* of lanais themselves as formally defined, and steer away from popular and personal definitions. We need to avoid the politics of divisiveness to reach meaningful dialogue that disposes of unnecessary confusion, and to elucidate the *real* areas where there are



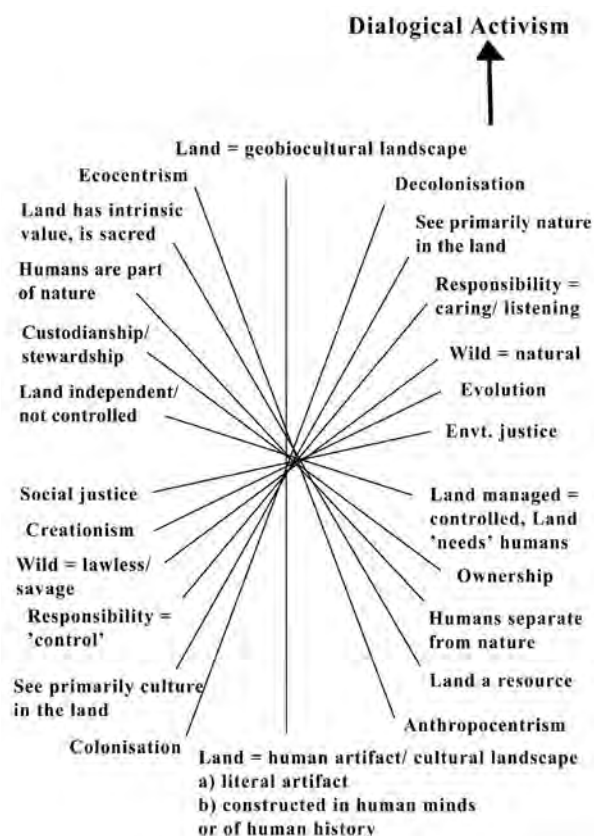


Figure 1—Mind-map of the land.

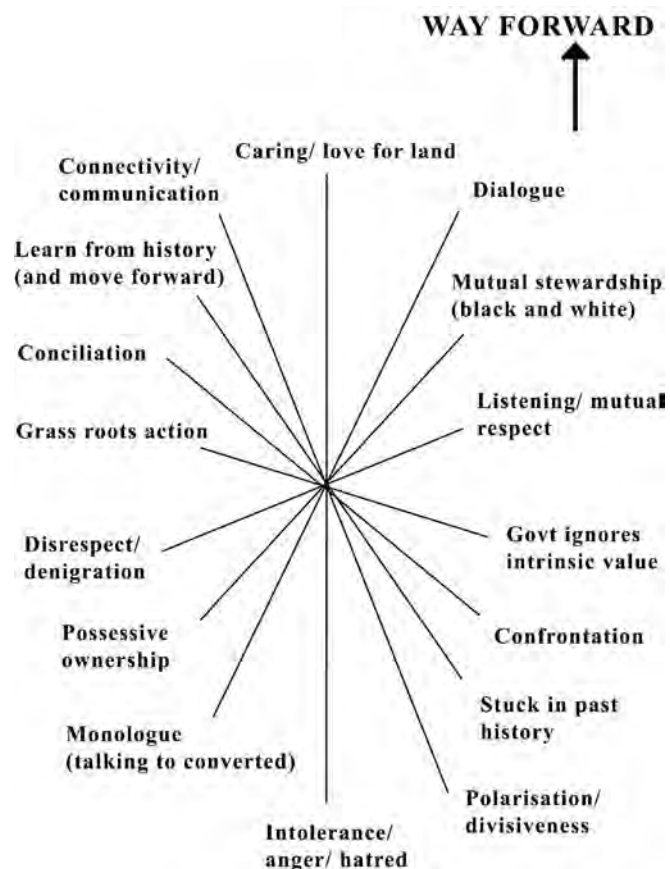


Figure 3—The way forward for "wilderness" as lanai?

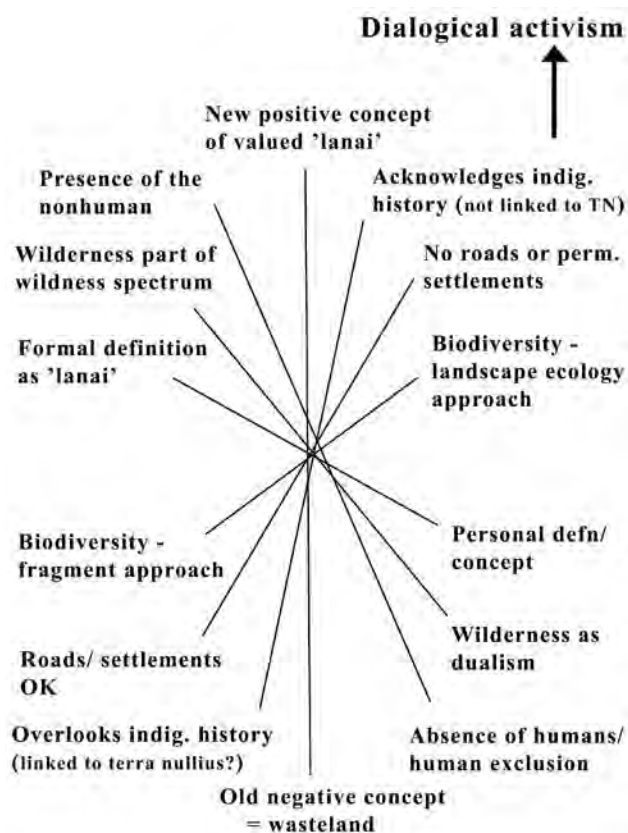


Figure 2—Wilderness mind-map.

sticking points, and how these can be resolved. We can seek to make connections or we can stay polarized, we can talk to ourselves or have meaningful dialogue, we can stay stuck in past history or move beyond it to mutual stewardship, we can let the unresponsive political ideologies of government ignore intrinsic value, or we can act at a grassroots level for change. Rather than deconstruct all grand narratives, perhaps we need to espouse a grand narrative of Earth protection and restoration, related to the "Great work" of Berry (1999), which in part includes protection of wilderness as lanai.

There is another issue however—that of *political naivety* in academia. Many academics are actually criticizing the associations *attached* to the word wilderness and *not* the formal definition and reality of lanais. This naivety is a problem, as criticisms deriving from it are having an effect in the real world in terms of the gazettal and management of wilderness. Given the very real power of the exploitation lobby, such naivety plays into the hands of those who are seeking *any* means to continue the exploitation of wilderness. By all means, let academia criticize some of the associations (rightly or wrongly) attached to wilderness—but every time this is done there is a need to re-state the urgency to protect large natural areas (= wilderness). The pressures to exploit wilderness have not gone away, rather they have increased. Many academics seem to forget this in the rush to make their particular contribution.

It is suggested that substantial confusion can be avoided, not by retreating from the use of the word, but by concentrating on the definition of wilderness as *large natural areas* (lanais), and by promoting the recognition that wilderness is in fact a *tribute* to past traditional indigenous land practices (and not a disregard of indigenous history). It was the evolved wisdom of sustainable traditional cultures that retained and sustained lanais—which today we call wilderness. Keeping wilderness is thus about honoring that traditional “wisdom of the elders” (Knudtson and Suzuki 1992). The idea of shared custodianship or stewardship of the land (rather than the possessive sense of ownership) is suggested as a way forward to disentangle the wilderness knot.

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# White Lions: Reintroduction to Their Natural and Spiritual Homelands

Linda Tucker

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**Abstract**—The Global White Lion Protection Trust is committed to establishing the White Lions both as South Africa's national treasure and as a global heritage. All conservation issues today are global issues. With many species, including many of the big cats, on the brink of extinction, urgent conservation measures need to be implemented to ensure their survival. The White Lions were born in one place only—the Timbavati region—but were artificially removed because of their beauty and rarity. After 13 years of extinction in the wild, the Trust has initiated a world-first reintroduction of the White Lions to their unique endemic range, based on scientific techniques of social bonding the White Lions with resident tawny lions, following successful lion reintroduction methods tried and tested in a number of reserves (Van Dyk 1997). It is our hope that this ground-breaking study will act as a precedent to assist related endeavors such as the challenges facing urgent 'rewilding programs' of other endangered cats.

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In 1991, I was rescued from a pride of angry lions by an indigenous wise-woman, known as Maria Khosa, Lion Queen of Timbavati. This powerful lion shaman was the most amazing woman I have ever met. She walked straight through the agitated pride of some 24 lions (at night, without so much as a flashlight), on foot, with a baby on her back, to come to the rescue of our pitiful group who were panicking in the middle of the predators in the African wilderness.

We had been stranded in an open-backed vehicle that had broken down after having ventured into the lions' territory this moonless night. In those days, the Timbavati prides were not used to vehicles, and there had been several aggressive attacks by the pride males—a coalition of five massive black-maned lions—on trackers sitting in the front seat. Stuck without radio contact or mobile phone coverage, our group began to panic and were desperately calling for help in the vast darkness. We were sweating in fear, behaving like prey, which further incited the agitated pride. Despite the fact that lions are nocturnal predators and members of this pride were approaching the Land Rover in the shadowy night, growling and snarling at us from the nearby bushes, Maria showed no fear. The baby on her back was testimony to her faith that she would not be harmed. Would she have taken her infant grandchild into the jaws of death if she had any doubt that the child was protected? She had heard our desperate calls for help, and walked through the pitch-black

bushveld to our rescue. Amazingly, the lions seemed to calm down at her arrival.

After this mind-altering experience—which, as you can imagine, put everything else in my life in instant perspective—I gave up my high-powered advertising job in London, and returned to my childhood haunt of Timbavati and to Maria Khosa, who became my teacher. It was this lion-hearted woman who taught me that the key to humankind's relationship with wilderness is two-fold: LOVE and RESPECT. Through these two profoundly simple principles, all the balance of nature can be maintained, and humankind has nothing to fear from wilderness and our natural environment.

Maria taught me to appreciate that there is an ancient contract with nature, which humankind has broken—to our detriment. Every contract involves a *give* and *take*—yet we humans expect that nature is simply here *for the taking*. We have raped, pillaged, exploited and destroyed virtually all the world's natural riches—and what have we given back? Where is our side of this contract?

Contrary to that old "if it pays, it stays" argument, I do not accept that nature has to justify its existence. Indigenous people believe that nature deserves our total love and respect—for nature is, after all, our Mother, providing nurturance without which we all would perish.

It was through Maria that I gained access to a great mystery that surrounds the White Lions. She introduced me to other African elders, who gradually entrusted me with ancient knowledge that had been held secret in the indigenous priesthood of Africa for many hundreds of years. Although it took me a long time to accept her words, Maria informed me one day that I myself carried the ancient title, "Keeper of the White Lions"—a mantle which carries grave responsibility, and which has dictated every step I have since taken in my life.

While the story of the White Lions may seem like a myth and legend, I have come to believe that it has urgent conservation value in our day, and in many respects may hold the key to the survival of our species and our critically endangered natural environment.

More elusive than the African leopard, more rare than the legendary snow leopard of the Himalayas and as white as the polar bear of Alaska, rumors of the existence of pure White Lions have existed in the African Oral Tradition for centuries. But there is only one place on earth where they have materialized—the Timbavati region, bordering South Africa's Kruger National Park.

## First Records

According to indigenous knowledge, the White Lions' arrival in this particular location on the globe is no coincidence.

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Linda Tucker, Founder, Global White Lion Protection Trust, South Africa.

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Native people across the globe believe that everything in nature happens for a reason. We live in a meaningful universe, and the White Lions' arrival at this precise location on the globe, in exact geographic alignment with the primary sacred sites along the Nile Meridian, is part of a Divine Plan.

The earliest White Lion sighting by a European witness was in 1938 by Joyce Little, whose family owned large tracts of land in Timbavati, and were friends of President Kruger. The first photographic records of the White Lions date to the 1970s when researcher, Chris McBride, recorded the existence of White Lions in more than one pride in the Timbavati region. However, African oral records indicate that the White Lions survived successfully in this region for over 400 years.

On the scientific front, it was discovered that the White Lions are not albinos (Cruikshank and Robinson 1997) but a genetic rarity of *Panthera leo*, which occurred naturally. They are one of the most rare and endangered animals in Africa. Unique to the greater Timbavati region where they were sighted for over 56 years, the White Lions were artificially removed from the wild into hunting/breeding camps in South Africa, and zoos and circuses around the globe. As a consequence of these forced removals from their endemic homelands, the White Lions have been extinct in the wild since 1993.

Whether one believes them to be sacred animals, or whether one simply views them as a rare genetic occurrence unique to the biodiversity of this region, the White Lions' extinction in the wild is lamentable, and a reflection on humankind's irresponsible mismanagement of our earth's natural resources.

## Scientific Reintroduction of the White Lions to Their Endemic Range

After studying the ancient knowledge of the White Lions with African elders from all cultures for over 10 years, I founded the Global White Lion Protection Trust in 2002, with the objective of returning these magnificent creatures to their rightful endemic birthplace. The mission of the Trust is not only to protect the lions themselves—which are at risk from appalling maltreatment in the trophy hunting and captive breeding industry—but also to protect the indigenous knowledge that holds them sacred.

Used to looking for spiritual signs in nature, the White Lions' arrival in wilderness areas is seen by African elders as the fulfillment of an ancient prophecy that identified these majestic creatures as angelic messengers from God. Their white color is explained in spiritual terms, meaning purity and enlightenment, beyond all racial connotations. White is sunlight, all the colors of the spectrum in one, beyond color, creed, race or gender, and therefore is the perfect icon for South Africa's rainbow nation and a unifying symbol across world culture.

Indeed, African elders believe that the White Lions are the most sacred animals on the African continent. As apex predator, the lion is viewed as the true guardian of the land, while the White Lion, in particular, is believed to be King of Kings, an angelic guardian presiding over the Timbavati wilderness, with a vitally important role in the

sensitive ecology of the region. The land of Timbavati itself was identified as a sacred site by African kings for many centuries, with its name "*Tsimba-vaati*" derived from the ancient Shangaan language and meaning "the place where star-lions came down from the heavens."

It is significant that the prophecies surrounding the White Lions correspond with beliefs of other ancient cultures on other continents. This podium at the 8<sup>th</sup> World Wilderness Congress, I share with the retired High Chief Francois Paultette of the Native Canadian Dene People, who will speak to you today of White Buffalo Prophecies. This Native American prophecy tells of the time when a white bison calf will stand on Mother Earth. It will have black eyes, hooves and nose (in other words, not an albino) and will bring the warning that humanity is at the crossroads. Humankind will be faced by chaos, disease and destruction unless we unite spiritually. Ten white bison have been born in America since 1994. Like the White Lions of Africa, the White Buffalo of America is an icon of love and light, uniting nations at a time when peace urgently needs to be restored on earth.

So, too, another advisor to the Global White Lion Protection Trust, Greenland Eskimo elder, Angaangaq Lyberth, speaks about the Black Polar Bear prophecies. Ancient Eskimo belief has it that the time when the Black Polar Bear walks the ice is a time of ecological crisis on earth, when humankind is urgently required to restore balance on earth.

As testified by the Alaskan Eskimo elders at this Congress, the Black Polar Bear prophecies in the North relate directly to significance of the White Lions in the South. Why should snow lions appear in the sunny continent of Africa?

Could it be that the White Lions are snow animals ahead of their times? Might they be precursors to a possible ice age, to glacial shifts or polar reversals—the consequence of climactic imbalances and global warming? In indigenous belief, Nature always provides signs before changes occur. Like the White Buffalo prophecies which tell of the arrival of these sacred animals at a time of ecological stress and fragility, the message that the White Lions bring is that humankind must unite spiritually, and reinstate love and respect for nature, in order to restore balance on earth. In this way, the White Lions are a symbol of majesty which spans continents and ages, with roots in ancient cultures but urgent meaning for modern ecological issues.

These magnificent creatures represent the pride and the spirit of the African people, and are a luminous icon of majesty, across cultures. They are a symbol of all that is good and magnificent in nature. In African culture, it is believed that harming a White Lion is an ultimate sacrilege, resulting in devastation on earth. Certainly, to me it seems, that if we can't respect and protect the KING of all beasts, what hope is there for the other kingdoms on earth?

Yet farming and trophy hunting of lions is big business in South Africa. Because of their rarity, the White Lions have suffered severe exploitation, removed from the wild into captivity where they are farmed in trophy hunting operations, like commodities, for gross material gain. The malpractice of so-called "canned lion hunting" (hand-rearing lions which learn to trust humans and are then shot in small enclosures for sport) has created an increasing international outcry and condemnation of South Africa's hunting policies.

My view is that "canned lion hunting" shows how modern humans have lost their values and, consequently, all respect

for nature. What legacy are we going to leave our children one day? The hunter might pay the lion-breeder the current going rate for the lion he kills, but we need to ask: what is the real cost—to our earth, our heritage, and our future?

## Endangered Animals

At the other extreme from indigenous people, many people today—and unfortunately that includes some conservationists—regard the White Lions as freaks of nature, without any conservation value. This latter view is generally based on ignorance, since many still assume, mistakenly, that the White Lions are albinos. Furthermore, at the present time, the sub-speciation issue is a contentious one, with one school of thought arguing against sub-speciation of lions, altogether. At present, as a consequence of not being classified as a sub-species, White Lions have not been listed for CITES protection (Convention on International Trade in Endangered Species of Wild Fauna and Flora). This leaves a dangerous loophole for their continued exploitation by the captive hunting industry. Whether as members of *Panthera leo*, or as a newly defined variant *Panthera leo Timbavati*, it should be all-too-apparent that the White Lions have significant conservation value, along with any rare product of nature's biodiversity.

Some even assume the White Lions' genetics to be defective, which could not be further from the case. Eyewitness accounts of the White Lions in the wild in the 1970s and 1980s, record that they were the dominant members of their pride. They were generally larger than their tawny counterparts, and their lack of camouflage meant that they became expert hunters—often leading the tawny prides in a hunt or taking down prey on their own without the help of the pride. Far from being unable to survive in the wild, as many people mistakenly argue today, the White Lions are a product of nature which survived magnificently in the wild, until removed by man.

Assisted on the scientific front by lion ecologist Jason Turner, the Global White Lion Protection Trust has embarked

on a long-term scientifically monitored White Lion reintroduction program. After nearly four years of fighting for her freedom, we have rescued a White Lioness called Marah, believed to be a great icon in African culture (fig 1). Marah's three cubs have had no human contact, which ensures their best chances of returning to the wild. After more than a decade of White Lions held in captivity, Marah and her unimprinted cubs will be the first White Lions to return to their endemic range of the Timbavati region (fig. 2).

Having specialized in Timbavati pride dynamics for over six years, Jason Turner is heading up the scientific reintroduction protocol for the White Lions, which is based on social bonding techniques successfully used for lion reintroductions to reserves such as Pilansberg, Phinda, Madikwe, Welgevonden, Makalali and Hluhluwe. The objective is not to captive-breed White Lions. As the White Lions were artificially removed from the wild, this program aims to redress the balance in returning pedigreed specimens to their natural habitat, and restoring the natural genetic evolutionary process. In the wild, White Lions were born to the tawny colored lion prides, which were carrying the rare gene. For this reason, integration with the normal tawny lions from the region is important to promote genetic diversity and to strengthen the bloodline.

While closely consulting with scientific experts in the field, the Trust also takes its guidance from indigenous knowledge systems, which have always upheld the balance of nature. In the words of Selby Gumbi, Zulu elder and African cosmologist: "The White Lions are the First Born of all God's Creatures upon earth. To return them to their sacred homelands signals that order and justice will be restored in the kingdom of earth." Swazi elder and traditional healer, Baba Mataba, who has been writing praise songs to the White Lions in the Great African Tradition, explains: "By holding the White Lion captive, the spirit of Africa is held captive. If we can free the White Lion, the spirit of the people can be free."

Having brought the white rhino back from extinction, Dr Ian Player, Conservation Doyenne of the World Wilderness Congress and advisor to the Global White Lion Protection



**Figure 1**—Marah in captivity (photo by Jason Turner).



**Figure 2**—Marah and her cubs after being returned to their endemic habitat of the greater Timbavati region (photo courtesy of the Global White Lion Protection Trust).

Trust since its inception, has this to say: “The reintroduction of the White Lions back to their endemic natural habitat of Timbavati represents a landmark in conservation history.”

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# Is This a One-night Stand or the Start of Something Meaningful? Developing Relationships to Place in National Park Backcountry

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**Abstract**—This paper presents empirical evidence that helps to understand how some visitors develop relationships with Rocky Mountain National Park in Colorado. The paper describes relationship to place as the active construction and accumulation of meaning, which involves both physical and social interactions over time. The discussion is organized around three themes evident in the data and the literature that describe, in part, how relationships to place develop: (a) time and past experience allow place meanings to accumulate, (b) social interactions with companions, and (c) physical interactions with the setting both contribute to how visitors create and assign place meanings. Implications are discussed from the perspective that a segment of visitors are engaged in long-term place relationships rather than seeking to meet short-term needs and expectations.

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## Introduction

When visiting wildlands, some people do more than encounter, record, process, and store information from the physical environment in their brains about the quality of their experiences. Researchers and managers inevitably miss the full array of meanings that visitors associate with particular places and their experiences when they try to download visitors' mental comparisons of what happened to what was expected during a given visit using satisfaction surveys alone. Understanding and assessing the personal and social meanings that visitors assign to wildlands and evaluating the quality of the experiences that visitors have there remain difficult tasks for researchers and managers despite decades of research.

Challenges arise when visitors describe their experiences in ways that offer little concrete information to managers

for improving the quality of a particular setting or experience. For example, visitors with a history of returning to a backcountry area (long-time visitors) may express a love-of-place and important social relations that have developed with time:

I love Rocky Mountain National Park. It was a special place that my family would always visit every year from the time I was six months old. Every year I continue to visit as much as possible. Anything that can be done to preserve this area would just be great, so that I can bring my children to visit. I hope to carry on my family tradition in this way and have my children love and respect the Park as much as my parents have taught me to do so (Additional comment written by a survey respondent; Wallace and others 2004: 165).

This visitor describes a valid way of relating to a wildland place and expresses something other than fulfilled expectations for a given visit. Similar place relationships probably exist for other long-time visitors at Rocky Mountain National Park (the Park). This paper examines how place meanings accumulate and how lasting bonds with the Park develop. We propose that long-term committed relationships with the Park are meaningful for visitors' lives and contribute to quality experiences and well-being in ways that are not completely understood (Fournier 1998). The objective is to move understanding of relationship to place and the quality of the experience forward by providing empirical evidence that describes how some visitors develop place relationships as they interact with settings, their companions, and themselves over time. Next, we briefly review the research literature that guided this study.

## Past Experience and Place Bonding

Having a place relationship presumes that a person has spent some amount of time at the place. Accumulated recreation experiences such as a person's or a family's history of visiting the Park or the frequency of trips in a one-year period can be useful indicators of place bonding (Hammit and others 2004). Previous studies demonstrate positive statistical relationships between measures of place attachment *and* familiarity and number of prior visits during a one year period (Williams and Vaske 2003), frequency of trail visitation (Moore and Graefe 1994; Moore and Scott 2003), total visits, and years since first visit (Williams and others 1992). Past experience at a place and longer history

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of contact with a place tend to be positively associated with emotional place attachments. Correlation, however, does not imply that place bonding is caused by past experiences, but time spent at a place is necessary to allow for the accumulation of place meanings through interactions with the setting and one's companions.

## Related Research on Place

Relationship to place and place meanings are not novel research topics. In a thorough review and synthesis of the scholarly literature on place concepts, Manzo (2003: 53) concluded:

Relationships to places can be a means through which we consciously express our worldview and explore our evolving identity ... people actively engage with places and the creation of meaning, and in doing so, can consciously foster relationships to places.

Manzo implies at least two conceptual areas that are important for understanding the process whereby people develop place relationships: the active creation of place meanings and evolving place identities.

## Place Meanings

Scholars have discussed how a variety of people actively assign personal, spiritual, and socio-cultural meanings to a variety of places through experience (Brandenburg and Carroll 1995; Fredrickson and Anderson 1999; Greider and Garkovich 1994; Gustafson 2001; Williams and Stewart 1998). Places are created by continuous reciprocal interactions between people and the environments in which they live and visit. People participate with places and places participate with people. In addition to socially constructed place meanings, places have important physical characteristics or environmental features with which visitors participate and interact (Eisenhauer and others 2000; Lane 2001; Stedman 2003). Research also supports that place meanings and relationships develop incrementally over time in a process characterized by continuity, change, past memories, and future potentials (Gustafson 2001; Manzo 2005; Milligan 1998). In Gustafson's (2001) three-pole "self-others-environment" model of interrelated place meanings, individual desires, group aspirations, intentions, and activities, at times in the history of a place, allow people to reassign past meanings, reproduce existing meanings, and create and assign new place meanings. Researchers have generally depicted people-place relations as multi-dimensional, interactive, and dynamic.

## Place Identity

People are affected when they create and assign place meanings. The development of emotional bonds with places can influence well-being by allowing individuals to actively adjust their views of self-in-place through introspection and personal growth, which can shape aspects of their lives relative to the places in which they live (Hay 1998; Korpela 1989; Manzo 2005; Sarbin 1983; Stokols and Shumaker 1981). An underlying theme in this literature portrays the concept of place identity as evolving alongside place relationships.

Proshansky and others (1983) argue that places can play important roles in the psychological development of the self where place identity develops as a sub-part of self-identity. Place identity has been defined as a set of interrelated clusters of broadly conceived thoughts and emotions about a physical environment. Place identity consists of:

... memories, ideas, feelings, attitudes, values, preferences, meanings and conceptions of behavior and experience which relate to the variety and complexity of physical settings that define the day-to-day existence of every human being (Proshansky and others 1983: 59).

The set of cognitions that comprises a person's place identity does not come pre-fashioned; rather, these evolve through experience. The idea that people create place meanings implies that actual behaviors are directed toward knowing the self in relation to place in order to construct a place identity (Sarbin 1983). Place meanings accumulate and environmental skills may develop as a person consciously and unconsciously interacts with a place.

Finally, other people play a substantial role in shaping one's place identity and relationship (Eisenhauer and others 2000; Gustafson 2001; Kyle and Chick 2004). For example, simply visiting a place or participating in an annual recreation trip is but one part of a person's socialization and evolving identity with the place or the trip. Seeing what his or her parents, siblings, or friends do there, hearing how they discuss the place or the event together, interacting with others through stories or recreation, and learning how others react to their experiences may each contribute to how a person assigns meaning to the place and the experience.

## Methodology and Analysis

Research shows that the concept of relationship to place consists of the self, the physical setting, other people, the interactions between these, and the place meanings that accumulate at various stages in the process. Figure 1 is presented to organize these dimensions and interactions for

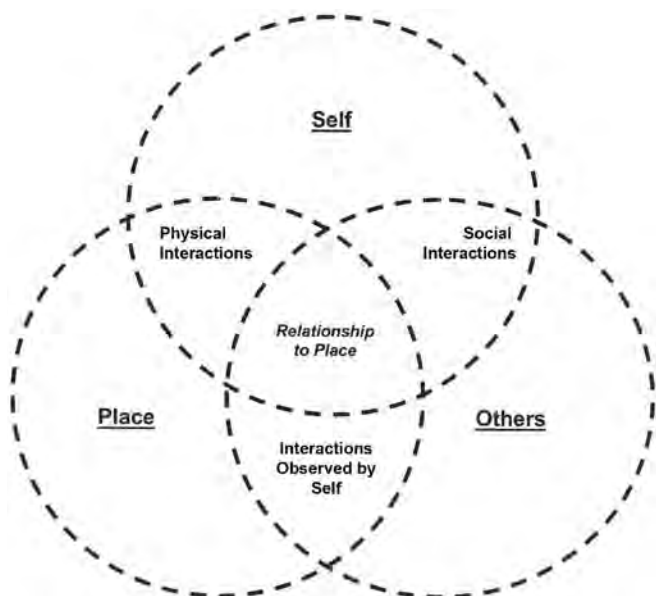


Figure 1—Self-place-others model of relationship to place.

this analysis. We adopt an appropriate definition of wildland recreation that views the visitor experience as emergent and “motivated by the not very well-defined goal of acquiring stories that ultimately enrich one’s life” (Patterson and others 1998: 423). In doing so, we hope to address the complex and dynamic nature of place relationships (Christensen, this proceedings).

To investigate how a person’s relationship to a place is defined by accumulated meanings and to add flesh to the skeletal structure in figure 1, we chose a triangulation design of three methods each with different samples: survey items, observations of behaviors, and qualitative interviews. We attempt a synthesis of results from the three studies to provide a basic description of relationship to place. Observations of visitor behaviors (Brooks and Titre 2003) and qualitative interviews (Brooks 2003) were conducted in 2001. These were followed, in 2002, by a comprehensive survey of visitors’ perceptions, attitudes, and experiences (Wallace and others 2004). Table 1 provides a summary of the methods

used in each study. For more detail, the reader is directed to the project reports and references cited in table 1.

The objective of combining methods and samples is to present complementary data that, when integrated, describe in part, how long-term place relationships may develop. Our analysis and conclusions are not intended to represent all park visitors’ relationships to place or individual differences in degree of place attachment in the population. In the spirit of exploration, we attempt to illustrate a story using empirical observations to better understand the dynamic nature of relationship to place and its emerging dimensions, each requiring additional research.

## Results and Discussion

### The Visitor Survey

The accumulation of experience at a place has been shown to be positively correlated with place bonding and attachment

**Table1**—Summary of the three visitor studies used in the triangulation analysis.

Detail	Behavioral observations (Brooks and Titre 2003)	Qualitative interviews (Brooks 2003)	Visitor survey (Wallace and others 2004)
Method	Structured field observations of visitor behavior (n = 378) <sup>a</sup>	Semi-structured in-depth interviews with park visitors (n = 12)	Structured self-administered questionnaire (n = 682)
Sampling	Random selection of locations by time block with purposive selection of subjects to maximize variation in sex, age, and group size	Random selection of locations by time block with purposive selection of subjects to maximize variation in sex, age, and type of visitor (i.e., day and overnight)	Random selection of trail head by time block with census of visitors (cluster sample); 67 percent response rate
Sample characteristics	139 families, 70 non-family groups, 111 couples, and 58 individuals	Ages 23 to 60; 7 male, 5 female Caucasians; 7 day, 5 overnight visitors; 0 to 10 years post-secondary education; various religions/occupations; 8 Colorado, 4 out-of-state residents	91 percent college or post-graduate education; 67 percent ≥\$50,000 household income; 60 percent Colorado residents; 28 percent ≥11 previous visits
Data management	Recorded on ethogram <sup>b</sup> forms in the field; database created in Excel	Tape recorded and transcribed	Mailed back or dropped off at the Park; database created in SPSS
Analysis	Frequencies of occurrence and rates of occurrence for behavioral events	Two-stage hermeneutical interpretation (I) within transcript and (II) across transcripts in Atlas.ti version 4.1 for Windows	Statistical analyses of scale items and continuous variables; Content and categorical analyses of open-ended items
Supporting citations	Altman 1974; Burch 1974; Suen and Ary 1989	Brooks and others 2004; Kvale 1983, Mishler 1986; Patterson and Williams 2002; Patterson and other 1998	Fowler 2002; Scheaffer and others 1996

<sup>a</sup> Sample sessions of observations averaged 10 minutes in duration and are the unit of analysis.

<sup>b</sup> An ethogram is “a thorough description of behaviors exhibited by individuals in specific situations” (Pellegrini 1996: p. 80).

variables (Hammitt and others 2004; Williams and Vaske 2003). Wallace and others (2004) included a measure of past experience in their survey that asked visitors how many total previous visits they had made to the Park's backcountry. They found that past experience was statistically associated with the place attachment and familiarity variables included on the survey and with an item that asked visitors if they associated friends with the Park (table 2). Similar to previous studies, survey participants who had visited the Park more times over the years tended to report higher levels of attachment, familiarity, and tended to agree that they associate other people with the Park. It seems intuitive that past experience and longer history of contact with the Park would play some important role for developing emotional and social place bonding.

Interested in the experience of off-trail exploration, Wallace and others (2004) asked visitors if they had hiked cross-country through places without trails. Survey participants often left the popular trails and attraction sites—20 percent of the sample reported that they had hiked cross-country in places with no trails during their visit. Fifty-four percent of those participants reported that they had ventured from designated trails two or more times. To further examine the interactive nature of hiking off-trail, Wallace and others (2004) asked the 128 participants who reported hiking off-trail to write in more detail about their best discoveries and experiences while exploring. The sub-sample of visitors listed 155 best discoveries or experiences that were grouped into six categories. One category, with 96 responses, was “observing or discovering some kind of attribute or phenomenon” perceived to be special or unique. For example, one respondent said that she went looking for the remains of an old cabin but without success. Another visitor went off-trail to summit a backcountry peak and wrote about finding, for the first time, antler velvet and eating ripe, wild raspberries. Another saw

two white tail ptarmigans in autumn plumage while on a cross-country fishing excursion. Two friends reported that they took “the road less traveled” to smoke, during which, one of the two “got hot and decided to go skinny-dipping in a mountain lake.” They continued with an amusing story of how the skinny-dipper was surprised when spotted by other visitors passing nearby. This relatively small sample seemed to enjoy exploring away from the designated trails perhaps as a way to interact with the setting and their companions in more meaningful and personalized ways.

## Observation of Visitor Behavior

Brooks and Titre (2003) observed individuals and groups physically exploring, getting into, and touching (table 3) the “particularities of place” (Lane 2001: 60). Visitors shooed, fed, intently watched, videoed, photographed, touched, and even tried to capture birds, ground squirrels, and spawning trout at some of the observation sites. We observed visitors (often adolescents) digging in the soil, throwing stones, snow, and sticks, climbing in trees and over rocks, and touching, tasting, and entering the water of lakes and streams. Physically interactive behaviors with the setting may play a part in shaping visitors' knowledge and memories of places (Gustafson 2001), particularly for children and adolescents. How these interactions and experiences allow visitors to create and assign place meanings requires further investigation.

## In-Depth Visitor Interviews

The data summarized thus far, when integrated with findings from previous research, provide some basic empirical evidence suggesting that place relationships involve return

**Table 2**—Mean differences indicating positive association between dimensions of place relationship and number of total previous visits (analysis of variance).

Indicator of place relationship <sup>a</sup>	Experience <sup>b</sup>	n	Mean	Standard deviation	F	P
How attached are you to RMNP?	High	289	7.9 <sup>c</sup>	1.2	76.7	<.001
	Low	188	6.8 <sup>d</sup>	1.7		
	None	133	5.9 <sup>e</sup>	2.1		
How familiar are you with RMNP?	High	289	6.9 <sup>c</sup>	1.5	181.2	<.001
	Low	187	5.3 <sup>d</sup>	1.7		
	None	134	3.8 <sup>e</sup>	1.6		
Being in RMNP brings back memories of time spent here with friends.	High	288	3.9 <sup>c</sup>	1.1	46.6	<.001
	Low	186	3.5 <sup>d</sup>	1.2		
	None	129	2.7 <sup>e</sup>	1.1		

<sup>a</sup> The attachment and familiarity items each used a 9-point Likert scale ranging from 1 (not at all attached/familiar) to 9 (extremely attached/familiar). “Being in RMNP brings back memories of time spent with friends” used a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

<sup>b</sup> Visitors who reported making 0 total previous visits to RMNP were classified as having no past experience, visitors who had made 1-4 total visits to RMNP were classified as low experience, and those reporting 5 or greater total previous visits were classified as high experience.

<sup>c, d, e</sup> Statistically significant difference among experience groups using Scheffe's multiple comparisons test at P = 0.05.

**Table 3**—Observations of visitors interacting with the setting.

Physical interaction <sup>a</sup>	Frequency of occurrence <sup>b</sup>
Exploring off designated trails within sight of observer	341
Feeding, disturbing, and/or watching wildlife	202
Throwing snow, stones, sticks, and other debris	181
Touching or entering water in lakes and streams	57
Miscellaneous	<10

<sup>a</sup>Actual behavioral events that were recorded in the field during 58 hours total observation time.

<sup>b</sup>We recorded behaviors for 139 family groups, 70 non-family groups, 111 couples, and 58 individuals.

visits—spending time at a place to consciously or unconsciously gain experience and familiarity. Second, time spent at the park, for some, appears to be purposely interactive and exploratory relative to both one's companions and the physical setting. Although interesting and insightful, these data alone provide an incomplete understanding of how relationships with the Park develop. To flesh out a more complete story of visitors' relationships with the Park, Brooks (2003) conducted qualitative in-depth interviews.

**Time and Experience in Place.** One broad theme that emerged from the literature and our empirical observations, is the importance of time, past experience, and extent of contact within place. We illustrate how the interviews provide deeper insight into the importance of returning to the Park and what specific experiences there mean to some visitors. Julie (pseudonym), a day visitor at a popular waterfall, describes how return trips involve a certain ritual that allows for the accumulation of place memories and meanings for her family.

They say that smell is the sense that brings you back to a certain spot, in your mind ... just walking in here, smelling the pine ... you just immediately think of the maybe five or six times you've been there before. *What kind of feeling does that evoke for you?* Good memories, a sense of stress-free, going back to ... usually good memories—you know, our kids are up the hill a little farther and the last time we were here they were—maybe 10 years ago, and you take pictures in the same spot and then you've got these little steps that they grew up in ... and then you go home and put it together and create stories ...

Extended overnight stays in a wildland may contribute in important ways to one's relationship to that place and perhaps one's concept of humanity's position in the environment. Jon, an overnight backpacker camping with family, describes how the experience emerges for him when immersed in the setting for extended periods.

*Would you consider people separate from wilderness, in the sense that they don't normally live in the wilderness?* Well, I would like to think not. I think that the urbanized world that most of us live in—there are some important contrasts there that allow us to appreciate both of those things ... I know one of the states of mind that I like to get into when I'm in the wilderness and takes 2 or 3 days to do that ... is to remember that you are not just kind of out camping that you're living outdoors. And it's kind of immersing yourself in [the] fact that you're living outdoors ... you deal with whatever comes whether its great weather or bad weather or physical issues that you may be dealing with, things like that, that's part of the challenge ... once you immerse yourself in it, you realize

that you become less and less separate from it. You adapt and adjust to whatever the physical conditions are of the place. I like to think that people come out of the wilderness understanding that as a species we're totally inseparable of course from the physical environment. I'm not sure from my experience that many people grasp that.

While past experience at a place may contribute to an accumulation of meanings for some visitors, an understanding of the processes involved when place relationships develop requires closer examination of the social interactions and physical contacts described by visitors.

**Social Interactions in Place.** Sam, a day hiker who visits the Park regularly, talks about his experiences there with family and friends. In one conversation, Sam describes how he socially identifies with the Park by associating the experience with memories of "special times" with his father.

... some special times that I've had with my Father—just he and I on top of a mountain having a conversation ... not a lot of people get to do that with their parents. People can have kind of strained relationships, and boy I'll tell you when you're walking up a 14,000 foot mountain, the world's problems seem pretty small, and you can sort of drop the walls and let the bullshit go and just have a talk, and that's something that I've experienced.

Sam indicates that the experience of hiking a mountain together has fostered an openness between him and his father that may not have developed outside of the backcountry setting. Sam continues by elaborating on his family's history and relationship with the outdoors and the nature of his social interactions with companions.

*Do you think that it is important that this stuff be around for future generations?* I would like to bring my children up here. Earlier today I was hiking with my family and some friends of our family, and the last time my friends were out here, they've got some children, and the last time they were out here their daughter was nine months old and now she is seven, and we are hiking the same trails and she is seeing this stuff again ... it is neat to see that ... I would love to bring my kids up here. My Dad moved out here in '70 from Jersey, and he and my mom, they were both campers out there, avid campers up and down in the Appalachians and did a lot of outside type of stuff, and then they moved out here, one for the job, and two because of this, and so as I've grown older, I've seen it change and get developed and I've seen a lot of growth here ... I just hope to be able to bring my kids up here someday and show them what I saw ... there is something special about a Dad passing that on to his son or daughter, and even like on the trail we were teaching [the girls] to use their *wilderness voice*, and be quiet and listen, 'What is

that sound? You know what that sound is, it's water falling down, we are getting closer because it is getting louder,' so that develops the kid's logical skills and reasoning skills ... maybe the selfish hope is to develop their outdoor wilderness skills, camping skills, and that kind of stuff.

Socialization of children at the Park emerges as a type of social interaction that may be an important dimension of relationship to place. Sam and his companions purposively teach the children in the group how to behave in the backcountry. Sam explains how people can develop a "wilderness sense" over time through repeat visits and active informal training. The parents and friends of visitors with little past experience at the Park may try to pass on elements of their place relationships by fostering "wilderness skills" and appreciation for features of the backcountry experience that they think are important such as quiet and natural sounds.

Returning to wildlands for leisure and recreation with familiar people makes the place part of a person's broader life and the quality of the experience is associated with the visitor's family and friends (Gustafson 2001; Kyle and Chick 2004). Family history in a place provides the time and social interactions necessary for place relationships to develop and for interpersonal relations to strengthen.

Being in the Park with other people can evoke other interactions such as philosophical discussions about humans and wilderness. Jon describes such conversations:

And there always tends to be—I guess you can call it an activity. I mean it seems like every time whether I'm by myself or whether I'm with a group we get into discussions about value of wilderness and the spin offs that have to do with the larger human civilization and the directions that we are going. And these kinds of places often become philosophical—these places become kind of catalysts for those philosophical discussions.

It appears that an accumulation of social interactions over the years at a place contributes to the formation of a visitor's place relationship, but additional research is required to fully understand the role and importance of such discussions and other socially derived place meanings.

**Physical Interactions in Place.** Some experiences at the Park may not be expected or positive at the time. Kim, an overnight visitor, shared a personal story from a previous visit in which she recounts about being unprepared and falling down a mountainside.

*. . . of the places that you've talked about . . . are there any particular places that have a special importance to you based on your beliefs, family, experiences, friends or memories? Oh my gosh, there's so many. Pretty much—I could pick a place in this park, and I could think of an experience that's been good, or scary . . . Would you mind briefly describing one for me? Oh sure, good, bad, a hike with friends? I guess probably one of the most vivid memories, and ones that still stick with me sometimes, are those—the ones that are—that were really frightening, I guess. The ones that really make you realize how small you are compared to the Earth. Like one day I went and hiked up Flat Top [a nearby peak] just a little more up above here. I wasn't equipped well enough, and I ended up coming down, falling in a waterfall, losing my jacket, my car keys, and all my food, and my lighter, and it was getting dark, and I had to cross the river, scurry across a log, and I was shaking so bad. Finally got down, made it down before total dark. Many people driving down the road . . . hitched a ride down. Finally made it back into town, all bloody and*

*scraped up, going 'Oh my gosh! I am so small.' You know and I was getting kind of cocky about being hot stuff, like 'I can do it' . . . you felt like you were brought down a couple notches? Oh yeah, like a hundred.*

For Kim, the most memorable experiences at the Park are those in which she feels humbled by the forces of nature. Kim's relationship with the Park seems to include knowing her place in the backcountry. She respects it because of its power, physical challenges, and vastness. In this story, Kim provides a vivid description of what this particular humbling (and physical) experience was like when she failed to properly respect the mountains. Researching the lessons that visitors learn over time in wildlands may enhance our understanding of the role of physical interaction with the setting in developing relationships to place.

In both the survey data and the field observations we found evidence suggesting that some park visitors may seek interactions with the setting by exploring off designated trails. Jane, an overnight backpacker, and her companions hike off-trail to create a sense of wilderness when in less remote places of the Park providing a concrete example of how and why exploring away from designated trails is an important part of her experience.

I have spent a lot of time at Glacier Gorge, probably more than anywhere else . . . what else comes to mind, a lot of places that I really couldn't name that are sort of off-trail . . . finding our own sort of routes. [We] tend to hike with a photographer. We just go off when we go looking for places that interest us, and not necessarily [on trail]—actually done very few peaks and stuff. When I think of wilderness, it's not necessarily a matter of remoteness, really sometimes almost what we bring to the experience. Soon as you get off the trail no matter how close the trail might be it feels more wilderness-like. Walking unguided . . . [with] maybe a topo [graphic] map and a sense of where you are, but basically not following the sort of point A to point B version of doing things. But, just getting out into it . . . and it doesn't necessarily have to be all that remote to be wilderness.

Visitors and their companions interact with one another and the backcountry setting at the Park in diverse ways, and meanings of place accumulate during the course of experience. Next, we describe in more depth how past experiences and interactions with and within a place can affect visitors' place relationships and identities.

**Place, Self, and Others.** Some interviewees talked about themselves, other people (companions and unrelated visitors), and the place in ways that illustrate a more integrated story of how place relationships and identities evolve and how these can affect behaviors. Jack, visiting with his spouse and another couple, highlights how his personal relationship with wildlands has changed through experience and learning from his companions.

*Speaking from your experience, how would you describe the relationship between people and wilderness? . . . my first instinct was to be positive, and say 'Ah, there's a very good relationship.' . . . then reality kicks in, and I think of all the carvings in trees I've seen, all the cigarettes, all the gum, the things that—my pockets are full [of] when I leave here everyday with litter I pick up . . . it's not that they don't like it . . . it's ignorance, is what it is, and I was there too, once. And, that comes with experiencing it, you become—a love for it or respect for it, just like people, you go into a relationship*

with it. So, it saddens me, but yet it really doesn't because people are people, and I just hope and pray that you grow out of it—I'm a teacher . . . I truly believe [that] you're who you are at the core, but you can add to that . . . I think one thing is respecting this place more . . . I hate seeing the people in their Velcro shoes, or even their polo shirts, and they're hiking into this place . . . 'Wow, I just wish they learned more about it before they did it.' But, hopefully by wearing those Velcro shoes they realize they need to change that a little bit next time, and that's part of the growing experience. I sure didn't know what to expect here, luckily I'm with someone who did, and they helped us.

Jack also explains how others can grow in their relationships with wildlands, similar to how people grow in interpersonal relationships, through lessons learned about how to properly behave at and respect these places. As longer-term place relationships develop, individuals may become more respectful and concerned about the protection of the Park. Picking up litter dropped by others, for example, may be an indicator that a stewardship-oriented relationship is developing.

Jack also recognizes that other visitors may relate to the Park differently than he and his companions do when he compares the behaviors that he sees on the part of others to his own. Kim, backpacking with her spouse and infant daughter, is also keenly aware of the presence and the actions of nearby visitors who she perceives as being completely unaware of the weather conditions and ill-prepared for a mountainous setting.

*Could you please list . . . all the feelings that you have when you visit the wilderness at the Park? . . . when I get in a crowd, I tend to do more . . . sort of the tourist watching I guess . . . like, 'Oh, what are you doing?' Not that I find myself—higher than anybody else, but then I find the things people do are ridiculous to me. Could you give me an example of some of these ridiculous behaviors? (Hearty laugh) Oh sure. Okay, a couple days ago, we're hiking up the trail and the sky is dark, I mean it's going to rain, you can tell. It's coming down the valley and it's going to rain, and here come a group of about fifteen people walking by, and all they have are little white paper lunch bags . . . their lunches. And they're about two miles from the trailhead, and that's all they have. And you just know that they're just going to get dumped on, and cold and sick, and you just have to go, 'Well, okay. Maybe they'll figure it out.' . . . Hiking with their purses—that just cracks me up. Almost like they're at Disney World. Yeah exactly . . . it's a lot like an amusement park.*

Some visitors may see evidence of their own place relationships and their broader environmental concerns contrasted or mirrored in the behaviors of others that they witness (or perhaps while reflecting on their own past behaviors). Through a type of social comparison with others combined with introspection, a park visitor might come to understand how his or her place relationship has changed over the life course. For Pete, a seasonal resident and long-time visitor, stewardship sensitivities develop and actual behaviors change as knowledge and understanding of the physical place and its features increase.

*What are the limits to human uses of wilderness? . . . Oh we absolutely know how devastating motorized vehicles can be. I have to admit I used to ride dirt bikes [during my] younger years up in national forest in Wisconsin. I wouldn't do that now; my son used to build and operate all-terrain vehicles, he*

*doesn't do that now. I think it has to be limited to particular activities that minimally impact what we have here . . . It took me a long time to realize how little replacement growth occurs at these higher elevations. You have to understand that when you start getting off the trails and damaging this environment—you know how fragile it is—It's not going to grow back like California in two years after the fire—you have green again. That doesn't happen. In 1978 you're up here and you see the damage that the fire did, and you barely have overgrowth up here, in all those years . . . I think it's got to be limited. There has to be rules; there has to be self-discipline. You bring out what you take in, you keep it to cooking stoves, and I would not care to see open fires anywhere. I think overnight tent camping—I think that's certainly a permissible thing. As long as you get farther into the wilderness areas, there's a real sense of self-esteem achieved, I think, when you go and live off the land for a number of days or even a weekend. I mean when—I had a younger family—we would spend ten days hiking in national parks around New England and the northern Midwest and Arizona. My children now—they love it, now they take their children . . . going around the country kayaking and tent camping and backpacking. So, what would have happened if there had been no rules from the very beginning?*

Pete describes growth on his part and for members of his family that has developed with experience at the Park and at other wildlands. Place identity and family history are portrayed as evolving for Pete, and socialization of children is evident. Acceptance and practice of low impact recreation indicates respect, care, and concern for the perceived fragility of the Park.

To summarize, relationship to place emerges as a complex function of the self, others, and the physical place (Gustafson 2001; Kyle and Chick 2004). In figure 1, the self-place intersection describes physical interactions between visitors and the setting; the self-others intersection describes social interactions with companions and perhaps unrelated visitors encountered; the intersection between others-place can be thought to describe interactions between other visitors and the setting that are observed by the self and internalized, but which do not socially involve the self (this conceptual intersection is least well-developed); and the central overlap in the Venn diagram of self-place-others describes *relationship to place*.

## Future Considerations

Our analysis identified a number of sub-dimensions of relationship to place that should be considered important research topics by social scientists interested in people-wildland relations. In addition, managers at the Park should consider developing new strategies, and adapting current visitor management and education, that is guided by the following non-exhaustive list of characteristics of a place relationship process, perhaps finding ways to facilitate these within the bounds of society and resource protection.

1. Time and Experience Accumulated in Place
  - a. Ritualized activities
  - b. Return visits and annual trips
  - c. Extended overnight stays
2. Social Interactions in Place
  - a. Family history in place

- b. Socialization of children
  - c. Conscious and unconscious informal training
  - d. Strengthening interpersonal bonds with companions
  - e. Conversation and shared experience
3. Physical Interactions in Place
- a. Lessons learned in both “good” and “bad” physical experiences
  - b. Exploring away from designated trails
  - c. Adventure, discovery, thrill-seeking, etc.
  - d. The role of physical contact and tactile experience with setting attributes

## Conclusion

This paper contributes to the body of research knowledge on place and the wildland visitor experience by focusing on relationship processes for a segment of visitors rather than the behavioral outcomes of place attachment for the average visitor. In doing so, we address an important “need to reconsider concepts and methods premised upon leisure as an enduring still-life photograph” (Stewart 1998: 399).

Relationships with the Park, for a segment of visitors, are ongoing and multidimensional, characterized by the accumulation of place meanings and the evolution of place identities (Manzo 2005). How having such a place relationship influences a visitor’s satisfaction with a given visit to the Park is not well understood. Moreover, how committed and satisfying relationships with the Park affect visitor behavior is in need of additional research.

The quality of the visitor experience, or satisfaction, has often been measured by comparing how well a recreation activity or a setting is perceived by a visitor to meet his or her expectations for a single trip (Williams 1989). Fournier and Mick (1999) concluded that consumer satisfaction goes beyond the one-time purchase of a product to include an active dynamic process, a social dimension, meanings and emotions, and broader quality of life aspects. These closely reflect dimensions described for place relationships in this study and in the literature. To learn and to communicate a more complete story of wildland visitor satisfaction, research and management might refocus on the visitor in his or her subjective experiences through time rather than studying the visitor as a receiver of messages and a judge of setting attributes for a given visit.

This analysis, integrated with the literature, provides a more complete understanding of the dynamic and multidimensional nature of relationship to place and the quality of the experience, though much remains to be learned. The take home message is: some visitors may see the Park as a beloved relationship partner for the long-term rather than a set of useful attributes, scenic facilities, opportunities for outdoor recreation and leisure, or other commodities.

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# Defining Values in Place: A Practical Application for Visitor Management in Protected Areas

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**Abstract**—This paper explores a value specification option to better meet a core information need in protected area management for recreation and conservation. It does not debate the meaning or definition of values, but instead identifies a perspective on values that is aimed at meeting practical conservation management needs. The first part of that perspective involves extracting from the wider values discourse some working pragmatic definition of what ‘Conservation Values’ are. The second involves clarifying how the priority attributes and features of conservation values could be considered management ‘assets.’ Then it describes how the Department of Conservation (DOC) in New Zealand is beginning to implement value-in-place specifications through its Visitor Asset Management System (VAMS). Future directions required to advance this implementation further through a wider range of conservation value considerations are discussed.

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## The Management Need

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Two extensive national workshops were convened in New Zealand by the Department of Conservation (DOC) to identify research needs for improving the management of visitor impacts in national parks and protected areas. The first looked at the physical impacts of visitors on natural and historic resources of conservation significance (Cessford 1997; Cessford and Dingwall 1999). The second looked at the social impacts of visitors to conservation lands (Cessford 1999). Both had the same objective of identifying the key strategic research topics and directions required to provide DOC managers with the information they needed to improve their decision-making capability. Both concluded that the greatest research priority should be assigned to achieving a more systematic definition of conservation values at specific sites. The main reason this priority was emphasized was that such site-specific values were considered the basis for the specification of any site-specific management objectives. Such improved specification of value-based management objectives for defined places can assist conservation managers in:

- Assessing the likelihood of any social or physical impacts developing at places;
- Evaluating the options for management interventions that may be applied at those places;
- Defining the particular types of measurement approaches and indicators required to monitor the outcomes being managed for at those places;
- Identifying key stakeholders and collaborative opportunities for engaging citizens in conservation;
- Determining the optimum topics and approaches for any provision of interpretive services at those places;
- Identifying any potential visitor experience opportunities that may be particularly salient at particular places; and
- Identifying any specific information gaps and related research needs.

The importance of specifically defining such management goals and objectives ‘in-place’ has been widely recognized. When concluding their comprehensive review of visitor impact management, Kuss and others (1990) emphasized that managing visitor impacts must begin with setting specific objectives. A stocktake review of the Limits of Acceptable Change (LAC) planning system after 15 years of application acknowledged that it had omitted a key first step—specification of the desired state (goals) for social and physical conditions at sites (Cole and McCool 1997). The importance of this value specification step was reinforced with reference to other planning systems in other accompanying review papers (Hof and Lime 1997; Nilsen and Tayler 1997). However despite the acknowledged importance of defining values, desired states or management objectives in place, there appears to have been limited advance in practice. As bluntly stated by Cole (2004:p. 16), “the lack of progress in recreation management largely stems from paralysis during the step of specifying desired end states, standards for acceptable impact levels, and for the appropriate experiences or settings in which experiences occur.”

In simple terms, the key questions facing conservation managers are about knowing what is important, where it is located, what threatens it, and how they can best act to manage it. Apart from some consultative processes, such specification of management objectives does not appear to be systematically provided in any of the major recreation planning frameworks being applied internationally. Yet, to most readily identify where issues and impacts are occurring, or more important, where they might be anticipated, managers need a systematic framework for clearly identifying the particular values they are managing for at different sites. The Recreation Opportunity Spectrum (ROS) was discussed

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at the DOC workshops as one example of a framework that goes part way towards fulfilling this need for recreational values at least. But the consensus view of the DOC workshop participants was that this conceptual framework applied at a level too coarse for effective site-specific management (Cessford 1999). The ROS classes can provide the physical and social background setting for more site-specific visitor management areas, but these finer-scale areas will require more site-specific and explicit social and physical management objectives to be set. In order to define such objectives, based on knowing what is important and where it is located, attention needs to be focused on an improved understanding of values-in-place, how to determine these, and on pragmatic ways to apply these more precisely at specific sites.

## The Importance of a Value Perspective

It is difficult to conceive of a human problem that would not be better illuminated if reliable value data about it were available (Rokeach 1973). Virtually all people refer at one time or another to their own values, or to values that characterize other people or groups (Schwartz and Bilsky 1987). Debate regarding how national forests should be managed often occurs because different interest groups hold different values (Vaske and Donnelly 1999), and while these may begin with a focus on a particular environmental or resource problem, they quickly become arguments over how people should interact with nature and each other (Gerlach and Bengston 1994). In fact, it is difficult to find any discussion of the management and use of parks and protected areas without seeing some reference to values—values are changing—we need to manage for multiple values—we need to account for new users with different values from our traditional users (Jakes 1998). Clearly values occupy a central place in natural resource management (More and others 1996) and in all the sciences concerned with human behavior (Rokeach 1973, 1979; Schwartz 1992).

However, while values are the most widely used means to characterize the human dimensions of natural resources (Williams and Watson, this proceedings), achieving an understanding of them is easier said than done. It is deceptively difficult to answer what seem to be simple questions, such as, “What do we mean when we talk about values?” (Jakes 1998: p. 147) or “What do we mean by value, and what do we value?” (Brown and Manfredo 1987: p. 12). Values may be one of the most dominant topics in social science, but extensive research and debate over many years and many disciplines has not produced any unanimity in definition (Williams and Watson, this proceedings). Value has been the topic of many hundreds of books and articles (Brown 1984), and with all this attention, it is not surprising that value has many meanings. To most people the term ‘value’ carries many vague and diffuse meanings, and even in the social science disciplines of philosophy, psychology, economics and theology, there are about as many definitions of values as there are people who think about them (Smith 1977). The term has acquired different meaning both across and within the social academic disciplines (Brown and Manfredo 1987), having been used variously to refer to interests, pleasures, likes, preferences, duties, moral obligations, desires, wants,

goals, needs, aversions and attractions, and many other kinds of selective orientations (Williams 1979). It is not surprising that Brown (1984) observed many non-economic works on value begin with a discussion of the problems caused by the many meanings. Crick-Furman and Prentice (2000) observed that for the last three decades, while the role of values and value systems has received much academic attention, there has been little success in finding any satisfactory measurement or application mechanism at the site management level. This paper acknowledges these difficulties but is based on the premise that for practical management applications, especially for achieving improved site-specific management objectives, some working conception of values in place must be applied as best practice.

## A Pragmatic Perspective on Values

It is important to identify some key descriptive principles of values to lead us toward the pragmatic solution being proposed for consideration. So we do have to ask the question—what are values? Clearly ‘values’ are not distinct physical things in any object sense. There is no such thing as *the* value of an object, because value is a relative rather than absolute concept, and depends both on the contexts of the valuation and the perspectives of those assigning the value (Brown 1984).

The large variety of value classifications that have been proposed do support the practicality of this contextual view of values. Rescher (1977) identified six principles by which values could be classified: their subscribership; the objects at issue; the sorts of qualitative benefits at issue; the purposes at issue; the relationships between subscriber and beneficiary; and the relationship the value bears to fulfilling other values. It is also clear that when applied investigation is made, it is possible to identify a consistent range of overall values held by people at a general contextual level. Many examples exist of comprehensive value classifications that are capable of incorporating almost any value concept raised. These values relate to what people, both as individuals and collectively as social groupings, consider as important desirable outcomes and states of being. Among these, the classification of values derived by Rokeach (1973, 1979) has been possibly the single most influential example. Other value classifications based on motivational perspectives of values (Schwartz and Bilsky 1987; Schwartz 1992, 1994), social sustainability goals/needs (Klessig and Hagengruber 1999), and overall belief systems (Williams 1979) all provide useful examples. Added to these are taxonomies of value meanings developed by Rolston (1985).

But this inclusiveness comes at the cost of being only applicable to very general issues, such as comparison of value orientations between different groups in society. This overall social descriptive utility is of importance to management for some general purposes, but is of progressively lesser validity when dealing with more specific management issues or site-specific situations. In this situation, the context within which values are being considered will direct the type and specificity of values defined. No overall unifying classification framework has emerged that can systematically incorporate all applicable values in any given situation. As with many

researchers before and since, Rokeach (1973, 1979) recognized the presence of different value perspectives within the realm of overall values. It has been acknowledged that while the array of underlying values was relatively consistent among all people, the relative importance of the different values can vary greatly. As demonstrated by the inter-group comparisons made originally by Rokeach (1973), these flexible value systems (or orientations) can vary considerably according to many personal, situational and other context factors. What must also be acknowledged is that there will always need to be consideration of a hierarchy of value perspectives, applying to different levels of value specificity and different orientations of value interest. In other words, investigation of value issues will be about understanding a series of contextual value orientations, depending on the issue being considered.

Rather than focus on the use of value classifications to assist management applications, a more useful understanding of potential value utility is provided by considering a fundamental distinction of value contexts. Based on value overviews in Brown (1984), Brown and Manfredo (1987), Burningham and O'Brien (1994), Kuentzel and Freeman (1994), Kuentzel and others (1997), Williams and Watson (this proceedings), and with reference to perspectives gathered from numerous other literature, it is possible to identify two simplified but usefully different orientations for values - 'held' values and 'assigned' values<sup>1</sup>.

## Held Values

The 'held' value orientation is based on the premise that people hold many common values, and that these shared values guide behaviors, interpretations and judgments in a society. Values are understood as being beliefs that exist in a given culture and are socialized through culture and learning into our individual identities (Williams and Watson, this proceedings). We are not born with these values, but we are born into cultures, societies, and communities that promote, teach and impart their values to us (Smith 1977). While these values are acknowledged as being no more than socio-psychological constructs, where commonly present, they are pragmatically considered as 'social facts' and as virtual entities in themselves. In other words, they are conceptions of the desirable that people have or 'hold' where the values are implicit in the subject (the individual or the group) rather than attached to the object (Burningham and O'Brien 1994). In fact they are referred to as 'held' values, after the definition as such by Brown (1984). This context is demonstrated in the statement from Vaske and Donnelly (1999: p. 523), "Debate regarding how national forests should be managed often occurs because different interest groups hold different values."

<sup>1</sup> A third type of 'discourse' values relate to a perspective on 'held' values that emphasizes their essentially transitional/transactional nature and the changes that can occur in them. With new experience, insight and perspectives, people and sometimes groups can alter the value composition and saliency within their personal 'held value' assemblages (Smith 1977; Burningham and O'Brien 1994; Kuentzel and Freeman 1994; Kuentzel and others 1997; Williams and Watson, this proceedings). For the purpose of this paper, space constraints, and acknowledging this distinction, all reference to 'discourse values' can be included implicitly in discussion of 'held values' above.

Further to this, it has been determined that 'held' values can be viewed as being either desirable 'end-states' or 'modes of conduct' (Brown 1984; Rokeach 1973). Values that can be considered desirable end-states such as freedom or happiness are most commonly referred to as 'terminal' values. These are values in the context of desired goals or outcomes—the 'ends' values. Values that can be considered desirable modes of conduct such as honesty, loyalty and compassion are most commonly referred to as 'instrumental' values. These are values in the context of desired ways of being and behaving—the 'means' values.

Overall, there appears to be general agreement in the literature that there are five main features that are common to most definitions of the value concept (Rokeach 1973; Schwartz 1992, 1994; Schwartz and Bilsky 1987). As presented by Schwartz (1994), a value is "a belief; pertaining to desirable end states or modes of conduct; that transcends specific situations; guides selection or evaluation of behavior, people and events; and is ordered by importance relative to other values to form a system of value priorities" (p. 20). These shared 'held' values are what most sociologists think of when the term 'values' comes up (Williams and Watson, this proceedings), and have been the subject of extensive research effort for many years. However, this conception of socially held value, independent of the value object, fundamentally differs from the value concepts underlying any discussion of assigned values in park management. While focus on 'held' values is useful to managers for understanding the motivations, attitudes and preferences of visitors in general terms, more specific and finer scale issues of site-based management concern require consideration of another value orientation that emphasizes a more 'theme' and 'object' orientation

## Assigned Values

The 'assigned' value orientation is based on the premise that definable objects hold some value for people, which they have attributed to those objects individually, or as part of some wider social perspective. This is where values are linked to the object rather than the subject (Burningham and O'Brien 1994), as is the case for 'held' values. In this context, the term 'object' often has a broad meaning. When describing such objects, Brown and Manfredo (1987) included a variety of physically definable things including goods, services, ideas, behaviors, opportunities, outcomes, experiences, and benefits. More usually, as they themselves note, value is assigned to the more tangible phenomena. In this context, value is usually derived from the function that an object is perceived to serve for providing desired outcomes. These outcomes may range from some form of personal psychological affirmation, through market consumption, to some more abstract contribution to an ecosystem life support role. This orientation also encompasses the particular value systems of worth and exchange associated with economics, based as they are on the evaluations of potential utilities of objects. These sorts of values are the subject matter for research questions or management statements about the 'values of something'. Brown (1984) refers to this as the 'object realm' of values, and values in this context are usually referred to as 'assigned' or 'attributed' values. In other words, these are the values specifically associated with object things, and the

contributions made to other desired outcomes by these object things.

Another key distinction among these object-oriented values is also apparent because there are values about things and values of things (Brown and Manfredi 1987). As put by Burningham and O'Brien (1994), this is the distinction between the value attributed to an object due to either some intrinsic quality or relational quality of the object itself. This is emphasized through the way we ask the following questions: What *are the values* of that object? What *is the value* of that object? The former question addresses the concept of an object holding a set of 'values' for a number of attributed reasons, each collectively important to social groupings of varying size and perspective. These are the values 'about' the object. Usually those reasons will be related to preferred attributes of, or preferences associated with, the object; its meanings; and the desired outcomes to which it contributes. This perspective is often a holistic and descriptive view of the object in itself, and may refer to a variety of valued features.

By contrast, when asking the second question, what is the value of that object, we are engaged in some form of direct context-related valuation. These are the values 'of' the object. Here we are making a judgment about the functional worth of something—for what purpose or outcome does that object have value, and how relatively valuable is it in doing this when compared with the contributions of other objects, or application of the object for other outcomes? What does it represent or mean to us that we assign it 'value?' Clearly, this will depend on the context from which we are asking the questions. Of particular interest here is that Brown (1984) stated that assigned values can be specified as particular types, such as social values, historical values, commercial value and recreational values. To that list we could add conservation values. The objects of our attention do not change, but what changes are our views of those objects (Brown and Manfredi 1987). If our interest is historic resource management, our objects value context could be in the extent of its role in contributing to our desired historic outcomes.

Such a distinction between held and assigned values is fundamental (Brown 1984). On the one hand we might say that someone "has a value" or we talk of someone's "values," and on the other hand we might refer to "the value" or "the values" of an object, or that an experience "has value." The assigned values relate to the importance of the thing being valued. With these subtle but quite fundamental distinctions, it is often not always clear whether held or assigned values are being implied. These values are, after all socially defined constructs, in what Brown (1984) refers to as the 'conceptual realm' of values. We are either talking about the values that people hold which affect how they relate to some conservation issue or relationship, or the values specifically associated with different things in conservation. These distinctions could be endlessly debated, but from a pragmatic management perspective, the main requirement is that when discussing value issues, the value context is made explicit. This type of assigned-object value perspective relates well to management practice, as managers practically deal with physical things and their meanings in specific places. Improved contextual understanding and specification of assigned values in place gives managers better information on site priorities, and a better context for judging such

priorities and setting appropriate site-specific management objectives.

## A Value in Place Context For DOC

When exploring means to achieve a more pragmatic contextual direction for value specification, Rokeach (1973) observed that one basis for deriving a more useful contextual value classification was that it was just as meaningful to discuss 'institutional values' as it was to discuss 'individual values.' Expanding on this, Rokeach (1979) distinguished cultural, societal, organizational and group values at a sociological level from individual values at a personal psychological level. Whatever terminology we accept for labeling collective value orientations, this perspective is important in providing a pragmatic means of coping with the immense possible variety of value combinations. However, when discussing the lack of any generally accepted theories for value classification, Schwartz (1994) did note that Rokeach had suggested an approach which he had never really elaborated on—to classify values according to certain societal institutions with which they could be associated. In that context, Rokeach (1973) had defined an institution as a social organization that has evolved in society and has become associated with the task of maintaining and enhancing selected subsets of values, and in their transmission across generations. Subsequently, when discussing this concept specifically as a form of value 'specialization,' Rokeach (1979) stated that, "It is as if the total spectrum of human values has, through a process of evolution or historical development, been divided up and 'assigned' to the several social institutions for their specialized transmission and implementation" (p. 51). Following this lead, the institution of religion can be defined as one specializing in the transmission, maintenance and enhancement of a cluster of values identified as 'religious values.' Similarly, the institution of science specializes in a cluster of values we might call 'scientific values.' Other types of institutional orientations referred to in the same manner by Rokeach (1973, 1979) included political, economic, legal, organizational, group and family. Notably absent from these examples was any mention of an environmental institution. By definition, such an environmental institution would be those social arrangements specializing in the transmission, maintenance and enhancement of what we might term 'environmental values.'

In most societies such an environmental institution would incorporate the central and local government agencies with environmental responsibilities, various non-governmental bodies and advocacy groups, and other groups and individuals actively involved in environmental use and protection. It is these environmental values that are the main institutional concern of land management and conservation agencies such as DOC. Such an institutional perspective on value classification is a very useful way (Williams 1979) in which to concentrate on a particular set of values that are prominent for a particular functional purpose.

The purposes of conservation management agencies are refined through guiding legislation from an interpretation of what society wants, and how it would like the agencies to achieve this. As stated by Eagles and McCool (2002),

"Parks are political manifestations of a society's interest in protecting its natural and cultural heritage" (p. 148). These conservation purposes are broadly defined through legislation and statutory management processes that include specification of objectives that guide an agency's work. The fundamentals of DOC's value context are derived primarily from the Conservation Act 1987<sup>2</sup>, where the key functions are broadly to:

- Manage land and other natural and historic resources held under the Conservation Act;
- Preserve indigenous freshwater fisheries, protect recreational freshwater fisheries and habitats;
- Advocate conservation of natural and historic resources generally;
- Promote the benefits of conservation of natural and historic resources to present and future generations;
- Prepare, provide, distribute, promote and publicize conservation information; and
- Foster recreation and allow tourism, to the extent that the use of any natural and historic resource is not inconsistent with its conservation.

To represent the institutional values it represents, DOC has defined its mission: "To conserve New Zealand's natural and historic heritage for all to enjoy now and in the future," and its vision: "New Zealand's natural and historic heritage is protected; people enjoy it and are involved with the Department in its conservation." This mission, along with that of many similar management agencies<sup>3</sup>, is indicative of priority being assigned to a quite consistently oriented set of values. Based on the fundamental premise of protecting indigenous environmental qualities, allowance is also made for protecting features of historic and cultural heritage, and for allowing qualified contemporary uses for recreation and tourism. Taken together, this value orientation can be most appropriately termed 'Conservation Values.' These conservation values would be assigned to those things that are of importance for 'conservation purposes.'

To help achieve this vision and fulfill its legislated conservation responsibilities, DOC identified two outcomes that represent its overarching conservation purposes. These were developed using the Conservation Act as a guide, and in particular the Act's definition of conservation: "The preservation and protection of natural and historic resources for the purpose of maintaining their intrinsic values, providing for their appreciation and recreational enjoyment by the public, and safeguarding the options of future generations." On this basis, DOC's main conservation purposes are to achieve the two ultimate outcomes of:

- Protection: New Zealand's natural and historic heritage is protected and restored; and
- Appreciation: People enjoy and benefit from New Zealand's natural and historic heritage and are connected with conservation.

These have been refined into more specific intermediate outcomes that provide more refined conservation value contexts. While the first five are normally associated with 'Protection' and the latter three with 'Appreciation,' together they represent the core institutional values that are DOC's fundamental business. While these could be reformulated in more value-oriented terms, it is clear that in terms of being desired outcomes they are fundamentally value statements:

- The natural character of managed places is maintained or improved.
- The damage from harmful organisms established in New Zealand is reduced.
- Managed threatened species have a lower risk of extinction.
- A representative range of New Zealand's environments is protected.
- A representative range of historic and cultural heritage is protected, restored and interpreted.
- People are aware of, understand and make valued contributions to conservation.
- People have access to and use a range of quality recreation resources.
- Appropriate business (concession) opportunities are allowed and operate in conservation areas.

With these desired outcomes conceptually specified as the conservation values that DOC is striving for, a major advance toward defining values in place has been achieved. The next step toward that goal is by applying an 'assets' approach to consideration of these values. There are numerous definitions of the term 'asset,' as any online search will show. However the common themes emerging from asset definitions emphasize intrinsic components of object, value, importance, advantage, responsibility and control. Assets are things that are valued, which can confer some advantage and are under some form of control. If these types of 'assets' can be defined in place for recreation and conservation management purposes, then the potential of management systems such as LAC could be more readily fulfilled, and processes such as management planning more comprehensively informed.

When referring to the concept of managing for values in place, the main pragmatic conclusion made here is that for practical management purposes, conservation values should be as much as possible conceived of as physical things that are managed, and in that context should be dealt with in asset management systems. Or in other words, all conservation assets that you have a management interest in should be in an Asset Management System. By this approach, the things that are important for advancing all our conservation value outcomes can be identified, located, monitored and managed relative to other things that affect them. How this can be practically achieved is demonstrated by the use DOC is making of its Visitor Asset Management System (VAMS)

<sup>2</sup> Other legislation exists in support of this but is not explored in this example of the conceptual approach.

<sup>3</sup> Similar mission statements include that of Parks Canada, "Building our Future Together;" the U.S. National Parks Service, "Caring for America's Heritage;" the U.S. Forest Service, "Caring for the Land and Serving People;" Environment Australia, "National leadership in the protection and conservation of the environment;" and, The New South Wales Parks and Wildlife Service, "Working with people and communities to protect and conserve natural and cultural heritage in the NSW landscape."

tool and the possibilities suggested for its functional expansion.

## The Visitor Asset Management System (Vams)

While there may be many expressions of value, value classifications and significant theoretical and conceptual advances, none of this aids managers if it cannot be applied to specific decision-making contexts. This relies on specific and systematic links being established between values, places, issues and management specifications. Asset management is the combination of management, financial and operational practices applied to an asset with the objective of providing the required beneficial outcomes in the most cost effective way. It can advance the desired conservation outcomes from stewardship responsibilities by providing improved:

- Accountability identification and evaluation
- Ability to demonstrate that goods and services are delivered effectively and efficiently
- Ability to balance service/price quality tradeoffs
- Ability to benchmark against other organizations
- Communication with all stakeholders (internal and external)
- Understanding between stakeholders and managers
- Stakeholder satisfaction
- Risk management—assessing consequences of failure
- Decision making process—assessing alternatives and priorities
- Financial efficiency through cost benefit analysis
- Forward capital expenditure planning and funding bids
- Recognition of all costs of asset stewardship responsibility

In this regard DOC has a powerful and unique tool designed by managers for managers. VAMS is effectively an applied data warehouse. However, it goes beyond simply being a repository for information. It is based upon a purpose-based definition of particular geographic places (sites) and includes specific links and processes to enable the programming, prioritizing and reporting of specific work tasks (fig. 1). These are based on a set of 'rules' written into the operating system, which are driven by programmed lifecycle models and condition standards for key 'assets.' In simple functional terms VAMS is based on defining particular spatial places and then attaching indexed links to key data stored elsewhere, which can be referenced to that place. Processes and tools for asset inventory, assessment monitoring, priority setting and work scheduling are also incorporated. Best practice operational procedures and standardized data management hardware and software are provided at the field office level, and the centrally managed national data management system is supported with dedicated technical support and helpdesk staff.

Each 'site' is an objectively defined spatial area based on the type of visitor use, known uses, the facilities provided there, the most efficient management of the area, plus a dose of informed common sense about what is going on there. At present, the spatial units of VAMS are defined predominantly on the basis of visitor use sites where a large variety of visitor management assets are located. This definition is a pragmatic knowledge-based qualitative process rather than a data-based quantitative specification. More objectively defined, the management assets at these sites are those physical 'things' that require management investment of time and resources to manage them to set standards of safety and service quality.

The entire visitor management network on the conservation lands managed by DOC, which comprise approximately

**Figure1**—Key components of VAMS.

Assets	Anything that DOC does work on. Each asset has its own unique number which is stored on the VAMS database, along with inventory, work task and life cycle data. Each asset record contains specific information relating to that asset.
Sites	A defined area of particular management interest. Definition was initially based around locations of visitor facilities and services, including standards for meeting specific visitor needs. But sites can be conceptually defined on any basis.
Life cycle modeling	Developed for all assets and facilities to provide staff with an effective way to cost, prioritize and program work and to produce national figures to support bids for additional funding. Standard models are proved but these can be customized.
Work tracking	Work planning systems to show for every asset what work was planned, has been done, when it was done, what still needs to be done, and financial implications.
Reporting tools	Standard reporting formats to provide answers to specific questions, and utility to develop customized queries as required.
Datalogger function	Standardized handheld data loggers used for all field data collection and transfer to VAMS databases in the office. Supporting information and operational procedures are also included for specific tasks as required.
Datalogger programs	Programs provided to enable staff in the field to inventory, inspect and record work electronically, to download data, and to transfer software upgrades to any field equipment requiring it (for example, visitor counters).
System support	Specialist staff supporting the VAMS system, regular upgrades as required, and helpdesk services for specialist functions through specialist software providers.
Best practice guidelines	Operational tasks are supported by a best practice guideline and manual system, key steps of which are built in to VAMS tasks and processes on the data loggers.



30 percent of New Zealand's land area, is currently managed through VAMS in this manner. To date this network comprises 4,142 sites (for example, track, road, amenity area, historic) including 211 defined as actively managed historic sites subject to visitor use. Included within these sites are over 12,800 km (7,954 miles) of walking/hiking tracks; almost 1,000 backcountry huts; over 13,300 structures of various types (for example, bridges, boardwalks, stairs, jetties, moorings, boardwalks, picnic tables, water supplies, visitor counters, etc.); over 1,500 direction and interpretation signs; 1,600 toilets; 26 visitor centers and over 2,300 km (1,429 miles) of roads. This is a very detailed and comprehensive system, covering a wide variety of different components in a systematic standardized system. Data are stored in a tiered structure from the level of individual assets, which are located within the next category level of 'site,' ordered together within 50 management areas which are then grouped into the 13 conservancies that comprise DOC's national management responsibility. Figure 2 shows a small example of this extensive coverage. This system effectively links systematically defined assets and sites in space with integrated management processes.

The information stored about specific assets can be as extensive as desired or available. For example, in relation to huts it can include hut location and setting (such as, ID numbers, GPS references, photos, diagrams); physical attributes (such as, substructure, superstructure, internal fittings, engineering reports, photos, diagrams); services provided (such as, provision of hut wardens, cleaning services, information services); and work requirements (such as, work history, schedules, costings). Information about visitor sites includes: physical components; summary detail about any known natural, historical and social values associated with the location; characteristics of the visitor experience that make the place special; levels and types of use; management intentions for the site; publications and information resources applicable to the site; links to other sites with similar management requirements; and, impacts considered to affect the area. If new opportunities and resources arise that could enable improved information to be added, processes exist for regular VAMS updates and new component implementations as required. In this respect, VAMS is a living system that is constantly evolving, and it is this capability that is enabling it to be used to deal with other types of non-visitor assets and values.

Initially VAMS functioned as a facility asset management system, but over time it has become apparent that this very practical functionality could be applied to other aspects of sites visited by people. If we could define a physical facility 'asset,' its state, lifecycle, threats and maintenance requirements, why couldn't we do so for any other defined 'assets'—namely the valued 'things' we are striving to protect? The first expression of this approach applied to the historic sector, which developed HAMS (Historic Asset Management), based on actively managed historic assets and sites. HAMS was originally developed independent of VAMS but the obvious synergies were soon recognized and it was integrated into VAMS. This added around 650 new actively managed historic sites and 1,601 historic assets to VAMS. The next VAMS enhancement project underway is to import data from New Zealand's national archaeological database to create a new set of archaeological sites within the VAMS framework. DOC

manages the Central Index of New Zealand Historical Sites on behalf of the New Zealand Archaeological Association. This includes over 60,000 defined archaeological sites, of which around 12,000 are managed on conservation lands by DOC. The aim is that these be incorporated into VAMS and managed alongside the existing historic and visitor assets. These developments represent a direction being taken that aims to apply an 'asset paradigm' to further areas of DOC business in order to more widely realize the benefits already demonstrated for visitor management. Attempting to apply such an assets paradigm to other themes of conservation value represents a very challenging direction, but one that seems worth exploring given the potential demonstrated to date.

## New Directions With VAMS

VAMS provides a management system through which conservation values, defined in asset terms, can be systematically located in place and managed. An enhanced capability to do so for a wider range of conservation values would significantly advance the ability of conservation managers to systematically define values in place, to compare the interactions of value priorities in these places, and from these considerations derive more site-specific management objectives. This kind of value in place system, set as it is in a spatial framework would lend itself to positive applications through other powerful management tools such as Geographic Information Systems. These can display this type of spatial information, but it is important to recognize that they are only the front end interface that is reliant on a larger data warehouse type of functionality behind the scenes. VAMS is our pragmatic means to organize this information in the structured and integrative way that can allow powerful GIS applications to be applied to best effect. It reflects its origin in a visitor facility management perspective, but the vision is that this asset management functionality could be applied to wider natural and historic assets - with the assets being both the values and the threats to them that we are trying to manage. The status and relationships between different asset types can then be reported in a consistent way.

The first and major challenge from this point is to increase understanding and acceptance that such an asset paradigm is worth exploring. Second is to determine various means by which to do this, with the wider range value information that is DOC's core business. This is obviously far too vast a task to be done as a single exercise. But thematic value directions derived from DOC's intermediate outcomes as listed previously can offer new perspective on developing more pragmatic value subdivisions and asset definitions. For example, arranged according to the three main disciplinary areas of management and research that characterize most conservation management agencies, the key thematic value themes could be those values and assets associated with:

- Physical and Biological Values
  - Maintained and improved natural character
  - Reduced damage from harmful organisms
  - Reduced risk to threatened species
  - An improved representative range of environments
- Social Importance Values
  - An improved representative range of historic and

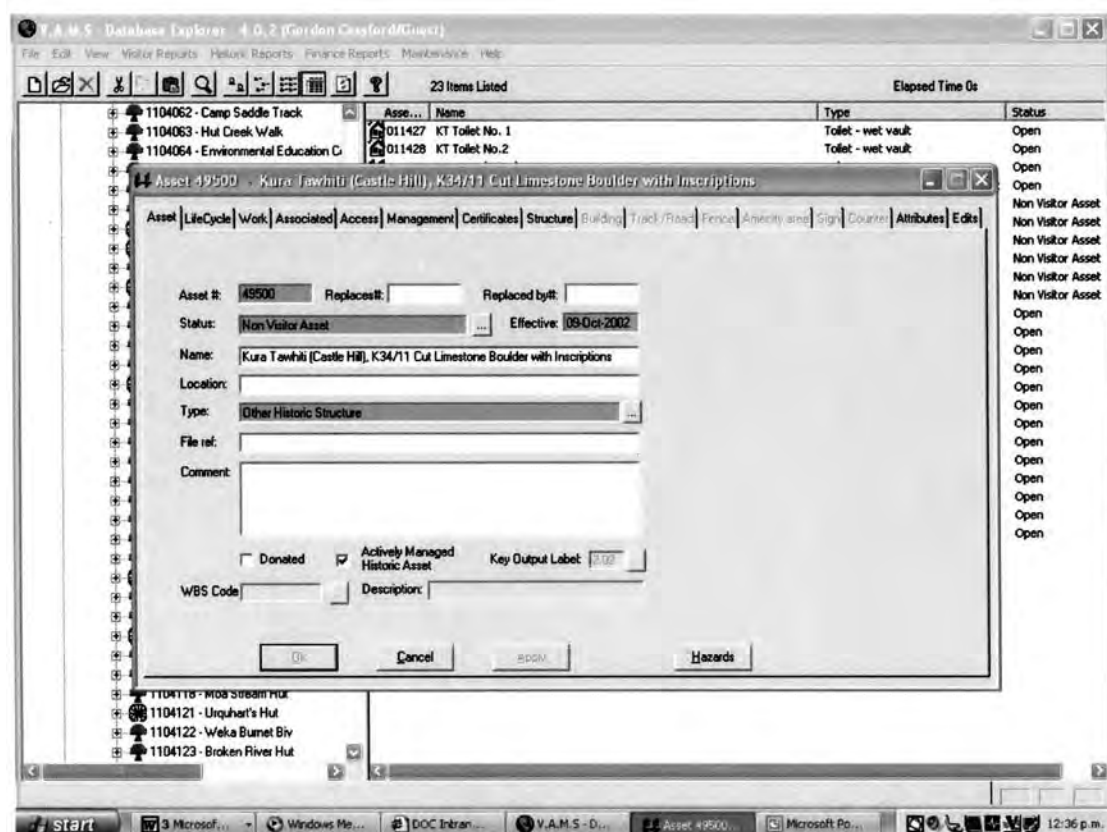
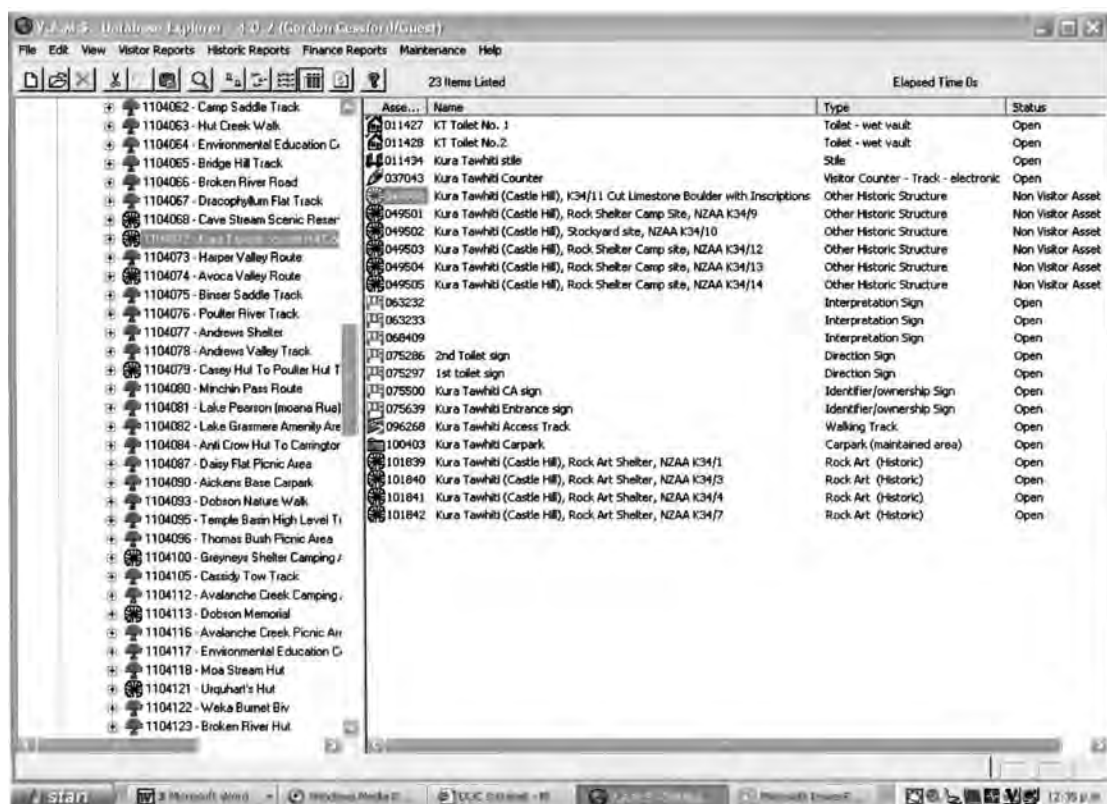


Figure 2—Sample pages from the online Visitor Asset Management System (VAMS).

cultural heritage

Opportunities to improve conservation awareness and contribution

- Visitor Experience Values

Access to and opportunities for quality recreation experiences

Opportunities for appropriate business opportunities

What would be the assets associated with any of these? Where are they located and what is their status? Answering these questions remains the main challenge even if an asset approach is accepted. But an asset approach does give a pragmatic and integrated management template within which existing knowledge can be reformulated, new knowledge created, and all knowledge better applied. Some direction is possible by considering the current state of asset-related knowledge in the three main management and research disciplinary areas referred to.

When considering physical and biological values, the taxonomy, classification, inventory and specialist conditional research is extensive here. Much of what is fundamentally required in establishing an asset management approach has been done. While the range of this work is diverse, fragmented and inconsistent, the basic understandings and specifications for an assets perspective are largely in place. The important features are known and identified, and much specific research on asset status, interactions, threats<sup>4</sup> and management has been done. After the visitor facility basis for developing the VAMS approach, and the archaeological database information, the next most accessible sector for large scale and systematic specification of values in place is the biophysical sector. The major direction required here, assuming an asset approach is supported, is towards establishing initiatives for coordination and standardization of information towards an outcome of this type of asset-based system. In this information age, we pose the question, why should information users have to repeatedly seek and query the information holders when needs arise? Could not the information be documented and shared as a best practice resource accessible to all? In DOC there is currently extensive effort being made to secure resources to initiate development of a Natural Heritage Management System (NHMS). While this is not yet being conceived of in asset management terms like those of VAMS, there is potential that part of its direction could provide the outcome of site specific natural values in place which could be incorporated into a future evolved version of VAMS.

When considering the visitor experience and social importance values, the taxonomy, classification, inventory and specialist conditional research is much less defined. Unlike the physical and biological sector the criteria for determining importance is much less consistently defined and much more contextually subjective. The need to engage in much more cumulative research and community discourse is clear here. New research tools need to be developed to provide us with more specific value definitions than are possible through conceptual frameworks such as ROS. Some of the current work in DOC is attempting to derive more refined visitor expressions of values in place. For example, a recent case study of the Kura Tawhiti Conservation Area assessed the mainstream sources of conservation value information that were available, and conducted an on-site user survey to try and gain an additional refined visitor perspective on what they

valued there. Another recent methodological development project is attempting to determine if the use of a combination of open-ended qualitative enquiry coupled with a cognitive mapping approach can identify what visitors consider the special experiential features of specific places. This is being done in an attempt to develop a monitoring-style tool to provide information that could be added to sites defined in VAMS. The main effort required here is in developing tools or approaches that can provide such refined site-specific value references. As for determining social importance outside of that included in physical and biological disciplines, the main approaches remain those based on consultative processes.

On this basis, the most significant gains in the shorter term could be made by developing the acceptance and means by which the physical and biological values could be treated in an asset context. For other social and experience based values, more methodological development is required. In the short term, any site specific highlights raised by particular research work can be added to VAMS sites. The main pragmatic advance that could be made in the short term would most likely be based on identifying specific groups of visitors, probably based on activity type, and undertaking targeted consultations to identify their priority places. DOC and others are exploring these within many different management processes and they do offer some degree of promise, but need much more research capacity devoted to them and more systematic frameworks in which to be applied. This paper has described one example of some of the new management concepts that are developing and being debated. Some of these are moving toward having the infrastructure and processes in place to apply value specifications to place. But more innovation is required to derive systematic means to actually identify those value specifications. In the meantime, managers will do what managers have always done - they'll do the best they can with what they've got.

## Conclusions

It is acknowledged that the complexity of the natural and socio-cultural values related to conservation on public lands makes the concept of 'conservation values' very broad. In the natural environment, there are many different types and scales of natural systems, each containing many different types of features and qualities that people may value. And paralleling this natural complexity are equally complex social (such as, cultural, community, political economic) and psychological (such as, moral, experiential, emotional, intellectual) systems that contain a wide range of different valuation modes and perspectives. But there are pragmatic management choices and directions that can make this complexity more manageable. To reiterate the quote by Cole (2004), "the lack of progress in recreation management largely stems from paralysis during the step of specifying desired end states, standards for acceptable impact levels, and for appropriate experiences or settings in which experiences occur" (p. 16). This paper has proposed a potential direction to help overcome such paralysis.

Given the inherent complexities in a value-oriented perspective, a pragmatic management response has been based on the conclusion that 'we can't manage values but we can manage assets - turn values into an asset context and we have something concrete to work with.' Developing this very

pragmatic value-asset approach has been of great value for visitor management by DOC in New Zealand. It could also represent a potential advance toward establishing a common language of reference for dealing with the extensive variety and volume of issues and interests that are often competing in places managed by conservation managers. From this pragmatic perspective, there appear to be more essential similarities than differences in the various value components included under the label of 'conservation values.' Important conservation and recreation things can be identified and located in place. This common understanding offers a very practical opportunity to apply a more unified values approach to management, and better guidance toward determining site specific conservation management objectives. If it is possible to advance this opportunity as a 'big vision,' in a few years time we may be talking about an acronym for the thing that the VAMS could begin evolving into—CAMS—the Conservation Asset Management System.

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<sup>4</sup> One conceptual advance recently suggested refers to the concept of threats being assets. Given that a threat to other values is an important thing that we have to actively manage, treating it in asset terms allows us to manage it using all the advantages of an asset management system.

# Relationships to Place in Wildland Resources Management: Developing an Effective Research Approach

Neal Christensen  
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**Abstract**—This paper describes an approach to understanding human relationships with public lands and considering those relationships in the decision making process. This understanding is based on segmentation analysis to identify groups of local residents that have similar relationships to place (RTP) with a public wildland. The research described in this paper uses a mix of quantitative and qualitative methods to describe local relationships to place and the salience of management issues to people living in proximity to public wildlands.

People's perceptions of places are variable and dynamic. People may ascribe intense emotional meanings to special places like public wildlands, and these intense feelings reduce the likelihood of collaboration and compromise in the allocation of scarce resources and opportunities. It is apparent that the relationships between Yakutat, Alaska, residents and the Situk River are complex, imbedded in history and culture, and include perspectives involving identity, tradition, subsistence, and livelihood—issues that greatly differ from those found among non-local visitors to the Situk River. This RTP research approach evolved with a desire to more fully account for the types of issues relevant to the local population—at a level of complexity that goes beyond what is typically considered in recreation visitor studies.

Although the importance of relationships to place is gaining recognition, applying understanding about the public's relationships with wildland places as a form of public input to management decisions has been slow to find mainstream application because planners tend to focus on more traditional and well-defined criteria. This paper presents ways to convey information to managers and stakeholders, and describes a structured approach for considering RTP in future research.

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## Relationships Between the Public and Public Wildlands

There is growing interest in understanding relationships between the public and public wildlands. Traditional resources on public lands, such as timber, minerals, grazing, watersheds, and developed recreation increasingly compete with the needs and desires of a public that is becoming more interested in non-consumptive existence and amenity values of these places. Managers must understand the public's relationships to wildland places in order to ensure these values are considered in multiple-use resource debates. An interest in understanding and enhancing relationships between the public, public lands, and the managers of those lands, derives from the view that increased understanding of public views and desires will enhance honest and meaningful involvement of the public and contribute to more balanced, integrated and equitable management decisions (Kruger 2003).

Human-place relationships are central to human organization and they influence attitudes and beliefs about those places; for example, opinions regarding conflict and management of a public wildland place are related to the types of experiences and expectations associated with that particular place. A focus on human-environment relationships as a planning approach is gaining recognition in social science assessments used to inform public land management decision makers (Beckley 2003; Kruger 2003). Yung and others (2003) see promise in the study of place for gaining understanding of diverse interests in natural resource conflict and management decisions. Place attachment, as a measure of relationships to place, has been used for understanding recreation and resource management issues in both developed and wilderness landscapes (Eisenhauer and others 2000; Kyle and others 2004; Williams and others 1992; Williams and Vaske 2003).

Although the importance of relationships to place is gaining recognition, applying understanding about the public's relationships with wildland places as a form of public input to management decisions has been slow to find mainstream application because planners tend to focus on more traditional and well-defined criteria. Williams and others (1992) critique typical resource planning that emphasizes traditional economic values, along with a growing awareness for ecological values, while failing to recognize the full range of

values associated with places, including emotional, symbolic and spiritual ties. Williams and Vaske (2003) identify the start of a paradigm shift from traditional resource management policies that emphasize commodity values toward a greater emphasis on understanding subjective, emotional, and symbolic meanings of specific places or landscapes. Beckley (2003) concludes that both community attachment and recreation-site attachment studies have been too narrowly defined to clarify factors of influence, and calls for understanding types and intensity of attachments to place with consideration for the broad spectrum of users who live, work, and play in a geographic place.

Borrie and others (2002) considered the importance of relationships between the public and public lands using a model guided by the principals of relational, public purpose marketing. That research resulted from a call by the Chief Operations Officer for the U.S. Forest Service to apply principles of private-sector marketing to provide satisfying outdoor recreation products and services for the public and to charge fees to recover the costs of those services (Pandolfi 1999). Borrie and others (2002) developed a relational marketing approach. They argued that this was more appropriate in public land management than a conventional transactional marketing approach, which is typified by a discrete transaction with a customer, having a distinct beginning, short duration, and sharp ending. In contrast, a relational exchange builds from previous agreements, is longer in duration, and reflects an ongoing process. Watson and Borrie (2003) feel that this approach is a more appropriate view of 'customer service' in public lands management, developing and fostering a relationship between stakeholders and the places that have been established on their behalf on public lands. They view the role of the public land management agency as stewards of that relationship. They concluded that segmenting groups based on differences in relationships to place is a useful approach to facilitating better communication and understanding between managers and the general public.

## Relationship to Place: A Research Approach

A place perspective reminds us that the values and meaning of places are greater than the sum of their attributes—it recognizes human relationships to place and acknowledges that special places do not have ready substitutes for many people (Brown and others 2002). A person's relationship to place refers to the set of attitudes, beliefs, and behaviors they associate with a particular place, along with the contextual and dynamic bonds they form with the place over time. Relationships are shaped by unique characteristics and experiences of the individual, as well as numerous external factors that operate at multiple scales of influence. A partial list of the factors of influence on relationships to public wildland places that are relevant to informing management decisions would include the geography and physical environment, predominant local culture, livelihood activities associated with the place, management history, traditional

and emerging activities, ongoing experiences, and history of uses that occur there. Consideration should also include the political and economic forces, exerted through media and governance that attempt to influence place meanings and the public's RTP. In conceptualizing the link between the public and public lands as ongoing, dynamic relationships this research seeks to improve understanding of how variations in relationships to place influence conflict, preferences for conditions, and opinions about appropriate management of public wildlands.

## The RTP Research Approach

The RTP research approach for assessing views about resource management issues held by residents of communities near public wildlands can be conceptualized in five steps (table 1). The five steps of this approach were developed for the case study described below through a history of research on relationships to public lands (for example, Borrie and others 2002; Brod and Christensen 1998; Watson and others 2004). The approach builds on work by Brod and Christensen (1998), who developed understanding of differential support for tourism development on and off a Montana Indian reservation using factor analysis, logistic regression, and measures of place attachment similar to those used in the current study; on the work by Borrie and others (2002), who segmented the public in Oregon and Washington based on measures of their relationships with managers and activity participation on National Forest lands in the two-state region; and on research by Watson and others (2004), who developed depth of understanding about jet boater relationships to place with the Salmon River through qualitative interviews before conducting a quantitative survey to generalize this understanding about activity and place.

## Case Study Example

This RTP research approach was applied in a case study conducted in the community of Yakutat, Alaska, that focused on management issues on the nearby Situk River. The Situk River is at the northern end of southeast Alaska, and flows just 25 miles (40 km) in length, almost entirely within the Tongass National Forest. It originates in the Russell Fiord Wilderness and ends in the Gulf of Alaska. The Situk is one of the most productive wild fisheries in Alaska, with large runs of steelhead, chinook, sockeye and coho. The fisheries provide for subsistence, commercial, and recreation uses. The Situk's growing worldwide reputation as an exceptional sport fishery, along with its ease of access, are contributing to an increase in tourism, economic development, and population growth in the local community of Yakutat. Yakutat has an ethnic mix of primarily Tlingit Indians and Caucasians, and is a traditional fishing community of about 700 people. The Situk River, Yakutat Resident Study (Christensen and Watson 2006) examined relationships to place between residents of Yakutat, Alaska, and the Situk River. It also assessed residents' perspectives on use, conflict, and management issues on the river.

**Table 1**—The five steps of the RTP research process used in the Situk River, Yakutat Resident Study, 2006.**RTP Research**

1. Problem Definition
  - a. Conduct a planning effort on public wildlands that includes understanding, involving, and considering all stakeholders in the decision.
  - b. Provide opportunity to build on knowledge about the RTP research process and to improve the use of results in future planning efforts.
  - c. Interview resource managers and planners to determine information needs.
  - d. Conduct a background investigation of relevant historical documents, media articles, meeting notes, previous research, public comments, etc.
2. In-Depth Understanding
  - a. Conduct interviews with community members and local leaders to understand their RTP with the wildlands and their concerns about management.
  - b. Conduct interviews with local experts to develop understanding of important RTP components and local terminology.
  - c. Analyze qualitative interviews to identify emergent topics and range of opinions, and to develop depth of understanding.
  - d. Document the researchers' understanding gained from the qualitative process. Include reviews by managers to refine the interpretation and understanding.
3. Generalizable Understanding of Local Community
  - a. Develop a survey questionnaire based on knowledge gained in steps 1 and 2. Include reviews by managers to refine the instrument.
  - b. Conduct a survey of a statistically generalizable sample of the population of residents in the local community.
  - c. Factor analyze questionnaire items to identify underlying RTP dimensions.
  - d. Cluster analyze respondents using their scores on multiple RTP factors to develop community segments.
  - e. Assess interactions between a respondent's membership in a particular RTP segment and their preferences for conditions and management.
4. Application of Research
  - a. Develop a comprehensive research report documenting qualitative and quantitative results. Include reviews by managers to refine the product.
  - b. Develop an executive/community summary of important results.
  - c. Present and interpret findings and results to managers and the community.
  - d. Continue dialogue, interaction, and advising on research application and monitoring.
5. Evaluation, Improvement, and Broader Generalizability
  - a. Obtain formal evaluation by managers and stakeholders involved in the process.
  - b. Conduct follow-up interviews with managers—focus on application and improving the approach.
  - c. Identify broad lessons learned with possible applicability beyond the local case study.
  - d. Design future case studies to build on current knowledge.

## The RTP Approach Applied

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### Step One, Problem Definition

The Yakutat resident study developed understanding of complex relationships to the Situk River through a series of

increasingly structured data collection phases (Steps 1—3 of the RTP research approach listed in table 1), beginning in step one with informal interviews with managers to determine their perspectives on information needs. This scoping was supplemented with review of documents including planning meeting notes and transcripts, news articles, and written public comments.

### Step Two, Increase In-Depth Understanding

The background investigation led to step two, which involved conducting and analyzing semi-structured interviews with purposefully sampled community residents. The objective of the purposeful sample was to obtain a wide range of perspectives. Eight qualitative interviews were conducted in the community, with each being recorded and transcribed for analysis. The respondents were asked about their history in Yakutat and their relationships to the Situk River in terms of: what the river means to them, why it is important to them, the types of activities they have done on the river, and other benefits they receive from the river. They were then asked to reflect on other people's uses of the river, and their preferences for conditions. Finally, they were asked about the management agencies, how management could be improved on the river, and whom they felt would benefit and lose from these management decisions.

The qualitative interviews were evaluated for emergent topics, both to develop depth of understanding about local relationships to the Situk River and to identify the range of categories among relationship topics covered in the interviews. Final coding of the transcriptions by emergent topics was facilitated using QSR NVivo qualitative analysis software. The emergent topics were identified and coded as they occurred in the text, with the development of categories guided by the review of literature and local background information, the researcher's personal experience in the community, and the study objectives (Berg 2004; Spradley 1979). The perspectives from these interviews were instrumental in designing the locally relevant quantitative survey that came next.

### Step Three, Develop General Understanding of Local Community Perspectives

A survey questionnaire was developed based on the information and themes that emerged from the previous steps. It was administered to a statistically representative sample of the local community. The survey was designed to account for RTP complexity since the set of relationship indicator variables were 'localized' using knowledge gained from the qualitative interviews. The RTP-related questions were designed to measure three types of self-reported characteristics: behaviors, values, and attachments. Each of the characteristics were measured with multiple items: 1) behaviors were measured as past or present participation in 14 recreation, subsistence, and commercial activities along the Situk River; 2) values were measured as the importance of the Situk River for providing various types of



tangible and intangible benefits; and 3) attachments were assessed as the level of agreement with 12 items describing different types of attachments to place for the Situk River and the local community of Yakutat. The three sets of items were also informed by previously tested measures used in other research on recreation, place, community attachment, and local effects of tourism (for example, Borrie and others 2002; Brod and Christensen 1998; Christensen and others 2004). In addition to assessing components of RTP, the survey questionnaire also asked respondents to indicate their concerns and preferences for resource conditions and management options. The questionnaire was administered randomly, door-to-door to a relatively large sample of 220 adult Yakutat residents in the spring of 2005.

The analysis of the questionnaire data was conducted using SAS statistical software, and required a series of statistical tools including: 1) missing value imputations on variables to be used in subsequent modeling to prevent loss of incomplete case data; 2) factor analysis of the individual RTP items to identify a set of more complex underlying constructs; 3) cluster analysis of respondents' factor scores to identify segments of the community with similar complex mixes of RTP characteristics; 4) descriptive analysis of respondent characteristics within RTP segments; and 5) testing for significant differences and predictive ability in preferences for conditions and management of the Situk River across the segments using forms of ANOVA and logistic regression with finite population corrections. The overall quantitative analysis followed the multi-stage decision process described by Hair and others (1998).

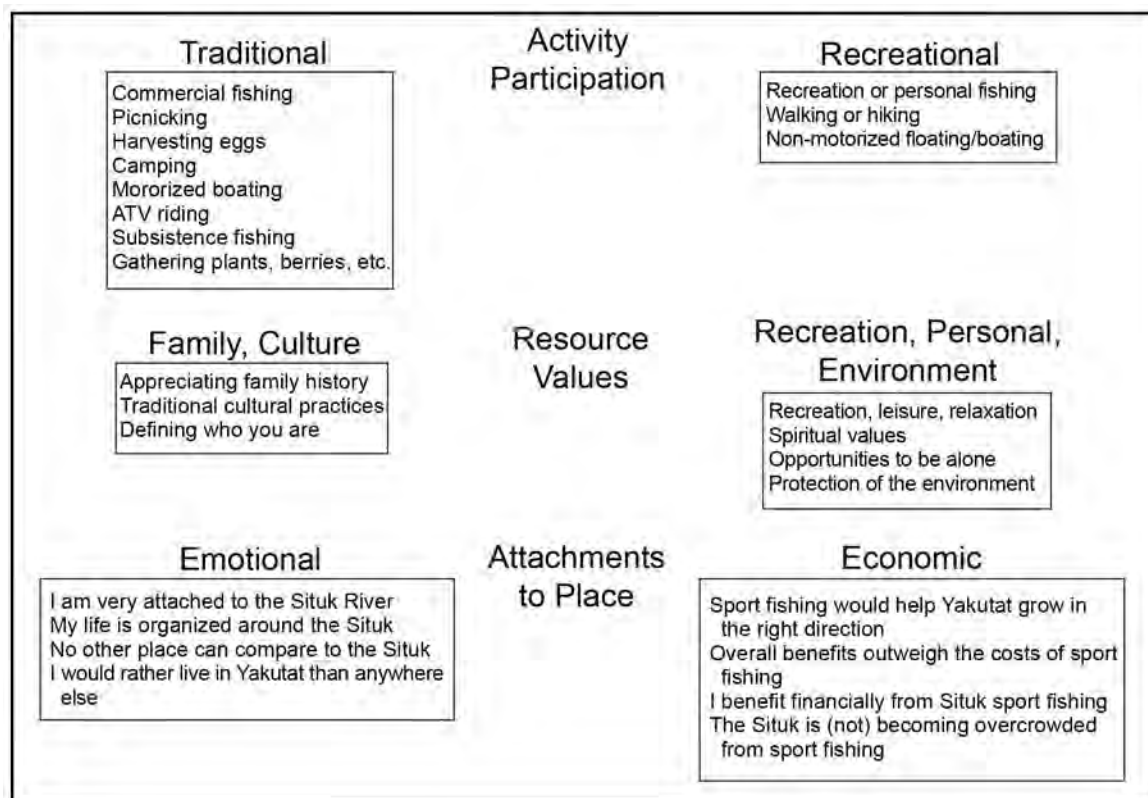
## Results

### Factor Analysis

The quantitative survey measured a number of items within three general types of RTP characteristics, and the items were factor analyzed to identify underlying dimensions within the general characteristic types. Figure 1 shows the categories that were identified from the factor analysis of the Yakutat resident survey data. The analysis identified two factors within each of the three general categories. For activity participation, respondents generally showed similar response patterns across traditional types of activities and across recreational types of activities. Looking at the recreational activity participation factor, for example (fig. 1), if a Yakutat resident respondent indicated that they participated in recreational or personal fishing on the Situk River in the past year they were also likely to indicate that they participated in non-motorized floating/boating on the river in the past year. Similarly, resource values represented two dimensions: items regarding family/cultural values and those indicating recreation, personal or environmental values. Attachments to place separated into two dimensions representing emotional and economic items.

### Cluster Analysis

The second statistical tool used in the quantitative analysis phase of the RTP research approach was cluster analysis



**Figure 1**—Six relationships to place factors identified using common factor analysis of questionnaire response items within three general category types; The Situk River, Yakutat Resident Study, 2006.

to segment Yakutat respondents based on their scores on the six RTP dimensions found in the factor analysis (fig. 1). Cluster analysis is a common market segmentation statistical tool. It identifies segments of respondents that have similar characteristics across a set of items—in this case the characteristics of residents' RTP with the Situk River. Through cluster analysis we identified a five-segment solution to represent Yakutat respondents based on their RTP response patterns.

Figure 2 summarizes the five clusters, identified in the figure by the labels L-St, M-St, M-Lt, H-Lt, and Vh-Lt. The five clusters were given abbreviated labels to aid in keeping

track of their characteristics. These labels do not reflect the complexity of the RTP within the segments, but provide a simple way of organizing them in memory. The segments and their labels, in order of ascending relationship intensity scores, include: Low intensity, short-term residents (L-St); Medium intensity, short-term residents (M-St); Medium intensity, long-term residents (M-Lt); High intensity, long-term residents (H-Lt); and Very high intensity, long-term residents (Vh-Lt). The Relationship Intensity index scores for L-St members were substantially below average, those for members of M-Lt were about average, and those for Vh-Lt members were substantially above average.



**Figure 2**—Characteristics of the five segments identified in the cluster analysis of RTP factors; The Situk River, Yakutat Resident Study, 2006.

Below the continuum in figure 2 is a table indicating the average relative scores given by each of the five segments to each of the six RTP factors. Segment L-St scored all of the RTP factors low other than economic attachment. Notice that the two 'average' segments, M-St and M-Lt, had different types of relationships to the Situk River as indicated by their scores on the six RTP factors. For example, members of the M-Lt cluster felt that family and cultural values are very important, but they had a low economic attachment to place. In contrast, members of segment M-St, with a similar overall relationship intensity score, had high economic attachment to the river and they rated family/cultural values very low. This illustrates the importance of understanding the complexities of relationships to place rather than focusing too narrowly on the composite index score or any single aspect of the relationship to inform management decisions. Segments H-Lt and Vh-Lt also had similar index scores but showed important differences in the types of RTP they had with the Situk River (here the greatest difference is reflected in relative scores on recreation activity participation and levels of economic attachment). The remainder of figure 2 shows some of the other characteristics that tended to vary across the Situk River, Yakutat resident RTP segments. These characteristics indicate a tendency toward a dichotomy in the community between the two segments of short-term residents (L-St and M-St) and the three segments of long-term residents (M-Lt, H-Lt, and Vh-Lt).

## Opinions About Management

One of the primary benefits of the RTP research approach for managers and stakeholders may be the increase in their understanding about how citizens' views on management issues differ across complex types of relationships like those described above and illustrated in figure 2. The Yakutat Resident, Situk River survey included a number of questions regarding management options for the river. Table 2 shows statistically significant levels of support and opposition for these management options across the five RTP segments. The difference in opinions about management options found across the segments indicates the ability of the RTP research approach to help clarify understanding of complex and contentious issues. These results suggest that cultural, community, and individual forces are all connected to forming opinions about appropriate solutions to wildland resource issues.

The table shows wide agreement on some management options, such as all segments being supportive of encouraging catch-and-release fishing and opposing decreases in subsistence and commercial fisheries. Table 2 also shows variation in opinions across the RTP segments in ways that suggest the important influences of RTP on opinions and preferences for managing public wildlands. Segments M-St and Vh-Lt, the two primary segments of Yakutat residents that currently sport fish on the Situk, show different levels

**Table 2**—Support and opposition for options to address resource management concerns: The Situk River, Yakutat Resident Study, 2006.

Management options for the Situk River: ( <i>n</i> =219)	Yakutat Community RTP Segments				
	L-St	M-St	M-Lt	H-Lt	Vh-Lt
Designate campsites with reservations	Support		Support		
Encourage catch-and-release fishing	Support	Support	Support	Support	Support
Prohibit motors > 10hp above weir	Support	Support	Support		Support
Stage boat launches at Nine Mile			Support		
Prohibit jetboats above weir		Support	Support		
Daily boat limit above weir	Support	Support	Support		
Daily limit on guided use		Support	Support		Support
Daily limit on nonguided rec use		Oppose	Support		
No upstream motor above weir during peak		Support	Support		
Prohibit all motorized boating above weir			Support		
No sport fishing below lower landing			Support		Support
Decrease sport fishing bag limits		Support	Support		Support
Decrease subsistence harvests of fish	Oppose	Oppose	Oppose	Oppose	Oppose
Decrease commercial harvests of fish	Oppose	Oppose	Oppose	Oppose	Oppose

Individual t tests with finite population corrections and Bonferroni corrections for multiple comparisons found the items indicated with 'Support/Oppose' to differ significantly from 'Neutral or No Opinion' at  $p \leq 0.05$ .

Measured on the scale: -2 'Strongly Oppose,' -1 'Oppose,' 0 'Neutral,' 1 'Support,' and 2 'Strongly Support.'

of support for management intervention, with the segment of newer residents (M-St) being more supportive of implementing management regulations than the segment of long-term resident sport anglers. Segments L-St and H-Lt, the segments with predominant economic attachments to the river tended to be less supportive of management options overall, while segment M-Lt was the least economically attached and the most supportive of management intervention.

Segment M-Lt is interesting in a number of ways. Segment members showed relatively low current activity participation levels, yet appeared to be highly concerned about resource conditions. Members of this segment, representing about 20 percent of the community, had fairly strong emotional attachment to the river compared to other residents. Although they had relatively low current participation rates in Situk River activities, respondents in segment M-Lt had the highest past participation rates in these activities. They were among the oldest respondents and were the segment that had lived in the local community the greatest percentage of their lives. This group would include many of the Tlingit Tribal elders whose opinions are highly respected in the community, and it is likely that management must address their concerns before city and tribal government stakeholders will support a collaborative management plan. The characteristics of segment M-Lt respondents provide evidence of evolving relationships with public lands, where the dominant components of a relationship change over time, but where the relationship itself remains important.

## Evaluation of the Research Application

As this study includes multiple goals for generalizability to the population of Yakutat residents and for generalizability to similar planning processes implementing an RTP research approach, it is important to evaluate the research itself following its implementation. The study included several methods of evaluation for content and effectiveness as a form of public participation to inform management decisions. The intent of the evaluations are to increase the relevance of the research and to better understand the RTP approach and its outcome by assessing whether managers and stakeholders feel that it could facilitate public input, mutual understanding, and acceptance of management solutions—a set of criteria supported in the natural resource planning literature.

Shindler and Neburka (1997: 19) found that for “local people, natural resource planning success was largely measured by the extent to which their own ideas and concerns were given serious consideration and the agenda was not driven by federal agency politics or national debates.” McCool and Guthrie (2001) identified research showing seven dimensions across two major categories (product oriented and process oriented) to be indicators of successful public participation in messy natural resource planning situations where there are conflicting goals and scientific disagreement. On the product side, these indicators include the development of a plan and measures of the social and political acceptability of the plan. Measures of process-oriented success include opportunities for learning, building a sense of ownership

in the solution, building interpersonal relationships, and feelings of being heard.

The criteria identified by McCool and Guthrie (2001) for assessing the benefits of a public participation process are supported by others who have described the benefits of public participation in natural resources decisions, especially within social assessments and collaborative planning (for example, Cortner and Moote 1999; Haynes 2005; Kruger and Shannon 2000; Shindler and Neburka 1997), and these criteria were used as a guide for evaluating the RTP approach to informing the Situk River planning process. The process-based criteria identified by McCool and Guthrie (2001) are especially important in this RTP approach evaluation as definitive planning outcomes will take much longer to unfold.

In addition to including manager review of research instruments and documentation throughout the research steps, a formal evaluation was conducted in step 5 to assess the likely benefits of this research. McCool and Guthrie’s (2001) effectiveness dimensions, along with effectiveness of influencing trust in management, were incorporated into an evaluation form that was administered to the managers and stakeholders ( $n = 7$ ) following presentation of the Situk River, Yakutat Resident Study results. The evaluations are a starting point for implementing ongoing feedback between science and application. A focus on improving effectiveness of the research will provide an insightful tool for continued improvement of the RTP approach during future case study applications.

Table 3 shows the criteria evaluated by the Situk managers ranked in terms of their perceived effectiveness. All of the seven elements that were evaluated by the managers and stakeholders were seen as positive contributions of the RTP research approach to the Situk River planning effort. Improving acceptability of the plan and increased understanding of the community were seen as the greatest benefits of the RTP approach while improved trust and cooperation were seen as the least effective aspects of the approach.

## Conclusions

Public land managers must adapt to more complex demands for public resources by developing planning models that better consider diverse public interests. The Situk River, Yakutat Resident RTP Study demonstrates an approach to information collection that goes beyond consideration of recreation experiences and opportunities and setting attributes, as is most typical of the Recreation Opportunity Spectrum (ROS) approach, to consider complex local relationships with wildland places. As we increasingly recognize competing demands for public resources, it is apparent that public interests in lands protected for their wildland values often go beyond onsite recreation experiences.

Peoples’ perceptions of places are variable and dynamic. People may ascribe intense emotional meanings to special places like public wildlands, and these intense feelings reduce the likelihood of collaboration and compromise in the allocation of scarce resources and opportunities. In the early stages of this overall Situk River social science research it became apparent that the relationships between the local residents and the Situk River were complex, imbedded in history and culture, and included perspectives involving

**Table 3**—Managers' evaluation of RTP research effectiveness as a form of public input; The Situk River, Yakutat Resident Study, 2006.

Evaluation of relationship to place (RTP) research effectiveness by Situk managers: (n = 7)	Effectiveness Rank
RTP information will improve the management plan's acceptability in the local community.	1
RTP information helps the managers better understand the local community.	2
RTP information will improve the management plan.	3
Consideration of RTP information will improve the community's sense of ownership in the solution.	4
Consideration of RTP information will improve the community's feelings of being heard in the planning process.	5.5
RTP information will improve understanding and cooperation among local residents in the community.	5.5
Consideration of RTP information will lead to improved trust between the community and managers.	7

identity, tradition, subsistence, and livelihood—issues that greatly differ from those we found studying the visiting recreationists (Christensen and others 2004). The Situk River, Yakutat Resident Study (Christensen and Watson 2006) evolved with a desire to more fully account for the types of issues relevant to the local population—at a level of complexity that goes beyond what is typically considered in recreation visitor studies.

A growing interest in conceptualizing the link between the public and public lands as ongoing, dynamic relationships reflects increasing awareness of the public's complex interactions with public wildlands that have not been well accounted for in traditional recreation planning models, which focus on onsite activities, thus possibly ignoring other important aspects of relationships. While a focus on providing a spectrum of recreation opportunities is useful for many wildland planning situations, other situations, such as those with diverse local interests in the wildlands, may benefit from a focus on a spectrum of relationships between the public and their shared common lands. In the case of planning for the management of the Situk River, these two approaches may complement each other. A traditional focus on recreation settings and experiences may be satisfactory for evaluating concerns of recreation visitors (Christensen and others 2004), while a relationship to place focus more appropriately accounts for concerns of local residents (Christensen and Watson 2006).

As researchers working with managers of public wildland resources, we need to recognize and understand these important relationships, and develop ways to incorporate this understanding of complex relationships between humans and special places into meaningful conflict resolutions and more acceptable resource allocation decisions. Management solutions receiving the most support in messy natural resource planning situations may be those that open the line of communication, increase mutual understanding, and encourage cooperation among the stakeholders. Social science may facilitate that interaction. Applying social science through a relationship to place research approach uncovers the types of shared values and goals that ultimately bring stakeholders together to develop cooperative solutions. In this way the RTP research approach may effectively influence policy aimed at resolving conflict in public wildland management.

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# Psychophysiological Responses and Restorative Values of Wilderness Environments

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**Abstract**— Scenes of natural areas were used as stimuli to analyze the psychological and physiological responses of subjects while viewing wildland scenes. Attention Restoration Theory (Kaplan 1995) and theorized components of restorative environments were used as an orientation for selection of the visual stimuli. Conducted in Taiwan, the studies recorded the psychophysiological responses of 110 laboratory participants while viewing 12 images that hypothetically represented the Being Away, Extent, Fascination, and Compatibility components of restorative environments. Psychological responses were measured using the Perceived Restorativeness Scale and physiological responses were recorded by electromyography (EMG), electroencephalography (EEG), and blood volume pulse (BVP) measurements. Results revealed a large degree of congruency between the psychological measures of restorativeness and the three physiological responses. Improved scores on the Perceived Restorativeness Scale corresponded to increased EMG and EEG readings and lower BVP measurements. These findings provide some objective evidence toward the psychophysiological values, and perhaps benefits, of wildland-wilderness environments.

## Attention Restoration Theory

Hiking and walking for pleasure in wildland/wilderness areas is strongly associated with viewing of the natural environment. Wilderness offers the best of natural environments for people to view, an experience ranked high in participation surveys of outdoor and wilderness users (Cordell 1999). Yet, we know little, in an empirical sense, about the visual perception and psychophysiological response of people while viewing the naturalness of wilderness environments.

An obvious research question concerning the popular activity of hiking and sightseeing in wilderness environments is, “what influences does the viewing of visual images of natural scenes and landscapes have on humans, and what are the

benefits of this activity-experience?” Hiking for pleasure and relaxation are hardly sufficient, scientific answers. In this paper, attention restoration theory (Kaplan 1995; Kaplan and others 1998) was used to select images of natural environments that were hypothesized to have restorative character benefits (Ulrich and others 1991). The scenes from the hypothetical recreation-restorative environments were then investigated to see if they elicited improved psychological and physiological reactions in people. Because on-line measures of psychophysiological responses in the leisure sciences are rare, and large samples of these kinds of data even more rare, the data set represents a potentially valuable window into human responses to natural-wilderness environments.

It is largely out of research on natural environments that Attention Restoration Theory (ART) has emerged. ART, proposed by Kaplan (1995) and Kaplan and others (1998), builds on the assumptions of limited human cognitive capacity, mental fatigue, and the possibilities of psychological recovery when in restorative environments, such as natural areas. It is concerned with the directed attention capacity that individuals use in demanding and/or uninteresting environments, such as work and stressful interactions with people or places. Directed attention capacity is subject to fatigue, which leaves the individual less capable of dealing with uncertainty, confusion, and demanding tasks that are of little human interest. ART also posits that environments and functions requiring indirect attention allow for recovery from mental fatigue and thus the restorativeness of psychological processes and properties in individuals (Hartig and others 1997; Kaplan 1995).

Although ART, as proposed by the Kaplans, does not theorize any physiological aspects associated with psychological restorativeness, other researchers have suggested a link between psychological and physiological responses in natural environments (Ulrich 1988; Ulrich and others 1991). In addition, even though ART may not be directly intended for psychophysiological hypothesis testing, other Kaplan writings do suggest linkages between the psychological and physiological processes of individuals when functioning in natural environments (Kaplan and Kaplan 1982). It seems reasonable to hypothesize that the psychological processes of recovery from mental fatigue could be associated with the physiological processes of brain and blood pulse activity during and/or resulting from the recovery/restoration process.

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Attention restoration theory describes restoration occurring in environments and situations that involve four components: Being Away, Extent or Coherence, Fascination, and Compatibility (Kaplan 1995). Restoration requires psychological and geographical distancing from aspects of one's usual environs, routines and situations (being away), immersion in a coherent physical or conceptual environment that is of sufficient scope to sustain exploration (extent), effortless attention as drawn by objects in the environment or engaged in the process of making sense of the environment (fascination), and a good match between personal inclinations and purposes, environmental supports for intended activities, and environmental demands for action (compatibility). Environments with elements of all four components promote the involuntary attention mode of information processing, and can lead to restorative experiences in which individuals may develop a state of cognitive clarity, enabling a pleasurable and contemplative state of mind (Korpela and others 2001). While ART proposes that all four of the restoration components must be present in an environment for it to be restorative (Kaplan 1995), it does not posit that all must be present in equal proportion.

As mentioned, much of the research that ART developed from has been conducted in natural environments, including wilderness-type environments (Kaplan 1984; Kaplan and Talbot 1983; Talbot and Kaplan 1986). Wilderness recreation and natural environments tend to rank high in the four properties of restoration environments and restorative experiences. However, there are other types of environments besides wilderness that have restorative properties or benefits, and these have been researched, as well. Rather than review the many studies that involve ART, the reader is referred to two recent special issues of journals that include 16 articles on restorative environments (Hartig 2001; Hartig and Staats 2003).

## Methods

### Study Area and Participants

The research was conducted in the psychophysiological laboratory at the National Chung-Hsing University at Taichung, Taiwan. The laboratory is well equipped for psychophysiological research and several studies have been conducted with a focus on natural recreation areas, and psychophysiological response (Chang 2003; Chang and Perng 2000; Chang and Van 1999; Chang and Yzeng 1998). This particular study was completed in 2001 with 110 participants, consisting of mainly students and faculty of Chung-Hsing University.

### Visual Stimuli

The four components of Kaplan's (1995) attention restoration theory—being away, extent, fascination, and compatibility—served as indicators for choosing pictures of landscapes with hypothetical attention restorative capability. Images were chosen according to the theorized features and suggested examples of restorative environments mentioned and illustrated in Kaplan and Others (1998). Although these authors do not specify particular landscapes at the exclusion

of others to exemplify the four restorative components, they do attempt to apply the concepts to environment design and management, and offer practical guidance through illustrative media and landscape examples. As an illustration, when discussing the component of extent, the authors of ART suggest that extent can be found in extensive environments, such as mountain wilderness; in small environments, such as Japanese gardens; and/or abstract environments, such as a view from the window. We used this type of guidance to select three photos to represent extent. Similarly, the hypothesized being away set of three photos illustrated a sense of remoteness where one could forget the tasks and routines of everyday life (for example, lying on the beach, lakeviews, mature forests). Fascination scenes were selected to illustrate the theorized elements of soft fascination (for example, sunsets, flowing water) and organism fascination (for example, fishing). Kaplan and others (1998: 69) provide illustrative scenes and text that guided our selection of fascination photos by stating, "open woods and rushing streams are just two of the many patterns of nature that can be fascinating" and that "fishing, canoeing, and wildlife viewing are activities that involve quiet fascination." Compatibility scenes depicted functional opportunities, such as shorelines and fields-trails to walk. In total, 12 images (3 per each of the 4 restorativeness components) were shown to participants on a large screen.

## Materials and Procedures

**Viewing Images.** To encourage participants to relax, soothing music was played during the instructional-explanation stage of the study, before the viewing of study images. Participants were also seated on a couch at a 3m (10 ft) distance from the picture screen. In order to eliminate the influence of the viewing order of pictures, the images were projected randomly in 12 different combinations. Participants viewed each slide for 10 seconds, with measurement scores based on the entire viewing period. The nonviewing time between slides consisted of a solid blue image, projected for an equal time of 10 seconds. An AELTA (AV 600) digital projector was used to show the visual scenes. The projector and physiological equipment were all placed behind participants to decrease annoyance of the machines on participant response.

**Testing of Physiological Reactions.** Physiological reaction values were recorded by using the Procomp+/Biograph V2.0 Biofeedback System made by Thought Technology Ltd., a system with a multi-modality 8-channel system. Guidelines for the facial and head placement of electrodes on subjects followed those specified by Cacioppo and others (2000). Testing procedures and instrument application also followed procedural guidelines specified by Cacioppo and others (2000). The resulting information was sent directly to the computer via a fiber-optic cable. Computer analysis software and precise sensors are included as part of the equipment.

Skeletomuscular (muscle tension) or electromyography (EMG) response was measured using the facial muscles of the forehead. Facial muscles on the forehead can reflect mental and emotional stress better than other muscles. Tension felt by the forehead extends to other parts of the body, even

while other parts of the body are relaxed. Therefore, three electrodes were placed 4 cm (1.5 inches) above the eyebrows of each participant, the middle one was “the reference,” a reference point of the other two electrodes, called “source 1” and “source 2.” By using the potential difference between the reference and source 1 as well as source 2, unrelated information is eliminated. An increase in EMG amplitude indicates a level of muscle tension increase, and vice versa.

Bioelectrical (brain wave) or electroencephalography (EEG) response was detected by placing the electrodes on the scalp, through which the brain waves produced by the cerebral cortex, are amplified and recorded by the electroencephalograph. The medial prefrontal cortex is the main position where the EEG is performed; therefore the electrodes are attached, at equal distance, at the front, back, left, and right of the forehead. An increase in EEG values indicates an increase in level of alpha brainwave activity.

Cardiovascular (blood volume pulse, BVP) was measured using an infrared detector, which senses the degree of cardiovascular change by emitting infrared waves, which in turn are reflected by blood cells in participants' fingertips. A sensor was placed on the middle finger of the non-dominant hand to measure BVP. By analyzing the spectrum of the signals reflected by the blood cells, it is possible to know a participant's pulses and his/her speed of blood circulation. An increase in BVP amplitude indicates decreased sympathetic arousal and greater blood flow to peripheral vessels.

**Testing Psychological Reactions.** The perceived restorativeness scale (PRS) proposed by Hartig and others (1991) was translated into Chinese and used for the evaluation of participants' psychological reactions. Based on the four components of restorative environment (being away, extent, fascination, and compatibility), 23 items such as “This place is a refuge from unwanted distractions,” “This place is fascinating,” and “This place does not place demands on me to act in a way I would not choose” were used to test degree of attention restorativeness after viewing each image. The 23 items were rated on a 5-point scale of agreement ranging from 1 = Very Much Agree, 3 = Neutral, 5 = Very Much Disagree.

In summary, previous psychological research concerning ART has shown that the PRS has had success at measuring the theoretical, restorative components in natural landscapes/environments. Psychophysiological research, associated with measuring stress recovery/restoration response to natural environments, has also suggested a relationship between improved psychological restorativeness and physiological condition. Oriented by this theoretical perspective and past research findings, the following hypotheses were developed for investigating the psychophysiological responses to visual images of natural and wilderness environments.

1. Although restorative environments must contain all four of the theorized components of ART, visual landscapes selected to hypothetically rate higher on a particular component will receive higher perceived restorativeness scores (PRS) on that specific component, as compared to the other three components present.
2. Viewing of the restorative environment images will produce improved physiological responses over the non-viewing control image.

## Results and Discussion

### Psychological Response

The internal consistency (reliabilities) for the four restorative components was computed by calculating the Cronbach's alpha for all 23 PRS item ratings that were completed for each of the four trio of photos selected to represent the four restorative components. The Cronbach alphas were acceptable, being 0.86 (Being-Away), 0.90 (Extent), 0.95 (Fascination), and 0.91 (Compatibility). After each trio of component images was established as being a reliable measure, the PRS mean values for the four restorative components were computed for each trio of images, and the means compared within each trio of slides to determine if the images selected to hypothetically represent a component of restorativeness scored higher on that specific component as compared to the other three components (Hypothesis 1). Congruent results were obtained for the being away, extent, and fascination image categories, with each set of photos ranking first on its respected restorative component (see table 1). In the case of the compatibility category, the images ranked first on the PRS fascination component and second on compatibility. Laumann and others (2001) found, using verbal stimuli, that compatibility was not always differentiated from fascination by respondents. Although some of the comparisons were not statistically significant, these results provide an element of construct validity and offer partial support for Hypothesis 1.

The images proposed as examples of the four restorative components were generally rated as hypothetically selected, although not cleanly enough to be treated as *representing* those components. Although Kaplan and others (1998) do not necessarily expect the exemplar environments offered in their text to be clean representatives of the different components, our findings do largely uphold their notions, enhancing our confidence in the validity of the restorative components. Perhaps this is the contribution of our research; that there is a degree of congruence between the actual PRS scores of participants and the theorized examples of restorative environments of Kaplan and others.

### Physiological Response

Because the restorative environment images cannot be a pure example of certain specific restorative components, we cannot interpret the physiological changes as responses to a particular component of the restorative images. The responses are likely a complex response to a combination of the restorative components. This is a reality despite our attempt to select visual stimuli to perhaps represent certain restorative components over others within the images, based on literature guidance. Therefore, the physiological changes to be reported for the trio of photos selected to represent the restorative components represent, at most, physiological changes in response to restorative images, in general.

Table 2 reports four physiological measurements for the four sets of restorative images and the non-viewing control image, thus reflecting the degree of change from the non-viewing condition. All four of the physiological responses reveal an improved condition over the non-viewing measurements, with EEGa, EEGb, and EMG measures increasing and BVP decreasing (Hypothesis 2). When examined for

**Table 1**—The mean value of the attention restoration score for each restoration component (PRS items) while viewing the four sets of images depicting each component.

Restorative features	Attention restoration score	Mean <sup>a</sup>	SD	Rank	Pairwise comparisons <sup>b</sup>
Being away	Being away	1.90	0.56	1	Being away/extent
	Extent	2.24	0.55	4	Being away/compatibility
	Fascination	1.99	0.55	2	Extent/fascination
	Compatibility	2.18	0.65	3	Fascination/compatibility
Extent	Being away	2.75	0.71	3	Being away/extent
	Extent	2.42	0.61	1	Being away/fascination
	Fascination	2.55	0.75	2	Extent/compatibility
	Compatibility	2.79	0.66	4	Fascination/compatibility
Fascination	Being away	2.36	0.82	2	Fascination/compatibility
	Extent	2.40	0.55	3	N.S.
	Fascination	2.27	0.82	1	N.S.
	Compatibility	2.47	0.93	4	N.S.
Compatibility	Being away	2.02	0.50	4	Being away/fascination
	Extent	2.01	0.59	3	Extent/fascination
	Fascination	1.88	0.58	1	N.S.
	Compatibility	1.94	0.63	2	N.S.

<sup>a</sup> Means based on a 5 point scale of agreement, where 1 = very much agree, 3 = neutral, 5 = very much disagree.

<sup>b</sup> Pairwise comparisons that were significantly different,  $p \leq 0.05$ ; N.S. = not significant.

**Table 2**—The mean value of respondents' physiological responses.

Physiological responses	Landscape feature	Mean	SD
EEG <sup>a</sup>	Being away	22.14	28.76
	Extent	19.04	25.46
	Fascination	19.05	26.72
	Compatibility	19.53	29.28
	Non-viewing	6.18	4.01
EEG <sup>b</sup>	Being away	23.86	35.48
	Extent	20.21	28.06
	Fascination	18.72	26.74
	Compatibility	17.36	24.40
	Non-viewing	6.03	3.60
EMG	Being away	11.45	7.70
	Extent	10.96	8.01
	Fascination	9.63	7.05
	Compatibility	10.03	8.08
	Non-viewing	8.67	7.77
BVP	Being away	25.02	0.53
	Extent	25.04	0.50
	Fascination	25.01	0.52
	Compatibility	25.02	0.46
	Non-viewing	25.22	0.73

<sup>a</sup> Alpha wave of left side of brain.

<sup>b</sup> Alpha wave on right side of brain.

significant change over the non-viewing condition, the differences were found to be statistically significant,  $p < 0.05$  (table 3).

These findings provide an element of converging psychophysiological evidence for restoration when viewing natural images. The findings also support and extend previous findings related to stress recovery and restoration in natural environments (Parsons and others 1998; Ulrich and others 1991) where the authors have found faster, more complete, and longer lasting improvements in physiological conditions after viewing natural-restorative environments. More specifically, measures in autonomic activity (for example, blood pressure) have decreased while somatic activities have increased.

However, the evidence of our findings is not without limitations. For example, one concern is the valid interpretation of the EMG findings. Some previous research has yielded reduced EMG, which was interpreted as a reduced level of stress. Other research has produced increased EMG, interpreted as indicative of a restorative, relating stimulus. Therefore, our finding concerning change in EMG is open to differing interpretations.

## Conclusions

What influences does the viewing of visual images of natural scenes and/or wilderness environments have on humans, and what might be the psychophysiological response and value/

benefit to this activity-experience? This was the general question that was the driving force behind this study. It was proposed that natural environments (images) selected to contain features of the four restorative components of being away, extent, fascination, and compatibility, would elicit improved psychological (PRS values) and physiological (EEG, EMG, BVP values) responses from viewers, inferring that visual resources of wilderness environments produce nature related restorative-leisure benefits (Ulrich and others 1991). Results from the psychophysiological responses lend support for this proposed relationship, and confirms previous research demonstrating the value of natural and wilderness environments at producing restorative experiences.

Our research, though but one narrow investigation into the potentially rich field of recreation-restorative environments, offers several future research questions. For example, to what extent do different wildland recreation environments evoke different psychophysiological responses? Do favorite places and wilderness areas of extreme naturalness rank higher in value/benefits from a psychophysiological perspective? And, what environmental features and/or recreation settings yield the "higher" responses? From a "negative" response perspective, what are the psychophysiological repercussions when daily hassle and conflict settings (for example, crowding) occur in wilderness environments? Urban environments are not the only sources of stress; there are examples within wilderness and other recreation environments! How does recovery from stressful settings in recreation environments occur in

**Table 3**—ANOVA of participant's physiological responses on different restorative environments.

Source	Type III SS	df	F	Significance	Pairwise comparisons <sup>a</sup>
EEGa <sup>b</sup>	17386.36	3.41	11.09	0.000	Being away/non-viewing Extent/non-viewing Fascination/non-viewing Compatibility/non-viewing
EEGb <sup>c</sup>	19858.99	2.86	12.01	0.000	Being away/non-viewing Extent/non-viewing Fascination/non-viewing Compatibility/non-viewing
EMG	530.97	2.77	18.58	0.000	Being away/fascination Being away/compatibility Being away/non-viewing Extent/fascination Extent/compatibility Extent/non-viewing Fascination/non-viewing Compatibility/non-viewing
BVP	3.54	2.31	10.45	0.000	Being away/non-viewing Extent/non-viewing Fascination/non-viewing Compatibility/non-viewing

<sup>a</sup> Pairwise comparisons that were significantly different,  $p \leq 0.05$ .

<sup>b</sup> Alpha wave of left side of brain.

<sup>c</sup> Alpha wave on right side of brain.

Note: The Mauchly's W Statistic was significant in all four cases (i.e.,  $0.000 < p < 0.05$ , Mauchly's Test of Sphericity), and therefore, the Greenhouse-Geisser correction was used.

a psychophysiological sense? Secondly, to what extent do individuals differ in their responses to a given wilderness environment? Do individuals prone to stress or those with a strong coping strategy repertoire respond differently? Does experience use history and specialization influence psychophysiological response? Thirdly, given that these data are on-line, how do responses develop and/or change over time? To what degree can physiological response be recorded as a wilderness environment and experience unfolds in the field?

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# Toda Relationship With Nature as an Indication of Ecosystem Health

Tarun Chhabra

**Abstract**—A relationship with nature begins at birth when the neonate is a silent participant at the elaborate rites. A number of specified plant species are used during this ceremony and a highlight is the holding of an ‘umbrella’ of *Mahonia leschenaultiana* over the mother and the newborn—to protect them from the destructive influence of a star called *keihhtt*. In fact, the baby’s face is never exposed to the outdoors for this reason, until the naming ceremony occurs after a couple of months. At the naming rites, the child’s face is ceremonially exposed in front of the dairy temple of the hamlet, by his grandfather. After prostrating at the temple, he is first shown and told the sacred names of all the major natural sites around his hamlet. These are purely representative and would include one example of a sacred peak, stream, buffalo, bird, animal, temple, tree and other sites that the baby would relate reverentially to, during his lifetime. Thus begins every Toda’s relationship with sacred nature.

## The Toda People and Nature

If we study the Toda ways of life, we realize that the historical and mythological connection with nature actually began soon after their ‘dream-time.’ During the earliest times, the gods lived among the Todas. Each of their life stories is well known to many Todas, and natural landmarks associated with their exploits still exist. These gods and goddesses, after their time, went on to occupy various hill summits where they are still believed to reside. These are called *taihhov tehtt*, or “deity peaks,” of which there are more than 30. Even today, a Toda elder would not commit the sacrilege of pointing out the location of a deity peak with his finger—he would, in all likelihood, point at the neighboring hill and say, “The peak next to that.” Therefore, the first sacred connection with nature, of the earliest Todas began when their gods took up residence in certain prominent peaks.

A typical Toda prayer consists of sacred chant words, or *kwa(r)shm*, to different natural landmarks like nearby peaks, slopes, valleys, ridges, shola thickets, specific sacred trees and sacred rocks, swamps, meadows, pools, and streams, as well as to the dairy temple, sacred buffalo pen, pen-posts, pen-post bars and others. If one analyzes all the prayers, we have a corpus of several hundred sacred natural features and if one attempts to map all the features that have survived

the ravages of the march of civilization, then we have one important aspect of the Toda cosmography in place. Of the natural landmarks, the peaks are the most sacred entities and represent either a major or a local deity.

Besides the deity peaks, there are the hills that are sacred to all Todas, but exceptionally sacred to one clan—being almost on par with the deity peaks for a specific clan. The *Taihhavfy* hill for the *Taihhfakh* clan and the *Tehhkolmudry* hill (where the gods used to hold council in ancient times) for the *Kerrir* clan are prominent examples of such locally very sacred hills. Then there are the numerous hills that are sacred to a single hamlet and temple situated in the immediate vicinity. Finally, there are hills situated in the Toda afterworld of *Amunawdr*. Here, the hill of the ruling deity *Aihhn* is called *Taihh mushkullnn*.

Todas believe the entire sacred peak to be the anthropomorphic representation of a particular deity and hence do not build shrines on the summit—although other groups have occasionally constructed shrines in later times. Todas passing in the vicinity of a deity peak would reverentially do the *koymukht* salutation and softly chant the sacred prayer words of that god. The only two peaks visited on a pilgrimage by a few Todas are: *Kwatteihhn* and *Kawnttaih*. Many Todas relate stories of how they hear the sound of the god entering the hill and the closing of the entrance. At *Kawllvoy*, which is situated close to *Pazhtaarr* hamlet, the door-like entrance into the hill can be seen. There are several stories relating the power of the specific god, both from ancient to more recent times. One recent story relates to the construction of the hydroelectric dam at upper Bhavani a few decades ago. At this time, the workers started digging earth from the deity hills of *Aihhzaihow* and *Mozaihow* that are situated in the vicinity. This earth was to be used for the construction work. Some Toda elders protested at the sacrilege being committed to their sacred hills, but their words were not heeded. After a while, came the news that during the digging work, the earth had caved in and killed some workers. These hills were not touched thereafter. Therefore, any alteration in the ecosystem around a deity hill is an indication of profound sickness of the environment. This may be due to the planting of exotic trees or tea or the actual destruction as mentioned above. It is imperative to get the government to declare all the deity hills and their surroundings as indigenous heritage sites so that these are inviolable in the future.

The second major connection with nature began when the goddess *Taihhki(r)shy* divided her people into several patrilineal clans, of which fifteen still exist. After creating the clans, *Taihhki(r)shy* brought forth the buffaloes by a miraculous process. She divided them into the secular or domestic grade herds and the sacred or temple herds. She then created a number of grades of sacred temples and ordained which clans were to own which grade of temple.

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She stated which people were allowed to serve as priests for the various grades of temples. She then created a particular grade of sacred buffalo herd for each of the temple categories. She also gave the *kwa(r)shm*, or sacred words, to all the sacred areas and sites. In summary, she laid down the rules that form the rituals of today. She also established a sacred relationship with numerous aspects of surrounding nature and gave these prayer names. We shall be examining these in some detail.

The god *Aihhn* who now rules the afterworld from the peak called *Taihh mushkullnn*, is said to have called his daughter *Taihhki(r)shy* who had divine powers even exceeding his own. He told her that he had decided to set up an afterworld—*amunawdr*—where Todas would henceforth live on after death. He then asked her to look after this world—*imunawdr*—thereafter. So, all men, buffaloes and trees came to bid farewell to him. On the way to the afterworld, *Aihhn* took a strange path—he climbed up a series of natural rocky steps, he cooked food at a site and rested, he touched his chest on a stone and forgot all worldly attachments. Finally, after a long trek across many other natural obstacles, he reached the area where he set up the realm of the departed. He then established that after observing the essential rituals from birth (fig. 1) right up to the funeral ceremonies, a Toda spirit is then eligible to depart to the other world, by following the same route and across the same natural landmarks that he crossed. The ceremonies specific to males being the priest's ordination rituals and to ladies those of pregnancy.

Hence if a young girl were to die, then these above pregnancy rituals are incorporated in the funeral ceremony so that the spirit goes to *amunawdr* and dwells there peacefully. This incorporated the third major relationship with nature. It established that only a Toda who had performed his/her lifetime and sacred rites—by using all the mandatory specific



**Figure 1**—The relationship with nature begins at birth—a number of specified plant species are used during this ceremony (photo by Tarun Chhabra).

plants—would be qualified to reside at the afterworld. As long as the Todas continue to believe in the afterworld and the journey there, their culture is likely to survive. Another point that is fascinating about the afterworld is the fact that all the fifteen or so landmarks that the spirit is supposed to cross enroute actually exist as physical landmarks on the ground. For example, the stone steps that the spirit ascends actually exist on the ground in the form of a flight of stupendous natural steps going through the center of an awesome vertical cliff-face.

We shall examine some of the other important natural sacred sites: waters. There are two major river systems (fig. 2) in the western Nilgiris and both are highly sacred to the Todas. The first is the Mukurti-Pykara system, called *Kawlykeen* by the Todas. This mighty river has its source in the Mukurti region—a high rainfall area known to receive up to 10,000 mm (394 inches) of rainfall in one year and most of that in just two months. The Todas have an interesting story of origin for this river. Briefly, in ancient times, the priest at the highest grade of temple dairy committed a transgression of sacred rules. He then harvested some honey from a tree cavity and planned to stash it away without sharing any with his boy assistant. As he was walking down the slope, the creeper that was fastened to the bamboo vessel containing the honey and slung over his shoulder, snapped and the honey began to flow from the broken vessel. As the honey flowed, it turned to water and marked the source of this river—and the stream that this story is attributed to can still be seen as its source. The bamboo vessel, on breaking, became a snake.

The snake then looked menacingly at the priest who became terrified and started to run away in fear. The snake gave chase to the errant priest and this continued over a short distance of just over one kilometer. Just then, the priest noticed a hare crossing his path, and instinctively threw his sacred black loincloth atop the hare. The snake thinking that to be the priest, continued chasing the cloth covered hare for a long distance, but was unable to catch hold of the hare that was too fast. Hence the priest was saved.

The stream that flowed from the spilled honey became the original source of the Mukurti-Pykara river and if one visits the same shola at the slopes of the *Tehhdhykeihn* hill, there indeed, lies the source of this sacred river. The route that was taken by the snake and the priest initially, followed by the snake and the covered hare, went on to form the course of this river. Hence at the origin, this river is called *koylkwehhdr paw* from which the general name of the entire river—*kawlykeen*—is derived. *Koyl* means bamboo and refers to the bamboo vessel that fell and from which the sacred honey started to leak out. The hare was chased up to a point near the Glenmorgan area and hence believed to be the area where the river loses its sanctity and flows down the slopes. The hare escaped at this point and the river is called *kadrtashpaw* at the end. In prayers, this river is referred to as: *Kawlykeen / Kavozerry /*.

In the past, this river was held exceptionally sacred. A Toda crossing it could not be in a state of impurity and had to follow certain rules and guidelines while doing so. For example, they could cross only on certain days of the week and whilst doing so, had to have their right shoulders kept uncovered (*kefehnaarr*). There is a well known song composed less than a couple of centuries ago at the funeral of a man named



**Figure 2**—Many rivers in the Nilgiri Hills are sacred to the Toda, and must be kept wild and free (photo by Tarun Chhabra).

*Marvoy* who after engaging in coitus, crossed this river and went to collect honey at *Mudhmarr* hill, thus violating both the sanctity of the river as well as of the sacred act of honey gathering. It is a true story and only when vultures (vultures sadly, have disappeared from the upper Nilgiris) were seen hovering some days later in that area did his relatives set out to search for him. A tiger had killed him and the song composed at his funeral describes his life and end in detail. Todas can still point out the steep rock where he searched for the hive before the Tiger meted out justice. Importantly, there were certain specified crossing points, different for the people and for the priests—especially those of the highest grade *Tee* temple complexes. Not surprisingly, then, that the other major river system of the western Nilgiris also had its roots in honey gathering. This is the Avalanche—Emerald reservoir of today, called *Kinatthill(zh)y* in Toda.

It was rules and true stories like these that helped maintain the sanctity of these rivers. Unfortunately, the above sacred crossing points no longer hold that much relevance in the daily lives of the Todas as the waters of the Pykara hydroelectric reservoir have submerged them. Younger Todas would not even be aware of the names and locations of these crossing points. Outsiders have no idea that the extreme sanctity associated with this river has all but been lost due to the damming. In addition to the Pykara and Mukurti dams, there are the associated dams and reservoirs at Porthimund

and Glenmorgan. These have further obliterated many hamlets and sacred temples, as well as sacred migratory paths leading to the abandonment of several migratory, seasonal hamlets and de-function of the most sacred *Tee* temples. Even today, when a Toda diviner goes into a trance and is asked a question relating to the many problems that Todas nowadays seem to be beset with, the answer is often linked to the abandonment of the *Tee* complexes.

As mentioned, all the Toda gods and goddesses are believed to reside in certain sacred hills. The only exception is the abode of *Awlvoy* that is at a sacred waterfall in the Pykara river. This indicates the veneration with which this river is treated by the Todas. We can conclude that the damming of the two most sacred river systems might have led to a surge in the hydroelectric power generation for India's Tamil Nadu state, but this by a series of cruel blows, blew the fuse of the most important link that the Todas had with these deity rivers. Since these rivers no more run wild, there is no real sanctity remaining—as the sacred crossing points do not exist anymore, except when they flow out from a dam or during the dry season when the water has been released from the reservoir. This is the time that devout Todas still recognize and pray at the crossing points. Therefore, as far as the rivers of the upper Nilgiris are concerned, the Todas believe that their ecosystem has suffered incomparable damage.



## Sacred Streams, Pools, and Springs and Ecosystem Health

Every Toda hamlet that has a dairy temple would have sacred streams. One would be the ordination stream where the person undergoing the ritual is subsequently elevated to priesthood. Another is the sacred dairy temple stream from where the priest draws water for his daily use and for cooking. This is called generally as *pol(zh)y neepaw*, although each has a separate *kwa(r)shm* used by the priest in the prayer of the specific temple. In case a hamlet has two or three temples, then there would be a stream for each of them, although sometimes a single stream may be used for more than one purpose. In this case, it would be that the higher course of the same stream is used for the more sacred temple. No person other than the priest or the priest-to-be can touch the waters of these two categories of streams. When a temple is reoccupied after an interval, or if the water is deemed to have been polluted by somebody, then the stream is purified with *tehhdr* bark by the priest. Most sacred hamlets also have another stream for the sacred salt pouring rites held during the year, and again, only the priest is allowed to draw water to dissolve the salt in.

In some temples of exceptional sanctity like the *Konawsh* conical temple, another stream is reserved for the Toda men to bathe and purify themselves before approaching the temple. It is noteworthy that these streams should be perennial as most temples are in operation during the dry season. The ecosystem is said to be in a state of ill health if and when any sacred streams run dry. This would generally be attributed to the alteration in the ecosystem by the adjacent plantations of exotic tree species by the forest service. Other possible reasons could be due to pollution effects by extraneous elements on the sanctity of the temple and sacred area (this is explained later), or the transgression of sacred rules by the priest—this is considered as most serious. One more factor attributed in modern times, is the change in the climatic patterns especially related to the southwest monsoon. At other migratory hamlets like *Teihhfakh*, there is a stream reserved for the guests to use for festive cooking on the migration day. Remember that every hamlet also has a non-sacred stream for regular domestic use. The segregation of sacred and domestic streams is marked and often the priest who is returning to his hamlet touches the domestic stream as a final act of becoming a 'layman.'

In addition to these, there are some other categories of streams. One is connected with the 'dream time,' when the Toda gods dwelled in the Nilgiris. For example, the pool *Nehrykaihrr* is from where the goddess *Taihhki(r)shy* created the buffaloes and this pool is mentioned in the prayer of the conical temple at nearby *Pawshaihh* (*Nawsh*). Similarly, the stream called *Naihhrotkwehhdr*, where the god *Kwattaihh* tied down the reflection of the sun, making daylight into darkness, is mentioned in the prayer of the conical temple at *Konawsh*. There are many other examples. Then we have sacred streams or pools associated with the gods that are not mentioned in prayers, for example, the pool in the stream *polpaw* near the Kurumba hamlet of *Pawny* (Tudiki), where the god *Kwatteihhn* came across the goddess *Teihhkosh* bathing. We came across this amazing pool shaped like a circular buffalo pen and engulfed in divine vibrations after a long and arduous trek. We have a

singular example of a waterfall called *Awllvoy* that is classified as a deity site—almost all the others in this list are deity peaks. This is, of course, mentioned in many prayers. Finally, we have a number of streams and pools that are connected with the afterworld *Amunawdr*. One example is the stream *waskonskwehhdr*, where the departing female spirit places her pestle into a mortar shaped pit within the stream. Another is the large stream *pufehrrkheen*, where the spirit crosses a thread bridge enroute to the afterworld.

Only when one has 'experienced' the energy levels of these sacred waters, can one understand the sanctity that Todas have traditionally attached to them. The pool where *Kwat-teihhn* came upon the goddess bathing is a fine example. It would not be out of context to quote another example. At the now abandoned hamlet of *Kashwehh* belonging to the *Kerrir* clan, the sacred dairy spring is called *Ooneer*. Since ancient times, only the priest has drawn water from this pool. Now that the hamlet is not occupied, other people may occasionally use this water—with utmost reverence we are advised. For eight years, I have been visiting this hamlet to observe periods of solitude in the wilderness. This sacred spring has always had water within, even during the driest months. Only twice was this observed to have run dry and both times, during the wet season. Once, this was traced to a non-Toda buffalo herder whose daughter had drawn water during menstruation. Soon after the rituals were performed to sanctify this pool, the water returned. Therefore, sacred waters are important indicators of the well being of the Toda homeland as in many cases, the temples cannot be operated otherwise.

The Todas have scores of swamps that are highly venerated and have sacred prayer names. These have undergone profound changes in recent times—inevitably for the worse. With the damming of the sacred rivers, many of the largest wetlands were inundated. This act also destroyed vast areas of extremely rich biological diversity—many of these species are endemic to the upper Nilgiris. These swamps have also been destroyed or altered due to agriculture, planting of exotic trees, overgrazing, lack of firing (either naturally or by the Todas) and climatic changes on a global scale that have more recently been affecting the southwest monsoon. The main indicator species from which the Todas continually realize that their wetlands have been 'swamped' by other invasive plants, is the progressive and alarming decline of the grass used to thatch their temples—itsself an endemic species.

## Other Natural Sites and Ecosystem Health

### Sholas

Sholas are the thickets of the upper Nilgiris composed of stunted montane evergreen trees that hold a variety of epiphytic flora including orchids, a forest floor containing a number of rare and endangered flora like wild balsams, and the ubiquitous stream. The Toda relationship with these can be sacred—many thickets are generally sacred and/or contain specific divine objects like trees, rocks, pools, streams, and, of course, the sacred pathways used only by the priest. The other connection is utilitarian—the sholas

house many of the important and often sacred flora used in various ceremonies and aspects of life.

## Grassland

The grassy downs that surround the sholas contain the sacred pastures, slopes, rocks, streams, milking grounds, valleys and other important sites mentioned in the prayers. They also contain the floral species vital to various aspects of Toda life. Indeed, the sholas and grasslands of the upper Nilgiris actually constitute the basis of the Toda ecosystem. Without them, there would be no water and no biodiversity. As we shall see in the section on flora, the absence of any of the important floral species normally housed in these 'climax ecosystems' and of water, indicates degradation in their vitality. These are attributed to actual destruction and/or plantations of exotic trees, agriculture, climate change and habitation.

## Rocks

In and around every sacred hamlet and site, there are several interesting rocks and stones. Many of these are sacred and have names that are chanted in prayers. Some of these may also have utilitarian aspects—like the specific rocks where the salt is ground for the salt ceremonies. Others have specific rituals performed by the priest—like pouring of freshly drawn milk from the sacred buffaloes. Some have been placed in ancient times to form either the walls of the sacred buffalo pens or of the temples. Many have interesting mythological stories associated and are thus of miraculous origin. Like the couple who went on a pilgrimage but were impure and thus turned to stone—the two vertical rocks show them looking in different directions just like the story narrates. Where the god is supposed to have made a steep stream flow 'backwards' by damming it—to show the others that he was their equal, still has a huge cylindrical rock by the side of the stream. Therefore, by treating various categories of rocks as sacred, the Todas are able to provide protection to various aspects of their ecosystem. Added to this is the fact that many of these sacred rocky areas are essentially the repositories of perennial mountain springs and streams. By protecting such zones by declaring them as sacred, the Todas have been able to offset to a large extent the effects of climatic changes that might otherwise have led to the drying up of water sources. So we see that just declaring the waters as sacred might not suffice and so the Todas of ancient times also declared many rocks and cliffs as divine.

Besides all the natural sites mentioned, there are also several areas that are a combination of both natural and man made. These are the sacred hamlets that usually house temple complexes of the highest grades. In these places—like the area around the *Konawsh* conical temple complex—everything is sacred. Besides the temple, the surrounding shola, grassland, waters, flora, specific rocks, pathways, buffalo pens, hills and other landmarks are all considered as sacred. One has to approach this area in a state of purity and walk barefoot. Relieving oneself is prohibited. We therefore see that the Todas treated various sites with differing gradations of sanctity and were thus protected. Even today, sacred

Toda areas maintain a healthy ecosystem and resultant microclimate that insulates them from extraneous effects like those of global climate change. Only in modern times, when the government disallowed them from managing an ecosystem that they had done so proficiently for millennia, did the fabric of ecological health begin to disintegrate. As anybody can now attest, the Nilgiri ecosystem has withdrawn from its 'climax' status. It however still houses phenomenal biological diversity and the government should take steps to restore it to its hallowed standing.

## Fauna and Energy for Health

Not unexpectedly, various faunal species have also been conserved and indeed protected (fig. 3) by the Todas by a twofold method. The first being their status as sacred, albeit in some cases, feared creatures. But the difference being that these animals or birds physically ensured their own (Toda) sanctity rather than other aspects of nature that are treated as such. The second method is by eschewing meat and practicing vegetarianism. This non-hunting trait is most unusual in a community that did not practice agriculture traditionally and where even today, game is abundant. Note that the Todas have a name and story for almost every animal and bird in their area.

We need to remember that the Todas herd a breed of buffaloes that are, like them, endemic to the Nilgiris. These are separated into the sacred and domestic herds. Each of the six grades of temple dairies has an associated grade of buffaloes that can only be milked by the priest of that particular temple grade. He incorporates a mind-boggling array of rituals into the seemingly mundane procedure of churning the sacred milk into various milk products. Therefore, these buffaloes are the most sacred and important facets of life to Todas. So, protection of these buffaloes from predators perhaps



**Figure 3**—The highly endangered Nilgiri Tahr (photo by Tarun Chhabra).

initiated their role as also sacred. We find that even the son of the god *Kwatteihhn* was carried away by a tiger for failing to adhere to temple regulations. We have seen how a tiger killed a man in more recent times for crossing the sacred river in a state of impurity. Even today, we are told of many instances of a tiger meting out justice when an errant priest thought that nobody had noticed his transgressions.

Birds too have a similar, although more varied, role. The bird that plays the role of warning people of transgression of sacred rules is the Pied bushchat (*Saxicola caprata*) (fig. 4) and is called *kaarrpill(zh)c* in Toda. Because the female of this species looks different, it has a separate name. This bird warned the founder god *Aihhn*'s son of a sacred regulation that he as priest had omitted. But this was not heeded and the priest met his end by drowning. The mighty god *Kwat-teihhn* himself was warned by this bird of getting close to the goddess bathing in a pool.

Some roles played by other birds are stated briefly. The Grey jungle fowl (*Gallus sonneratii*) was the companion of some gods and plays its traditional role of rousing them and us from sleep. The god bestowed beauty upon them in return. The Egyptian vulture (*Neophron percnopterus*) is a divine messenger often from the afterworld. This bird sat atop the head of an old lady belonging to the *Kerrir* clan when they were on the brink of extinction and thus helped her conceive. The House sparrow (*Passer domesticus*) is the one who helps in controlling the severity and duration of the



**Figure 4**—The *Pied bushchat* plays the role of warning people of transgression of sacred rules (photo by Tarun Chhabra).

monsoon. The Common Kestrel (*Falco tinnunculus*) and the Oriental honey-buzzard lead Todas towards new sources of honey. Certain birds like the Streak-throated woodpecker and one species of Owl are harbingers of ill fortune and to be avoided. Others like the White-cheeked barbet (*Megalaima viridis*) call at a precise time thus indicating the time of the day. The Greater coucal (*Centropus sinensis*) has the uncanny ability to locate rare herbs from remote mountaintops that are inaccessible to man and the Todas have used these birds to bring them such medicinal plants.

Amongst amphibians, we have seen how an errant priest was chased by a snake in ancient times and how this episode led to the formation of one of the most sacred rivers. Even today, Todas believe that certain snakes take care of sacred temples, especially in the absence of the priest. These snakes are also quick to warn a priest when sacred transgressions are being committed.

With insects, the Todas have long understood the specific pollinators of flowering species as this assisted them in honey collection. This is elaborated in the next section.

## Flora and Energy for Health

The intimate connection with their flora exhibits the dependence of the Toda people upon their ecosystem. Broadly, maintenance of ecosystem health is done by marking all natural resources—notably the flora—that are likely to be used, or associated with, within a lifetime, as sacred and thus to be conserved. All these hundreds of species have sacred prayer names and are to be used in a sustainable manner. The Todas did so remaining within the natural cycle and keeping their own population levels low—even today, restricted to 1,400.

Since specific floral species used in various lifetime ceremonies cannot be substituted, these species have to be abundant around all hamlets. The most important uses that Todas have for the plants in their homeland are cultural. Every ritual or ceremony, be it of birth, pregnancy, paternity rites, priests' ordination, the elaborate dairy temple rituals and ceremonies, or the funeral rituals, all of these are centered on the use of specific species of plants. One reason why the Todas have preserved their ecosystem well is their dependence upon these plants for their culture. And why have these people preserved their cultural ethos? One important reason is the belief that only a person who has performed the mandatory lifetime rituals is qualified to take residence at the afterworld—*Amunawdr*. Therefore, as long as this is believed, the Todas will continue to preserve their culture and as long as this is done, they will strive to preserve their environment. For example, the pregnancy and paternity rites entail the use of the following plants: *Arundinaria* sp. of bamboo reeds; *Mappia foetida* leaves; *Rhododendron arboreum* ssp. *Nilagiricum* sticks; *Rubus ellipticus* leaves; *Myrsine capitellata* branches; *Syzygium arnottianum*; *Sophora glauca* branches and *Andropogon schoenanthus* grass. So, if all the species used in a Toda's rituals and culture were to be counted, we would have a total of more than 100 plant species that are required in the vicinity of each hamlet.

The barrel-vaulted and conical temples are also constructed using only specified forest produce like: *kwehtf* or *paarsh*

(*Sideroxylon* sp.) tree poles; specified wooden planks or stone slabs; rattan cane (*Calamus pseudo-tenuis*); *waadr* bamboo reeds (*Arundinaria wightiana* and *A. w.* var. *hispidula*); other bamboo species' sticks; specified wood for the door and carved *kweghaishveil* that is like a totem placed vertically atop the thatch; *teff*—thin bamboo reeds (*Pseudoxytenanthera monadelphica*); and a swamp grass called *avful* by the Todas. Again, if any of these once plentiful species were to get depleted, the Toda culture would be at the crossroads, as they are not allowed to substitute with other species. Taken a step further, if any of these were to become locally extinct, then their culture could collapse in a short period. This is indeed a frightening scenario given the fact that Toda culture is unique and so are their barrel-vaulted temples and houses as well as the conical temples. Only two conical temples are remaining, one of which is situated in a very remote location and was rebuilt in 1995. It took us some time to convince the clansmen of the need to rebuild this structure and keep the equally unique rituals alive. Now, the conical temple of *Konawsh* is opened every year for a month for ritual purposes. Such temples are veritable marvels of tribal architecture and even in areas where annual precipitation can cross 3,000 mm (118 inches), they can last for up to 80 years, only requiring periodic re-thatching.

The grass used to thatch their temples perhaps illustrates best the predicament that these people today find themselves in. Excluding a few hamlets in the east, they are only allowed to use a species of grass called *avful* for this purpose. At one time, around a quarter of a century ago, this grass was fairly common in many swamps in the main Toda heartland of the Wenlock downs. Today, it has all but disappeared from this area and can be found in reasonable quantity only in some large swamps in the extreme western plateau, especially in the Korakundah and surrounding areas. Even here, another species is now predominating. What are the reasons for the disappearance of this species from most of the erstwhile swampy areas? We recently initiated a study to find that out and it emerged that ever since the Todas were not allowed to set fire to these swamps (one way of Toda management—by a sacred ritual) during the dry winter months, other species started to dominate and soon took over. The mass planting of exotic trees like eucalyptus and wattle on adjacent hillsides also contributed. This species was finally identified as: *Eriochrysis rangacharii*, C.E.C. Fischer—a Nilgiri endemic mentioned in the red data book of endangered species. In fact, even though the Todas have used this regularly to thatch their temples, it was thought by science to be almost extinct some decades ago! This is also the only Indian representative of an otherwise African and American genus. This project was sponsored by the WILD foundation.

To the Toda, their ecosystem is in good stead if all the indicator species flower at the precise time that the corresponding stage of every season commences or ends. Recently, alteration in the hilltop ecology where the Nilgiri lily and the 'churning stick' plants are located has caused them to become scarce. Similar examples indicate a change in the health of the environment.

Plants are indicators of the different seasons in a year and of each stage within every season. To give an example of the southwest monsoon, the indicator species for the immediate

pre-monsoon phase are: *avfulazhky* and *nicazhky*—both belonging to the *Oldenlandia* genus and are ubiquitous during May. An ancient song and story refer to a sacred buffalo that came to this world from *Amunawdr* and calved when the flowers of these two bushes were blooming. From this we know that this story occurred during the month of May. The name *avfulazhky* literally means 'puffed rice' and it is apparent that this derives from the unopened buds of this plant that closely resemble grains of this food. Another plant that flowers during this period are the different species of *arisaema* or the 'cobra flowers' called *poddwa(r)shk*. The early monsoon is indicated by—*Ceropegia pusilla* (the 'churning stick' plant), *Drosera peltata* (an insectivorous sundew) and the orchid *Calanthe triplicata* (the leaves are used to make a vessel to hold honey in). The delicate *Anemone rivularis* blooms denote the peak monsoon. The final phase is represented by the most handsome of all Nilgiri wildflowers, the Nilgiri lily—*Lilium neilgherrense*. The final phase of the monsoon in early September is also the most vitriolic. I once told a Toda elder *Kwattawdr Kwehhttn* that the rains showed no signs of abating and he assured me that the monsoon would end within a week. He explained that the sacred *maw(r)sh* trees (*Michelia nilagirica*) had started flowering en masse in the sholas, thus indicating the impending end of the southwest monsoon. From that time, I have noted that this botanical indicator of the cessation of the monsoon is remarkably accurate. The other seasons and intervening stages are also similarly indicated by specific species by their flowering cycles.

Plants are indicators of the climatic pattern of a particular period of the year. The Todas have terms for the differing climatic variations that every season brings. The precise flowering of corresponding species of plants denotes these. And the relationship does not end here. The climatic pattern of that period, the species flowering and the star most prominent in the sky, all have identical names. The ecosystem is therefore said to be vital only if all elements of this climate-flower-star triad are in perfect synchronicity. Any change in climatic pattern first affects the flowering cycle of the indicator species. For example, a change in the intensity of the southwest monsoon in recent years has caused the peak monsoon indicator—*Anemone* sp. not to bloom in profusion, but very sporadically.

Certain species, like *Strobilanthes* and some bamboos, flower in precise cycles of many years. As long as they continue to do so at the precise intervals—the Todas are aware of the number of years after which each of these should bloom—the ecosystem is deemed to be in fine tune. Changes are usually due to alteration in the ecology or climatic variations. An equally profound dying down follows mass flowering.

To assist in the practice of honey gathering, the Todas have not only noted when different species flower and the kind of honey produced, but also the insects and bees that pollinate them. This is elucidated in an ancient song that elaborates on when specific flowers are in profusion and the corresponding species of bees that are pollinating them. Today, when climatic changes cause some tree species not to mass flower at the correct time, the Todas realize that something is profoundly wrong with their ecosystem and that honey is not going to be available that season.



The flowers of *Ceropegia pusilla* were used to model the unique cane milk churning stick. And, interestingly, not only do these endangered flowers look like miniature churning sticks, their tubers are also highly nutritious. Similarly too, the circular buffalo pens said to have been inspired by the shape taken by a clump of *Gaultheria* sp. bushes --this is the wintergreen used in our pain balms. Flowers also inspired several embroidery motifs and continue to inspire song compositions.

An herb that blooms on the grasslands of the Toda heartland, are the small flowers of *Gentiana pedicellata* called *arkilpoof*. This Toda name literally means 'the worry flower' and the flower indicates the anxiety levels of humans. This carpets the grassland and sometimes it is difficult to walk without treading upon these delicate blooms. It is believed that if a person with worries plucks this plant and holds it in the hand without touching the flower, the flower closes. It is very sensitive and closes faster if the degree of anxiety is pronounced. We have experimented with this over the years and found it to be very accurate—whenever a person with some nagging worry accompanied me, this flower would close in a flash. As long as such species are present at the right period and continue to show the correct reactions, the ecosystem is normal. Since most such plants are hygrophites, climatic changes leading to variation in monsoon intensity have led to their scarcity in many areas.

The Todas have depended upon certain plants for their flowers to indicate not only the season of the year, but also the time of day. One prominent example of this is the 'six o'clock flower' (*Oenothera tetraaptera*) that blooms at almost exactly that time in the evening irrespective of weather conditions. The Todas have a good knowledge of several *Strobilanthes* species, depending upon their flowering cycles and the medicinal qualities of the honey they ultimately produce. These are called generally as *katt*, with *tehrverykatt* flowering once in six years, *pelil(zh)ykatt* every twelve years, and *pyoofkatt* mass flowering after eighteen years. This is also used to denote a man's age and wisdom—a man is said to be extremely wise if he has witnessed several flowering cycles of *pyoofkatt*. It is noteworthy that in the past, this species was present around every hamlet and therefore anyone who had seen it flower twice would know that he/she were 36 years old and so on. Nowadays, with rapid alteration in the ecosystem and the changes in climate, a Toda just cannot rely on this for one's age.

There are some species like the bark of the *Meliosma wightii* tree that can only be used by a priest and nobody else. Several thorny plant species are used during ordination ceremonies of the priest, to purify him.

Some bamboo species are used to make flutes, others in the construction of traditional structures, yet others are used to make sacred vessels. Rattan cane is used for a variety of uses. Some sticks are used to fabricate spears. The leaves of the terrestrial orchid *Calanthe* are used to make a vessel to hold honey. Amongst the plants used routinely by the Todas in their rituals for practical purposes are those of the species *Litsea wightiana*. The thin branches of these are dried and used to make fire by friction and fire cannot be made by any other means at ceremonies. Finally, the species of grasses used for thatching purposes are known to provide prolonged shelter from rain.

## Sacred Rituals and Ecosystem Health

Traditionally, every year the priests of the highest-grade temples would initiate a sacred ritual of setting fire—with fire sticks—to certain areas of the grassland at the start of winter. Although this was done for ritual purposes, they had a larger role of managing the grassland ecosystem. With the forest service disallowing the firing rites and the changes in climatic conditions, we have noted the alarming decline of vital species like the endemic *Eriochrysis rangacharii*—the specific species used to thatch temples. The second method is by ensuring that the ecosystem—be it shola thicket or grassland—around sacred water sources is preserved. Since the Todas know the specific plant species that conserve the hydrology of these ecosystems, they take special care to see that these species are abundant around water sources. This insulates the water source from the effects of global warming. For example, during the summer months it is not unusual in recent times to experience a fairly long period of drought. However, due to conservation of the ecology especially the water retaining species, the sacred stream would still be perennial, albeit with less water. Most of these species have a complex subterranean 'sponge' like effect, but a few like *Oldenlandia verticillaris* hold 'jugs' of water within their large leaves. It is due to such plants that the western upper Nilgiris has the unique distinction of being one of the few ecosystems where the precipitation and the areal water runoff levels (the 'water yield') are the same. The Todas also address the harsh climate controls of the western Nilgiri edge by migrating there during the dry season and returning by the time the harsh monsoon sets in.

The salt pouring ceremonies are performed by the priests at all temples during different periods of the year, for the sacred buffalo herds. This ritual, besides the utilitarian aspect of feeding brine to buffaloes (in an area almost devoid of natural salt), is basically a prayer for an abundance of rain and hence pasture and hence milk and other vital natural resources in the coming months. Ceremonies like these are a plea to the divine to bless and maintain the health of their ecosystem. Failure to perform the salt rites even today is an invitation for climatic changes and resulting ecological ill health. There is another ceremony where the Todas gather annually on a sacred hilltop to pray for good rainfall and normal climatic conditions. Besides these, a few Todas claim to possess the ability to chant sacred incantations that can either bring about localized rainfall or to withhold it for a short period.

## Toda Ecological Footprint

It has been calculated that the ecological footprint of an average U.S. citizen is 8,000 kg (4,409 gallons) oil equivalent and the CO<sup>2</sup> emission: 20,000 units. Compare this with those of an Indian: 500 kg (276 gallons) oil equivalent and an average CO<sup>2</sup> emission of 1,000 units. Of course, in this consumerist monoculture world, the eco-footprint is directly related to the per capita income (PCI) of the nation. The USA has a PCI of \$35,000 whereas India is lagging far behind at just \$700. At the same time, we realize that if India were to

increase its PCI by fifty times, then its eco-footprint would also reach 8,000 kg oil equivalent. One can then visualize the impact this 'growth' would have on the ecosystem—keeping in mind the Indian population. In fact, Edward O. Wilson has calculated that for the developing world, including China and India, to reach current levels of the developed world, it would require four planet Earths to sustain this phenomenal growth.

So, what would be the ecological footprint of a modern Toda? We could calculate the PCI to be around \$300 which is less than half that of an average Indian. Even today, less than one out of every 100 Todas owns a vehicle (including two wheelers). Compare this with a 1:1 ratio in the United States. Therefore, emissions of CO<sub>2</sub> from this source is negligible for a Toda. And air travel is almost non-existent amongst Todas.

But you might ask—what about burning wood to supply energy? Yes, the Todas do rely totally on wood as a source of fuel. And while the government is going all out to 'modernize' these people by providing them with modern style housing, these too remain small and have little cement and more mud. Toda traditional houses are marvels of tribal architecture. These can last for many decades, only requiring periodic re-thatching, in areas where the annual precipitation can reach 4,000 mm (157 inches). When it is bitterly cold or windy outside, these are very warm within. It is important to keep a fire burning as much as possible as this makes the various components bind into one cohesive unit. Despite having hardly any foundation, they act as natural windbreakers and remain intact even after the most violent storm. They also blend superbly with the undulating terrain and do not stand out like modern houses do in the grassy downs. The entrances are very low and small and this ensures that no enemy or wild animal is able to enter easily. We have already seen the specific species of raw materials that are used for the construction of traditional structures.

In the early 1990s there were just half a dozen barrel-vaulted houses remaining. All except one of these was situated in migratory hamlets where no other forms of housing are allowed. Then one man asked us to obtain government sponsorship for a barrel-vaulted house as his ailing father wanted to depart in a traditional house. The rest, as they say, is history and over the past ten years we have approached government and private agencies for sponsoring traditional houses. Today, we have been able to assist in funding over 40 barrel-vaulted houses. The WILD foundation has sponsored a few. Added to these are the scores of existing temples—two are conical and the rest barrel-vaulted.

It is noteworthy that these traditional structures use natural products that are sustainably harvested from a climax ecosystem—where the consumption and emission of carbon are already balanced (fig. 5). The raw materials



**Figure 5**—Toda traditional structures use natural products that are sustainably harvested from a climax ecosystem.

are renewable and harvested when mature and hence have already served the vital function of capturing carbon during their growth. A fascinating aspect is that these traditional structures have the unique property of not emitting carbon into the atmosphere from the wood burned within. Hence these structures are actually able to capture and sequester carbon. Therefore, they are most eco-friendly and should be promoted amongst the Todas. In fact, a traditional structure cannot survive for long without the fuel wood being burned within. They require the smoke to be absorbed within all components and this binds the various raw materials into a cohesive unit structure. We can conclude that the ecological footprint of a Toda is barely traceable on the ground and in the air.

# Living in Interesting Times: Selected Implications of Landscape Ecology for Conservation Science

John Shultis

**Abstract**—The phrase ‘May you live in interesting times’ links well with the sub-discipline of landscape ecology. Recent research in landscape ecology and associated disciplines (for example, conservation biology) provides significant challenges to the traditional conceptions of wilderness and conservation science, and may in part reflect upon our view of contemporary society as being characterized by complexity and uncertainty. Four selected implications of landscape ecology research for wilderness advocates and managers are identified and described. These issues relate to the importance of ecological processes in ecosystem functioning, the existence of multiple spatial and temporal scales in landscapes, the integration of the natural and social realms, and unpredictability and lack of understanding of ecological patterns and processes. While there are many ramifications of these four issues for wilderness conservation, there are also broader implications of landscape ecology’s conceptualization of nature and conservation. A parallel movement in conceptualizing society and nature as self-organizing systems characterized by disturbance and complexity in the natural and social sciences is also discussed. Both these disciplinary and trans-disciplinary findings will significantly affect the social functions and management of wilderness in the future.

## Introduction

When reviewing recent research in landscape ecology (LE) and associated disciplines, the popular phrase ‘May you live in interesting times’ comes to mind. While commonly thought to be an ancient Chinese curse, in fact, this saying was written by an American science fiction writer more than 50 years ago (DeLong 1996-98). However, the power of this saying in contemporary times shares at least one characteristic with LE research. In many ways, the history and author of this saying is irrelevant: there is no doubt that much of its power and usage comes from the perceived uncertainty and unpredictability of contemporary society, and the numerous social perturbations taking place in the early 21<sup>st</sup> century. We seem to be suffering the ‘curse’ promised by the saying.

Such rapid change is also evident in the sub-discipline of LE. Indeed, as will be demonstrated, change is at the

very heart of LE, and landscape ecologists are learning to deal with ‘interesting’ findings and issues raised by their research. As a conservation scientist—not a practicing landscape ecologist—I believe that many important lessons for wilderness conservation, science and management can be gleaned from studying research in LE.

The first task in this paper will be to briefly review the history and central tenets of LE. Next, several of the most relevant findings in LE for wilderness and other conservation managers will be identified and reviewed. While these direct ramifications are important to wilderness and protected area managers, the broader implications of LE research will also be provided; linking the common findings and approaches of LE with other sub-disciplines suggests the emergence of a trans-disciplinary conception of landscapes, conservation, society and science. Finally, the paper concludes with a review of the major implications of LE research for wilderness and other protected area administrators and managers. Specific challenges to conservation scientists become evident when viewed through the lens of LE.

## History and Central Tenets of Landscape Ecology

The sub-discipline of LE arose in the 1980s from the fields of ecology, conservation biology and wildlife biology/ecology (Bissonette and Storch 2003). Theoretical and methodological advances in these and other fields led to the creation of a sub-discipline focussed on the study of patterns and processes in landscapes. From a more practical perspective, the increased degradation of wild landscapes, loss of biodiversity, and increased frustration with the lack of targeting these social issues in ecology also led to the creation of LE. These latter factors are also shared with the closely related sub-discipline of conservation biology (CB), which also combines both a theoretical and applied focus on protecting species and biodiversity (Salafsky and others 2002).

LE and CB were also informed by and helped create a shift of how nature is conceptualized. The traditional view of nature was of a homeostatic, linear reality. More recently, the conception of landscapes has changed to being categorized by disturbance and complexity. This has led to a new conceptualization of nature as a complex, adaptive system. More specifically, instead of seeing nature as homeostatic, predictable, linear, and steady-state, it is now viewed as multi-causal, non-linear, non-deterministic, self-organizing and dynamic, an interacting maze of patterns and processes that exist simultaneously at numerous scales.

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Change and disturbance have moved from the background to the foreground of landscapes, and the scale of research has expanded to the landscape level. The new keywords that define natural processes are unpredictability and complexity in a self-organizing, non-equilibrium state (Berkas 2004; Bissonette and Storch 2003; Callicott 2003; Levin 1999).

The main conceptual framework of LE, as originally posed by Forman and Godron (1986), separates landscapes into: 1) structure, 2) function, and 3) change. Structure refers to spatial patterns of landscape components, their composition, configuration and connectivity. Landscape functions are ecological processes that take place in these spaces (for example, succession, nutrient recycling, species emmigration/immigration). Change is the constant dynamic that occurs at all scales.

## Selected Implications of Landscape Ecology Research

### 1. Focus on Both Ecological Components and Processes

This new model has tremendous implications for the way we view wilderness and wilderness conservation. First, LE suggests that we need to focus as much on protecting landscape processes as on components, although landscape ecologists themselves have only begun to study the characteristics of these processes (Bürge and others 2004; Hobbs 1997). Most conservation efforts still target species, or a larger species-based target, such as biodiversity or biodiversity hotspots (Lyons and others 2005). Other shortcuts to conserve ecosystems include the use of indicator, flagship, umbrella, endangered or focal species. While these shortcuts are absolutely essential to conservation managers - it is impossible to preserve all species—the long-term effectiveness of these shortcuts in preserving species or biodiversity is still uncertain, and each approach has limitations (see Bifulchi and Lodé 2005; Lyons and others 2005; Manley and others 2004).

For a variety of reasons, it has proven to be very difficult to shift managerial focus from species or biodiversity to ecological processes; the most obvious reason is that species are concrete, while processes are much more abstract. Public opinion can easily be swayed by endangered charismatic megafauna, but it is hard to generate public opinion or funds by highlighting dangers to ecological processes such as succession or nutrient recycling. Shifting focus to ecological processes in conservation science (rather than components such as species) will probably involve incorporating such approaches as ecological integrity and ecosystem health. While some conservation agencies, such as Parks Canada, have attempted to shift management directives to preserve ecological integrity, there is still difficulty in making such a significant shift in terms of organizational mindsets and capacity, funding, and research capabilities (Parks Canada Agency 2000). In addition, the definition of these two terms are still being debated in the scientific community and our knowledge of how these concepts (as social constructs) can be measured and managed in the landscape is still nascent (Pimentel and others 2000).

### 2. The Issue of Scale

The finding most emphasized in LE is that numerous, interacting scales exist in all landscapes. These scales exist in both spatial and temporal dimensions, and seem to drive much of the uncertainty and complexity in landscapes. Frustratingly, findings from one scale are often irrelevant at different scales, from the genetic to the global. Spatial scales are in turn affected by the history of the ecosystem, so that events occurring at one location will not necessarily occur in a similar ecosystem with a different ecological history (Landres and others 1999). Thus, findings in one location or scale can often not be extrapolated to other locations/scales; each landscape often has an idiosyncratic ecological history, which then leads to, for example, different responses to human-based disturbances such as fragmentation. These emergent, dynamic properties exist at all spatial and temporal scales, with each scale dynamically interacting with other scales.

These findings mean we cannot continue to view wilderness as static islands of conservation: ecological processes at smaller and larger than park scales are inevitably, though virtually invisibly, affecting protected areas. It seems likely that maintaining or restoring connectivity between and among scales will be the only way to conserve ecological components and processes in the medium term. For example, recent research suggests that while park size is important in maintaining biodiversity, maintaining the flow of processes between and among different scales, including the landscape level, will be even more critical. That is, *de facto* or designated buffer zones surrounding wilderness or other protected areas are essential, equal in importance to protected areas themselves. This is perhaps the greatest challenge facing wilderness, as neighboring landscapes are becoming increasingly fragmented and populated (DeFries and others 2005; Parks and Harcourt 2002; Wiersma and others 2004).

### 3. Acknowledge Limited Understanding of Ecological Structure, Function, and Change

Given the increased recognition of the sheer complexity of landscape structure, function and change, many landscape ecologists and conservation biologists accept that our knowledge of ecosystems and ecological processes is limited. In addition, huge gaps remain in our knowledge of even relatively basic ecological information. Acknowledging this lack of understanding and lack of data – not to mention the lack of funding to conduct research – requires different approaches to research in and management of ecosystems. For example, when knowledge is incomplete, an adaptive management approach may be optimal; the precautionary principle has also been suggested as a useful approach, although the political support for this approach has been inconsistent at best (Lyons and others 2005). In addition, multiple approaches to conservation (at multiple scales) may also be needed. As Kati and others (2004: 478) have noted, “conservation practices must be as dynamic as ecosystems.”

An important corollary of this implication is if one acknowledges uncertainty and imperfect knowledge of landscapes, the traditional techno-scientific model of decision-making becomes displaced. The role of science becomes focused on description of reality, but the evaluation of reality is open to all in society; science loses its hold upon decision-making in management (Beck 1992). This in part explains the recent movement towards, for example, ecosystem management, adaptive management, the precautionary approach, and community-based conservation. Each management approach recognizes this uncertainty, our limited knowledge base, and the limits of the traditional techno-scientific decision-making model.

#### 4. Re-Integrating the Natural and Social Realms

Like many other relatively recent sub-disciplines, LE and CB acknowledge that the natural and social realms co-exist in landscapes (Berkes 2004; Bissonette and Storch 2003). Further, these two realms cannot be separated: humans impact all landscapes from the genetic to global scales. Of course, this is antithetical to the original wilderness ideal, and constructivists have also taken wilderness to task on the separation of landscapes and humans (see Callicott and Nelson 1998). LE and BC provide similar challenges to the wilderness concept.

However, recent research also makes it clear that wilderness and other protected areas are still necessary tools to protect landscapes. They are currently the best short-term approach to protecting landscape structure and function. But by themselves, species-based conservation approaches in protected areas will not preserve the ecological processes that provide the foundation of all landscapes at all scales over the long term; landscapes outside protected areas and the agencies that manage them must also conserve landscape structure, function and change (Marzluff 2004; McKinney 2002; Pierce and others 2005; Struhsaker and others 2005).

#### Broader Ramifications of Landscape Ecology

As noted, the four issues described above all have critical implications for wilderness and conservation science. Approaches to wilderness and conservation science and management will need to be refocused in order to reflect the importance of scale, acknowledging uncertainty and imperfect knowledge, the re-integration of natural and social forces and the necessity of managing ecological processes as well as components, especially species. To be sure, current management approaches such as ecosystem and adaptive management attempt to incorporate some—though not all—of these new realities. However, these management approaches are still being integrated into administrative structures, and conservation managers have been shown to continue to rely upon more traditional management actions (for example, species-based research and conservation at park scales) (Pullin and others 2004).

However, there are broader ramifications of the issues noted above. First, LE is not the only sub-discipline to emphasize non-linearity, scale uncertainty and complexity. Increasingly, newer sub-disciplines in the social sciences (for example, natural resource sociology) also characterize society as multi-scalar, showing non-linear processes and high levels of uncertainty and complexity. There is a movement towards an integrated socio-ecological systems model, one which suggests that similar processes and forces are at work in both the landscape and society (Scoones 1999; Warren 2005).

For example, the community concept in conservation science has tended to reflect a rather homeostatic, steady-state, linear view (much like the traditional view of nature). Communities are often seen as roughly equivalent, and similar approaches are attempted when introducing community-based conservation. However, the term 'community' hides a great deal of complexity. Communities are now seen, like landscapes, as dynamic, self-organizing entities influenced by spatial and temporal scales. Like landscapes, the history of communities affect their present structure and capabilities; they are dynamic and self-organizing. Perhaps the uneven success of community-based conservation in protecting biodiversity is based, at least in part, in viewing communities as steady-state, linear systems unaffected by social and cultural processes at other scales. For example, regional or national policies can have the effect of neutralizing or reversing local scale policies. Some researchers have suggested that the global focus on economic growth and increasing consumption of natural resources work against our efforts to preserve landscapes and ecological processes at the local level (Czech 2000; Naveh 2000). However, most community-based research tends to ignore the structural forces at larger scales, which may obstruct the ability of a community to protect biodiversity (Berkes 2004; Carlsson 2000).

The concept of communities is not the only concept to be critically questioned. Science itself is also being re-conceptualized. From the Enlightenment era, science was focussed on the prediction and control of nature for utilitarian ends. Science traditionally uses deterministic, reductionist approaches to studying the natural (or social) world. But when nature and society are conceptualized as inherently complex and unpredictable, new approaches to science are required. So-called 'post-normal science' embraces the inclusion of non-linearity, complexity, multi-scaled reality, and self-organizing systems (Galopli and others 2001).

A number of related approaches in many other disciplines and sub-disciplines have embraced this new model. For example, complexity theory, adaptive management, ecosystem management, and non-equilibrium thermodynamics all stress the dynamic, non-linear nature of reality and integrate humanity and the natural world (Shultis and Way 2006).

#### Conclusions

While I hesitate to use this oft-used phrase, I believe that wilderness and conservation science are facing a major paradigm shift. LE is both contributing and reacting to this shift, which relates to the 'interesting times' we are living

in at the beginning of the 21<sup>st</sup> century. Several threads in this shift are emerging:

1. From viewing landscapes as homeostatic, ordered, and mechanistic to dynamic, complex systems;
2. Conceiving nature in multiple scales, with each spatial and temporal scale acting separately and in an integrated manner; and
3. Integrating nature and humans in science and conservation, acknowledging the impact social forces have upon ecological forces and human conceptions of nature, wilderness and conservation (and vice versa).

It is worthwhile to reiterate that the above changes are occurring in both the natural and social sciences; that is, landscapes and society are beginning to be viewed as having equivalent organizing processes and properties. This may serve to further hasten the consilience of natural and social science research (Warren 2005; Wilson 1998).

For wilderness advocates and managers, the issues identified in this paper provide a range of additional challenges to conservation science and management. For example, administrators and managers must begin to fund research into the patterns and changes in ecological processes; while species- and biodiversity-based approaches are very useful, it is dangerous to focus on ecosystem structure while ignoring ecosystem function and change. Research in wilderness and other protected areas should also occur at multiple scales. Too much park research examines only park level scales; however, ecological structures, functions and changes in other scales—both in the natural and social realm—also affect park ecosystems. While there are many structural barriers to manage for conservation purposes outside protected areas, conservation scientists must continue to push for conservation outside park boundaries. A multiple, adaptive approach to conservation is warranted, given the uncertainty and complexity of landscapes and our lack of understanding of all these complexities. In addition to using multiple scales, multiple approaches to research and management should also be attempted. While shortcuts to preserving ecosystem structure, function and change are inevitable (for example, using concepts such as biodiversity, indicator or endangered species), managers and scientists must be aware of their idiosyncratic limitations. Finally, wilderness and other protected area administrators and managers must communicate the new assumptions and conceptualizations to the public and decision-makers in order for necessary changes in approaches to science and management to germinate.

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# Managing for Ecological Integrity in Protected Wildlands: Key Management Challenges and Research Priorities in British Columbia

Pamela A. Wright

**Abstract**—Protected areas have long served two masters: providing recreation, tourism and economic opportunities while conserving resources. As wild lands have become more scarce, there has been increasing realization that recreational use of protected areas is not benign. Consequently, there has been growing discussion and debate about how to reconcile human use with conservation. British Columbia is still within an active park creation phase with an increase from approximately 5.6 percent of the land-base protected in parks as of 1992 to approximately 13 percent today with new areas being added daily. This paper presents the results of a series of interviews and surveys that identify key management challenges and research priorities for managing for ecological integrity in British Columbia. Although significant barriers and challenges remain, Parks Canada has moved beyond the issue of organizational culture towards more resource specific management challenges. The agency has changed capacity and organizational structure to develop and implement a strong research agenda. In contrast, while BC Parks staff identified some key research challenges, they are by and large, not a research-oriented organization and are lacking capacity to conceive, organize, manage and implement research to aid management. Most agency resources are focused currently on maintaining current operations in the face of significant organizational barriers.

## Introduction

Protected areas systems (for example, national and provincial parks agencies) have long served two masters: providing recreation, tourism and economic opportunities while conserving resources (Foster 1978; Searle 2000). Over time, however, as the land surrounding protected areas has been more intensively modified, wild lands have become more scarce and public values for conservation of protected areas have increased (Globescan 2000). At the same time, there has been increasing realization that recreational and tourism use of protected areas is not benign (see for example Banff-Bow-Valley Study 1996; Parks Canada Agency 2000a,b; Wilkinson 2002). Consequently, there has been growing discussion and debate about how to reconcile human use with conservation (Wilkinson 2002).

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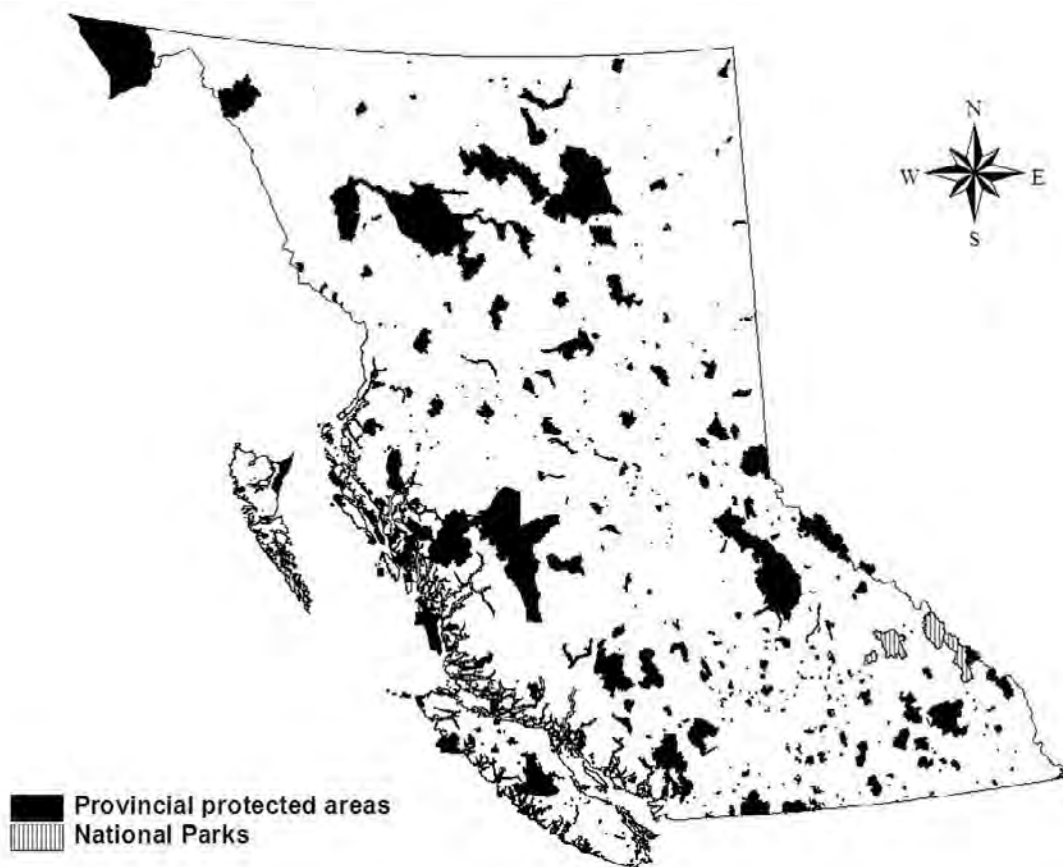
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In: Watson, Alan; Sproull, Janet; Dean, Liese, comps. 2007. Science and stewardship to protect and sustain wilderness values: eighth World Wilderness Congress symposium: September 30–October 6, 2005; Anchorage, AK. Proceedings RMRS-P-49. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

In addition to a growing number of studies on the impacts of human use on protected areas (Cole 2004) there has increasingly been a focus on clarifying, in policy and legislation, the purpose and objectives of protected areas management and on the adoption of new management approaches. Paralleling the emergence of ecosystem-based management in the broader resource management literature (Grumbine 1994) has been the emergence of the concept and management framework of maintenance or restoration of ecological integrity (Woodley and others 1993) within protected areas, among other jurisdictions. Parks Canada has been a leading adopter in the idea of managing for ecological integrity, first setting the policy in place in 1979 and later strengthening the accompanying legislative and policy guidance in 2000 (Wright and Rollins 2002). Subsequently, other jurisdictions (for example, BC and Ontario Provincial Parks) have been exploring management, policy and/or legislative options for managing for ecological integrity. The adoption and diffusion of the management goal and the subsequent management challenges is of great currency given that other jurisdictions are currently considering the merits of revising their goals.

In northern and western Canada, notably in British Columbia and the territories, wildland and protected areas management is a critical issue and growing concern. Federally, the majority of new national parks and over 95 percent of new park lands have been designated in the territorial north. Over the past 20 years the overwhelming majority of new federal park lands have been created with the support, and at times at the behest of Aboriginal peoples (Dearden and Rollins 2002). In British Columbia, we are still within an active park creation phase with an increase from approximately 5.6 percent of the land-base protected in parks as of 1992, to approximately 13 percent today with new areas being added daily (fig. 1). And like the federal counterparts in the north, the active treaty process in British Columbia means that new park establishment in BC has come with the active participation of First Nations. The role of Aboriginal peoples in new park creation and subsequently, in management, while not exclusive to the north is a dominant feature of northern protected areas management. Aboriginal involvement and co-management brings with it an additional set of challenges to ecological management.

In addition to the growing role of aboriginal peoples in new park creation and management, other unique aspects of protected areas management include the accelerated growth of wildland designations concurrent with a rapid decrease in staffing and financial resources for management; rapidly accelerating resource development outside of protected areas;



**Figure 1**—Protected areas in British Columbia as of 2006 consisting of National Parks and Provincial protected areas.

changing meanings of wilderness; increasingly polarized public perspectives on use and management of protected areas; and growing interest in the economic rewards from nature-based tourism inside and outside of protected areas.

## Purpose

Few projects have examined protected area management barriers and challenges (for example, Carr and Eagles 2003; Wiersma and Campbell 2002) and most discussion is informal or anecdotal (for example, Rasker and Lee 2003). Although targeted research has focused on barriers to management and research within Parks Canada (Banff-Bow Valley Study 1996; Parks Canada Agency 2000a,b; Searle 2000; Wright 2002), follow-up and expansion to other agencies is needed. The primary purpose of this project is to identify key management challenges and research priorities for managing for ecological integrity within British Columbia.

## Methods

In phase one of this project a series of 27 in-depth interviews were conducted within BC/Yukon provincial and federal agencies in the summer of 2005. Respondents included BC Parks personnel, regional park planners, conservation specialists, and recreation officers and federal parks designated research

contacts (for example, manager of resource conservation/ecological and commemorative integrity). Additional material in the form of park research permits and lists of research priorities were also collected and incorporated into the results. Further phases of the project will involve interviews with other agency personnel and with researchers involved in wildland and protected areas research.

## Results

### Challenges and Barriers to Protected Areas Management

Previous studies of Parks Canada identified a series of key challenges and barriers to managing protected areas for ecological integrity (see for example Parks Canada Agency 2000a,b; Wright 2002). The question was expanded to include a broader range of management challenges and to allow us to examine differences between federal and provincial parks in the BC/Yukon area. We felt that identifying management barriers would help identify research priorities. Highlights of these findings are noted below.

**Organizational Culture, Policy, and Legislative Barriers Improved in Parks Canada.** Five years ago, the key barriers to management for ecological integrity in national parks were focused foremost on organizational culture with

cascading effects in policy and legislation, the role of science, competing management objectives, staffing and other areas. In this study, key barriers that were identified for Parks Canada included:

- Staffing levels and amalgamation of management units
- Inadequate funding and timing of funding
- Social science expertise and information
- Knowledge of how/who to consult
- Coordination challenges between initiatives/acts, etc.

Our preliminary examination suggests that the barriers Parks Canada is facing in BC/Yukon are more typical logistical management challenges. Although policy and legislative barriers appear to have been largely removed, political influence and decision-making remains a challenge.

**Conflicting Policies, Objectives, Culture and Intent, Significant Barriers for BC Parks.** BC Parks has undergone significant cultural shifts in the last decade from a gradually increasing focus and capacity (including training) on ecosystem-based approaches, to management, to more recent political shifts in the role of the organization. Along with drastic staffing reductions (more than 50 percent in the last five years) the major barriers are centered around organizational culture. Staff are conflicted and in turmoil, such that interviews were at times quite emotional. Primary barriers identified were those related to organizational culture including:

- Not enough staff to do jobs
- Requests to suppress information to public
- Lack of focus on what Parks' purpose is
- Lack of common vision
- Start-stop decision-making
- Shifting power within agency
- Shifting organizational mandate from conservation to providing economic revenue-generating recreational opportunities
- Political interference
- Funding given to things not considered a priority internally
- Park deletions occurring to enable development

#### Unique Northern Challenges for Protected Areas.

We asked all participants whether they were able to identify any unique challenges in management facing northern protected areas. A number of key problems or challenges were identified from logistical to cultural including:

- Pine beetle
- Oil and gas exploration—directional drilling under park
- Wind power in alpine areas in exploration
- Highest economic development in province
- Introduced species on remote archipelago
- Frontier philosophy
- Cumulative effects not understood
- Caught between north/south ideals
- Money for contractors/cooperators and infrastructure is limited
- Some cultural differences
- Transportation of toxics
- Global warming effects more dramatic in north

- Northern issues more a matter of geographic size than complexity
- Acceptance and use of traditional knowledge
- Northern issues more focused on aboriginal issues
- Communication problems between north and south
- Parks more a 'state of mind' as opposed to a place in north (cultural construction/geography)
- International attention for cooperative management

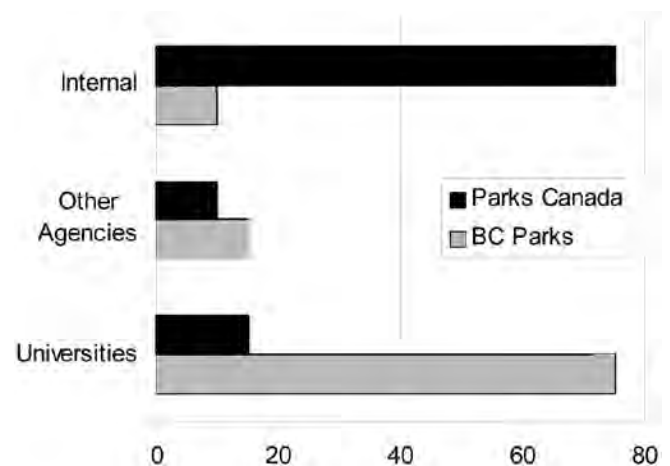
## From Management Challenges to Research

The identification of challenges to managing for ecological integrity is the first step in identifying possible responses (Rice and others 2003). We were interested in exploring the role of research, possible research priorities and challenges for using research to address these challenges. In particular, we wanted to address questions including:

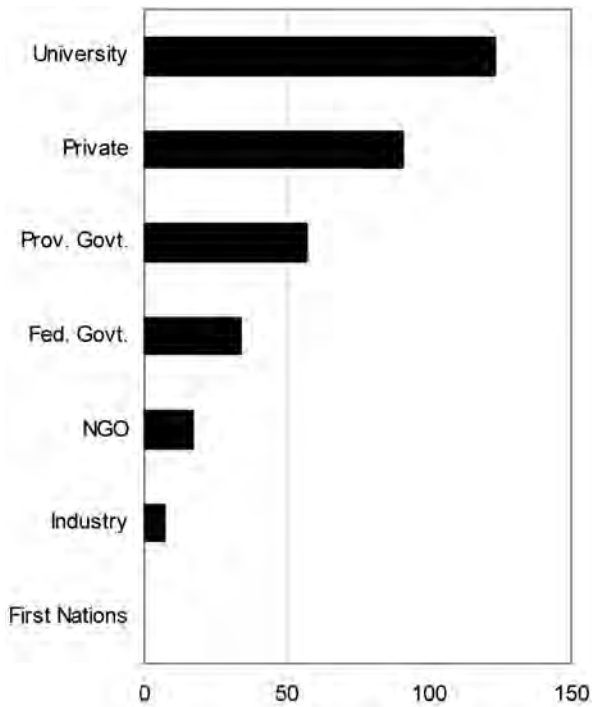
- Who is doing research in parks?
- How is research communicated to management?
- Is science used in decision-making?
- What were emerging research needs?

**Who Is Conducting Park Research?** We asked survey respondents to identify who was conducting research in parks and whether it was initiated by the agency or by an external researcher. Significant difference was noted between Parks Canada and BC Parks in this regard. Parks Canada staff were most likely to indicate that research was initiated internally while BC Parks staff indicated that research was initiated by external organizations, predominantly universities (fig. 2).

To expand upon this question, we conducted a review of the BC Parks research permit records (2005) to identify those who currently held research permits. Universities and private individuals were the primary research permit holders, confirming the estimates provided by survey respondents (fig. 3).



**Figure 2**—Responses to the query of who initiated research projects: internal initiation (within the agency); other agencies; or universities and other researchers.



**Figure 3**—Number of BC Parks research permits held or applied for within the 2005 year by applicant type.

**How Is Research Translated for Management?** Communicating research findings to managers is a critical step in an adaptive research/management process. By and large, BC Parks staff indicated that there was no real mechanism for this to happen and that much of the time they did not even receive the results of research or if they did, they were likely to be filed by the staff member receiving them and not shared. Increasingly, BC Park staff are looking to develop catalogues of research projects and exploring the idea of searchable databases, however, to date these efforts are not widespread. Parks Canada has more of a heritage of formalizing links from research to management but this it probably strongly related to the fact that they initiate much of the research. Key mechanisms identified to communicate research to management range from informal to formal including:

- Joint project review of plans (for example, Department of Fisheries and Oceans, and Parks Canada)
- Conservation training
- Access to electronic journals
- Use of scientific subcommittees and science advisory panels
- External reviews of applications/projects
- Preparation of background documents for planning that summarize information
- Non-formal peer review with universities
- Personal connections to university professors

**Is Science Used in Decision-Making?** When asked whether research results were used in park decision-making, we received a qualified yes in our answers that we have summarized as a 'Yes, but....' response. Qualifiers ranged

from challenges with the research itself to challenges with the decision-making process, including:

- Yes, but less than 50 percent of the time
- Sometimes it is too detailed for park decision-making
- Some research has direct applicability
- When we get research results it is definitely useful
- Some is useful, for example, identification of species habitat, archaeological work
- Getting better
- Depends on site superintendent
- Applying specific studies regionally difficult
- No - structure of decision making is politically, not scientifically based
- Could be better- need more capability in parks office to handle findings
- Increasingly yes (past no)
- Yes, if it was appropriate research in the first place
- Some research projects range in validity
- Some research may make situations muddier
- Yes, although sometimes we face political influence in the use of results

**What are Emerging Research Needs?** The capacity to identify research questions varied significantly between organizations. While Parks Canada had in most cases published or has readily accessible lists of research priorities and projects, most BC Parks personnel were not able to identify researchable questions and challenges. However, the following research needs were identified:

- Identifying thresholds for activities to preserve park values
- Introduced species impacts and control methods
- Effective indicators for human use
- Causes of caribou herd decline
- Role of parks in larger landscapes
- Visitor/activity use trends (geo-caching)
- Understanding natural disturbances
- Forest health management

## Conclusions

### From Management Challenges to Research

Although significant barriers and challenges remain, Parks Canada has moved beyond the issue of organizational culture towards more resource-specific management challenges. The agency has growing capacity and organizational structure to develop and implement a strong research agenda. Some weaknesses, particularly in the areas of social science research are noted, however, improvements in these areas are being targeted.

In contrast, while BC Parks staff identified some key research challenges, they are, by and large, not a research-oriented organization and are lacking capacity to conceive, organize, manage and implement research to aid management. Most agency resources are focused currently on maintaining current operations in the face of significant organizational barriers. Approaches, such as the BC Protected Areas Research Forum ([www.unbc.ca/bcparf](http://www.unbc.ca/bcparf)) may help move

the research agenda forward but without structural changes to the agency there will continue to be major challenges.

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# Ecological Restoration of Degraded Wilderness Ecosystems: Removing Exotic Plants and Introducing Prescribed Fire to Restore Natural Diversity in Two National Park Wilderness Areas

Gary Vequist

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**Abstract**—In the United States, national parks were established mainly for their scenic qualities with an emphasis on how they looked rather than how their natural systems worked. Natural conditions in Theodore Roosevelt National Park and Buffalo National River had been degraded by decades of livestock ranching and timber harvesting prior to their designation as units of the National Park System in the late 20<sup>th</sup> century. These ecosystems remained degraded and showed no progress toward recovering on their own. It became unrealistic to assume that the landscape's natural diversity could recover without some purposeful ecological restoration. The removal of exotic plants and the reinstitution of fire have helped to set in motion the recovery of native plant communities in these two Midwestern wilderness areas.

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## Wilderness Management in the Past

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### Wilderness Designation

The Wilderness Act created a new management paradigm for some Federal agencies, but not for the National Park Service (NPS). The Wilderness Act calls for a level of natural area protection that can be higher, but not lower, than the protection afforded by the agency's legislation. The NPS Organic Act of 1916 created the National Park Service with a natural resource preservation purpose, "to conserve... natural objects...unimpaired." Likewise the Wilderness Act of 1964 created the National Wilderness Preservation System whose purpose is to preserve "natural condition... unimpaired" (Sec. 2(c)).

Practically speaking, both national parks and wilderness areas share a principle purpose of protecting natural conditions unimpaired. Because of this shared purpose, during the first decade after the passage of the Wilderness Act there was little need seen to seriously consider wilderness designation in park areas. Wilderness designation in parks moved slowly until

1976 and 1978 when 19 park sites were designated Wilderness, including the two discussed in this paper.

### Wilderness Management

Many Midwestern national parks had been through periods of indiscriminate logging and livestock grazing. Early NPS management emphasis was placed on protection of existing landscape scenery, not on restoration of lost biological attributes. It was believed that simply protecting new parklands would allow nature's resiliency to reestablish ecological integrity. But it became apparent that "forces of nature" alone cannot naturally heal the most severely damaged ecosystems.

NPS Management Policies 2001 state that: "Management should seek to sustain the natural distribution, numbers, population, composition, and interactions of indigenous species." Further, these Policies direct the National Park Service to restore extirpated native plant and animal species whenever the species had disappeared, or was substantially diminished, as a result of human-induced change. Exotic species, (non-indigenous species) have opportunistically invaded disturbed native plant communities. At this time it is unrealistic to assume that natural diversity can recover in the most severely degraded wilderness areas without park managers undertaking restoration.

### Wilderness Restoration

Should damaged ecosystems in wilderness be restored? One common view is that ecological restoration should not occur in wilderness since it should remain "untrammeled." Another common view is that ecological restoration should occur to reverse the downward trend created by fire exclusion and exotic species invasion. The need for action or non-action depends on the extent of damage to wilderness resources and whether those resources would likely continue to diminish under mere custodial management.

Restoration of wilderness to natural condition is not easy or quick and cannot exactly duplicate pre-disturbance condition. Although it is difficult to understand or be able to predict all the interacting ecological processes, it is critical that managers of national park wilderness explore appropriate ways to repair damage to prairie and forest ecosystems. Examples of wilderness restoration successes are discussed for two Midwest parks, Theodore Roosevelt National Park and Buffalo National River.

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In: Watson, Alan; Sproull, Janet; Dean, Liese, comps. 2007. Science and stewardship to protect and sustain wilderness values: eighth World Wilderness Congress symposium: September 30–October 6, 2005; Anchorage, AK. Proceedings RMRS-P-49. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

## Theodore Roosevelt National Park: Removing Exotic Plants to Help Restore Native Plant Communities

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### Background

The Theodore Roosevelt Wilderness consists of two separate units totaling 29,920 acres (12,108 ha) within the Great Plains of North Dakota. While most Western parks were carved out of vast public lands, Theodore Roosevelt National Park had to be pieced together in 1947 from former ranches. The prairie grasslands were invaded by exotic plants (non-native grasses and forbs), which had replaced native plants in some locations. The prairie bison had been replaced by domestic livestock, while elk and bighorn sheep were hunted to near extinction. The initial reintroduction of bison, bighorn sheep and elk into the wilderness improved its natural diversity.

### Problem Statement

The wilderness character will degrade further without restoration of the natural condition of the prairie plant communities. In recent decades, exotic plants, particularly leafy spurge (*Euphorbia esula*), invaded indigenous biotic communities within the wilderness, altering the prairie ecosystem. Leafy spurge, an import from Eurasia, easily becomes the dominant plant in the native prairie plant communities. When the abundance of native plants declines, the animals that depend on them lack the food and habitat needed for their survival. Leafy spurge, with few natural enemies, is an aggressive plant capable of competing directly with native plants. Its woody roots are nutrient reservoirs that can sustain the plant during droughts. In patches of spurge the soil is altered, inhibiting many native plants from growing nearby. Leafy Spurge has invaded most of the suitable wildlife habitat across the Theodore Roosevelt Wilderness.

### Solution Identified

The Northern Great Plains Exotic Plant Management Plan and Environmental Assessment stated that the “weed infestations left untreated would continue to degrade the park wilderness resource.” Unmanaged exotic plant infestations will change wilderness into a weed wasteland. The minimum requirement analysis provision will require some extraordinary measures to achieve the purposes of the Wilderness Act. Management actions should be undertaken only when the knowledge and tools exist to accomplish restoration goals. The preferred alternative precluded vehicle ground access in favor of aerial herbicide treatment and the dispersal of biological agents. The restoration of natural condition will ensure protection of ecological integrity and wilderness character.

### Results

The hallmark of this Park’s restoration program is its exotic plant management team (EPMT), which has been successful in halting the spread of exotic plants with

judicious application of chemical herbicide and biological agents (insects). Within the 10,047 acres (4,066 ha) of the lower wilderness of Theodore Roosevelt National Park, there are approximately 2,800 acres (1,133 ha) dominated by leafy spurge plants. Essentially all of those acres infested were treated with aerial application of herbicide. Between 1994 and 1999, close to 1,200 acres (486 ha) were treated, while between 2000 and 2004 over 3,000 acres (1,214 ha) were treated. In addition, biological control agents, such as flea beetles (*Aphthona* spp.), were released at hundreds of sites in the wilderness (fig. 1) with over 16 million beetles released in the park.

Exotic plant distribution monitoring was conducted in the wilderness. This research relied on Geographical Information System (GIS) analysis to record the presence and relative density of the targeted species throughout the wilderness. The monitoring allows the EPMT to adapt to local conditions and needs. It appeared that areas of infestation have been reduced resulting in a return of plant diversity in some plant communities. The restoration of shortgrass prairie ecotype depends on successful control of leafy spurge and other invasive exotic plants. This would allow for the recovery of this prairie ecosystem, restoring the natural condition to wilderness lands.

## Buffalo National River: Reinstating Prescribed Fire to Help Restore Native Plant Communities

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### Background

The Buffalo River Wilderness consists of three separate units totaling 34,933 acres (14,137 ha) in the central forested highlands (Ozarks) of Arkansas. Early 19<sup>th</sup> century land clearing followed by fire suppression unfortunately yielded an undesired consequence for the ecosystem. Fire suppression in the last century contributed to changes in composition and structure of the forest communities, resulting in overgrown thickets of oak, hickory and cedar. The extensive open forests with oak savanna and rocky glade plant communities that existed prior to European settlement were an artifact of American Indian use of fire. For thousands of years Native Americans played an essential role in significantly shaping plant diversity associated with shortleaf pine (*Pinus echinata*) and post oak savanna (*Quercus stellata*) communities. They used fire to promote ecological succession into what has generally been accepted as natural condition for wilderness.

### Problem Statement

The wilderness character will degrade further without reintroduction of fire as a natural process in wildlands. New forest growth and years of fire exclusion allowed dense stands of trees to shade out grasses and other sun-loving plants, resulting in catastrophic changes to plant communities. Many specialized endemic plants are being shaded toward extinction and natural diversity is declining. Researchers had spent 14 years studying the disappearance of oak savanna and barren glade ecotypes within the Lower Buffalo Wilderness. Conservation biologists knew these important





**Figure 1**—Sixteen million flea beetles were released in Theodore Roosevelt National Park to reduce leafy spurge populations (National Park Service photo).

ecological communities needed help if they were to survive into the next century.

## Solution Identification

Prescribed fire is the most natural method available to restore the plant communities' ecological integrity. The prospect of a prescribed burn in designated wilderness sparked philosophical debates. Thus, returning fire to this wilderness landscape was no simple matter. It was deemed necessary to reverse the ecological degradation, resulting from abuses and errors of human use in this forest. Fortunately, plant diversity still persists along forest edges, so they should respond by reseeding burned areas. A fire management plan was developed which included fire prescription to reverse the man-caused changes to this ecosystem.

## Results

Restoring ecological integrity to the wilderness area required sophisticated knowledge of how natural systems work and the expertise to apply it. Applying the minimum requirement concept to wilderness fire prescription resulted in some localized, short-term impacts but also contributed long-term benefit. The long-term benefit to the wilderness character would be preventing the loss of rare open savanna ecotypes. Ecological restoration activities aimed toward long-term desired natural condition often required repeated applications of prescribed fire (fig. 2).

Following a series of smaller prescribed fires, an 11,284-acre (4,566-ha) prescribed fire was ignited in 2003. Conducting this prescribed fire in a remote and thickly wooded forest proved

to be no small undertaking. After years of planning, the entire unit was ignited by hand with no motorized equipment in deference to wilderness values. An underlying direction for wilderness stewardship policy was not to impede natural disturbances, such as fire. So, protecting ecological integrity was shifted from maintaining static natural conditions to allowing free play of natural forces. The restoration to natural condition of the open shortleaf pine forest and oak savanna depends on the successful introduction of prescribed fire.



**Figure 2**—Repeated application of prescribed fire at the Buffalo National River was needed for ecological restoration (National Park Service photo).

## Wilderness Stewardship for the Future

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A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. (Aldo Leopold)

As the half-century mark approaches for the National Wilderness Preservation System, many wilderness areas will be on the path to restoration. The goal of wilderness

stewardship is to preserve the natural condition of wilderness. Unfortunately, protection alone, which has been the hallmark of National Park Service resource management program, is not enough to achieve this goal. The restoration measure should be undertaken at the minimum extent necessary to restore wilderness resources. Once the recovery of natural diversity in wilderness is achieved, then the newly restored wilderness character can be maintained and preserved.

# Wilderness and Wild Lands in the Northern Appalachian Region of North America: An Ecological Perspective

Stephen C. Trombulak

**Abstract**—The ecological context of the Northern Appalachian region of North America is reviewed and general patterns of ownership and protection status of land discussed. Although there is wide variability among the states and provinces in the proportion of their land that is publicly owned, only a very small proportion, ranging from 0.1 percent to 8.0 percent, anywhere is managed as wilderness. However, a recent analysis of the Human Footprint in the region identifies a larger amount of land (35 percent) that is as yet relatively little modified by human disturbance, indicating that the amount of wild lands in the region is much higher than the amount of designated wilderness. Six challenges for wilderness and wild lands protection are identified: continuing public land acquisition; increasing the protection status of land to prioritize ecological integrity; improving incentives for private ownership of lands managed as wilderness; developing an integrated view of conservation strategies that increasingly sees wilderness protection as part of a suite of conservation tools; assessing the contribution of wilderness to the region's long-term ecological integrity; and actively using wilderness areas as ecological controls against which to compare the consequences of more manipulative land-use practices.

## Regional Overview

### A Consideration of Terms

Any discussion of “wilderness” must be clear on what is meant by the term. In common usage, wilderness can be in colloquial reference either to the natural character of a landscape or to a formal regulatory label. Either use offers only imprecise insight into the actual character of a landscape with respect to its place along the spectrum from human-dominated (or cultural) to natural, and both uses are open to abuses; a place colloquially referred to as wilderness can simply be, or appear to be, more natural than its surrounding landscape, and a place legally designated as wilderness can have any level of cultural modification legally allowed.

Yet the intent of both uses of the word is sound; societies benefit from being able to distinguish lands that are essentially dominated by ecological processes from those that are not, both for the insight those lands give us about the

baselines for ecological normalcy and for the identification of places on a landscape intended for the conservation of species and ecosystems that are not viable within the human sphere of dominant influence.

Thus, some way to distinguish between wilderness as a condition of a landscape and wilderness as a legal designation is needed. In this paper, I refer to lands that are, at most, minimally affected by cultural modifications as “wild lands.” No place on Earth is completely *unaffected* by cultural modifications if for no other reason than the changes that are occurring in the global climate as a result of greenhouse gas emissions (McKibben 1989). Yet wild lands can be identified relative to surrounding landscapes (Sanderson and others 2002) based on the degree of change in land use, land cover, human populations, transportation networks, and changes in hydrology. Further, I refer to lands that have a legal designation to be managed primarily or exclusively for the conservation of biological diversity or ecological integrity as “wilderness.”

## Ecological Features of the Northern Appalachian Region

The Northern Appalachian region of the northeastern United States (which includes portions of New York, Vermont, Massachusetts, New Hampshire, and Maine) and southeastern Canada (including New Brunswick, Nova Scotia, Prince Edward Island, and a portion of Quebec) represents a geographically diverse landscape united by the dominance of mixed northern hardwood (primarily maple, beech, and birch) and softwood (primarily spruce and fir) forests. Distributions of these forest types vary climatically, with the softwood forests predominant at higher latitudes and elevations.

In addition, numerous small-scale ecological types are scattered unevenly throughout this region embedded within the larger matrix forest communities. These include a wide range of wetland and non-forested upland communities, as well as rare late-successional (for example, old-growth) forest stands (Leverett 2001). Thus, complete ecological representation of the region within a system of protected areas (including wilderness areas) requires region-wide distribution.

Hydrological regimes in the Northern Appalachians are strongly linked to the North Atlantic Ocean, through the St. Lawrence River and numerous other rivers that flow directly into the Atlantic. In addition, with the exception of a few ice-free refugia, the region became free of glacial ice only between 15,000 and 10,000 years ago (Klyza and Trombulak 1999). This period of deglaciation was associated with and followed

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In: Watson, Alan; Sproull, Janet; Dean, Liese, comps. 2007. Science and stewardship to protect and sustain wilderness values: eighth World Wilderness Congress symposium: September 30–October 6, 2005; Anchorage, AK. Proceedings RMRS-P-49. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

by higher sea levels and salt-water inundation even in the western portion of the region. Thus, aquatic biodiversity here, such as migratory Atlantic salmon (*Salmo salar*), is strongly linked to the ocean, and its conservation requires attention to complete migratory corridors from headwaters to ocean.

## Ownership Patterns and Status of Protected Land in the Region

As anywhere, lands in this region are owned either publicly (for example, federal, state/provincial) or privately. Both types of ownership have different relationships to the protection and management of wilderness and wild lands. It is surprisingly hard to obtain consistent or complete information on the amount, location, and management priorities of conservation lands in the entire Northern Appalachian region; Canada, in particular, makes access to such data quite difficult. Yet despite the poor quality and availability of data, based on what is available a few general trends are clear.

The U.S. portion of this region is primarily in private ownership with relatively little of it managed to achieve conservation goals. For example, in the state of Vermont, slightly less than 13 percent of the state is publicly owned as conservation lands and only an additional 3 percent is private conservation land (Klyza and Trombulak 1999). The majority of all conservation land has GAP 3 status of conservation protection, primarily in the Green Mountain National Forest; only 1.0 percent of the state is protected as wilderness (Klyza 2001a), making it one of the lowest proportional levels of GAP 1 status in North America (DellaSala and others 2001). The other states in this region within the United States show a similar pattern, with wilderness protection (state and federal combined) ranging from 0.1 percent (Massachusetts) to 4.1 percent (New York) (table 1).

A much greater proportion of the land in the Canadian portion of this region is publicly owned. For example, in the province of New Brunswick, 45 percent of non-submerged land is Crown Land (New Brunswick Department of Natural Resources 2005). Again, as in the United States, the vast majority of public land is managed for resource extraction rather than for conservation of ecological integrity. The level of GAP 1 status land in Canada ranges from 3.6 percent (New Brunswick) to 8.0 percent (Nova Scotia) (DellaSala and others 2001), with the caveat that data are not available for Prince Edward Island.

## Ecological Condition in the Region

Recently, colleagues and I have assessed the Human Footprint of the region in order to identify its major remaining wild lands (Woolmer and others, in review). Working with a resolution of 90 x 90 m, we scored each of nearly 42 million grid cells on four general parameters: human population, human land use, human access, and energy infrastructure. The scoring system for each parameter was scaled so that the greatest extent of cultural modification (for example, highest human population density, closest distance to the largest type of road) received a score of 10, and the least extent of cultural modification received a score of 0. Scores for each grid cell were summed across all parameters and reported as a Human Influence Index (HII). We designated those grid cells with cumulative HII scores  $\leq 10$  as wild lands, recognizing that wilderness is a continuous and relative character.

Based on the criteria established in this analysis, 35 percent of the region is characterized as wild lands, and 8.5 percent of the area has an HII score of zero. The distribution of wild lands is uneven across the region. Large blocks of wild lands are present in the Adirondack Park region of New York (largely representing current wilderness areas), northern Maine, eastern Quebec, and northeastern New Brunswick.

## Conserving and/or Restoring Ecological Integrity in the Region

Given the existing patterns of both wilderness and wild lands in the region, one can now ask what is necessary to conserve and restore ecological integrity here. Certainly, ecological integrity requires more than just wilderness and wild lands. For example, sustainable resource harvesting, control of exotic species, reintroduction of extirpated species, and minimization of pollution are all critical for maintaining and improving the ecological health of a region, including the Northern Appalachians. Moreover, the reality that human populations in this region will continue to increase into the foreseeable future demands that increasing attention be given to how urban and exurban development can proceed in such a way as to promote ecological integrity within the sphere of human influence. However, even with a strong focus on sustainable development and/or "smart growth," no

**Table 1**—Public conservation lands and wilderness in the United States that contribute to the Northern Appalachian region (acreage and percentage of state) (Klyza 2001a).

State	Federal conservation land	State conservation land	Federal wilderness	State wilderness
Maine	172,163 (0.9)	717,069 (3.6)	19,392 (0.1)	188,000 (0.9)
Massachusetts	65,315 (1.3)	533,624 (10.6)	2,420 (0.0)	6,000 (0.1)
New Hampshire	757,378 (13.1)	186,682 (3.2)	102,932 (1.8)	0
New York	66,839 (0.2)	4,128,534 (13.5)	1,363 (0.0)	1,261,639 (4.1)
Vermont	375,936 (6.2)	309,782 (5.2)	59,421 (1.0)	0

set of region-wide conservation strategies will be completely successful without inclusion of wilderness and wild lands.

Thus, with respect to wilderness and wild lands protection as tools in the conservation toolbox, three essential efforts are required. First, public lands must increasingly be managed at the GAP 1 level. Second, the remaining blocks of wild lands identified through the Human Footprint analysis must increasingly be the focus of future land acquisition or protection, both by government and private-sector conservation organizations. Third, the land that serves as linkages among large blocks of wilderness and wild lands must increasingly be the focus of attention for land acquisition or other conservation strategies (for example, conservation easements). These efforts would allow an integrated system of ecological reserves to maximally contribute to the ecological integrity of the region over the long term.

## Successes and Failures in Establishing Wilderness and Wild Lands in the Region

Historically, two countries and nine states/provinces have been involved in creating a regulatory structure for designating wilderness in this region. One of the earliest, and still perhaps greatest, successes in wilderness designation in the Northern Appalachians was the passage of the “forever wild” clause to the New York State constitution in 1894, which declared that the lands of the state constituting the Adirondack and Catskill Forest Preserves (now forming the cores of the Adirondack and Catskill Parks) would be “forever kept as wild forest land,” and timber from those lands would not be sold, removed, or destroyed (Klyza 2001b). This state-owned land remains today as the largest block of wilderness in the region.

Yet the action of the New York State legislature in the late 1800s had little *region-wide* impact on the establishment of wilderness. What was needed was a regulatory framework to emerge at the federal levels. In the United States, this came from the Wilderness Act of 1964. The original act viewed the wilderness character of an area to be a function both of its size (“of sufficient size as to make practicable its preservation and use in an unimpaired condition”) and unaltered condition (“a wilderness ... is hereby recognized as an area where the earth and its community of life are untrammelled by man”).

Neither of these conditions could be easily met in eastern North America as a result of the region’s long history of occupancy and alteration by European colonists. Thus, the so called “Eastern Wilderness Act” of 1975 was passed, creating 15 wilderness areas that were smaller or had greater degrees of human alteration than would have been acceptable under the more stringent requirements of the original Act (Klyza 2001b). At the present time, wilderness is an established regulatory land-use designation for federal land in the eastern United States, which recognizes that not all conservation goals require large areas and that, over time, ecologically healthy conditions can be restored to areas that have experienced anthropogenic degradation.

In Canada, actual designation of wilderness areas, if it is to occur, falls under the domain of each province, and there is no such thing as federal wilderness. Land protection at

the federal level is largely covered by the Canada National Parks Act. Revised in 2000, the Canada National Parks Act now stipulates that “maintenance or restoration of ecological integrity, through the protection of natural resources and natural processes, shall be the first priority [in] considering all aspects of the management of parks” (Department of Justice Canada 2004) leading national parks in Canada to now be managed in a way that captures at least some of the priorities we hold for wilderness.

Despite historical success in establishing wilderness and protecting wild lands in the Northern Appalachian region, recent setbacks have not been encouraging about the prospects for future protection efforts, especially in the United States. Perhaps the greatest problem recently has been the obstructionist position taken by a vocal minority of the public concerning even modest proposals for wild lands protection. In 1997, for example, Champion International, a privately owned timber company, put 132,000 acres (53,419 ha) of land in Vermont up for sale. A coalition of buyers, made up primarily of the U.S. Fish and Wildlife Service and the State of Vermont, purchased the land to expand an existing wildlife refuge, maintain a large amount of the forestland in timber production to support the local economies, and create a small (12,000 acre/4,856 ha) ecological reserve to protect special natural communities (Bateson and Smith 2001; Klein 2002). Although the amount of land to have been protected in the reserve was small (only 9 percent of the total area) and hunting and fishing would still have been allowed in the area, the proposed reserve was bitterly and successfully contested in large part on the grounds that the proposed management plan for the reserve would not allow the use of motorized vehicles in the area, even though the area has no permanent residents.

Similarly, a recent proposal by the Vermont Wilderness Association for the expansion of the federal wilderness system in the Green Mountain National Forest (Vermont Wilderness Association 2001) generated considerable public opposition and little support among the state’s largely progressive and environmentally supportive congressional delegation in part because it would require the closure of 21 miles (34 km) of snowmobile trails (which constitute less than 0.2 percent of snowmobile trails in the state). That efforts to protect wild lands and establish wilderness areas could so spectacularly fail based on the complaints of motorized recreational vehicle users, despite the overwhelming support by the public for wilderness and ecological protection, does not speak well for the potential for significant successes in the U.S. in the immediate future. [President Bush signed the New England Wilderness Act into law on 1 December 2006, which designated 34,500 acres of land in New Hampshire and 47,000 acres in Vermont as wilderness. The amount of land in Vermont represented a political compromise from the original proposal of almost 100,000 acres in response to the controversy noted above.]

## Challenges for the Future

### Public Acquisition of Wild Lands

Conservation provides public benefits measured by more than just economic returns. Thus, the public, through its governments, needs to remain involved in the acquisition of

public lands to achieve conservation goals, especially lands that can be managed as wilderness (in other words, ecological reserves managed with a GAP 1 status) and lands that can serve as landscape-scale linkages between ecological reserves. The trend, noticed especially in the United States, toward privatization of public functions must not come to define our culture's philosophy on how we should meet our conservation needs and responsibilities.

## Developing and Implementing New Models for Wilderness

As described above, a large amount of the land base in the United States portion of the Northern Appalachian region is currently in private ownership. One approach to overcoming the limitations imposed by this pattern of ownership is to continue public acquisition of lands for management as wilderness, as noted above. However, this approach is unlikely to be sufficient on its own to develop the kind of wilderness system necessary to achieve the broad scope of biological conservation goals; much of the most productive and biologically diverse lands, particularly at lower elevations and latitudes where the potential for human settlement and agriculture are greater, are unlikely to be put up for sale at a price the public can consistently afford. Thus, in contrast to other regions of the continent, an expansion of the wilderness system in this region will require direct inclusion of privately owned lands to a greater degree than is currently the norm anywhere.

Unfortunately, few private landowners are in a position to manage land as wild lands. Property tax rates in the northeastern region of the United States generally focus on what the land *could be* used for, not what the land *is currently being* used for, and tax support programs intended to prevent the conversion of land to development generally require that the land be subject to some kind of harvesting for eligibility.

What is needed are mechanisms to allow, if not outright encourage, private landowners, whether they are individuals or organizations such as land trusts, to manage large areas for long-term ecological integrity without a requirement for resource extraction. So-called "current use" programs that are now in place could be supplemented with "wild lands" programs, where the emphasis in management plans on private land would be on encouraging the development of old age-classes in forest ecosystems, natural succession, and populations of native species that fluctuate through their naturally dynamic range of abundance and distribution. Such wild lands programs could also encourage large-scale conservation through incentives to enroll more acreage under a single owner or through collaboration among several owners.

## Taking an Integrated View of Landscape Management

Regional land management needs to stop being viewed as the search for the optimal balance of conservation and economic development on each plot of land, a model that could be called the "living lightly everywhere" philosophy. Some conservation goals are just fundamentally incompatible with

economic growth, and "living lightly everywhere" will, in a world of expanding human population size and per capita resource use, ultimately lead to the loss of these ecological elements. Instead, regional land management needs to be viewed as the search for balance in mixing dominant land uses (for example, conservation lands, stewardship lands, and high-intensity use lands) across the landscape or the "integrated dominant-use" philosophy (Trombulak 2003). Wilderness advocates need to seek allies in other conservation communities (for example, smart growth advocates, sustainable forestry and agriculture advocates) by uniting under the integrated dominant-use model.

Wilderness advocates also need to transcend the traditional views of what lands have value as wilderness, moving away from the "pristine landscapes" and "rock-and-ice landscapes" models to include lands that have great ecological value and that could be enhanced through restoration but are under-represented in wilderness because they are neither pristine nor scenic. In the Northern Appalachian region, a greater emphasis needs to be placed in the future on protection of wild lands and restoration of potential wild lands at lower elevations, especially in lake and river valleys where agriculture and development are more prevalent than at higher elevations.

## Taking a Long-Term View for Landscape Management

Establishing wilderness and protecting wild lands should not be viewed in the context of "locking up" lands in the present. Rather, these areas should be viewed in terms of their on-going contribution to creating a preferred human footprint across the entire landscape—conservation lands, stewardship lands, and high-intensity use lands—into the future. In a sense, discussions about wilderness and wild lands must evolve from a focus primarily on our desires in the present to our responsibilities and priorities for the future.

Cultural influences on the environment, whether they involve the construction of roads, development of housing or recreational facilities, or the extraction of resources, all of which are alternatives to wilderness, should be viewed in a holistic, incremental way over long (40 to 50 year) time frames and not in isolation from one another. Thus, the question should never simply be, for example, "what are the consequences of losing *this* 10 acre (4 ha) wetland *this* month?" but rather "what are the consequences of losing 10 acres per month for the next 40 years?"

The tools for comparing alternative scenarios for regulation and zoning are already well developed at the local scale through GIS-based build-out analyses. Recently, we have begun to scale these tools up to the landscape level in the Northern Appalachian region in order to look at what the potential consequences are for the region over the next 40 years for either including or not including different types of regional systems of ecological reserves (including wilderness) under different scenarios of economic development and population growth (Baldwin and others 2007). Our analyses extend the approach taken in measuring the current Human Footprint, described above, and therefore we refer to it as a Future Footprints analysis.

Although this work is still preliminary, we have been successful in modeling both the expansion of human settlements and road networks under development scenarios that range from the status quo (existing trends for the past 10 years remain true for the next 40 years) to accelerated growth (the next 40 years are characterized by the pattern of growth and development seen in the Pacific Northwest region over the past 10 years). Both models predict a dramatic decline in wild lands (as defined in the Human Footprint analysis described above) and landscape-scale linkages, with much greater losses under the scenarios of greater cultural expansion.

Through such analyses, I believe the importance of wilderness and wild lands protection is better highlighted because it becomes clear in a spatially explicit way what society stands to lose by not establishing such protected areas now while the chance remains.

## Rigorously Identify the Biological Value of Wilderness and Wild Lands

Aldo Leopold spoke of wilderness as being baselines of ecological normalcy (Leopold 1966). Unfortunately, wilderness advocates have done little to demonstrate that this view is useful and that wilderness is irreplaceable as a way to understand the efficacy of land management practices carried out on stewardship lands (for example, lands where forest harvesting occurs). The vast majority of research on wilderness addresses recreational values and management tools. While important in themselves, they do not address the fundamental question of what the ecological values of wilderness are relative to, for example, lands managed for timber harvesting. In the absence of rigorous, long-term studies across numerous taxa and ecosystems comparing wilderness—lands where nature is allowed to operate in its own way and in its own time—to lands managed to achieve such culturally derived goals as resource extraction and motorized recreation, we will have no way of knowing whether sustainable forestry is, in fact, ecologically sustainable.

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# Protecting Biodiversity *in situ* in the Amazonian Region of Brazil

Claudia Sellier

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**Abstract**—Brazil has approximately 3.6 million km<sup>2</sup> (1.4 million mi<sup>2</sup>) of forest, with the majority concentrated in the Amazonian region. The Atlantic Forest was reduced to less than 8 percent of its original territory. Development activities are being implemented without consideration for the local environment, causing both biodiversity and habitat losses. Establishment of protected areas is one of the specific strategies to protect the biodiversity *in situ*, therefore, the Brazilian government has an international commitment to maintain 10 percent of the country's landscape under the integral protection regime. Environmentalists, communities, and environmental institutions have different points of view about biodiversity conservation or preservation *in situ* programs within the conservation units (protected areas), with the disagreement centering on natural resource use by the forest dwelling people within the conservation units.

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## Introduction

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The biodiversity in the Amazon rainforest has been historically unknown, although it accounts for the biggest biodiversity on the Planet, habitat to more than one-fifth of all vascular plant species, one in eleven mammal species, and one in six bird species worldwide. The knowledge about its fauna and flora distribution is still incomplete and fragmented and yet this richness is threatened by the intensification of deforestation. This situation is aggravated by development activities associated with the root causes of biodiversity loss (Wood and Porro 2000) such as population growth, poverty, immigration, inequality, isolation/marginalization, cultural changes, macroeconomic policies, international trade factors, policy failures and poor environmental laws.

The impact of anthropic activities on the ecosystem in the Amazon is probably even bigger than what the official statistics indicate, about 15 percent of the original Amazonian forest is already destroyed (INPE 2001) and according to official data, as of the year 2020 the Amazonian forest will have lost 25 percent of its native coverage (WWF-Brasil 2001). The forest is being replaced by human activities; according to Fearnside (1995) the current deforestation rate in tropical areas is exceeding 150,000 km<sup>2</sup> (57,915.32 mi<sup>2</sup>) per year. Redford (2002) points out that 60 percent of available fresh water on the Planet is already being used by

the human population and 83 percent of the earth's surface is being used in some productive way—he concludes that there is very little of the earth's surface that has not been substantially changed to suit the needs of industrialized human society.

In this context, the establishment of territorial spaces that are specially protected, mainly by the means of protected areas of restricted use, has been one of the oldest and still more efficient strategies to protect biodiversity. The Amazonian forest is the largest standing, sequential tropical forest and the last frontier on the Planet that contains extensive areas of contiguous dense forest. It has become the subject of the world's attention since the mid-1980s and especially after the Earth Summit, the UN Conference on Environment and Development in Rio de Janeiro in 1992, where its conservation policy guidelines started to be established. The increasing deforestation process seems to interconnect, in a catastrophic scenario, three contemporary tendencies that could lead to a global environmental disaster: global warming, ozone layer depletion and biodiversity loss.

## The Deforestation Process in the Brazilian Amazon

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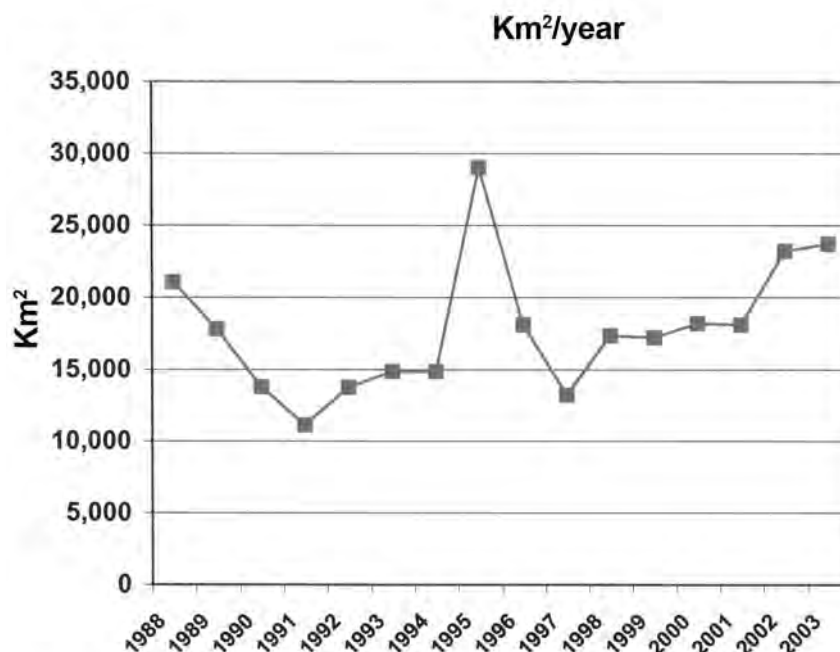
Since the arrival of the Europeans in Brazil, the Amazon region, which encompasses 60 percent of the country's territory, has been considered an inexhaustible source of natural resources to fulfill the demand of human needs. The relative insulation of the region was broken at the end of the 1960s with the Amazon integration process under the military regime. Yet during the 1960s the deforestation of the region was envisaged as a necessity and the forest was considered a big challenge to be overcome. Until the late 1980s the governmental policy and programs in the Amazon region were strictly founded in the paradigm of progress, when deforestation started to become a concern of world attention. The deforestation rate was drastically increasing in the 1980s, reaching the highest rate in 20 years in 1995 (see fig.1). Every year deforestation rates are publicized, becoming one of the nation's biggest concerns. Modifications in the floristic cover of the Amazon forest has happened at an accelerated rate, 0.57 percent in 1975 increased to 12 percent in 1988. The increase in the deforestation rate at this point is an outcome of the governmental infrastructure constructions, colonization programs and agriculture and cattle expansion without an adequate public policy framework.

Currently, the main agents of deforestation are cattle raising activities, mechanized soybean expansion, illegal logging, construction of roads, and the agrarian reform settlements. According to Théry (1999), cattle raising and soybean production are occupying mostly the oriental and meridional part of the Legal Amazon (deforestation arch),

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**Figure 1**—Deforestation rate per area—km<sup>2</sup> (INPE—National Institute for Spatial Research 2003).

especially the areas within the Cerrado (Brazilian savannah) and deciduous forests, which is due to easier access for logging, if it is compared to the floodplains and to the dense pluvial forest ecosystems.

These activities, associated with the lack of policy enforcement, resulted in one of the highest deforestation rates in 2004 since 1988, reaching 26,130 km<sup>2</sup> (10,100 mi<sup>2</sup>). It is an indicator that the environmental policy instruments are not being effective or enforced well enough. Even if the policy instruments have been an outcome of long-term discussion which stimulated public participation based on the local knowledge of forestry, the impact of the development initiatives in the Brazilian Amazon are resulting in a fast pace destruction of the forest, with no regard to the conservation policy or sustainable development initiatives.

## The Conservation Policy

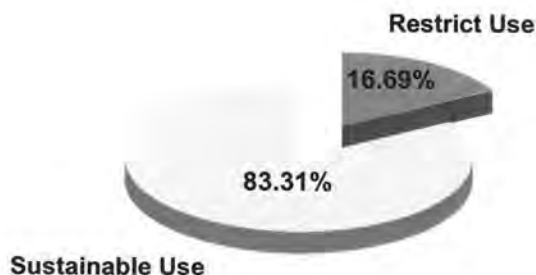
At the beginning of the 21st century a better strategy still could not be found to protect biodiversity from human activities, the majority of which are causing serious damage to the environment, and mostly in an irreversible way, such as, species extinction. The protected areas are still the most effective strategy to protect and conserve biodiversity, therefore the Brazilian government assumed since Rio-92 an international commitment to keep 10 percent of the country's territory under the integral protection regime.

Brazil's territory encompasses a total area of 8,547,403 km<sup>2</sup> (329,942,300.62 mi<sup>2</sup>), currently 7 percent of the country's territory is being protected by the means of established protected areas, where 2.61 percent are protected areas for integral protection and 5.52 percent are for natural resource

sustainable use (IBAMA 2005). In the Amazon region the tendency for the conservation policy has been in consonance with the countries in creating more protected areas for natural resource use than for integral protection (see fig. 2).

Nowadays, it is very clear that the relative displacement in the axis of the conservation approach in the Amazon is inseparable from the natural resource sustainable use issue (Albagli 2000). Even though Milano (2004) argues that the 2.61 percent of the country's territory that is under integral protection, where legally and technically human interference is not foreseen, there has been little success in conserving the country's biodiversity. He points out that

## Federal Protected Areas in Amazon



**Figure 2**—Federal Protected Areas in the Amazon (IBAMA—Federal Agency for the Environment 2005).

the urban population in Brazil is in the order of 78 percent of the total population, and even if 20 percent to 30 percent of the country's territory were under restricted protection, a large portion of land will remain for sustainable use for people dwelling in rural areas.

## Conservation Law

The complete ecological and socioeconomic failure of public policies for development that were applied to the Amazon region during the 1970s has stimulated the search for new territorial organization models (land use and occupation) which are more concerned with long-term sustainability activities. New programs and initiatives are being applied with the aim of diminishing the negative impacts of anthropic activities as an attempt to avoid the threatening deforestation rates.

The federal environmental law 9985, from July 18, 2000, institutionalized the Conservation Units National Policy (SNUC). It was built as a system where the areas that are being protected by the federal government are linked with the state and county protected areas, integrating diverse systems.

The conservation units (protected areas) are defined as a dichotomy between two different groups: the one of integral protection that is divided in Ecological Station, Biologic Reserve, National Park, Natural Monument, Wildlife Refuge; and the natural resources sustainable use group divided in Environmental Protected Area, Area of Relevant Ecological Interest, National Forest, Extractives Reserve, Fauna Reserve, Sustainable Development Reserve, Natural Heritage Private Reserve. Since the year 2000, many things have been changing in regard to the policy for protected areas in Brazil, even if the majority of these areas are still under government management (at the federal, state and county levels) the participatory approach starts to be adopted and traditional peoples (indigenous people, river dwellers, colonists, rubber tappers, slave descendent communities, etc.) started to be considered part of the environment. The traditional knowledge (TKS) is now being incorporated into the conservation unit protection and management. Two conservation units, the Extractive Reserves (RESEX) and the Sustainable Development Reserves (RDS) belong to the sustainable use group and allow the presence of forest-dwelling and the use of natural resources within the reserves area.

The RDS was originally created in the state of Amazonas with the objective of implementing actions for the sustainable use of resources. Through the traditional peoples' elaborate system of knowledge about the ecology and practical uses of flora and fauna resources is a basis for livelihood strategies. In this sense, traditional knowledge of rain forest ecosystems is an important component of biodiversity conservation. The RDS is defined by SNUC as a natural area that serves as a shelter for traditional peoples, whose subsistence is based on natural resources sustainable use. TKS plays a fundamental role in the protection of nature and biological diversity (SNUC 2000).

The reserves were established with the objective to implement sustainable development actions through traditional knowledge about the ecology and practical uses of flora and fauna resources as a basis for livelihood strategies. In this sense, traditional knowledge of rain forest ecosystems is an

important component of biodiversity conservation. RESEX is defined at SNUC as an area that is utilized by traditional peoples, subsistence is based on resource extraction complementary with subsistence agriculture and the raising of small animals. They have basic objectives to protect the way of life and culture of these populations, assuring sustainable use of natural resources (SNUC 2000). The Sustainable Development Reserve (RDS) is defined as a natural area that contains traditional peoples with existence based on sustainable systems of natural resource use, developed across generations and adapted to local ecological conditions, playing a fundamental role in nature protection and maintenance of ecological biodiversity (SNUC 2000: Article 20).

The reserves are managed by a Deliberative Council which is formed by the institution responsible for its management (president), public institutions representatives, civil society organizations and local residents of the RDS. It must have a management plan that is approved by the Deliberative Council; the natural resources used by the dwellers will be ruled by the management plan and by article 23/SNUC, which allows the replacement of forest coverage for subsistence agriculture practices and commercial logging only to be admitted on sustainable bases and only under the zoning specifications.

Another significant change in the conservation policy was the inclusion of indigenous land within the scope of the law 9985 SNUC as part of the protected areas national system. The logic of this approach is to emphasize the importance of indigenous lands as a reservoir of biodiversity and traditional knowledge of forest management. There is an inevitable convergence between indigenous land rights and biodiversity conservation associated with the rescue of many different ethnic groups. Indigenous rights and policy development for land tenure issues have demonstrated a considerable improvement since the 1980s. Currently, there are approximately 366 indigenous lands in a territory encompassing 98.5 million ha (243.4 million acres) (FNUAI 2004).

## Conclusions

For most of the 500 years that have elapsed since Europeans arrived, much of the Amazonian forest has experienced a long respite from significant clearing. Only within the past two decades have the rates of destruction and degradation of neo-tropical forest become unprecedented in human history. Development initiatives such as cattle raising activities, mechanized soybean expansion, illegal logging, construction of roads and the agrarian reform settlements, are gradually invading protected areas. Environmental laws have not been obeyed and enforcement has also failed.

Although Brazil has one of the world's most modern environmental laws, it hasn't been enough to avoid the primary forest destruction, especially in the Amazonian region. This situation is aggravated by the lack of personnel dedicated to enforcement activities and due to the monitoring and control in large areas with difficult access. This is one of the reasons for the complete failure of enforcement in the protected areas. Meanwhile, illegal exploitation of the forest invades the protected areas, the laws are disobeyed, the control fails and the quality of the area is gradually destroyed.

Even if Brazil has made important strides towards a conservation policy in the Amazon, the reality is still that far more forested areas have been allocated to logging than to protected areas. Within the scope of SNUC many logged forest areas have been incorporated as a multifunctional protected area category. The key for conservation in Brazil is to find the balance among the multifunctional protected areas, restricted use protected areas, indigenous land and development initiatives. It must be based on the knowledge of the ecology of the forest and offer at the same time benefits to the economy as well as to forest dwellers and for the biodiversity.

It seems that all the effort undertaken to develop a comprehensive conservation policy based on a participatory approach, has been in vain with the deforestation rate reached in 2004, one of the highest in history. The country's politicians, instead of making sure that the conservation law is being enforced and supporting the environmentalist's initiatives, is tending to give more incentives to the agribusiness activities. It is no surprise that Brazil has become one of the leading producers of cattle meat and soybean worldwide.

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# Some Practical Considerations in Restoration of Wilderness Geodiversity: Insights From Lake Pedder, Tasmania

Kevin Kiernan

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**Abstract**—Geodiversity values involve aspects of the abiotic environment that are sometimes the dominant element that imparts scenic and wilderness value, are scientifically important in their own right, and almost invariably form the essential habitat for the biodiversity that is often the main target of modern conservation policies. Given this dominance of the physical landscape over other aspects of wilderness character, the potential for restoration of degraded wilderness depends foremost on the significance and resilience of the landforms and the capacity for them to recover over an acceptable time frame. The contradiction between the expectations that wilderness is in pristine natural condition, should be available for recreational use, yet is devoid of artificial intervention in natural processes must also be addressed. This challenge looms increasingly large in a world in which virtually all wilderness areas now face anthropogenic climate change that is increasingly distorting natural processes. This paper illustrates a geomorphological approach to assessing wilderness restoration prospects by presenting a case study of potential restoration of the original Lake Pedder, a scenic glacial lake that was widely regarded as both the heart and crown jewel of the Tasmanian wilderness prior to its inundation beneath a large hydro-electric reservoir in the early 1970s. The applicability of this approach to assessing potential wilderness restoration endeavours elsewhere is discussed.

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## Introduction

Geodiversity values involve aspects of the abiotic environment that are often the dominant element that imparts scenic and wilderness value, are scientifically important in their own right, and almost invariably form essential habitat for the biodiversity that is often the main target of modern conservation policies (Gray 2003; Kiernan 1991, 1996; Sharples 1995). Geconservationists focus on protection of important geological features, landforms, soil types and natural geo-processes, aiming to safeguard specific sites deemed outstanding in some way or that are representative of geodiversity, and natural types, timing, rates and magnitude of geo-processes. Implicit in this approach is the belief that nature conservation should include a concern

with safeguarding overall environmental diversity rather than being locked into a narrow focus just on biodiversity (ACIUCN 1996).

Many of the attributes that first triggered conservation initiatives were related to landforms rather than biology. Thus, the geysers of Yellowstone, U.S.A., a small cave containing a hot spring at Banff, Canada, and the Jenolan Caves in Australia were early stimuli to later broader conservation initiatives in those areas. The original Lake Pedder was widely regarded as both the heart and crown jewel of the Tasmanian wilderness prior to its inundation beneath a large hydro-electric reservoir in the early 1970s (fig. 1). This development caused by far the greatest loss of wilderness of any single development in Tasmania (Lesslie and others 1988). The campaign against the dams played a major role in development of the modern conservation movement in Australia, giving birth to the world's first Green political party, stimulating formation of a national Wilderness Society, and laying the foundation for eventual establishment of the Tasmanian Wilderness World Heritage Area. This defining battle in the emergence of wilderness conservation in Australia was fought almost entirely on the basis of the physical attributes of the Pedder environment, the discovery of endemic species in the area occurring only late in the campaign and even then being viewed as supplementary rather than fundamental to the case against the dams.

Landforms such as Lake Pedder may be perceived as being of significance for their existence value, a recognition that they are of great worth in their own right irrespective of their utility to others. They may also be judged important for their underpinning of natural processes, including geosystem and ecosystem support. Finally, landforms may be of instrumental value to humans for spiritual, aesthetic, recreational, scientific, educational, economic and other reasons (Kiernan 1996). Many of these attributes potentially contribute to the range of values typically sought in wilderness.

There is a common misconception that any phenomenon to which the term *geo* is affixed must be made of solid rock and therefore inherently robust and require little protective management, but there are numerous examples of loss and damage to important features. Landforms composed of unconsolidated sediments are particularly vulnerable. The geomorphology of an area is defined by its contours, hence, any artificial change to those contours at whatever scale *by definition* constitutes damage to the geomorphology. The real questions concern the degree to which important values are compromised, the extent of damage, and the potential for natural or assisted recovery of damaged values. As in bioconservation, it is often necessary to safeguard all components of natural geo-systems (including palaeo-systems), such as

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**Figure 1**—Lake Pedder beach and the Frankland Range, Southwest Tasmania (photo by author).

the catchment from which water is delivered to sustain a limestone cave. Moreover, the value of a set of landforms such as those around Lake Pedder may exceed the sum value of its individual parts (Kiernan 1991).

Inclusion of the artificial reservoir that drowned Lake Pedder within the boundaries of the Tasmanian WHA was accepted by the World Heritage Bureau in the express hope that the original Lake Pedder might one day be restored. The 1994 IUCN General Assembly in Buenos Aires passed a resolution seeking restoration. Ongoing calls for restoration of the original Lake Pedder mirror similar pressures to restore wilderness affected by dams at sites such as Hetch Hetchy and Glen Canyon, USA. The practicality of such proposals is dependent upon the capacity of the environment to recover to an acceptable degree if an impoundment is drained.

## Wilderness Restoration: A Contradiction In Terms?

Pressures on the environment are increasing and there are few places that have not now felt human impact. This situation poses significant management challenges given the internal contradictions already inherent in the expectations of many wilderness advocates and some of the legislative frameworks for wilderness protection. For example, the goals specified in the U.S.A. *Wilderness Act* (1964) include preservation of natural or pristine conditions, avoidance of intentional environmental manipulation, and provision of opportunity for recreational use. The wilderness manager

is already faced with difficult trade-offs. These challenges have now been superimposed by broader-scale pollution of air and water, changes to ambient light levels (night-time increases and global dimming by day) and gross changes to geomorphological processes caused by anthropogenic climate change. While Earth history is a story of continuous natural long-term environmental change, those changes evident since the industrial revolution are inconsistent with the type, timing, rate and magnitude of earlier natural change.

Responding to on-site consequences of global environmental change or restoring a wilderness valley after removal of a dam both involve the same necessity for managers to become involved in direct environmental manipulation. That implies first making decisions about what is “natural” or “pristine” and then working to retain it or facilitate its re-creation. This is not akin to building an artificial replica of a historic house but instead involves working with the self-regenerating capacity that is possessed by many natural systems.

A very cautious approach is required when contemplating intervention in complex natural systems given limited understanding and the dangers that erroneous actions may pose for Earth’s already diminished stock of wilderness. In addition to their potential value in returning to wild condition precious places that were once wild, attempts to restore wilderness values to areas where they have been largely erased can also provide learning experiences that will better inform the inevitably much riskier intervention that will increasingly be needed in order to redress problems in areas where wilderness integrity still remains relatively high.

## Wilderness Geodiversity Restoration After Decommissioning of Dams

What are the prospects for recovering geoheritage drowned beneath artificial reservoirs, the environmental diversity the landforms under-pinned, and the wilderness character that may previously have existed? Answering this question requires identification of the values the site previously contributed to overall wilderness value, followed by realistic assessment of the potential for their return. Evaluation involves a three step process: (1) inventory of the geodiversity present, (2) assessment of its significance in intrinsic, natural system support and/or human instrumental terms; and, (3) evaluation of the potential for the return of the geodiversity values.

Geodiversity significance assessment requires investigation at a number of levels:

- *System controls* — the geological, climatic/palaeoclimatic/temporal, etc., context within which landforms have evolved;
- *Landforms & landform assemblages* — analogous to biological species and communities; some landform types are common and some are rare, some are robust and some are fragile;
- *Landform contents* — sediments, archaeological material or biota dependant upon the landform in which they are contained may impart value to a landform that might not have been considered significant in its own right; and
- *Human use* — past, present, future.

From a geomorphological perspective there are four critical principals to consider in assessing the feasibility of restoration proposals.

1. *Material Resilience Principle*: Landforms composed of hard bedrock are susceptible to damage by deliberate actions such as quarrying, but they are much less susceptible to more subtle processes such as erosion by water or wind than are depositional landforms that consist of unconsolidated sediments. Dams are typically constructed in gorges eroded in robust bedrock but other surfaces surrounding and within the reservoir area may host landforms comprised of less resilient material.

2. *Impacting Forces Principle*: The impacting forces may be either the direct result of human activity, such as use of explosives, or by-products of human activity, such as erosion caused by run-off of water from a disturbed area. The duration of these forces can also be important, although typically geomorphic change is caused more by extreme events such as major floods than by prolonged moderate run-off. Direct contour change is generally localized around the actual dam-sites and associated quarries and roads, while the wider reservoir area is affected by a change to predominantly lacustrine geomorphological processes.

3. *Landform Age Principle*: An ancient landform has been through a long period of weathering and erosion such that the surviving morphology is likely to be relatively robust. Conversely, a very young landform may be at relatively higher risk of damage because it may retain considerable subtle detail. The gorges in which dams are constructed are typically relatively old features but other younger features

that were morphologically fresh prior to inundation may occur close to stream level and within the reservoir area.

4. *Genetic Process Continuity Principle*: The potential for natural healing depends upon whether the key natural processes that first formed a landform are still operating. Even if the damaging agent is removed there is limited if any potential for natural healing of a landform created by geomorphic processes that are no longer operating (for example, previous glaciation) or are operating at much changed intensity. If the gorge dammed was created by fluvial erosion that process is likely to be able to resume if the dam is removed, but there are likely to be other landforms within the reservoir area that were formed by a variety of other processes.

### Case Study: Geodiversity Inventory and Geoheritage Evaluation of Lake Pedder

A review of the key attributes identified by a reconnaissance geodiversity inventory of Lake Pedder is available elsewhere (Kiernan 2001a; see also <http://www.lakepedder.org/resources/reports>) and need only be summarized here. It has shown that the geo-conservation significance of Lake Pedder at various levels of evaluation varies from global to local in scale. Note that this particular assessment relates only to geoscientific values and does not take account of existence values, ecosystem support functions or biodiversity, or non-geoscientific instrumental values to humans such as spiritual, aesthetic, wilderness or biological science.

**Systems Level.** The lake basin at Pedder was formed by tributary mountain glacier deposits damming a major trunk valley (the Serpentine Valley). The geographical context of Lake Pedder is globally significant. Important differences exist between the long-term climate histories of the northern and southern hemispheres and resulting glacial systems. In contrast to the northern hemisphere, the temperate southern latitudes are predominantly oceanic, reducing the potential for terrestrial evidence of past glaciation and implying glaciological differences from the continental ice sheets of Eurasia and North America. In contrast to other southern temperate glaciated areas, Tasmania is tectonically stable, allowing survival of very ancient glacial features, some of which date from the onset of glaciation in the Antarctic region over 30 million years ago. The rock types in which the glacial landforms of western Tasmania have developed are not present in the other glaciated areas of southern temperate latitudes. Nothing comparable to Lake Pedder in terms of this particular mode of genesis giving rise to a lake of similar size and character has been identified from the world geomorphological literature.

**Landforms Level.** Both the individual landforms and the genetically-related set of landforms were significant. The shallow (3 m) (10 ft) Lake Pedder lake basin was part of a wider landform community that included glacial features on the adjacent Frankland Range, itself an exemplar of the importance of snow-fence and shading effects on glaciation in southern temperate latitudes (Davies 1967). The individual mountain cirques are significant at a state level, which given negligible past glaciation of mainland Australia, implies national significance. The significance of the landforms produced by glacial deposition cannot be as-



sessed fully due to inundation by the reservoir. The fluvial geomorphology was also significant. Upstream of Lake Pedder and the smaller Maria Lakes lagoon system on its eastern margin the drainage system in the trunk valley comprised strongly braided channels. In contrast, the Serpentine River, which drained the lake and regulated lake level, occupied a highly sinuous single channel, its character being genetically influenced by past glaciation in a manner not apparently recorded elsewhere in the world literature.

Lake Pedder was also a nested set of component landforms, many of which were the result of ongoing post-glacial processes. They included lake margin features such as beaches, barriers, spits and bars. The main beach, formed partly of pink quartz sand and up to 600 m (656 yards) wide in summer, was more extensively developed than any comparable freshwater system in Australia (Bayly and others 1972; Timms 1992). Barriers or offshore bars are otherwise rare in Australian lakes, and the only others are in very different environments. The bar featured spectacular mega-ripple structures (fig. 2) that projected into the lake for over 400 m (437 yards) beyond the beach and which differed in form from the nearest analogues identified in the world literature. A major lunette bounding the beach was noteworthy for its



**Figure 2**—Aerial view of the Lake Pedder megaripple system (photo by author).

very humid environmental setting. It was also by far the largest “dune” on an Australian glacial lake.

**Landform Contents Level.** From a geoscientific perspective the most significant known attributes at this level were planar concretions of iron with minor manganese formed around pebbles to produce what were known as Pedder Pennies. Their character was very different from related phenomena found at a handful of other Tasmanian sites (Tyler and Buckney 1980). They were morphologically similar to some related features recorded from the Gulf of Finland but genetically more similar to forms in some Canadian freshwater lakes, although the iron content was much higher and manganese content very much less at Pedder than in Canada.

**Human Use Level.** In addition to its great inspirational and recreational value, from a geoscientific perspective, the Pedder area was important to development of some early concepts in Tasmanian glacial research, and its significance is compounded by an association with at least one notable geoscientist. Damming has precluded capitalizing on its geo-scientific assets, but the area remains a storehouse of untapped evidence concerning environmental history and change, and geodiversity-biodiversity relationships.

## Prospects for Restoration

Direct contour change due to construction activity did not occur within several kilometres of Lake Pedder itself, hence the principle changes are those associated with superimposing a much larger artificial water body on the landscape. The principals enunciated earlier coupled with observations made as the reservoir filled and insights obtained from other temporarily drained Tasmanian reservoirs, provide the principal sources for conclusions on landform recoverability, together with some observations made by bathymetry and diving.

That the lake basin and Serpentine outlet remain intact has been proven by bathymetric surveys (Tyler and others 1996). There has been negligible sediment infill (either minerogenic or organic) with diving and grab sampling having revealed that no more than a few millimetres of organic sediment have accumulated. Sand is still exposed on the original beach. All principal geomorphological features formed by past cold-climate processes are known to remain intact (Kiernan 2001b).

The other landforms nested within the lake basin also appear to be mostly intact but even if they were not, the fact that they were formed by contemporary processes means the potential exists for natural healing. Features known to be intact include the megaripples and smaller ripples. Pedder Pennies have been recorded still lying on the sand. Underwater photography obtained by the Australian Broadcasting Commission revealed that even the slight indentations in the sand made by light aircraft that last landed on the beach prior to damming remain readily identifiable. Erosion of the dune system as the reservoir filled was very limited (maximum cut-back less than 5 percent of the narrowest part of the lunette). The dune face was naturally eroded as the lake level rose when the Serpentine River was unable to discharge the entire winter inflow. Sand blown from the exposed beach nourished the dune in summer. Because the

reservoir surface lays 16 m (52 ft) above the original lake and is limited to 1.5 m (5 ft) fluctuation by statute, the dunes are now too deep to be disturbed by the short wave-length wind waves.

Erosion has occurred around some parts of the wider reservoir perimeter but it is limited and discontinuous, does not significantly affect the key landforms, and would be inconspicuous from Pedder beach. Its confinement to a band usually no more than 3 to 4 m (10 to 13 ft) in vertical extent would imply visual disturbance no greater than that caused by discontinuous lengths of vehicular track that could rapidly be screened by low vegetation. Undecomposed peat on the dunes and valley floor remains intact hence it continues to protect the underlying sediments. Remnant viable seed is not out of the question. Significant weed invasion is unlikely (Balmer and Corbett 2001).

## Discussion

A 1995 Australian Parliamentary enquiry concluded that the political climate was not appropriate for priority to be given to restoration of Lake Pedder but that restoration was technically achievable (Australia 1995). Many of the classic photographic images taken from the beach of Lake Pedder might be captured again almost immediately after the reservoir was drained, and few if any significant long-term technical obstacles to restoring the wilderness character of the area are likely to arise (Kiernan 2001b). Restoration would increase the integrity of the WHA by facilitating protection of the set of geodiversity values, the World Heritage Guidelines stipulating that the areas described should retain all or most of the key inter-related and interdependent elements in their natural relationships (UNESCO 1984). The progressive loss of wilderness documented as development intruded (Lesslie and others 1988) would be reversed by restoration of Lake Pedder and rehabilitation of dam-building roads, reducing a major re-entrant into the boundaries of the WHA and attendant management difficulties.

To what extent might a similar framework for assessing the feasibility of restoring wilderness geodiversity be useful elsewhere—what initial guidance might be available from the first principles of: Material Resilience, Impacting Forces, Landform Age and Genetic Process Continuity? There are always several key questions. What are the values that contributed to wilderness character, and to what degree did they involve geodiversity? To what extent has that geodiversity been compromised? What level of intervention is required and considered acceptable in order to return (a worthwhile proportion of) those values?

## Hetch Hetchy

Construction of the O'Shaughnessy dam in Yosemite National Park (USA) was approved in 1913 and 10 years later the 7.8 km<sup>2</sup> (3 miles<sup>2</sup>) reservoir commenced filling. The project was strongly opposed by some for its destruction of the scenically spectacular "twin" to Yosemite Valley. That it seems to have been a site important for glacial geodiversity conservation does not appear to have been recognized explicitly in early debates.

The Material Resilience Principle is important here because the trough walls against which the reservoir laps have been carved primarily in solid granite, hence, there is a high probability of minimal damage to them. Directly Impacting Forces associated with construction activity were not confined to the dam-site but included other disturbance inside the reservoir perimeter (Riegelhuth and others 1988). Because the reservoir is 100 m (328 ft) deep, landforms on its floor are safely beyond the reach of its short wind waves. A light-colored watermark ("bathtub ring") formed where lichen on the granite has been killed by inundation can be anticipated to restore naturally, Riegelhuth and others (1988) estimating a likely time frame of up to 100 years. Those authors also report that areas of the reservoir floor exposed by draw-down in 1977 had been covered by no more than 250 mm (10 inches) of sediment in the half century since the reservoir was filled.

Landform ages vary at Hetch Hetchy. At least some of the valley-floor landforms are young and hence might be vulnerable to loss of morphological detail but for the depth of their inundation. Draw-down of the reservoir in 1977 revealed that the upper 6.4 km (4 miles) of the river was still contained in its original channel. Although the present form of Hetchy Hetchy Valley is largely the product of glacial processes that are no longer active, the only potentially vulnerable landforms appear to be those on the reservoir floor that were formed by similar processes to those that prevail in the general area today, hence there is ample potential for their natural healing in the unlikely event of damage having occurred.

## Glen Canyon

The 216 m (709 ft) high Glen Canyon dam on the Colorado River (USA) was completed in 1963, the reservoir extending 300 km (186 miles) up-river and having a total shoreline length of over 3,200 km (1,988 miles). In addition to its intrusion on a wild and scenic place, the dam also had implications for geodiversity conservation, drowning well developed landforms produced by running water, the area being an exemplar of active fluvial processes and canyon formation. Key morphological and process attributes were canyons and a very heavy sediment load. Adverse impacts of the dam extend downstream through the Grand Canyon.

The dam traps about 85 percent of the 60 to 180 million tons of sediment that previously moved through Grand Canyon annually, hence the situation contrasts dramatically with the very limited sediment accumulation at Lake Pedder and Hetch Hetchy. Controlled water releases only allow sediment already downstream of the dam to be moved around with no new sediment being introduced into the system.

The canyon walls are solid bedrock and resilient, with softer sediment landforms mainly confined to the reservoir floor. From the perspective of Impacting Forces, only a tiny part of the area has been affected by direct excavation for engineering works, the predominant change being the transformation of a very high-energy fluvial environment into a low energy lacustrine environment. Over relatively recent geological time at least 11 natural dams have previously formed along this part of the Colorado River (Hamblin 1994) and, in a sense, the river system is essentially adjusted

to such occasional obstructions, their ultimate removal, and effective evacuation of the sediment that accumulated behind them. The key natural fluvial processes responsible for the Glen Canyon landscape are still potentially operating, but for the intervention of the present artificial dam. With the reservoir level down to 37 percent of full as of January 1, 2005, due to drought, exposure of more than 60 km (37 miles) of the Colorado and San Juan rivers and hundreds of kilometres of side canyons, has revealed that a high level of geomorphological integrity remains, with rapid flushing of accumulated sediments, the "bathtub ring" rapidly being covered in desert varnish, and vegetation up to 7 m (23 ft) high having re-established. Ongoing sediment accumulation behind Glen Canyon dam implies increasing costs the longer decommissioning is delayed, particularly with respect to greater adverse consequences downstream the more accumulated sediment has to be dealt with (Miller 2000).

## Conclusions

The four principles enunciated earlier can usefully be employed to approximate restoration prospects in general terms, and provide a framework within which to identify site-specific considerations. In all three cases reviewed here, restoration appears technically feasible, but this will not always be the case, particularly where the dominant landforms are relict but relatively young and are formed from unconsolidated materials.

Physical scars created during dam construction are a greater issue at Hetch Hetchy than at Lake Pedder due to the greater degree of construction disturbance within the reservoir perimeter at Hetch Hetchy. The proportion of the Glen Canyon reservoir area affected by construction disturbance is very much smaller than either in the Lake Pedder area or at Hetch Hetchy. The consequences of inundation will also vary from reservoir to reservoir. Negligible sediment accumulation in the Lake Pedder and Hetch Hetchy reservoirs contrasts with massive accumulation in the Glen Canyon reservoir.

In all three cases reported here, those landforms produced by geomorphological processes that are no longer active have survived inundation. The only landforms that might have sustained any damage are the product or processes that would be reactivated by removing the reservoirs and which have the capacity to naturally heal any damage, but this fortuitous circumstance is unlikely to always be the case.

In all three cases reviewed here, the "bathtub ring" appears no impediment to restoration, although its origin is sometimes different, varying from a line of dead moorland, eroded soft sediment or redeposited sand at Lake Pedder, to killing of rock-encrusting algae at Hetch Hetchy. But even in a situation where a ring did appear likely to persist, would that be of such consequence as to outweigh the other benefits of restoration? If some means of intervention to remove it were feasible, would that be consistent with the wilderness ethic?

The issues that arise during reservoir draw-down and subsequent re-vegetation are likely to vary significantly between different sites and require differing levels of intervention as natural processes reclaim local environments. For example, while only minimal risk of invasion by exotic weeds exists at

Lake Pedder (Balmer and Corbett 2001) the potential for invasion appears to be far greater at Hetch Hetchy (Riegelhuth and others 1988). Such concerns require value judgements regarding levels of intervention considered consistent with concepts of wilderness and the typically conflicting agenda contained within wilderness statutes.

Emergence of the western wilderness ethic greatly post-dates a long and often under-recognized history of human presence that has included a long history of traditional land stewardship and harvesting in such places as the floor of Hetch Hetchy. Restoration projects are not inconsistent with such histories of human influence. If adopted, they may not only return precious places to the wild, but may usefully inform less dramatic intervention elsewhere that will increasingly be required to safeguard wilderness values in a world where no place remains beyond the globalized environmental damage caused by human population growth and associated economic development.

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# Wilderness Restoration: Bureau of Land Management and the Student Conservation Association in the California Desert District

J. Dan Abbe

**Abstract**—The California Desert Protection Act of 1994 was the largest park and wilderness legislation passed in the Lower 48 States since the Wilderness Act of 1964. It designated three national parks and 69 Bureau of Land Management wilderness areas. The California Desert and Wilderness Restoration Project is working to restore and revitalize these lands through a public/private partnership. The Project utilizes Student Conservation Association crews to inventory, to remove and rehabilitate unauthorized vehicle ways, to restore important wildlife habitats, and to help maintain popular hiking trails and other recreational infrastructure. Since 2000, hundreds of miles of unauthorized vehicle ways in wilderness have been removed and rehabilitated by utilizing techniques such as decompaction, scarifying/pitting, recontouring, erosion control, vertical mulching, vegetative restoration, boundary signing, and placement of vehicle barriers. These efforts have decreased the visual and environmental impacts of vehicle ways, restored wildlife habitat and native plant communities, and reduced the illegal use of motorized vehicles within wilderness boundaries at a significant cost savings.

The California Desert District (CDD) of the Bureau of Land Management (BLM) manages approximately 11 million acres (4,451,542 ha) of public lands in southern California. The California Desert Protection Act (CDPA) created approximately 3.6 million acres (1,456,868 ha) of designated Wilderness under BLM management in the CDD. This equates to 51 percent of BLM Wilderness acres nationwide. The recent (1994) establishment of these Wilderness areas has brought with it a number of management challenges for the BLM.

## Management Challenges

The passage of the CDPA created a number of management challenges for the BLM. These challenges centered on protecting the Wilderness character of newly created areas through educational and enforcement actions. Many of the challenges were complicated by the proximity to large urban populations such as Los Angeles, San Diego and Las Vegas,

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high population growth rate in regional cities and counties, public perceptions of the desert environment, historic mining and off highway vehicle (OHV) use, BLM staffing levels, and the extreme climate.

The limited BLM Wilderness staff began to prioritize actions that would have the most impact on protecting the Wilderness character. Chris Roholt, California Desert District Wilderness Specialist, and others thought that the restoration of old roads or vehicle ways within Wilderness boundaries would be an effective way to eliminate illegal motor vehicle access and the associated impacts. Chris began promoting a “Six-Point Mantra” to help prevent illegal vehicle trespass. This mantra was: 1) boundary signage; 2) accurate maps; 3) outreach and education; 4) hard barriers; 5) soft barriers; and, 6) law enforcement. In an attempt to achieve these points the idea of a work crew developed. The work crew would help mark Wilderness boundaries, install hard boundaries, create soft barriers or restore old vehicle ways to a more natural state, and provide some baseline data for future monitoring efforts. In 2000, the CDD proposed using Student Conservation Association (SCA) volunteers to do Wilderness restoration. The justification included not only the restoration of OHV routes but also to provide an educational experience for youth (wilderness exposure, conservation ethics and environmental awareness) and to help create a cadre of potential environmental leaders and players in public land management for the future. The first SCA Wild Corps consisted of six volunteers and began work in September of 2000.

## Management Actions

The SCA Wild Corps model focused on preventing illegal vehicle access to Wilderness. This was primarily through the establishment of soft barriers (visual barriers to old vehicle ways within Wilderness). These barriers are referred to as restoration because of the use of native materials to return the area to a natural setting. Restoration efforts needed to address the questions of **why, where, when, who, and how?** **Why** has already been addressed, to prevent illegal vehicle access and its associated impacts. **Where** to do restoration was in all five Resource Areas of the CDD, which included 66 Wilderness areas. **When** to do the work would be from September through May to avoid the extreme summer heat. **Who** would accomplish this work was the BLM and SCA (see List of Contacts) with assistance from a number of other organizations including the California State Parks Off Highway Vehicle Commission, the U.S. Forest Service, the U.S. Border Patrol, and Eco Associates. **How** would be through the use of a number of restoration techniques.

These techniques included pitting and scarifying, contouring, decompaction, vertical mulching, horizontal mulching, rockwork, raking and sweeping. Through the use of these techniques work crews could adapt to site-specific characteristics and make old vehicle ways literally disappear (see figs. 1 and 2). Pitting, contouring, vertical mulching (planting

dead plant material) and horizontal mulching (placing dead plant material on the ground) helped promote re-vegetation. These techniques helped capture wind blown seeds and more effectively retained moisture. These restoration efforts reduced the visual impacts of vehicle ways and effectively prevented illegal vehicle access into Wilderness areas.



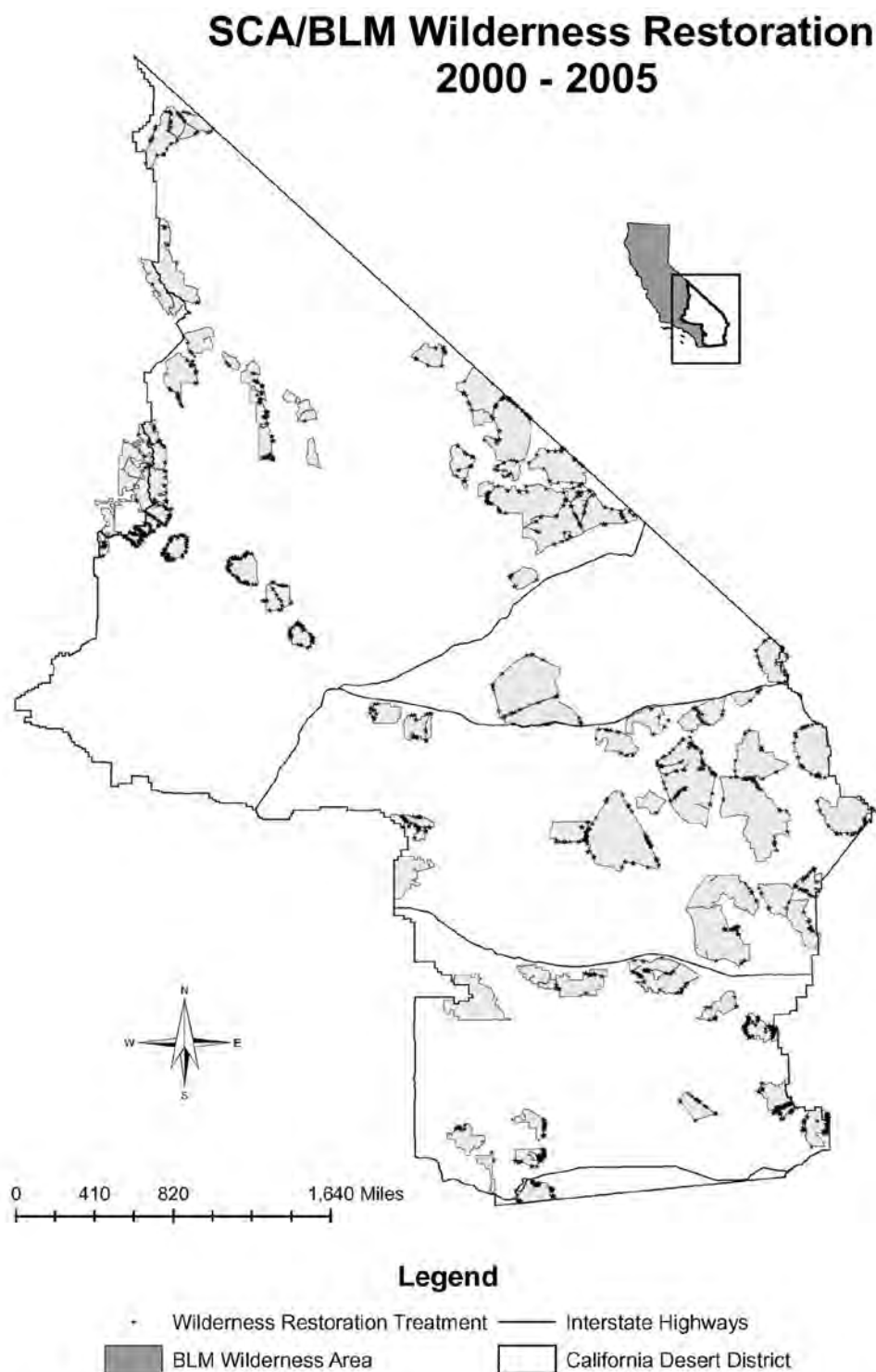
**Figure 1**—Before CDD wilderness restoration of a vehicle way.



**Figure 2**—After CDD wilderness restoration of a vehicle way.

The work accomplished through SCA Wild Corps from 2000-2005 is impressive. They worked in 64 BLM Wilderness areas, provided treatments to approximately 1,500 sites, restored approximately 70 miles (113 km) of illegal vehicle ways in Wilderness, and provided a cost savings of approximately 50 percent compared to in-house BLM costs (see fig. 3). The work has been well received by the public

and provided approximately 30 SCA Wild Corps graduates valuable personal and professional experiences. Future SCA Wild Corps efforts will now focus on monitoring Wilderness character including treated areas and applying re-treatment when necessary. The BLM will continue to monitor the efficacy of these restoration efforts.



**Figure 3**—Wilderness restoration efforts in the CDD; 2000-2005.



## Conclusions

The SCA Wild Corps model, as used in the CDD, has provided a win-win situation for the BLM, SCA, other involved organizations and the public. Not only does it provide

a valuable management tool for the BLM as a “turn-key” operation, with SCA providing the personnel and logistical support for Wild Corps staff, it helps ensure that valuable Wilderness resources in the California desert are protected for future generations.



## 9. Wilderness, Water, and Wisdom



*Alaskan waters provide visitors and residents memorable experiences (photo by Becky Nourse).*



# Salmon Theology: Return to Traditional Reasoning

Joseph Clair

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**Abstract**—When beauty and utility are divorced in the loss of wonder, beauty begins to perish. Salmon go extinct. The fragility of beauty is the fragility of wilderness. It does not perish due to weakness but from the generosity and vulnerability that are bound up with its usefulness.

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## Introduction

Today we have heard about brilliant work, interesting research and thoughtful proposals on the state of salmon. I feel very fortunate to be part of such a symposium. But now I have the job of token-philosopher, the almost perverse task of standing up at the very end of the show and asking, “What does it all mean? No, what does it all *really* mean?!” I may never get used to the perversity of philosophy, but there is nothing I’d like to ask questions of meaning about more than salmon.

## Contingency

Scientists tell me that the ancestors of Pacific salmon emerged a mere 18 million years ago. Most of the Pacific salmon runs as we know them today emerged 18,000 years ago, after the last glacial maximum, spawning in the great thaw.

The salmon myths of the indigenous people near my home, the Columbia River watershed, tell me of great Coyote running off the Ice People and defeating old man Blizzard to make winter easier and to make way for salmon. Coyote is the maker and helper of human beings, they say.

Scientists tell me that salmon can navigate the open sea and migrate thousands of miles relying solely on small particles of iron in their brain tissue and polarized ocean sunlight. Then, after landfall, salmon can migrate hundreds more miles up wide channels and narrow slots to the gravel beds of their birth relying solely on a keen sense of smell.

The salmon myths tell me that Coyote drove a hole through the Cascade Mountains and breached ancient dams to make way for salmon. He led the fish upstream to the starving people.

Scientists tell me that Earth is a rare planet in the galaxy and that H<sub>2</sub>O is hard to find. Seventy percent of Earth’s sur-

face is water and so is seventy percent of the human body. Water is crucial to the variation, adaptability and resilience of life on this planet. Fish are therefore the prime example of the contingency of hydrogen and oxygen binding, river fish in particular, and anadromous fish the premier symbol of fortunate contingency, connecting fresh and salt, mountain and sea.

It could have been otherwise. Salmon didn’t have to run up the rivulets of thawed-out glaciers, from Baja to Yukon to Taiwan. The Pacific Rim has contingently evolved such that salmon continue to swim thousands of miles, up creeks and waterfalls, from gravel bed to natal gravel bed, and into human nets. They have done this for a long, long time. It could have been otherwise.

## Beauty and Utility

Columbia River salmon mythology tells me that Coyote made Willamette Falls from the body of a woman. He squeezed the banks close together at The Dalles and he designed all falls, riffles and eddies to make fishing easier for humans.

This sense of the contingency of Coyote’s work signaled the importance of salmon as a divine gift. But it would be misleading to say that this sort of divine-gift-receiving was not a utility-based relationship also. They were as much concerned with commodities, resource supplies and protein-units as any of us who hope to winter over in the Northwest. In the people’s system of annual utility—catching and drying and trading—salmon myths functioned to remind them that the utility-cycle was much larger and older than the human animal’s memory stretched. In “ancient times,” the myths say, other animals had been privileged and depending on human behavior privileges would come and go. The utility of the salmon cycle wasn’t to be taken lightly, it was to be respected, celebrated and gratefully received. Catching them became art: work that paid attention to principles of generosity. Salmon were a way of life, based on utility, but also on consciousness of salmon’s independent relationship to a higher order of being, their participation in a larger story.

Wendell Berry says that one of the great crises in modernity is the divorce between beauty and utility. Saint Augustine said that utility disconnected from beauty is the root of our violent relationship with the natural world. He said that self-oriented pride blinds us from beauty, and thereby the “true utility,” which actually resides *in* things. The usefulness of things is often separated from their symbolic power to reveal higher forms of order and interdependence. This separation is part of the death of wonder. Wonder is a type of seeing, a vision, that gives us access to the beauty of things and places. This experience of ‘wonder unveiling beauty’ Henry Bugbee referred to as an experience of the *finality*

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of things, the reception of things in their *own* importance. Henry David Thoreau called it a glimpse of, “the infinite extent of our relations.” Gerard Manley Hopkins: “the dearest freshness deep down things.”

This makes me wonder what we Industrial people have been ‘seeing’ these past 150 years, since we arrived with our canning machines and dams and hatcheries? When we see salmon what do we see? Dollars and cents? Protein-units? Turbines and electricity bills? Surely we do, we must. We increasingly see only the usefulness or un-usefulness of salmon as our human populations increase and global markets competitively shift. A telling title in environmental ethics is Frank Ackerman’s new book, *Priceless: On Knowing the Cost of Everything and the Value of Nothing*. Salmon value is part of our commodified economic landscape. The otherness, the contingent-gift-ness of salmon leaping up waterfalls in spring is muffled by necessity in the ringing telephones, crying bellies and stacks of kitchen-table bills.

## Fragility

In the salmon myths of the Columbia, ‘beauty and utility’ remain appropriately connected in the attitudes and practices of receptivity taught by Coyote: gratitude, celebration, order, and generosity:

“Then he and the people had a big feast—a feast of salmon cooked in the proper way, the way he explained to them. Coyote said to the animal people along Big River and along all the streams that flow into it, ‘Every spring the salmon will come up the river to lay their eggs. Every spring you must have a big feast like this to celebrate the coming of the salmon. Then you will thank the salmon spirits for guiding the fish up the streams to you, and your Salmon Chief will pray to those spirits to fill your fish traps.’”

When these practices and attitudes are forgotten or lost there are consequences. The relationship is fragile. When Coyote teaches the Columbia River people the appropriate ways to catch, clean, cook and celebrate the salmon’s miraculous annual return, he warns against greed. He makes Beaver the Salmon Chief and promises that there will always be enough salmon, even for strangers, if the people are not overtaken by excessive desire. “If you cook three salmon and can only eat half of one, the salmon people will be ashamed and will not return.”

Scientists tell me that 10–16 million Columbia River salmon used to return each year, but due to “anthropogenic threats” (over-fishing, dams, resource extraction and industrial influences, to name a few) the returns have recently dipped below 200,000. Pacific salmon have survived threats for 18 million years. These “anthropogenic threats” are less than 150 years old.

The beauty and utility of salmon have been separated long enough now that we must take account of how much has perished. This is the work of mourning. The salmon stories told by the Columbia River people today are mostly lamentations. This past year’s run of spring salmon was so meager that the tribes had to import salmon from other rivers for the First Fish ceremony in April. We can only mourn in part with Elizabeth Woody as she remembers Celilo, or with Sherman Alexie as he observes the ghosts of salmon jumping over Spokane Falls.

## Memory

What right do we “white men” (new-comers) have in mourning the extinction of salmon? Not much. Our memory is too short. As Hopkins put it, “After-comers cannot guess the beauty been.” We do not have the cultural, tribal, co-evolved, storied-past and ancient memory with which to do any real mourning. But we mourn the perishing of beauty, even in an adolescent way. For some of us, the embodiment of beauty in these fish is the most of beauty we’ve known, quickly perishing as it is. For me, short-memoryed, utility-and-pride-blinded, adolescent-new-comer that I am, literally, my first memory is salmon-fed.

I spent this past year in my childhood basement bedroom in Oregon. In between graduate degrees I decided to take a wonder-year back home to do some reflecting and reorienting before my next migration to New York City. I spent much of the year sick-and-tired, slowly realizing I had a genetic blood disorder that I did not want to realize, a lot of time on my bed or couch near the woodstove, living amidst the fragments of my past 25 years. My parents’ kindness has kept my bedroom pretty much intact since my departure, including shoeboxes of baseball cards, mini-compound bow-and-arrow, fly-rod, build-your-own moccasin-kit and snowboarding gear: the stuff that my kids will one day have to throw away. My parents figured my homecoming was a good chance to comb through the over-stuffed storage spaces of our house and *simplify* (or ‘make room for all the new crap,’ as it were). As I was combing through the artifacts, a Polaroid picture (fig. 1) slid out from between two boxes and fluttered to the linoleum floor. I couldn’t believe what I saw!

For many years I’ve had a vivid image of my first memory, my first self-conscious flicker, the first stored perception of something on my mind’s screen: I smell a coastal squall coming over Mary’s Peak, a giant western red cedar and my dad standing in the periphery. I see a coho salmon.

What blew my hair back about this photograph is that it seemed to be a picture of that exact flicker. A picture of me having my first memory. Strange. Mom says that I must be two-and-a-half years old because she can see my diaper underneath my pants and I’m wearing my big sister’s rubber boots. There is the coastal squall dark in the West behind me, a soggy Oregon afternoon, red cedar to my right, dad



Figure 1—Joey’s first memory (photo by Mary Ann Clair, 1982).

to my left, and there the coho. We are both about two-and-a-half feet tall.

What struck me when I picked the photo off the floor was the look on my face. I don't appear to be looking anywhere or at anything. I look astonished. I have the look of wonderment. I am rocked back in my oversized rubber boots, standing on my heels, mouth agape, screaming. Not crying, screaming for joy, for wonder, not just at the buck in my dad's upraised arm, but for wonder about a mystery that the fish represents, or symbolizes, or bears witness to. (Side-note: When I received an email awhile back about this symposium asking what sort of equipment I would need for my presentation, I realized I wasn't going to a humanities conference! I figured I should have some visual aid. My dad graciously flew up to join me here in Anchorage this week and brought me a picture of my first memory.

Please note that the wonder-look was not just county-fair, cotton-candied happiness. It was wonder, a scream for salmon-finality, both joy and fear. Riding my dad's back across the slick mouth of Fall Creek down to Alsea's Big Bend at two-and-a-half years old was sobering joy. Remember that river fishing the coastal streams for fall salmon is not some happy-summer-in-Montana-Brad-Pitt-fly-fishing-for-two-pound-trout-type of experience. For a two-year-old, coho fishing was as terrifying as a hospital delivery room and as melancholic as a nursing home. After five years feeding in the open sea those river deities became totally disproportionate to their little natal creek. Bucks thrashing around the hole, me stumbling onto rotting hens, jawing their last gasps, hidden in the long grass along the bank. The pungency of death and new life in the ceaseless sound and sight and smell of a rushing green river. My first memory is also my first experience of wonder, my first perception of beauty, my first experience with the finality of things: salmon.

To experience salmon in their own *finality*, to understand their own meaning, is to bump up against the edge of a mystery much larger and deeper than most of us realize. That is why these fish have historically inspired the most elaborate seasonal rituals and detailed stories, an attempt to make sense of their fortuitous annual arrival and attune ourselves to it. Salmon, more than any other character in Columbia River mythology, offer an insight into the very heart of being, a vision of the way things *really* are.

One of the great gifts of modern salmon biology has been the careful, intricate observation and narration of Pacific salmon's function as *keystone species*, contingently supporting multiple other species and weaving multiple ecosystems. From bears to eagles to humans to flora to fauna to nameless species we haven't yet named: salmon nourish others. The crucial nutrients and essential marine elements of salmon-chain-linked-life have been traced at the top of 200-foot spruce trees and in the embryos of salmon's very own offspring. Biologically we have only begun to understand "the infinite extent of their relations." If you think that giving life to others is beautiful then salmon are absolutely gorgeous.

It is a crucial historical moment for us, for salmon. It is time to offer salmon a gift in return: inland hospitality, maybe even sacrifice. To hear salmon stories, new and old, offers us an attunement to the landscape, people, fish and even ourselves. To celebrate salmon as a way of life offers us an assessment of our contemporary cultural attitudes and socio-economic practices. This assessment is a damning

critique and inspiration for new possibilities. Pacific salmon as *indicator species* are more than a 'canary in the coal shaft.' For Pacific Rim peoples they are an outright vivid, symbolic and substantial reminder of the hospitable wheel, the circle of sacrifices that makes our lives possible. To trespass on this beauty and stand by while it vanishes is more than an assault on bio-diversity, it is ignorance of a greater mystery.

In one short generation, in one life, salmon-inspired-wonder can birth a whole new tradition, or rebirth an old one, as it were. In the end, salmon will save themselves. New stories have emerged, lives have been made whole, and beauty continues to be revealed.

After this conference, instead of returning straight to the East Village in New York City, I will fly home with my dad to greet the returning salmon on our homestream, the Alsea. The coho have all but disappeared now. We will fish for their cousin the chinook. Sometimes I offer my dad a hand crossing the heavier riffles.

I am proud to bring a dime-bright 20 pounder home to my mom's table. We offer prayers of gratitude and butternut squash with brown sugar to celebrate the first fish's arrival. My dad doesn't keep fish anymore. He doesn't need to. I see him on the basalt bench down river, crouched with both hands in the cool water, reviving his catch in a quiet pool, muttering something, talking to the salmon. He leans down on his knees and kisses the fish before it swims away.

Why does he still fish? Hungry for wonder, I suppose. He prays that they will be around another year; around long enough for his grandchildren to experience wonder, to touch the finality of things, to see beauty. Each fish released is a prayer. So is every fish counted, every ecosystem fought for and kept intact, every sample taken, every report written, every observation noted, every sacrifice. Wonder gives way to beauty, gives way to mourning, gives way to hope: the place where prayer becomes action. I sincerely thank you for your work at that intersection where biology becomes story, becomes conservation. It is the action of hope and, I believe, the work of love.

## Postscript (Three Days Later)

The sun is moving through mist in the Alsea valley. I stand on two rocks, my rod bouncing with a wild salmon. It's 6 a.m. and the fish is taking a heady run down the pool, possibly heading all the way back to sea. I am trembling on my homestream in the first light. I feel the nervous pulse of joy, gratitude, wonder and fear in having this huge salmon on my line, mixed with the awkward emotion of hooking and piercing something that you love. To my surprise the net is filled with a million ocean-going silver scales. A bright chinook: a 'keeper' on the Alsea. I realize it is the first salmon of the day on the bank, the first of the season. I feel torn. There is no guarantee I'll see another fish today, the river is low and clear, its early in the season, I have to go back to New York soon.

The act of offering first-fruits back to the earth, or first-fish back to the river, is supposed to be an act of gratitude, a sacrifice. It is a conscious act of remembering that everything is a gift from beyond yourself. (Sometimes the sacrifice feels more difficult, foolish and inefficient than others). The offering-back is symbolic, mysterious, and material gratitude. I raise the chinook to the lightening clouds. I let out a



two-and-a-half year old coyote-yelp of wonder and offer the king back to his river. The nervous salmon waves back into a million invisible currents of an underwater rhythm.

Nothing enjoys being tricked, pierced, dragged, netted and thrown back (even lovingly). Depending on water level and color and barometric pressure (and a whole host of superstitious fisherman speculations) salmon are more or less wary of biting your hook. They are not stupid, and I've never caught the same salmon twice.

You can imagine my surprise, when twenty-six minutes later, I'm standing on those two rocks, rod bent, line buried in the narrow slot and that same silver-scaled, sun-beamed, God-sent, gift-fish swam into my net. Infinite generosity. Another chance at salmon-wonder. Given once, given again, and again.

Inexplicably, the Alsea River was flooded with an early mystery-run of wild coho this year. They were stacked in like cordwood. We kept catching them, hand-over-fist, wide-eyed, all morning. What some fishermen might consider to be a catch-and-release, Oregon Department of Fish and Wildlife 'bother,' we met with honest-to-God-grateful-wonder and secret-delight as we kept on kissing and releasing coho with

prayers all morning...prayers for their journey, for this fall, and all falls. For as long as the coho run and the rains come and the gift-wheel whirls on and humans have the chance to admire, catch, and eat wild salmon, we will also have the chance to become wild, sacrificial, and self-giving like the salmon, and their Maker. The salmon-Maker is my own Maker.

Salmon, more than any other character in Columbia River mythology, offer an insight into the very heart of being, a vision of the way things *really* are. They poignantly embody the self-giveness of God's very Being in nature, which, in Western theological terms, is the "Christological" witness of creation. Theology says that we live in a "cruciform" cosmos wherein every life requires a series of gifts and sacrifices to continue and these salmon-gifts and river-sacrifices witness to and participate in the gift and sacrifice of God's own life given in creation and represented in the food of Christ's death and resurrection. Celebrating these mysteries opens the crucial connection between the beautiful, generous, sacrificial self-giveness of God's world (in salmon, in Christ) and the shape of our own lives.

# Wilderness, Water, and Quality of Life in the Bitterroot Valley

Kari Gunderson  
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**Abstract**—The Bitterroot Valley is located in western Montana, U.S.A. Most of the Bitterroot Range above the Bitterroot Valley is protected as wilderness, and is a source of much of the water that flows down and through the valley floor. With an annual precipitation of only 12.3 inches, the Bitterroot Valley is classified as a high desert environment. Today the quality of life in the Bitterroot Valley is high, and it is deeply connected to the water resources and naturalness of the mountain landscape. To provide water for orchards, food crops, and hay, farmers constructed dams in the Bitterroot Mountains in the late 1800s and early 1900s. They were built to capture spring runoff from snow melt and store it until late July and August when flows in the Bitterroot River and its tributaries are usually too low to support irrigation and water-based recreation. In 1964, 251,443 acres (101,755 ha) of the Bitterroot Range were classified as wilderness. Special provisions in the Wilderness Act allowed continued operation and maintenance of these dams for existing uses. When dam repairs are undertaken periodically, there is intense discussion on the appropriateness of using heavy equipment, the type of repair to be implemented, and, sometimes, even whether to do the repair at all. The dams have substantial influence, both upstream and downstream, on the biological integrity of this wilderness ecosystem, but the influences may be considered tradeoffs with human needs for the same resource. This study attempted to develop an understanding of the ecological, economic, social, and cultural values associated with wilderness dams in the Bitterroot Valley.

Humans rely on freshwater for a number of reasons, including in our homes, agricultural uses, and for recreational use. At our homes we use water for drinking, bathing, cleaning, watering the lawn, and draining wastes. In fact, the “average per capita consumption of water in this country is about 100 gallons (379 liters) per day...” (Finstick 1986). However, household systems are not the only systems dependent on freshwater. The natural environment also requires freshwater to maintain ecosystems. The amount of water we rely on to continue our lifestyles increases when we consider the amount that is required to produce the food that we

eat. When combined with our household use of water, the total amount of water required to sustain our livelihoods is quite extensive. To supply this demand for water, humans have regulated the flow of many rivers and streams. As the human population increases, the need to control freshwater resources also continues to increase.

Water is also an important component of recreation in the United States. Rivers provide resources for rafting, kayaking, fishing and swimming. Lakes and reservoirs created by the placement of dams provide for recreational opportunities. Additionally, lakes and rivers provide picturesque scenery for hiking and picnicking, and are often sought after for camping locations when traveling through backcountry areas.

The natural world is also dependent on water abundance to sustain freshwater ecosystems. In an ideal situation the freshwater resource would be adequate to provide for each use, whether it is for humans or for the environment. However, the freshwater resource is finite (Naiman and others 1995). Freshwater is most often derived from precipitation and therefore is a function of the area's geographic location.

The human population continues to increase, and because we are not the only species that rely on the freshwater resource, decisions must often be made about how the water is managed and which user, the environment or humans, will receive the most benefits from that water. Most often, the competition between users favors humans. Since the early ages, humans have diverted water to irrigate lands and grow crops to feed people (Postel 1999). Ward and Stanford (1979) conclude that today most of the mainstream rivers are effectively manipulated for anthropogenic purposes. Until recently, flow regulation from impoundments and diversions has proceeded without due consideration of the ecological consequences on the environment.

What has often been overlooked, and is now becoming of increasing interest, is what the effects are to the ecosystem from the regulation of streams and rivers for human uses and how those human uses affect the larger ecosystem. Therefore, the purpose of this paper is to provide an understanding of the ecological and human connections between the freshwater resource and the ecosystems and people that it supports; and, to explore the effects of human alterations (diversions, dams, and irrigation) on those connections through a case study of the history of dams in the Selway-Bitterroot Wilderness (SBW) in western Montana.

The connection between ecosystems and the water resource has been termed ‘hydrologic connectivity,’ and is defined as “the movement of matter, energy, and/or organisms within water and between elements of the hydrologic cycle” (Pringle 2001: 21). This paper also explores the “human connectivity” of future resources, defined here as human meanings

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or values ascribed to freshwater resources including, but not limited to, quality of life, safety, transportation, and survival.

## Dams in the Selway-Bitterroot Wilderness

The Bitterroot Valley is nestled between two mountain ranges on the western edge of Montana. The Bitterroot Valley is 25 miles (40 km) wide and 96 miles (154 km) long covering 2,383 square miles (6,172 km<sup>2</sup>). Average rainfall is 12 to 15 inches per year (Bitterroot Chamber of Commerce 2004). The Bitterroot Valley would be very arid without the water produced on the east face of the Bitterroot Range. The Forest Service estimates that this slope produces 70 percent of the water for the Bitterroot River (USDA Forest Service 1963). The Bitterroot Mountain Range forms the western boundary of the Bitterroot National Forest and over 70 percent of the land in the Bitterroot Valley is part of the Bitterroot National Forest. According to the 2002 population census there are 37,730 residents living in Ravalli County in the Bitterroot Valley.

Ravalli County, which includes most of the Bitterroot watershed, experienced a 43 percent increase in population during the 1990s and was the fastest growing county in Montana (Swanson 2001). The quality of life in the Bitterroot Valley is high, and it is deeply connected to the water resources and naturalness of the mountain landscape. Prosperity of some economic sectors, aesthetic beauty, and sense of place are all believed to be somewhat dependent upon the water and other natural resources of the Bitterroot National Forest.

## Cultural/Historical Resources

Archaeological surveys revealed prehistoric occupations at some sites in the Bitterroot Mountains, including a possible Early Archaic presence (5000 – 3000 B.C.). Aboriginal campsites have been surveyed although many artifacts have been destroyed around dams constructed in the late 1800s.

The primary legislation governing modern heritage resource management is the National Historic Preservation Act (NHPA) of 1966 (amended in 1976, 1980, and 1992). All other heritage resource management laws and regulations support, clarify, or expand on the National Historic Preservation Act. The Forest Service is required to consider the effects of dams, as pre-existing structures and requests for maintenance and reconstruction by dam owners, on cultural resources that are determined eligible for the National Register of Historic Places or on heritage resources not yet evaluated for eligibility. Resources include such things as campsites, artifacts, historic cabins and bridges, and other cultural objects. These laws and regulations guide the Forest Service in identifying, evaluating, and protecting heritage resources on National Forest System lands (USDA Forest Service 2002a).

Long before they arrived in the Bitterroot Valley, the Salish were one of several tribes living in the Columbia Plateau. By 1805/1806, the Lewis and Clark expedition observed that the Salish were two distinct tribes: the coastal Salish,

who had migrated west to the Pacific slope, and the inland Salish, the group that included the small tribe who followed the Clearwater River and eventually made their home in the Bitterroot Valley (Malone and others 1991; Stevensville Historical Society 1971).

Events occurring between 1812 and 1841 altered the lives of the Salish people (Malone and others 1991). The Salish learned about the “Black Robes” through Iroquois Indians who were traveling across the West with fur trappers. Big Ignace LaMouse, an Iroquois Indian, led a band of his tribe west eventually settling among the Salish in the Bitterroot Valley. He assured them with the “Black Robes” pointing the way that “all men could enjoy the fruits of heaven” (Stevensville Historical Society 1971: 38).

Even though the Salish survived quite well in a nomadic life of hunting, fishing, and collecting “bitter roots,” the Jesuit missionaries considered agriculture as the better alternative to the itinerant native lifestyle. The Jesuit priests successfully planted and irrigated a crop of potatoes, oats, and wheat at St. Mary’s Mission in the summer of 1842. “Thus, by appropriation, the first water right in the state of Montana was established” (Stevensville Historical Society 1971: 141).

Six years after the first successful crops were harvested by priests at St. Mary’s Mission, the British ceded a large portion of its Northwest Territories to the United States and the Bitterroot Valley was placed under the jurisdiction of the Oregon Territory. Five years later, the Bitterroot was incorporated into the Washington Territory. One of the first priorities of Territorial Governor, Isaac I. Stevens, was to solidify the land claim by resolving “the Indian question,” developing transportation networks and opening the land to homesteaders (Malone and others 1991). Governor Stevens’ solution to the “Indian difficulties” was cession of their aboriginal lands and removal to reservations, where clear, established boundaries would protect both the settlers and natives from squabbles over the white concept of property (Zeisler 1982). Stevens negotiated the Hellgate Treaty with the Salish, Kootenai, and Pend Oreille tribes in 1855 that established the Flathead Reservation in the Jocko Valley. As a result of the treaty, the Salish own federal reserved water rights, and they were also given fairly broad rights in the Hellgate Treaty, including hunting and fishing rights through the Upper Clark Fork Basin. The Hellgate Treaty was ratified in 1859. Twelve years later, as more and more settlers came to the valley seeking land, the remaining natives’ presence was perceived to hinder white settlement, so President Grant issued an executive order requiring all of the Salish to move. By 1891, all of the Indians had moved to the Jocko Indian Reservation, which freed the Bitterroot Valley of one obstacle to white settlement (Malone and others 1991). Scarcity of water and productive soil were the barriers that remained.

## History of Water Rights in the Bitterroot Valley

Soon after the Hellgate Treaty was ratified, new immigrants arrived in the Bitterroot Valley. With a growing number of homesteaders, Montana became a territory in 1864. By 1865, there were approximately one hundred white

inhabitants in the Bitterroot Valley, most of whom were engaged in agricultural pursuits (Baumgartel 1923).

One of the earliest acts of the newly established Montana Territorial Legislature was to establish a system of water rights. On January 11, 1865, the legislature ratified the doctrine of riparian rights resulting from English common law and practiced throughout the eastern states. The riparian rights system gives individuals rights to water flowing on their property, allowing them to use that water however they please so long as the water stays in its channel and continues downstream substantially “undiminished in quantity or quality” (Deuel 1999: 29). Miners and ranchers protested against the riparian doctrine so the legislature approved the fundamentals of prior appropriation as well.

Mining and agriculture interests provided the impetus for construction of some of the earliest dams in the Bitterroot Range. The steady expansion of agriculture and settlement was reflected in the continual filing for water rights and concurrent construction of irrigation ditches.

In the 1870s, the Bass brothers planted the valley’s first successful commercial fruit orchard and initiated an experimental station that operated for 20 years (Zeisler 1982). In 1871, the Etna Mutual Ditch Company was founded as the earliest recorded cooperative irrigation project in the valley, to divert water from the main stem of the Bitterroot River. The trend towards group irrigation projects initiated by Etna Mutual in the early 1870s gathered momentum in the 1880s with the formation of several small ditch companies comprised of groups of neighbors sharing the costs and labor required to build and maintain ditches.

The Organic Administration Act of 1897 provided a formal system for managing the forest reserve system. The Bitterroot Forest Reserve was one of the first forest preserves, established in 1897. The importance of stored water for agriculture and economics of the Bitterroot Valley was emphasized by the U.S. Geological Survey. The survey report notes that “nearly all the canyons of the western watershed offer good opportunities for creation of small storage reservoirs” and “small scale dams have been constructed on some small streams on the west side of the Bitterroot Range that hold back a portion of surplus water” and their construction has been “a matter of local enterprise” (USDI Geological Survey 1899: 261). As of 1899, residents of the Bitterroot Valley had constructed 75 small dams within the Forest Reserve (Bitter Root Water Forum 2003). In 1905, the Bitterroot National Forest was established and boundaries were adjusted. Because of the agricultural character, some land along the East and West Forks of the Bitterroot River was removed from the original Forest Reserve status.

## Wilderness Considerations

In 1964 there were 144 dams within the initial 9.1 million acres (3,682,639 ha) designated as wilderness within the National Wilderness Preservation System (NWPS) (USDA Forest Service 1963). Many of the dams required routine maintenance, replacement or removal.

Most of the dams in the Selway-Bitterroot Wilderness (SBW) typically have earth and rock-filled log crib cores with native rock facings. They are approaching (or in some cases, exceed) 100 years old. The log cribs have rotted, the fill has settled, and the facings have deteriorated after a

century of use and exposure to naturally occurring events like windstorms and avalanches (USDA Forest Service 2003a). Inclusion in the wilderness presents unique challenges for repair, maintenance and reconstruction. Routine maintenance usually involves access by foot, saddle horses and pack mules, or helicopter (by special authority on a case-by-case basis). The dams are located at high alpine elevations and are only accessible from July until October of each year. These dams require a certain level of annual maintenance, including removal of woody debris that falls into the reservoirs and floats up to the face of the dam. This debris must be removed periodically to keep the spillway from becoming blocked with the resulting danger of the dam being over-topped (USDA Forest Service 1991a). The normal sequence of operation of dams in the SBW is to leave the irrigation gate open August through late June/early July, at which time the gate is closed to impound the remaining spring snowmelt. The gate is opened in August to provide late season irrigation water.

Federal agencies charged with managing wilderness are faced with challenges of dam management when interpreting the intent of the Wilderness Act and other resource protection policies regarding pre-wilderness water and property rights, reasonable access, dam safety, recreation, cultural resources, and fisheries considerations.

The SBW consists of lands that were within the Selway-Bitterroot Primitive Area established by the Forest Service in 1936 under the L-20 Regulation. When the primitive area was established there were 45 irrigation reservoirs in use on the east face of the Bitterroot Mountains within the boundaries. Most of these dams were constructed around the turn of the century using hand or horse labor and utilizing on-site materials. Twenty-nine of the original 45 dams have been abandoned by the original owners. Difficult access, costs to maintain and operate dams, and no actual need for water are some reasons for abandoning these reservoirs.

The L-20 Regulation, which was replaced by Regulation U-1 in 1939, was more permissive than Regulation U-1 and permitted certain improvements and developments in Primitive Areas such as logging and road construction, that are now prohibited in wilderness areas (USDA Forest Service 1963). U Regulations prohibited timber cutting and road construction but allowed grazing and water resource development (Hendee and Dawson 2002; Roth 1995).

In 1961, the U.S. Senate overwhelmingly approved legislation similar to Senator Humphrey’s 1956 Wilderness Act legislation. During the 1961 Senate debate on the legislation concerning the issue of protection of “existing private rights,” Senator Metcalf of Montana expressed that “private rights are protected, and the intention is to protect them as these areas are converted into wilderness” (U.S. Congress 1961: 3).

In 1963, Secretary of Agriculture, Orville F. Freeman, recognized the importance of the eastern face of the Bitterroot Divide draining into the Bitterroot Valley. Some of the areas under consideration for wilderness designation were excluded “because it is needed for irrigation reservoirs.” These areas were deemed “more valuable for water storage purposes than for wilderness.” The interests of the Bitterroot Valley residents in water produced on the east face of the range were recognized in the decision by guaranteeing that “individuals or organizations holding special-use permits for irrigation structures ... shall be entitled to access to such

structures and to repair or enlarge such structures by any means which shall not be unduly destructive of other natural resources in the area" (USDA Forest Service 1963: 19).

The SBW was designated by the Wilderness Act of 1964 (PL 88-577, 78 Stat. 890). Facilities for water storage, such as dams and reservoirs, are permitted by the 1964 Wilderness Act. Currently, there are 16 privately owned dams within the SBW, all existing prior to wilderness designation. Five of the dams were built before the establishment of the Bitterroot National Forest in 1905 and are authorized by virtue of recognized outstanding rights (USDA Forest Service 2003a). Remaining dams are authorized under Forest Service special use permits, with several qualifying for permanent easements to be issued under authority of the Colorado Ditch Bill (Ditch Bill, PL 99-545). Special use dams are shown in figure 1.

Section 4(c) of the Wilderness Act of 1964 states prohibited uses and actions in wilderness "except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act..." In this section Congress acknowledges that even though the activities are prohibited there are times that exceptions will need to be made.

From Section 4 (c), the minimum requirements decision guide (MRDG), formerly referred to as the "minimum tool rule," was derived to assist managers in assessing both the minimum work that is necessary and the minimum tools to implement the action that will result in the least impact to wilderness. Use of the MRDG is not required by law or Forest Service policy. The interpretation of the MRDG is to be used when the proposed action is generally prohibited by the Wilderness Act and/or policy (USDA Forest Service 2004). Forest Service wilderness policy requires a minimum tool analysis for dam maintenance and reconstruction proposals when motorized tool use or mechanical transport in wilderness is requested.

Until the late 1960s, the Forest Service had a permissive policy regarding the use of mechanized and motorized means to maintain the dams. The Wilderness Act placed restrictions on the use of motorized equipment and mechanical transport. The Bitterroot National Forest responded to those restrictions by scrutinizing each request for use of motorized equipment or mechanical transport. A comprehensive review of dam management policies was undertaken in 1991 leading to further restrictions on the use of mechanized and motorized means for dam maintenance and reconstruction.

In a 1998 Region One supplement (2300-98-1) to the Forest Service Manual regarding maintenance of dams in wilderness, use of motorized/mechanized equipment for maintenance or reconstruction of dams in designated wilderness will be permitted if one or more of the following conditions apply:

1. Emergencies (immediate threat to life and property).
2. Where impacts to wilderness and/or resources therein would be greater using non-motorized/non-mechanical methods (includes duration of impacts).
3. When physically infeasible to use non-motorized methods.
4. When costs make the use of primitive methods not feasible.

The determinations required may be made and documented by the responsible Forest Service official through the National Environmental Policy Act (NEPA) process. Specific

project level conditions apply to site-specific conditions and the situation at the dam. A "minimum tool" analysis may be required that can be incorporated into an environmental analysis.

A brief history of two dams located within the SBW is presented to illustrate the complexities of managing dams that were constructed long before the Wilderness Act was passed. The original Bass Lake Dam was built in 1887 to provide irrigation water for farmland in the Bitterroot Valley. The dam was reconstructed in 1918, 1952–1953, and most recently in 1996. A road was built in 1952 for heavy equipment access to the dam and was renovated again in 1996 so heavy equipment could be taken to the dam site (Bass Lake Reservoir Company 2003). When the equipment was removed the road was restored to trail conditions. Normal storage capacity of the dam is 3,600 acre-feet (4,441 cubic dekameters). In contrast, Big Creek dam was initially constructed in 1892 as a rock and timber structure. The original dam was in a 7ft (2m) cut with a hole in the logs of the dam for an outlet (USDA Forest Service 2002b). Significant repairs to the dam were done in 1942. Over the years much of the maintenance has been done using traditional hand tools. The dam was rebuilt in 1977 using heavy equipment and helicopters. No access road was built to the dam so all construction materials and equipment were transported by helicopter. Concrete was flown in to build a new dam at the site of the old dam (USDA Forest Service 1991b). Normal storage capacity of the dam is 3,261 acre-feet (4,022 cubic dekameters) (Big Creek Lakes Reservoir Association 2002). Both dams were originally constructed before the turn of the century using traditional tools, have been rebuilt more recently using mechanized and motorized equipment, and they have similar storage capacities. The contrast is that no road access was allowed for reconstruction of Big Creek dam and heavy equipment had to come in by helicopter transport.

## Policy Considerations and Implications

The National Historic Preservation Act requires consultation with the Salish Culture Committee of the Confederated Salish and Kootenai Tribes at sites within the Bitterroot National Forest that may have been occupied by the tribes. Consultation with the Montana State Historic Preservation Office is required for dams with Ditch Bill easements and special use permits, dam reconstruction, and other activities as needed. Ditch Bill easements date back to 1866 legislation, granting right-of-way for a ditch or canal that was constructed by the holder of a valid water right prior to inclusion of the land in the National Forest System.

The Forest Service also has oversight responsibilities on dams located on federal lands in Montana to ensure compliance with federal dam safety regulations. Federal regulations are very stringent (USDA Forest Service 2003b). A dam poses potential risks to persons and property downstream, so the dam owner is legally obligated to maintain the dam in a safe condition (USDA Forest Service 2003a).

Federal and state dam safety requirements and oversight have increased significantly since the SBW was established. Examples include the Federal Dam Inspection Act of 1972 (PL 92-377); Presidential Memorandum of October 1979 and Federal Guidelines for Dam Safety of June 1979; the Water

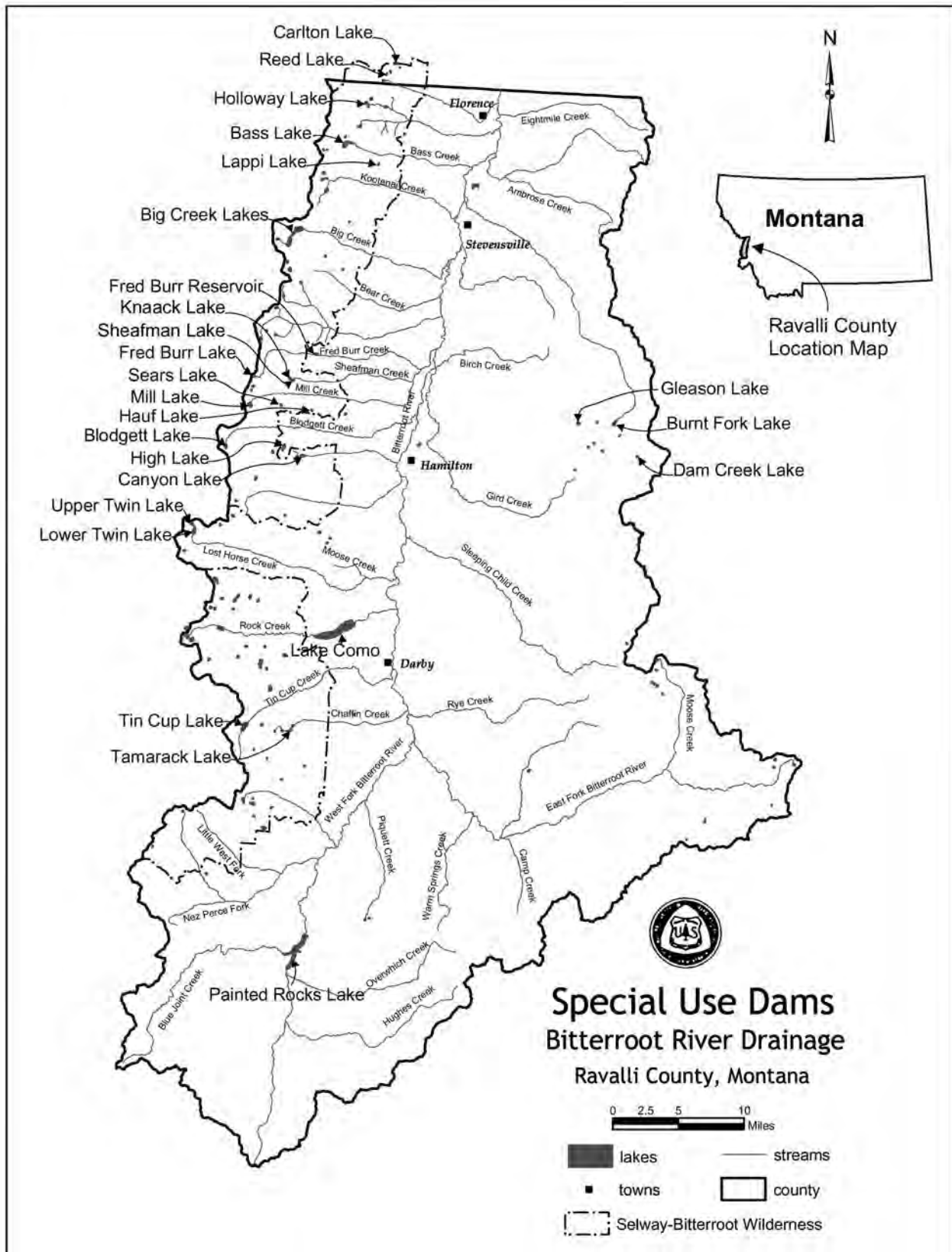


Figure 1—Special use dams, Bitterroot River drainage.

Resources Development Act of 1992; the Montana Dam Safety Act of 1993; the National Dam Safety Program act of 1996 (PL 104-303); and, the National Dam Safety and Security Act of 2003 (PL 107-310). The Montana Dam Safety Act eliminated the regulatory role of the state on dams located on federal lands, leaving the regulatory role of dam safety entirely with the Forest Service. Hazard ratings are applied to dams based on the potential for loss of life and/or property should the dam fail (USDA Forest Service 2003a).

Six of the dams in the SBW are high or moderate hazard and require Emergency Action Plans. The dams include Early Warning Systems, powered by solar panels, and installed below dam sites in the SBW or closer to the wilderness boundary or the trailhead to alert the downstream population at risk of dam failure.

## Contemporary Implications for Wilderness, Water, and Quality of Life in the Bitterroot Valley

Many of the dams in the SBW are old and pose a great challenge to meet standards set by state and federal dam safety regulations. Inclusion in the wilderness presents unique challenges for repair and maintenance of the dams. There are no roads to any of the dams and access is by foot, horseback, or helicopter (USDA Forest Service 2003b). Since the Wilderness Act was signed into law in 1964, different Forest Service personnel have interpreted the analysis and the definition of "reasonable access" differently, resulting in inconsistent treatment of similar requests. Section 5(b) of the Wilderness Act does not provide specific direction for access and appears to be in conflict with Forest Service dam safety policy (USDA Forest Service 2003a).

Today the Bitterroot Valley is characterized by an influx of new people with different values and economic means. The once very rural communities here are evolving into communities of commuters to the Missoula area, retirees, a growing service and high technology business center, as well as trying to maintain a strong relationship with agriculture. Ravalli County has no building restrictions along creek drainages outside of the Selway-Bitterroot Wilderness.

Many people living below the dams on the west side of the Bitterroot Valley, who are members of an irrigation district, pay a tax assessment for maintenance, operation, and rehabilitation of dams. In return, some landowners receive water to irrigate their crops, fields, or land. Not all landowners downstream from the reservoirs receive water, use it, or even know they have access to it until a dam needs repairs and they suddenly receive a sizeable bill. With the rapid population growth in the Bitterroot Valley (Swanson 2001), newcomers will continue to create increased demand on water resources.

The Bitterroot Water Cooperative was formed by many of the owners of the dams in the SBW who are working together to be informed on legal requirements and to resolve issues affecting the operation of dams in the SBW. In 2001, the Water Cooperative decided to request Congressional legislative action to "alleviate the severe and perhaps insurmountable physical and financial strain placed on the dam owners whose reservoirs are located within the boundaries of the SBW" by asking that the wilderness boundary on the

east face of the Bitterroot Mountains be moved to "cherry stem" the reservoirs and the canyons and trails leading to them so the result is that these areas would not be in the Wilderness" (T. Bumbarger, personal communication, letter to Lawrence Siroky, Montana Department of Natural Resources, October 12, 2001).

The Bitter Root Water Forum was started in 1995 as a collaborative, consensus-based group of people with diverse ideas who meet monthly to gather information on issues such as growth and water and then work towards change. According to Roxa French, former Project Coordinator for the Bitter Root Water Forum, "One by one, irrigation companies are facing the daunting task of reconstruction or at least serious maintenance on the aging structures. The Irrigation Company must decide whether the dam continues to be valuable and thus a worthy investment, or whether to simply breach it, rather than trying to secure funds for repairs. For any one of the dams, the decision of the irrigation company seems to affect only the company and its shareholders. Taken collectively, the potential loss of this much water storage capacity and late season flows might drastically affect the greater Bitterroot Valley in the physical setting we've become accustomed to, and perhaps the way in which our ecosystem has evolved."

Wilderness Watch (WW), founded in 1989, is a national conservation organization dedicated solely to the preservation and proper stewardship of those lands and rivers included in the National Wilderness Preservation System (NWPS) and National Wild & Scenic Rivers System (<http://www.wildernesswatch.org/>). Dams in wilderness is one issue WW monitors throughout the NWPS. While WW agrees that dams are part of wilderness, and recognize them as cultural artifacts with valid water rights, they have taken a firm stand on the use of non-motorized primitive tools and access for operation, maintenance, and reconstruction. They argue that the original dams were built with primitive tools and that the intent of Congress was that they continue to be maintained with primitive tools, in accordance with the Wilderness Act of 1964 (W. Worf, personal communication, June 5, 2003).

The issue of dams in the SBW is complex and often divisive with many stakeholders in the Bitterroot Valley holding diverse viewpoints and interests, both social and economic. Bitterroot Valley residents want to protect their quality of life.

## Future Research Questions

The key to understanding the concept of hydrologic connectivity is to focus on a large scale. The effects of regulating water are not limited to the immediate river or drainage in which they are located. Rather, these effects are often noticeable across an entire landscape. In the Bitterroot Valley of Montana, the effects of regulating water that originates within the Selway-Bitterroot Wilderness can be observed across the entire Valley. The regulation of these creeks also affects the biological integrity of the entire Columbia River drainage.

Regulation of rivers and creeks threatens the landscape's biological integrity. As species of the ecosystem become lost or threatened as a result of loss in habitat, it sends a ripple through the entire food chain. At the local level, the loss of



one species, perhaps an insect, may be seen as irrelevant. However, when that loss is viewed from a landscape perspective, that one species may have been a vital food source for several species. As species are lost, the predator/prey continuum is altered. Most importantly, by simply altering the amount of sediments and organic material contained within the river, we can severely disrupt the biological integrity of the area.

The regulation of freshwater and its subsequent uses also affects the quality of life for the residents of the area, namely in the availability of groundwater. In the Bitterroot Valley, this is perhaps the most important connection between alpine lakes and people residing there. As Finstick (1986) indicates, the area's groundwater supply could not sustain the county's current population levels without the additional water added to the groundwater from irrigation. These irrigation waters recharge the area's aquifers, which provide water for domestic uses. If the irrigation practices within the Valley were discontinued, the availability of groundwater would be severely diminished.

This connection is important to note because the Bitterroot Valley is experiencing a rapid population increase. To accommodate the new residents, lands are being taken out of agriculture, and therefore, out of irrigation. If this practice continues, Valley residents' wells will likely go dry.

And lastly, a recurrent theme of this analysis is the inevitability of tradeoffs between water resources and the quality of life Bitterroot Valley residents enjoy. Due to the nature of this dilemma, with its foundation in human values, science alone cannot provide a solution. Science can provide information as to the effects of certain alternatives, but the solution can only come from mutual agreement on behalf of all stakeholders. If scholars are correct that "there is commonly a lack of data on hydrologic connections between wilderness resources and surrounding areas" then "the role of water, both aboveground and below the surface, must become a more integral consideration of wilderness integrity" (Pringle 2001: 21).

Based on this analysis, and reviewer comments, these are several research questions to consider for future research. The questions are divided into two subject areas: A) hydrological connectivity; and, B) human dimensions.

## A. Hydrological Connectivity

1. Careful consideration of ecological and socioeconomic tradeoffs associated with altering hydrological connectivity require answers to this question:

- How can we balance long-term ecological and public health benefits associated with water supplies, with short-term economic gains?

2. Development of a more comprehensive understanding of hydrological connectivity is also needed.

- How does hydrological connectivity operate within different landscapes?
- How does hydrologic connectivity link different ecosystem types?
- What are the time lags between a given alteration in hydrologic connectivity and consequent ecological effects on biodiversity? Ecosystem function?

- How do alterations in hydrologic connectivity affect foodwebs? How do cascading ecosystem-level effects of foodweb alterations affect both aquatic and terrestrial ecosystems?
- How do interactions between anthropogenic and 'natural' disturbances affect hydrologic connectivity?
- How do cumulative effects of alterations in hydrologic connectivity operate at different spatial and temporal scales?

3. There is a need to develop a basic understanding of the ecosystem processes that are affected by dams and to understand how dams and their hydrologic connectivity have been influenced by past and present human activities. This can be achieved through a paired watershed (dam/non-dam) analysis in the SBW along the Bitterroot Front that estimates populations of key floral and faunal species to ascertain ecosystem changes from dams. This will assess the availability of biological data at the local level and the implementation of GIS and hydrographic modeling to estimate and display current and future ecosystem effects from dams. More specific comparisons are offered below:

- Compare August streamflows (on a per drainage acre basis) for selected westside drainages with and without dams.
- Compare stream and riparian conditions (fisheries, aquatic life, etc.) of selected westside drainages with and without dams.
- Compare irrigated land, land values, natural and aesthetic values for private lands at the lower end of selected westside drainages with and without dams.
- Compare the aggregate of drainages with dams and those without.

## B. Human Dimensions

Research could be accomplished to better understand the economic, social, historical and cultural role the dams play in providing water to the Bitterroot Valley.

1. Breaching of dams.

- Understand why some private dams within the SBW have been breached. Conduct interviews with dam owners to develop oral histories of individual dams.

2. Social values.

- Conduct research to define the ecological, economic, social and cultural values held by local residents regarding wilderness water resources.
- Determine if Bitterroot Valley residents recognize and comprehend the relationship between wilderness water resources and the quality of life they enjoy in the Bitterroot Valley.

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# Are Wildland Watersheds Safest and Best?

Lawrence S. Hamilton

**Abstract**—The 2003 International Year of Freshwater highlighted the critical current and future scenario, on a global scale, of scarcity of adequate water—the essential need for all living things. About 40 percent of the world's population currently have moderate to high water stress, and it is estimated that by 2025 about two-thirds of the world will live in areas facing such water stress.

Within a given climate and physiographic situation, the human land use (or lack of it, as in wild lands) strongly influences the available quantity and quality of water. After briefly discussing the impacts of various land uses, it is concluded that wild land (or wilderness) is the hydrologically safest and best allocation of land. This is examined from the standpoints of wetlands, headwaters (including montane cloud forests) and the surface waters themselves. While sustainable use, and providing livelihoods to local people are desirable goals, there are just some situations where human use must surely give way or be strictly controlled, if water and its services are to play their full, critical role. Where highest quality and best regulated water is a necessity, wildlands or wilderness is the way to go. Examples of water resources protection giving opportunity for wilderness designation and protection are presented, for example, in New York State's Adirondack Forest Preserve.

## Introduction

Freshwater is the most crucial of all resources for humans, and essential for all other creatures that live in terrestrial or freshwater aquatic environments. A serious crisis looms, or already exists, in much of the world with its increasing population and burgeoning demand. The 2003 International Year of Freshwater attempted to raise public awareness of the problems we face in securing adequate supplies of suitable quality water, in the right places at affordable cost, given that:

- About 40 percent of the world's population currently have moderate to high water stress.
- By 2005 it is estimated that about two-thirds of the world will live in areas facing such water stress.
- By the year 2025 it is predicted that water withdrawal will increase by 50 percent in developing countries and 18 percent in developed countries (United Nations 2003).

Land cover and land-use activities strongly affect the availability and quality of freshwater that comes to us via the hydrologic cycle. As competition increases for scarce water,

societies will be increasingly searching for interventions in this cycle to capture more water (for example, through storages on watercourses, reducing evaporative losses from open water, pumping more groundwater and manipulating vegetative cover to reduce evapo-transpiration "losses"). None of this bodes well for wildlands, wild rivers and wild wetlands. But is this a necessary scenario?

Aside from all the compelling reasons for establishing and maintaining wildland protected areas having to do with biological diversity, cultural heritage, scenic amenity, healing value, limited recreational use, scientific benchmark and research area, the role of wilderness in watershed protection merits much more attention. The quest for adequate supplies of water of suitable quality will dominate much of the world's development agenda in this 21<sup>st</sup> Century and beyond. For potable water, industrial and irrigation supplies, hydroelectric use, navigation, recreation, and for all aquatic life, there are requirements for availability at the right place at the right time, and of the right quality (freedom from sediment or pollution). It is the thesis of this paper, that these requirements are best met from watersheds in some kind of protective status, but above all by wildland protected areas.

## The Early Wilderness-Water Connections

One of the historically earliest concerns about water and what our assault on the forest wilderness had done to it was expressed by a fellow Vermonter, George Perkins Marsh, a much under appreciated chap. In his great work, "Man and Nature, or Physical Geography as Modified by Human Action," published in 1864, and in earlier lectures and writings from 1856 on, Marsh linked water problems being experienced in the USA to human activity in forest clearing and logging, and related this to what he had seen in his foreign diplomatic posts in Turkey, Greece and Italy and travels in Egypt and Arabia (Trombulak 2001). His thinking and writing were seized upon by Verplank Colvin, New York State surveyor in the Adirondacks, who pointed out that: the Adirondack Wilderness contains the springs that are the sources of principal rivers and the feeders of the canals. Each summer the water supply for these rivers and canals is lessened, and commerce has suffered (Terrie 1992).

This was in 1870, but it took 15 years for this concept to materialize into a 1885 law establishing the New York State Forest Preserve in the Adirondack Mountains and also in the Catskills. (The State-owned Preserve constituted roughly 551,093 acres [223,000 ha] in the Adirondacks.) On these State lands the forest was to be kept "forever wild" according to the State Constitution (1902), and the rationale was for watershed protection. Thus, the first officially designated area

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for water protection was this first wilderness. Yellowstone had been created as a National Park in 1875, but it was primarily for the scenic value and thermal phenomena, not wildness. In 1902, the large Adirondack Park, including both Forest Preserve lands and private lands was established. The Park today embraces 5.9 million acres (2.39 million ha), of which 2.7 million acres (1.09 million ha) are “forever wild” Forest Preserve (personal communication, David Winchell, N. Y. S. Dept. of Environmental Conservation 2005).

At the end of the 19<sup>th</sup> and beginning of the 20<sup>th</sup> Centuries there arose a powerful doctrine in the watershed arena—that forests were the key to abundant, well-regulated, high quality water. Lands in the Public Domain of the American West were reserved from entry and alienation as Forest Reserves (later called National Forests), partly as timber supply, but also for watershed protection (Hibbard 1965). Some of this would eventually become designated “wilderness.” Moreover, we owe the existence of National Forests in the East to land acquisition authorized by the Weeks Act of 1911, “to protect the headwaters of navigable streams” (Dana 1956). In fact, it was only because of water’s importance for interstate navigation that the Federal Government was permitted to purchase land within the States. The bulk of our wilderness and wildlands in the East, aside from New York and Maine, occur in these purchased National Forests.

## Separating Myth From Reality

During these early years, respected professionals, politicians and even some scholars reinforced the popular conception that forests could prevent floods, ameliorate droughts, provide more low flow and that reforestation or afforestation would raise levels in wells, cause springs to flow again and reduce flooding in the lower basins. For instance, it has even fairly recently (1981) been claimed that logging and land clearing in the Nepal Himalayas has been responsible for devastating flooding in the lower Ganges basin in India, and that restoring forests can cause dry rivers to flow again, relieving drought (World Water 1981). Even my friend and respected, courageous campaigner for conservation, Dr. Norman Myers and others, as recently as 1983 were stating that tree roots soak up water in wet periods and release it slowly and evenly in the dry season to keep water supplies adequately restored (Myers 1983; Spears 1982). This is nonsense, for tree roots are more like pumps. It led to my writing of a landmark book of 1983 dealing with the 4 M’s: myth, misunderstanding, misinterpretation and misinformation (Hamilton with King 1983).

The popular thinking just does not “square” with the following phenomena, of which I have personal knowledge and experience:

1. Following large-scale reforestation of abandoned farmland in central New York, 1920s-1940, fishermen found that summer streamflows were diminished and adversely affecting trout fishing. This lower flow phenomena was confirmed by a famous U.S. Geological Survey stream monitoring study.irate fishermen were saying to professional foresters, “You lied to us.”

2. Forest clearing in certain areas of Australia for pasture or crops resulted in salts being brought closer to the soil surface by rising water tables, rendering the soils saline

and unfit for crops, in other words, rising, not falling, water tables following deforestation! And, the Chinese are planting trees in wet areas to draw down the water table.

3. Monsoon rains even on unlogged forests produced devastating floods in Malaysia.

4. Following large-scale forest blowdown in the 1938 New England hurricane, there were no disastrous floods the following two years. The same was true for the Big Blowdown in the Adirondacks in 1950.

5. Serious flooding occurred following the tail end of 1955 Hurricane Hugo in the Catskills, a largely forested area, which did not prevent flooding.

Scientific research in the watershed arena has given us a better understanding of the hydrologic role of forests, and forest alteration. Let me give you a few bits of this:

Tree roots are not a **sponge** as has been stated by some. They absorb water, but do not give it back to the soil. Trees transpire it, and they evaporate it, from foliage. In fact, they are more like a **pump**, taking from the soil more water than other vegetation because of deep roots, and evaporating more because of canopy roughness. Hence, when trees are cut down this heavy use is diminished. On deep soils, every experiment has shown an increase in water in the dry season, but also to a smaller extent in the wet season, when we do not want it in streams (Hamilton with King 1983). Nor does the tree canopy protect the soil from the kinetic impact of falling raindrops that causes splash erosion and dislodging of soil particles. Tree canopies are more like **umbrellas**, producing larger drop size, and once the surface is wetted, it all flows off or drips down. The larger drop size, and if the canopy is higher than 20 ft (6 m), means that terminal velocity is reached, and the energy of rain hitting the ground per unit area can be higher than in the open. It is the understory—short trees, shrubs, ground vegetation, litter, and forest-floor debris—that protect against raindrop impact and soil dislodging (Wiersum 1984). It is the soil with its organic matter that stores water, reducing overland flow, and that permits water to infiltrate and recharge ground water.

So, having “trashed” trees/forest, what can I, as a druid, say about them? First, they are **anchors**, with their root systems’ shear strength providing a greater safety margin against shallow landslips when steep slopes become saturated (O’Loughin 1974). Moreover, they provide leaf litter and debris that reduces surface erosion. Forests also are usually not subject to frequent intensive human or animal uses that make land more susceptible to erosion. Less erosion means less sediment, which means higher water quality.

Second, through their use of soil water, they keep the soil in the best state of preparedness to receive additional water for storage instead of runoff. In deep soils, this function can reduce **local** flooding from small or short storms that occur with great frequency. However, for prolonged rains (monsoon type) or high-intensity rains, soil water storage capacity determines whether there will be floods or not. If 5 inches (127 mm) of rain in 12 hours falls on soils whose storage is only 3 inches (76 mm) (especially previously wetted), there will be flooding, even if covered with pristine forests, three deep. It is also necessary to realize that the farther one moves down a watershed, into large basins, the role of headwaters forests in reducing flooding becomes overwhelmed by other factors.

And what about water shortage in dry season? I recall in the dry years in the 1960s, when New York City was terribly short of water and there were “shaveless Wednesdays” being advocated as a water conservation measure. By then, also, research had appeared that pointed out that trees use water. I was asked by a New York newspaper reporter, “What about cutting the Catskill forest to increase water availability for the City’s Catskill reservoirs?” I had to point out that the Catskill Park and Preserve perform many other ecosystem services than water, including erosion protection, wildlife habitat, wilderness experience, carbon sequestration, outdoor recreation (including a tourism industry), and fine scenery. Moreover, that there was a constitutional protection for forests in the Preserve. This illustrates the danger of small-box thinking in complex situations. This narrow thinking surfaces again from time to time as a proposal for U.S. National Forests in the Intermountain West, as a measure to provide more water.

There are also unusual types of forests in mountains that experience persistent or frequent cloud or fog, especially where wind-driven. These are the legendary cloud forests (also known as, elfin forests or mossy forests). Laden with epiphytes on their branches and stems, these forest surfaces rake moisture from the fog, which drips or runs down to the ground and is added to the water budget (Bruijnzeel and Hamilton 2000). Due to high humidity and lower radiation, evaporation/transpiration is lower than normal forests, and this water **capture** from horizontal precipitation is extra—a bonus. In this case, removal of forest does result in less water available in streams, groundwater or springs. These sensitive ecosystems need total protection as wild lands everywhere they occur.

And now, having raised some questions about the role of forests and water, by dispelling some myths and misunderstanding, what can we say about wild lands as a producer of water?

## Wilderness or Extraction/ Conversion?

Untrammelled (wild) forests are absolutely the **safest and best watershed cover** if we want the highest quality of water, in a **natural streamflow** pattern (quantity and timing), which has been long established so that streams, aquatic life, and people are adjusted to that pattern. Let us consider some alternative land uses.

- **Cutting some or all of the trees and extracting them.** While it will result in greater water yield, it does somewhat increase streamflows when you do not want it, during floods. This effect may be important close to the area logged, and in the more frequently occurring smaller storms (Hamilton with King 1983). In major storm events and in large basins, the effect is dwarfed by other factors. It would not be as harmful to water quality if the trees were airlifted out (or perhaps carried out by elephants); no roads, skid trails, or log landings. But logging **does** involve these ground-baring passageways, and moreover usually heavy equipment, which compacts soil, thus reducing infiltration. Both more rapid runoff and greater soil erosion are a consequence of getting wood out. Greater erosion means more

sediment, which impairs water quality for human use and aquatic organisms. Moreover, the loss of root shear strength of the cut trees renders the area (if sloping) more susceptible to landslips (O’Loughlin 1974), until regeneration is well established.

- **Conversion to grassland.** Grasslands are excellent watershed cover and yield more water than the same area in a forest. But where there is grass, it is usually called “range” or “grazing land,” and someone will be putting livestock on it. And, while lightly grazed grassland is hydrologically and erosionally satisfactory watershed land use, it is rare, and overgrazing usually prevails. Here then, soil compaction and accelerated erosion again come into play, especially along streambanks where stock go to drink water. Here too, animal manure may impair water quality. Fire is used in some regions to maintain grasslands, and this has its own baggage of reducing water quality and altering streamflow regimes. Grazing of grasslands does present problems. Alpine meadows or other wild grasslands are superb watershed land cover.
- **Conversion to crops.** Large areas of former wild land have been cleared for agricultural crops, and this process continues. While none can fault the “traditional,” carefully constructed and maintained rice terraces from a hydrologic and soil conservation standpoint (and even aesthetic), these again are rare. Most sloping agricultural cropland is accompanied by bare soil at times (hence erosion), compaction, susceptibility to soil slips if on steep slopes, additions of fertilizers and often pesticides, all of which impair water quality and hasten run-off. Eutrophication of rivers and lakes from agricultural nitrogen and phosphorus runoff is a problem in many areas.
- **Human habitation and associated business** have the most adverse impacts. One scarcely needs to enumerate a list that includes non-absorbing surfaces, soil disturbance, human waste disposition to water or groundwater, or other wastes and chemicals from human occupation, transportation, and industry, pesticides and so forth.
- **Mining** has very serious impacts such as from road building, waste pile erosion and drainage, toxic mine drainage, work force wastes and the practice in some areas of mountain top removal and fill in valleys or depressions. Add in requirements for water diversion and use, which adds toxins and so forth. The quest for new sources of fossil fuels can severely, adversely impact both wilderness and water.
- **Roads** are a common element in all of these alternatives, and their construction and maintenance must be labeled as having some of the most seriously negative impacts on water quality, and to some extent quantity. Hence, roadless wilderness areas have much going for them as best water source areas.

In summary, wild lands, because they represent the least human disturbance and intensity of use, best maintain the quality of water for human use and all other living creatures. Wild lands as watersheds have produced over time a certain volume delivery and timing of water to which the stream, river pattern and landscape has adjusted. Changes from wild status change that pattern, usually to the detriment of the downstream environment. This is why there are so

many instances of the setting aside of watershed conservation areas, as water reserves, national parks or other kinds of protected areas that reduce human impact. Thirty of the world's major cities, including Cape Town, Rio de Janeiro, Singapore, Caracas, Quito, Vienna, Tokyo and New York, obtain all or some of their water supplies from protected area watersheds (Dudley and Stolton 2003). Increasingly, we are witnessing payment transfers from water users to the protection of land at the source. The city of Quito puts a charge on each water bill that goes to a Condor BioReserve complex of National Parks and Ecological Reserves in the Andes—wild lands (Echavarría and Arroyo 2004). New York City gets its high quality water from the Catskill Forest Preserve and is spending large amounts of money to upgrade land use practices on adjacent private land and municipal settlements in the Catskill Park.

## Wetlands as Wildlands

Wetlands are areas where water is the primary factor controlling environmental processes and the plant and animal life (Maltby 1986). Their role as natural water retention and storage sites hardly needs emphasis. Draining or draining and filling these wildland ecosystems speeds water into channels and hence aggravates downstream flooding. Moreover, without their slow release function, downstream water low flows are aggravated. Habitat for important wetland flora and fauna is eliminated along with the water filtration and groundwater recharge functions. Whether they are swamp forests, bogs, marshes, fens, vernal pools or given other names, they need protection. This may be either through wetland conservation legislation (for example, a permit for alteration is required) or designation as some kind of Protected Area such as Waterfowl Reserve, Wildlife Sanctuary, Wetland Park, or Wilderness (if large enough). The international protection that is afforded to globally important wetlands comes under the Ramsar Convention.

Wetlands worldwide have been unduly lost or degraded because society has not comprehended their valuable functions. They have been appropriately called “Wetland Wealth” (Maltby 1986). In a recent paper, I have designated them as “Red Flag” areas, which need to be carefully assessed and valued prior to clearing, draining or serious alteration (Hamilton 2004). While we talk much of mitigation and restoration, these are poor (though perhaps at times necessary) measures. We really need much more coverage of wetlands in our Protected Area Systems, and especially into categories or types that maintain them as natural, wildland ecosystems, of as large a size (including buffer zones) as possible. Then they perform best their critical watershed functions, as well as recreational use.

## Montane Cloud Forests

Of particular relevance and concern are mountain forests in the tropics called “cloud forests.” These vegetation types capture additional water above normal vertical rainfall from persistent clouds and horizontally wind-driven fog or cloud water. In continental situations, such as the Andes, they occur from 2,000 to 3,500 m (6,562 to 11,483 ft) in elevation, and are known there as *selva de neblina* or *bosque nuboso*

(Hamilton and others 1995). On oceanic islands, they may occur as low as 300 m (984 ft), and may be known as mossy forests or elfin forests. The extra water captured by the leaves, twigs, branches and abundant epiphytes (mosses, bromeliads, ferns, liverworts, orchids and lichens) varies from 15 percent to 60 percent of regular rainfall, more in dry locations with fog. If these forests are cut and removed, this cloud water function is lost. Moreover, they are also treasure houses of unusual biodiversity, much of it endemic. Well-known and threatened species such as mountain tapirs, quetzals, Andean spectacled bear and mountain gorillas inhabit cloud forests. Their loss is basically irreversible and even modest utilization has not proven to be sustainable (Bruijnzeel and Hamilton 2000). With a maximum potential occurrence of only 2.5 percent of all tropical forests (Bubb and others 2004), and disappearing fast, these unusual water-producing ecosystems need protection rather than utilization. Having them in wildland status would be the best policy.

## Wild Waterways

While this paper deals primarily with water and **wild-lands**, it would be remiss not to briefly mention wild waterways. Our meeting host State of Alaska has many fine wilderness rivers, including significant portions of the Yukon River whose capacity is exceeded by only four other rivers, the Amazon, Mississippi, Missouri and St. Lawrence. One way to protect the wilderness character of a waterway is to include it in a formal protected area. For instance, a portion of the Yukon is conserved within the Yukon-Charley Rivers National Preserve (915,000 ha or 2.26 million acres). Not far away, in Alberta, the Ghost River has been designated as a Wilderness Area (15,317 ha or 41,500 acres). Meanwhile, a little farther away, in Siberia the 4,347 km (2,700 mile) long Lena River, Russia's most pristine river, the only major waterway free of dams, with water clean enough to drink, is facing new development threats without any formal protection (Tayler 2005).

Extremely effective in maintaining the natural character of some of the United States' waterways has been the Wild and Scenic Rivers System. Enacted in 1968, the Wild and Scenic Rivers Act provided that some of America's rivers were to be preserved in a free-flowing condition. “Wild” rivers were “those rivers or sections of rivers free from impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These present vestiges of primitive America.” (Public Law 90-542).

There is now significant action and a growing movement for dam removal, to restore some of the free-flowing nature of rivers. There are an estimated 800,000 dams of all sizes blocking the free flow of the world's rivers (Postel and Richter 2003). But flow restoration efforts are underway on more than 230 rivers in at least 20 countries (Postel and Richter 2003). In my own State of Vermont, many of the small hydropower dams are currently coming up for licensing renewal review, and in many cases, we are saying no. A landmark case in Olympic National Park is the removal of the dams on the Elwha River, which is currently underway. There is even a movement to remove the dam flooding the Hetch Hetchy portion of Yosemite National Park, whose reservoir supplies

drinking water and power to San Francisco. "Restore Hetch Hetchy" and the Sierra Club are two of the groups pushing for this. Governor Schwarzenegger has ordered a study review.

## National Parks and Water

While National Parks worldwide are often far from being equivalent to wildlands, they are usually the next best thing, in that human uses are regulated in the interests of nature protection. Many watershed headwater areas have been formed into National Parks or equivalent reserves with a major objective of conserving water resources. In Malawi, for instance, a long narrow country consisting basically of three increasingly high plateaus separated by escarpment, large portions of the highest plateau have been designated as reserves of different kinds for watershed purposes. Here are located most of the Forest Reserves: Nyika National Park and its extensions, Nkhotakota Game Reserve and the extension to Lengwe National Park, and Majete and Mwabri Game Reserves (Kombe 1984). One of the best known examples of recognition of the key role protected areas can play in safeguarding water values is the case of Dumoga Bone National Park in Sulawesi, Indonesia. Here, The World Bank in funding the Dumoga Valley Irrigation Schemes, allocated funds to support the establishment and management of this park in the catchment headwaters (MacKinnon and others 1986).

José Rafael García, the former Director of National Parks in Venezuela, aptly pointed out that Canaima National Park, with savannahs, gallery forests, *tepuy*s, rivers, and waterfalls (including Angel Falls), is a guardian of the hydroelectric production of 9 million kilowatts from the Caroní River (García 1984). The park was enlarged from its original 1 million ha (2.5 million acre) size of 1962 to 3 million ha (7.4 million acres) in 1975, so that it now covers one-third of the Caroní basin. The justification for the tripling in size was not scenery or endangered species, but to safeguard the huge investment in power development then, and in future expansion to 20 million kilowatts, by supplying high quality (low sediment) water. Likewise for Guatopo National Park which is headwaters for a major water supply area for Caracas. García stated, "the most important thing is that the water from this park is of very high quality, and for this reason, its treatment for human consumption is less expensive" (García 1984). Spectacular rainforest and high quality water source only two hours from Caracas!

## Conclusions

It is fortunate that as wildlands and protected areas face increasing pressures for development in an increasingly populous world, that the critical task of securing adequate supplies of suitable quality water also increases, and this could mean more protection for wilderness watersheds. Water has been identified as a most pressing global problem as highlighted in the 2003 International Year of Freshwater. **Take-home message:** A watershed with the least human intervention produces the safest and best hydrologic situation. Sounds like wildlands to me.

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# Field Testing Existence Values for Riparian Ecosystems

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**Abstract**—This paper presents preliminary findings on a cash and contingent valuation (cv) experiment. The study replicates major elements of an earlier (1990) experiment, which solicited hypothetical and actual donations to benefit instream flows for Montana fisheries. Extensions of the earlier work include: repeat contacts to increase response rate, follow-up of the contingent valuation question to explore respondent certainty, and several question format treatments (payment card, as in the original study, and dichotomous choice). The sample populations are subsamples of licensed Montana resident and nonresident anglers. Dillman mailing procedures (five contacts) were used to reach potential respondents. Treatments included a replication of the 1990 payment card (PC) question format (mailed to an initial 1,250 resident and 1,250 nonresidents respectively) and a dichotomous choice (DC) format (mailed to 1,250 nonresidents). Response rates were higher for the PC compared to the DC format and for the cv treatments compared to cash. The resident and nonresident angler populations are quite different, with nonresidents tending to be older, richer, more avid and specialized anglers, and more conservation-minded. For the PC treatments, cv donation amounts averaged about double the cash (actual) donation amounts for both subsamples. In constant 2005 dollars, the PC values comparing 1990 and 2005 are similar for resident respondents.

## Introduction

This paper describes preliminary results from a field experiment designed to compare responses to a contingent valuation instrument to actual cash donations. This study is in part a replication of an earlier experiment (Duffield 1992; Duffield and Patterson 1991; Duffield and Patterson 1992) aimed at measuring monetary values for provision of a public good. The resource in the 1990 survey was increased streamflow in several potentially important spawning tributaries for two endangered fisheries: a fluvial population of

Arctic Grayling and a population of Yellowstone cutthroat trout.

A limitation of the 1990 study was that the two treatments of most interest were implemented as one-time mailings to simulate typical fundraising solicitations. Both of the latter went out under The Nature Conservancy letterhead and were designed to be very similar in content and wording. As a result of the single mail contact, the response rates were relatively low to these treatments, particularly for the cash response. There was a third treatment (contingent valuation) that paralleled the first two, but went out under University of Montana letterhead and included repeat mail contacts (a total of four) and achieved high response rates (74 percent and 77 percent for resident and nonresident anglers respectively). The University of Montana treatment was used to characterize the population and provide a contrast between a “typical” academic contingent valuation and the other treatments.

The objectives in replicating the 1990 survey in 2005 included achieving higher response rates in the comparable cash and contingent valuation treatments to provide a better measure of potential differences in real and hypothetical economic commitments for this resource and setting.

It was also anticipated that the replication over the span of 15 years would provide an opportunity to measure changes in values, and insights into what, if any, measures of attitudes, preferences, or socio-economic status and characteristics might explain any changes found. (Parenthetically, this aspect of the work relates to a separate multiyear project that may be of interest to readers. The Montana Challenge (<http://fwp.state.mt.us/tmc/reports/ecovalues.html>), directed by Daniel McCollum at the USDA Rocky Mountain Research Station is a state-level case study examining changes in attitudes and values relating to wildlife from a number of social science perspectives. The web citation provides reports including demographics, non-market values, recreation, and a content analysis of newspaper articles.)

## Literature and Methods

The comparison of real economic commitments with contingent valuation responses had its beginning in the work of Bohm (1972) and Bishop and Heberlein (1979). There have since been a number of laboratory and field experiments. Studies specifically investigating donation payment mechanisms include Duffield and Patterson (1991), Navrud (1992), Seip and Strand (1992), Brown and others (1996),

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Champ and others (1997), Byrnes and others (1999), Champ and Bishop (2001), and Champ and Bishop (2006).

From a theoretical standpoint, a central feature of the current and 1990 study is that many of the services provided by the resource in question are not excludable. It is anticipated that existence and bequest motives (Krutilla 1967) relating to instream flow in these streams and associated passive use are significant relative to direct use. In fact, it is not very likely that any given angler respondent will ever fish any of the several small streams described in the 1990 and 2005 studies, or experience significantly improved angling in the larger rivers fed by these small tributaries. Nonetheless, direct use may still be an important motive. In any case, the specific payment vehicle used here is anticipated to capture both passive and direct use in a total valuation framework (Randall and Stoll 1983). The choice to make a donation can be modeled in the context of an indirect utility function framework (for example, Boyle and Bishop 1987). The willingness to pay (donate) amount that will just make an individual ambivalent between the current level of services and one with adequate streamflow defines a Hicksian compensating variation welfare measure. Cameron and Huppert (1991) provide an empirical model for estimating willingness to pay (WTP) from payment card interval data. Similarly, parametric or nonparametric methods can be applied for the dichotomous choice models (Hanemann 1989; Kriström 1990; Poe and others 2005).

The current 2005 study includes payment card treatments for both resident and nonresident Montana licensed anglers that were conducted in cooperation with Trout Unlimited. This provides a replication of the earlier payment card treatments done in cooperation with The Nature Conservancy. Table 1 summarizes and compares study methods between 1990 and 2005. The 1990 University of Montana treatments were not replicated.

Extensions to the 1990 study include a question on respondent certainty as a follow-up to the contingent valuation responses (following Champ and Bishop 2001), and testing responses across several question formats. As noted, the latter included payment card formats for both resident and nonresident subsamples (providing the replication to 1990), as well as a dichotomous choice treatment for a second nonresident subsample. Based on the pretest and 1990 study, cash treatments were oversampled relative to contingent valuation in anticipation of lower relative response rates.

An important change in survey methods for the payment card treatments was to use Dillman method repeat mail contacts. The 2005 study included five contacts: an initial letter, first survey mailing, reminder postcard, second survey mailing, and a third survey mailing.

The basic structure (and most of the original questions) of the 1990 survey instrument was retained for 2005. The sequence was as follows: initial set of questions on angling use, questions designed to measure attitudes and preferences, valuation question sequence, and questions addressing respondent socioeconomic characteristics. The decision was made to use the same set of payment card amounts as in 1990 (10, 25, 50, 100, 250, other).

The revised instrument was pretested in the fall of 2004 with a mailing to a sample of 300 anglers. One important finding from the pretest was that the subsample of the 2003–2004 nonresident season angler license list made

available to the researchers by Montana Fish, Wildlife and Parks included nonresidents who held season licenses by virtue of a “combination” elk and/or deer hunting license that included season fishing. The latter group had very low response rates to the 2004 pretest, and had not been included in the 1990 sample frame. For the main 2005 survey, this group was excluded from the nonresident season license subsample.

The initial contact letter for the 2005 survey was mailed on January 21. The reminder postcard went out February 8, the first survey package January 27–31, second survey package on February 25, and third survey package on April 13.

The following discussion of results summarizes responses received and identification of undeliverable mail returns as of May 27, 2005. Preliminary results for the uncertainty follow-up and dichotomous choice questions are not reported here.

## Preliminary Findings

Tables 2 and 3 summarize the 1990 and 2005 response rates, with table 3 summarizing the allocation of the total initial mailing list (of 3,750 anglers) across the various treatments. Not surprising, using five mail contacts in 2005 (compared to one in 1990) significantly improved response rates. The overall response rate is 47 percent. The cash response rates were higher than anticipated and average about 85 percent of the corresponding contingent valuation treatment response rate. The dichotomous choice response rates were also systematically lower (and also about an 85 percent ratio) compared to the corresponding nonresident payment card response. Sample sizes for each treatment are close to the study goal of about 200 in each cell for the contingent valuation treatments and well in excess of that number for the cash treatments (table 3).

Table 4 provides some detail on the declining marginal effect of subsequent respondent contacts on response rates. There is considerable consistency across treatments. Figure 1 shows a plot of five-day moving average responses per day for residents and nonresidents. The three spikes in response rates correspond (with a five or so day lag reflecting mail delivery time) to the mailings of the initial survey package plus reminder postcard and the next two survey mailings. Note that well after each mailing, a low level of response continues.

Table 5 summarizes selected respondent characteristics by subsample. Age, percent female, median education, and median income level are similar across cash and contingent valuation subsamples within each treatment. Table 5 also shows characteristics measures aggregated for residents and nonresidents. Preliminarily, it appears that nonresident anglers are older, less likely to be female, better educated, and richer than resident anglers.

Table 6 summarizes other respondent characteristics by residency including measures of angling use, angling specialization, angling avidity, recreational property ownership in Montana, importance of adequate streamflows, and measure of environmental and wildlife-related attitudes and preferences. It appears that nonresidents are more avid, more specialized, and have preferences more favorable to conservation initiatives. One notable result is that 20.5

**Table 1**—Comparison of study methods: 1990 and 2005 studies.

Study characteristic	1990 Study	2005 Study
Resource examined	Instream flows / Threatened fisheries	Instream flows / Montana fisheries
Cooperating group	The Nature Conservancy	Trout Unlimited
CV question format	Payment card	Payment card and dichotomous choice
Surveys mailed	7,662	3,750
Survey contacts	One	Five
Sample frame	Licensed anglers	Licensed anglers

**Table 2**—1990 study response rate statistics.

Statistic	Residents		Nonresidents	
	Cash	Hypothetical	Cash	Hypothetical
Surveys mailed	2,622	1,166	2,682	1,192
Undeliverable	344	153	310	138
Potential respondents	2,278	1,013	2,372	1,054
Useable returns	205	193	306	288
Response rate	9.0%	19.1%	12.9%	27.3%

**Table 3**—2005 study response rate statistics.

Sample	Surveys mailed	Bad Addresses	Delivered	Surveys returned	Response rate
Resident payment card			<i>Percent</i>		
- Cash sample	850	53	797	350	43.9
- Hypothetical sample	400	24	376	181	48.1
Subtotal-resident payment card	1,250	77	1,173	531	45.3
Nonresident payment card					
- Cash sample	850	79	771	378	49.0
- Hypothetical sample	400	46	354	204	57.6
Subtotal-nonresident payment card	1,250	125	1,125	582	51.7
Nonresident dichotomous choice					
- Cash sample	850	110	740	311	42.0
- Hypothetical sample	400	47	353	173	49.0
Subtotal-nonresident dichotomous choice	1,250	157	1,093	484	44.3
Entire resident sample	1,250	77	1,173	531	45.3
Entire nonresident sample	2,500	282	2,218	1,066	48.1
Entire sample	3,750	359	3,391	1,597	47.1

**Table 4**—Marginal effect of subsequent respondent contacts on response rates.

Sample	Wave 1 response	Wave 2 marginal response	Wave 3 marginal response
Resident payment card	<i>Percent</i>		
- Cash sample	24.0	14.3	4.9
- Hypothetical sample	27.1	13.0	6.9
Nonresident payment card			
- Cash sample	28.3	16.1	5.4
- Hypothetical sample	37.6	14.7	6.5
Nonresident dichotomous choice			
- Cash sample	20.1	16.4	5.5
- Hypothetical sample	30.9	12.5	5.7
Entire sample	26.6	14.9	5.6

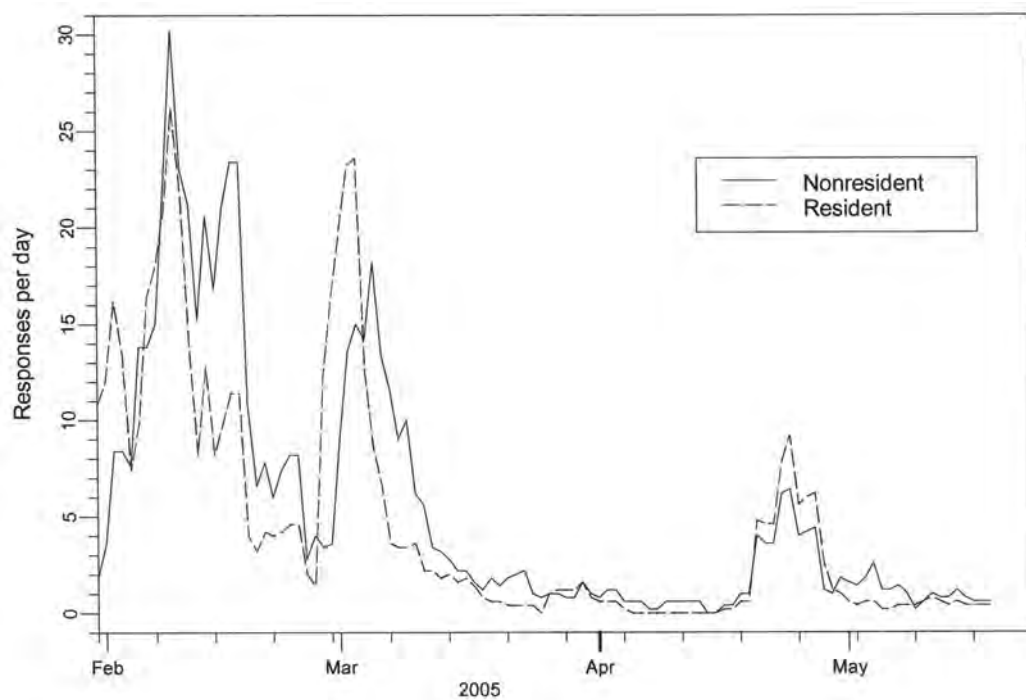


Figure 1—Payment card responses per day, 5-day moving average.

Table 5—Respondent characteristics, by subsample.

Sample	Mean age	Percent female	Median education	Median income level
Resident payment card				
- Cash sample	47.9	24.2	Some college	40 to 60
- Hypothetical sample	46.7	25.0	Some college	40 to 60
All resident payment card	47.5	24.5	Some college	40 to 60
Nonresident payment card				
- Cash sample	55.2	14.1	Finished college	60 to 75
- Hypothetical sample	54.1	15.4	Finished college	75 to 100
All nonresident payment card	54.8	14.6	Finished college	60 to 75
Nonresident dichotomous choice				
- Cash sample	53.9	13.4	Finished college	75 to 100
- Hypothetical sample	55.2	11.5	Finished college	75 to 100
All nonresident dichotomous choice	54.7	12.2	Finished college	75 to 100

percent of residents but 67 percent of nonresident anglers fly fish only.

Both resident and nonresident anglers favor rainbow and brown trout fisheries over native cutthroat and bull trout fisheries as far as a priority for improved streamflow (table 7). Nonresidents are more certain about their preferences on this allocation issue.

Turning to the preliminary valuation findings, only results for the payment card treatments are summarized here. Additionally, all reported values are simple means of the respondent indicated contingent valuation or actual donation amounts, not WTP values. These simple means are the correct approach for identifying the actual average amount of money raised in the cash transaction treatments.

Tables 8 and 9 summarize for the 1990 study the mean donations per respondent and per delivered mailing, as well

as the relative frequency distribution of contributions across payment card bid amounts. On a per respondent basis, the ratio of the cash to hypothetical mean donation amount was 0.48 for residents and 0.73 for nonresidents. The ratios on a per delivered basis are much lower, reflecting the disparity in response rates between the cash and contingent valuation treatments (table 8).

Table 10 provides relative frequency and mean donation per respondent for the 2005 payment card treatments. Here the ratio of cash to contingent valuation is 0.52 for residents (similar to 1990) and 0.45 for nonresidents (much lower than in 1990). The cash donation amounts for nonresidents are approximately six times higher than those for residents in 1990 and five times higher in 2005.

Table 11 compares the 1990 and 2005 donations in current (survey year) dollars, while table 12 provides a constant 2005

**Table 6**—Selected respondent characteristics, by residency.

Characteristic	Residents	Nonresidents
	Percent	
Percent of respondents who fished 25 days or more in Montana in 2004.	8.1	10.3
Percent who only fly fish.	20.5	66.7
Percent who say fishing is their favorite outdoor recreational activity.	11.4	35.9
Percent who own or lease recreational property in Montana.	14.1	24.5
Percent who say that adequate streamflows are "very important" for the future of Montana fisheries.	74.6	87.5
Respondents who said they knew either "a fair amount" or "a great deal" about existing conservation trust fund efforts.	41.6	53.2
Respondents who "strongly agree" with the statement "I'm glad there is wilderness in Montana even if I never get to see it."	51.6	63.7
Respondents who agreed with the statement "I feel I should be doing more for Montana's rivers and streams."	38.5	45.5
Respondents who agreed with the statement "Private conservation organizations should play a major role in protecting our environmental resources."	54.8	75.4
Respondents who strongly disagreed with the statement "I think most Montana rivers already have enough water in them to be a healthy resource."	22.4	17.9
Respondents who strongly agreed with the statement "Rivers have spiritual or sacred value for me."	11.0	18.1
Respondents who agreed with the statement "I would be willing to contribute money or time to help Montana rivers even if I could never visit them."	25.5	39.3

**Table 7**—Respondent opinions on fisheries and streamflows, by residency.

Characteristic	Residents	Nonresidents
	Percent	
Respondents who think rainbows and brown trout fisheries should be a priority for improved streamflow.	33.3	38.7
Respondents who think native cutthroat and bull trout fisheries should be a priority for improved streamflow.	22.5	28.4
Respondents not sure how best to prioritize improved streamflows.	37.6	26.4
Respondents who ranked Arctic grayling as a lowest priority for streamflow improvement.	24.2	30.4

**Table 8**—1990 study mean donation amounts.

Statistic	Residents		Nonresidents	
	Cash	Hypothetical	Cash	Hypothetical
Donation per respondent	2.24	4.64	12.60	17.36
Cash/Hypo ratio	0.48		0.73	
Donation per delivered survey	0.20	0.88	1.63	4.74
Cash/Hypo ratio	0.23		0.34	

**Table 9**—1990 frequency distribution of contributions (percent of all contributions).

Bid	Residents		Nonresidents	
	Cash	Hypothetical	Cash	Hypothetical
\$10	54%	75%	41%	39%
\$25	42	18	35	36
\$50	4	7	17	17
\$100	0	0	6	8
\$250	0	0	1	1
Average contribution	\$17.69	\$14.92	\$28.43	\$31.85
Average per respondent	\$2.24	\$4.64	\$12.60	\$17.36

**Table 10**—Relative frequency distribution (in percent) for amount contributed, payment card.

Amount(\$)	Resident		Nonresident	
	Cash	Hypothetical	Cash	Hypothetical
0	89.8	73.3	69.4	48.1
1		1.1		
10	5.0	15.9	8.4	7.2
15			0.3	
20	0.6		1.0	1.0
25	3.5	6.3	9.2	20.2
50	0.3	2.3	6.3	11.5
100	0.6	1.1	4.7	9.1
200	0.3			
250			0.8	2.4
500				0.5
<i>n</i>	343	176	382	208
mean	\$2.80	\$5.44	\$13.19	\$29.28

**Table 11**—1990 and 2005 mean payment card donation (current dollars).

Study/Statistic	Residents		Nonresidents	
	Cash	Hypothetical	Cash	Hypothetical
1990 study	2.24	4.64	12.60	17.36
Ratio		0.48		0.73
2005 study	2.80	5.44	13.19	29.28
Ratio		0.52		0.45

**Table 12**—1990 and 2005 mean payment card donation (constant 2005 dollars).

Study/Statistic	Residents		Nonresidents	
	Cash	Hypothetical	Cash	Hypothetical
1990 study	3.22	6.68	18.13	24.98
Ratio		0.48		0.73
2005 study	2.80	5.44	13.19	29.28
Ratio		0.52		0.45

dollar comparison (correction based on the CPI-U average for November-December 1990 versus February-March 2005).

Based on the constant dollar comparison (table 12), the resident cash and the resident and nonresident contingent valuation donation means differ by 15 to 20 percent across the 15-year period. The cash nonresident values declined by almost 40 percent.

Figure 2 is a plot of cash payment card mean contribution (11-day moving average) for both residents and nonresidents. The pattern for residents shows a strong downward trend in mean cash donations over time. It also appears to be roughly parallel to, but much lower than, the nonresident, and goes to zero shortly after the second survey mailing. The nonresident is more variable, but also appears to show a gradual decline in mean donations, but donations do not go to zero over the period plotted.

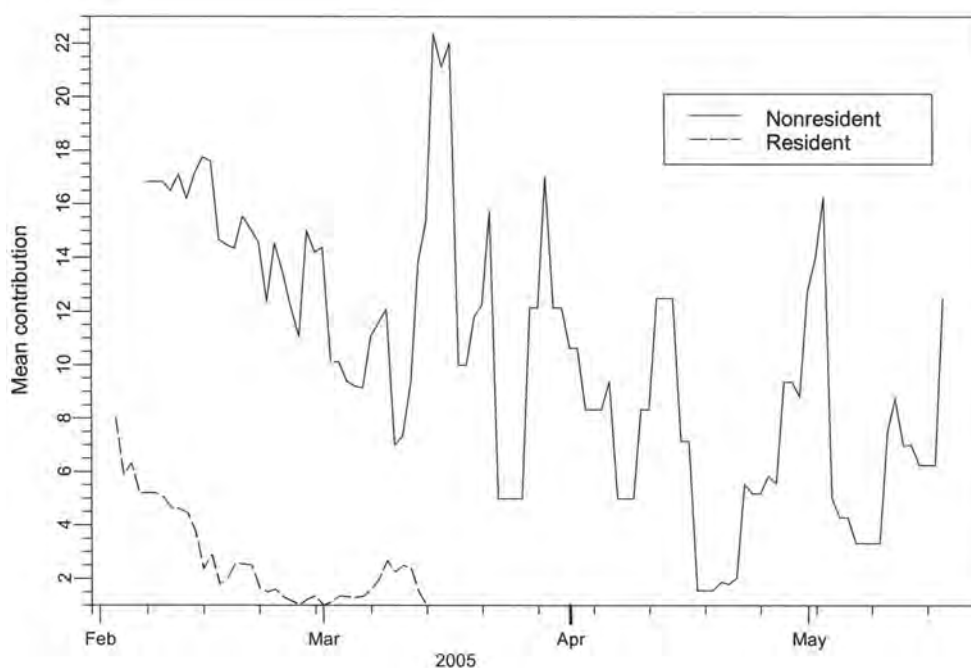
By contrast, in figure 3, the contingent valuation means for both groups show no obvious downward trend. (Certainly there is greater variability in the means shown late in the survey period as marginal samples are declining (table 4).

## Discussion

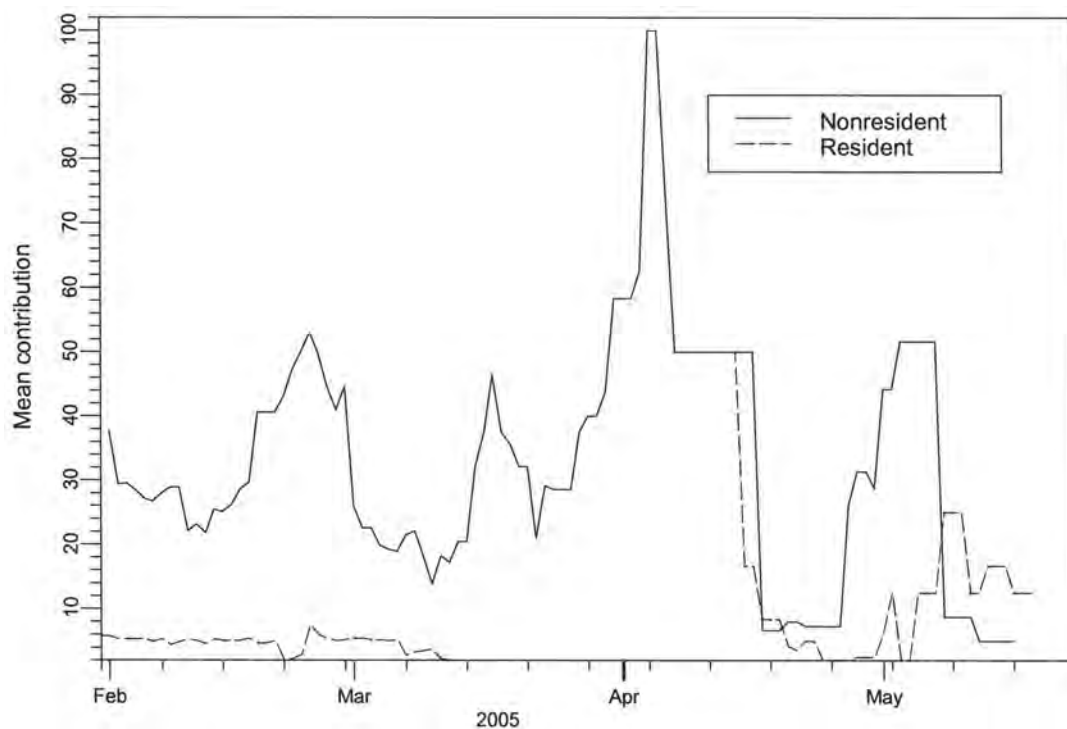
The preliminary results presented here are just that, preliminary. Obviously they have not yet been subject to any rigorous statistical analysis or modeling. Nonetheless there appears to be some interesting consistency with the 1990 payment card format findings.

The simple mean cash transaction measures tend to be around 50 percent or better of the contingent donation measures. The large differences in values across the two angler populations (resident and nonresident) are replicated. The direction of the differences is also consistent with what one would expect from economic theory given differences in some potential covariates for WTP models (income, avidity, etc.).

It is obvious that there is strong selection bias reflected in the pattern of mean cash donations over time. For residents, cash contributors show up early then disappear altogether by the last wave of respondents. Nonresident cash contributors also are a lower and lower share of the response over time.



**Figure 2**—Cash payment card mean contribution, 11-day moving average.



**Figure 3**—Hypothetical payment card mean contribution, 11-day moving average.



By contrast there appears to be a more stable persistence of contingent donations over time. These two patterns are consistent with a decline in the cash/contingent donation ratio across waves, and may partly explain the 2005 results relative to 1990 (tables 11 and 12).

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# Three Rivers: Protecting the Yukon's Great Boreal Wilderness

Juri Peepre

**Abstract**—The Three Rivers Project in the Yukon, Canada, aims to protect a magnificent but little known 30,000 km<sup>2</sup> (11,583 miles<sup>2</sup>) wilderness in the Peel watershed, using the tools of science, visual art, literature, and community engagement. After completing ecological inventories, conservation values maps, and community trips on the Wind, Snake, and Bonnet Plume rivers, the Yukon chapter of the Canadian Parks and Wilderness Society (CPAWS) embarked on the Three Rivers Journey in 2003. First Nations, community participants, nationally selected artists, writers, scientists, photographers and conservationists paddled hundreds of kilometers down three tributaries of the Peel watershed. These journeys resulted in a national touring art exhibition, multi-media shows, and a book featuring the land and people. This paper describes the conservation campaign and the challenges in advocating wilderness protection in light of complex community priorities and government policies on resource use. CPAWS urges full protection for the Three Rivers wilderness and conservation of ecological integrity throughout the greater Peel watershed. CPAWS recommends special conservation zones in the remainder of the Peel watershed to protect critical wetlands, sensitive river corridors and other important biological and cultural features. The Peel watershed is identified as a candidate biosphere reserve.

## Northern Canada's Peel Watershed

The Wind, Snake, and Bonnet Plume rivers, along with their sister tributaries the Hart, Blackstone and Ogilvie, rise in the stunning Selwyn and Wernecke Mountains and flow through the vast Peel River basin on the Yukon's north-eastern border, an area that accounts for 14 percent of the territory. Perched at the apex of Canada's boreal forest and the northern end of the Rocky Mountain chain, the Peel watershed also includes some of the unglaciated area known as Beringia. A blend of biomes, it is a distinct and varied land of plateaus and mountains, rivers and wetlands, not yet fully revealed to science.

Here, unbounded and colorful mountain ranges frame pristine taiga forests and subarctic watersheds. Robust woodland and barren ground caribou, free-ranging wolverine and grizzly bear, the threatened Anatum Peregrine Falcon,

unspoiled aquatic habitat, and thousands upon thousands of boreal songbirds and migratory waterfowl occupy an ancient and unfettered landscape that is the essence of wildness.

This is the traditional territory of the Nacho Nyak Dun and Tetl'it Gwich'in First Nations; for generations they were sustained by the plants, fish and wildlife of this region as they traversed its valleys and mountains on a network of travel and trade routes. Today the wilderness of the Peel basin serves as a vital benchmark of untamed nature; ancient and complex ecological processes continue to evolve freely, and the full complement of predators and prey ranges across the landscape. Although fishing, hunting and trapping are still important to the way of life in the region, local people and visitors from around the world also value the watershed as a premiere destination for canoeing, backcountry travel, photography, education, cultural activities and scientific research (fig. 1).

## A Brief Political History

When the oil industry cast its gaze to the Canadian north in the late 1960s and early 1970s Chief Justice Thomas Berger understood what was at stake. During public hearings on the proposed Mackenzie Valley natural gas pipeline, he broke new ground by saying that conservation areas should be set aside at the same time as any decisions to permit big resource development projects. He reasoned these protected areas would help compensate for loss of wildlife habitat and the diminished arena for aboriginal people to sustain their traditional economy. For the northern Yukon, Berger recommended a new type of wilderness park, one that would preserve wildlife and natural landscapes but include continued aboriginal hunting and fishing. Years later, partly as a result of Berger's work, Ivvavik and Vuntut National Parks were established through First Nations final agreements, protecting key Porcupine caribou herd range and the bounty of arctic and subarctic life found in the northern Yukon. Now, farther south, the Peel River watershed offers one of Canada's and the Yukon's best remaining chances for conservation that is worthy of international recognition to protect its mountain boreal forests, intact large mammal ecosystems, pristine rivers and unbounded wilderness.

In the days when the people of four northern First Nations—the Nacho Nyak Dun, the Tetl'it Gwich'in, the Tr'on dek Hwech'in, and the Vuntut Gwich'in—traveled throughout the greater Peel watershed, making their living from the wildlife and fish and trading goods with their neighbors, legal boundaries had no meaning. Now, all four peoples have settled land claims in their traditional territories, though hammering out these agreements was not easy; it took decades of Canadian judicial rulings, hearings, hundreds of hours in meeting rooms, and many, many lawyers.

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In: Watson, Alan; Sproull, Janet; Dean, Liese, comps. 2007. Science and stewardship to protect and sustain wilderness values: eighth World Wilderness Congress symposium: September 30–October 6, 2005; Anchorage, AK. Proceedings RMRS-P-49. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.



**Figure 1**—Northern Canada's Peel River watershed is a vital benchmark of untamed nature (photo by author).

In their 1992 land claim settlement, the Nacho Nyak Dun people, reflecting their desire to conserve an important part of the Peel River basin, nominated the Bonnet Plume watershed as a Canadian Heritage River. Unfortunately, Heritage River designation proved to be purely symbolic, offering no legal protection. Early Tetl'it Gwich'in land plans also called for conservation in the Peel watershed. In historic times they traveled throughout this watershed, but now the Yukon border bisects their traditional territory. They live downstream on the Peel River in the Northwest Territories but still own 600 km<sup>2</sup> (232 miles<sup>2</sup>) of land in the Yukon and have been forceful about their right to maintain the abundant clean water of the Peel River that flows into their territory.

The Tr'on dek Hwech'in territory includes another Peel River tributary, the upper Blackstone River, west of the Ogilvie Mountains. The Vuntut Gwich'in, based in Old Crow, Yukon, are part of the Gwich'in Nation spread across the western subarctic. After years of responding to ad hoc development proposals and calls for an improved process, all four First Nations participate in a regional land use planning commission that began setting a course for the future of the Peel watershed in 2005.

## The Catalyst for a Wilderness Campaign

In the early 1990s prospectors exploring for copper, staked the flanks of the Bonnet Plume valley. They did so armed with the historic privileges afforded by the Yukon's free-entry mining law, which grants powerful rights to those who first lay claim to the land. Ironically, the Bonnet Plume was soon to be honored as a Canadian Heritage River.

It was apparent that one corporation was on the verge of setting the entire future for the Bonnet Plume valley, and we (CPAWS) could not accept surrendering this wild river to a money play in the southern penny market. If this northern

wilderness were to be diminished, where would we draw the next boundary for nature?

CPAWS initiated a judicial review of the mining exploration on the grounds that the federal government had failed to conduct an adequate environmental review. At that time, work on mining claims in the Yukon was exempt from the Canadian Environmental Assessment Act. In the end, CPAWS lost the case under the weight of legal minutia, but CPAWS did win an important point: the judge conceded that the federal government was obliged to consider how mining could affect a Canadian Heritage River. For its part, the federal government realized its antiquated mining regulations were no longer tenable, and it dusted off long-awaited new rules to improve the way mining companies carry out exploration work in the Yukon. After a few years of exploratory work the company had found less copper than anticipated and, when metal prices dropped, they packed up and left, abandoning their airstrip, drill pads, and mining camp.

CPAWS joined a government-led planning group to work out the Bonnet Plume land use puzzle. At the first meeting, it appeared the nervous bureaucrat at the front of the room had made a mistake when he said, "Wilderness is *not* an option for the Bonnet Plume Heritage River." But in uncharacteristically plain language he was actually expressing the government policy of the day: a fresh articulation of the persistent frontier myth that the North's only purpose was to provide raw materials for the South.

We didn't accept that "no wilderness" edict for the Bonnet Plume; instead, we embarked on a long journey to learn the rhythms of the Peel watershed and to persuade people in the Yukon and elsewhere in Canada that here was a place worthy of leaving alone. Having heard too many voices over the years lamenting the wild places lost because too few people knew about them, we were determined to avoid that mistake, and we gathered wildlife biologists, botanists, and First Nations youth and elders to join our conservation crews to survey the heart of the Peel watershed. Since the

proponents of industry were charting a course for resource extraction, it was obvious we had to draw maps for nature, too. But when I asked one of the staff in a community lands office to point out the First Nation's traditional lands along the Bonnet Plume, I realized the young man wasn't sure where that distant river flowed. Although their ancestors traveled the headwaters of the Peel for generations, the aboriginal youth of today rarely have a chance to visit these places. So it became clear that the scientific value of our research trips would be outweighed by the chance for community members to renew their acquaintance with ancestral lands.

At first it was hard to find community folks willing to paddle for two weeks with strangers. Then Gladys Netro, a Vuntut Gwitchin woman from Old Crow, used her family connections across the western Arctic to reach out to northern communities and bring them together on the work to save the Peel watershed. She brought an acute sense of purpose to this work from her years of campaigning for the protection of the Porcupine caribou herd calving grounds in the Arctic National Wildlife Refuge in Alaska. As a result of her leadership, for close to 10 years Gwich'in and Nacho Nyak Dun people joined the CPAWS river trips, enriching these experiences for all of us.

We learned much from each other. Peter Kay, a Gwich'in from Fort McPherson who traveled with us on the Snake River, spoke of his long family history in the Peel basin and explained the lay of the land around his traplines. But he could not conceal his amusement over where we liked to camp—windswept gravel bars, free of bugs but short on shelter and food. Elder Jimmy Johnny, who knows the headwaters country better than anyone, pointed out big herds of sheep and caribou high on mountain slopes where we could see only scenery. For Jimmy, a Nacho Nyak Dun and long time hunting guide in the Wind, Snake and Bonnet Plume valleys, this place is home.

Those river surveys and the scientific data and maps we gathered helped make a strong case for conservation in the Peel watershed. Yet, for the First Nations people who live in the lands of the Peel watershed, its value is not in question. To Elaine Alexie, a young filmmaker and conservation activist from the Peel River community of Fort McPherson, these are the storied ancestral lands of her Gwich'in nation. In 2003, while on the Three Rivers Journey, she said, "Going through these lands, I think about the old people going through the Wind River area and remember the stories my father told me about how our people used to travel. We need to ensure clean waters keep flowing out of these mountains."

For this river system to endure—both as an anchor for the Yellowstone to Yukon region and as a benchmark for Canada's boreal forest—it was clear we needed to convey the value of the watershed from fresh and compelling perspectives. Northerners sometimes take for granted how exceedingly rare such places have become in the rest of the world. Continental economic forces leaning on the future of the Peel watershed called for a counter-weight to aid the local conservation effort. Our response to this challenge was the Three Rivers Journey.

## The Three Rivers Journey

Wilderness without beginning or end; wild spaces big enough for a journey of discovery almost beyond the imagination of

most Canadians—that's the country of the Wind, Snake and Bonnet Plume rivers. How does one celebrate and protect a vast boreal mountain wilderness area unknown to most people? CPAWS took on this challenge by bringing to life the ambitious Three Rivers Journey project in the summer of 2003, when we invited 18 nationally prominent artists, writers, journalists, and photographers to join people from the Yukon and Northwest Territories in simultaneous journeys along the remote Wind, Snake, and Bonnet Plume rivers.

After 18 exhilarating and arduous days, the Three Rivers Journey ended at the confluence of the Snake and Peel rivers. Here, members of the Tetl'it Gwich'in First Nation greeted the 37 paddlers—artists, writers, filmmakers, scientists, conservationists and First Nation community members—with traditional gun salutes and a chorus of cheers, welcoming them to an elders' feast held on the banks of the Peel. More than 100 people participated in this gathering, the majority having traveled upstream by riverboat from Fort McPherson—a trip of at least eight hours. We feasted on fresh moose meat and grayling and listened to elders and First Nation members speak eloquently about the importance of the land, wildlife and waters of the Peel basin. Elaine Alexie, on behalf of Gwich'in youth, said:

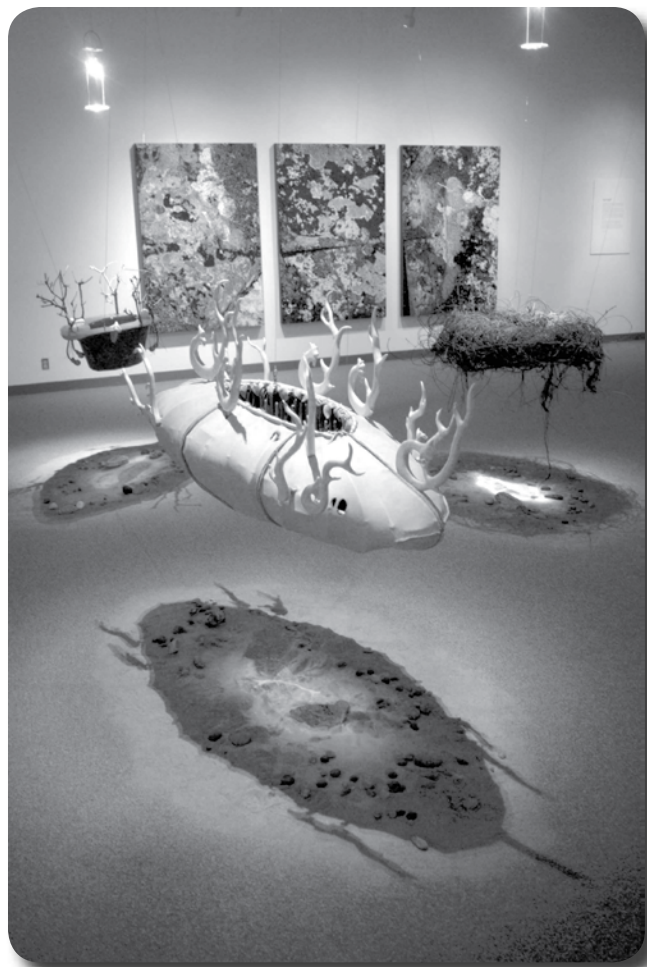
We, the youth of the Tetl'it Gwich'in, a generation of tomorrow, are here today to express our profound concern for the well-being of our sacred and ancestral lands within the Peel River watershed and our right to maintain our cultural way of life.

Later, in return for sharing in the Three Rivers Journey, many of the participants created art and literary works that responded to this wild and mystic landscape. These artistic explorations of northern Canada's primeval origins and cultural heritage were then embodied in a national touring art exhibit, and an anthology of photography, essays and poetry.

The national group art exhibition, *Three Rivers: Wild Waters, Sacred Places* is an eclectic response to a sojourn in one of Canada's wildest places. After paddling down the Wind, Snake, and Bonnet Plume Rivers, the eight artists produced works in a variety of media, including photography, installations, painting, and sculpture (fig. 2). This engaging show challenges the way we perceive the links between art and nature. It will compel many, who may never have connected art with conservation, to re-think their notions about our remaining northern wilderness. The Three Rivers Journey fits within a long tradition of artistic engagement with nature—its unique contribution in Canada is the scale and complexity of the endeavor. The project combined visual art and photography with writing, science, traditional and community perspectives on the land, amidst the urgency of conservation advocacy.

The resulting book, *Three Rivers: the Yukon's Great Boreal Wilderness*<sup>1</sup>, celebrates one of the world's finest wild mountain river systems and highlights the threats to its integrity. Through visual art, imagery, essays, stories and poems, the book aims to present conservation essentials that will help safeguard this vital wilderness.

<sup>1</sup> Parts of this paper were adapted from *Three Rivers: The Yukon's Great Boreal Wilderness* (2005).



**Figure 2**— The national group art exhibition, Three Rivers: Wild Waters, Sacred Places is an eclectic response to a sojourn in one of Canada's wildest places (photo by Cathie Archbould).

## Conservation Essentials in the Peel Watershed

In the Yukon, as Three Rivers Journey participant Richard Nelson reminded us, there is a chance to achieve what has eluded us elsewhere in Canada—to live on the land and draw from its resources while assuring that the entire living community remains whole. As wildlands and mountain rivers such as those of the Peel watershed become increasingly rare in North America and around the world, we have a profound responsibility to bequest these wonders of nature to future generations—both for humanity and for their intrinsic value.

### Why Protect It?

The Peel watershed and the Three Rivers wilderness are globally important and vital to northern conservation. Some of the key values to protect include:

- Pristine mountain boreal ecosystem, a benchmark of Canadian significance, with a full complement of native predator and prey species;

- Elements of four distinct biomes represented in the Peel watershed—boreal forest, Beringia, western cordillera, and sub-arctic plateaus and plains;
- Intact mountain watersheds and wilderness on a vast scale, with fresh clean waters and undisturbed aquatic ecosystems, rare in the world;
- Largest intact woodland caribou herd in the Yukon, a species vulnerable elsewhere;
- 25 percent of the Yukon's Peregrine Falcons breed in the Peel watershed;
- Large and numerous critical wetland areas of territorial significance, used by waterfowl for staging and nesting; and
- Refuge for large carnivores such as grizzly bears, wolves, wolverine, species that require large wilderness to survive.

Wilderness, or traditional homeland as it is viewed by many aboriginal people, is an integral part of the Canadian North; it has intrinsic and spiritual value now and for the future. Conservation provides lasting community and economic benefits, supporting traditional land uses such as harvesting, and sustaining cultures and local ways of life.

### What Are the Threats?

Just as the Three Rivers area slowly begins to gain the recognition that it deserves, plans for development are already compromising its future. The Peel watershed, like much of Canada's North, is vulnerable to the continental hunger for hydrocarbons, including new development schemes for oil and natural gas, pipelines, coal and coal-bed methane. Consecutive Yukon governments have offered these precious lands to industry at bargain prices.

Others dream of building roads and rails to extract iron ore, copper, and other metals from the remote mountains. And the Yukon government is promoting all of this activity before citizens have had a chance to consider the watershed's future by completing a land use plan. Our governments seem especially eager to industrialize the Peel before setting aside conservation lands, even though pre-emptive resource development would have an overwhelming impact on the Peel watershed and the ecological health of its major tributaries. As the continental energy and natural resources debate heats up, promoters with their eyes on the Peel are already at work, and the supporting wheels of governments are in motion. After the heavy machinery is gone and tracts of land laid waste, what future would be left for the people, communities and wildlife in the North?

### Three Rivers Project Goal

Our goal is to protect and conserve the wilderness of the Three Rivers and the ecological integrity of the greater Peel watershed.

To achieve this goal, CPAWS proposes wildland areas in the Three Rivers watersheds, including territorial park protection for the Snake River drainage. We call for special conservation zones in the remainder of the Peel watershed to protect critical wetlands, sensitive river corridors and other important biological and cultural features.



Taken as a whole, the Peel watershed is an exceptional candidate for a "biosphere reserve," a place where conservation supported by local communities, can contribute to a lasting economy that respects the region's way of life and is sustained by an intact ecosystem (fig. 3).

This focus on wildland conservation within the Peel watershed reflects many of the protected area proposals put forward during the past 20 years by First Nations, territorial governments, local renewable resource councils, and non-government organizations such as CPAWS. It is also consistent with the Canada-wide effort to conserve the boreal ecosystem and protect key landscapes within the Yellowstone to Yukon Conservation Initiative.

## The Science Behind the Proposal

Canada, as if finally awakening to its history, is asking urgent questions about its boreal forest—the northern land of spruce, pine, myriad lakes and rivers, the root of so much of our country's story. Even though industrial development is outpacing conservation in many southern parts of Canada,

the northern boreal forest is still one of the largest intact ecosystems left on the planet. About 70 percent remains in a natural state, 30 percent is tenured for industrial uses, and 10 percent is protected. In the Yukon the amount protected roughly matches the 10 percent national average, but is far short of the 50 percent protection goal recommended by scientists and conservation organizations such as the Canadian Boreal Initiative and CPAWS.

We propose a conservation strategy that includes core protected wilderness areas in the Three Rivers watersheds, along with special conservation zones in the Greater Peel watershed. The core wilderness area is approximately 30,000 km<sup>2</sup> (11,583 miles<sup>2</sup>), a sufficient size to support species and ecological processes that depend on intact ecosystems.

The conservation strategy would:

- Conserve a globally important mountain boreal ecosystem both for its inherent value and as a benchmark for more developed ecosystems elsewhere in the boreal;
- Allow for appropriate new economic and community development compatible with maintaining a healthy ecosystem;

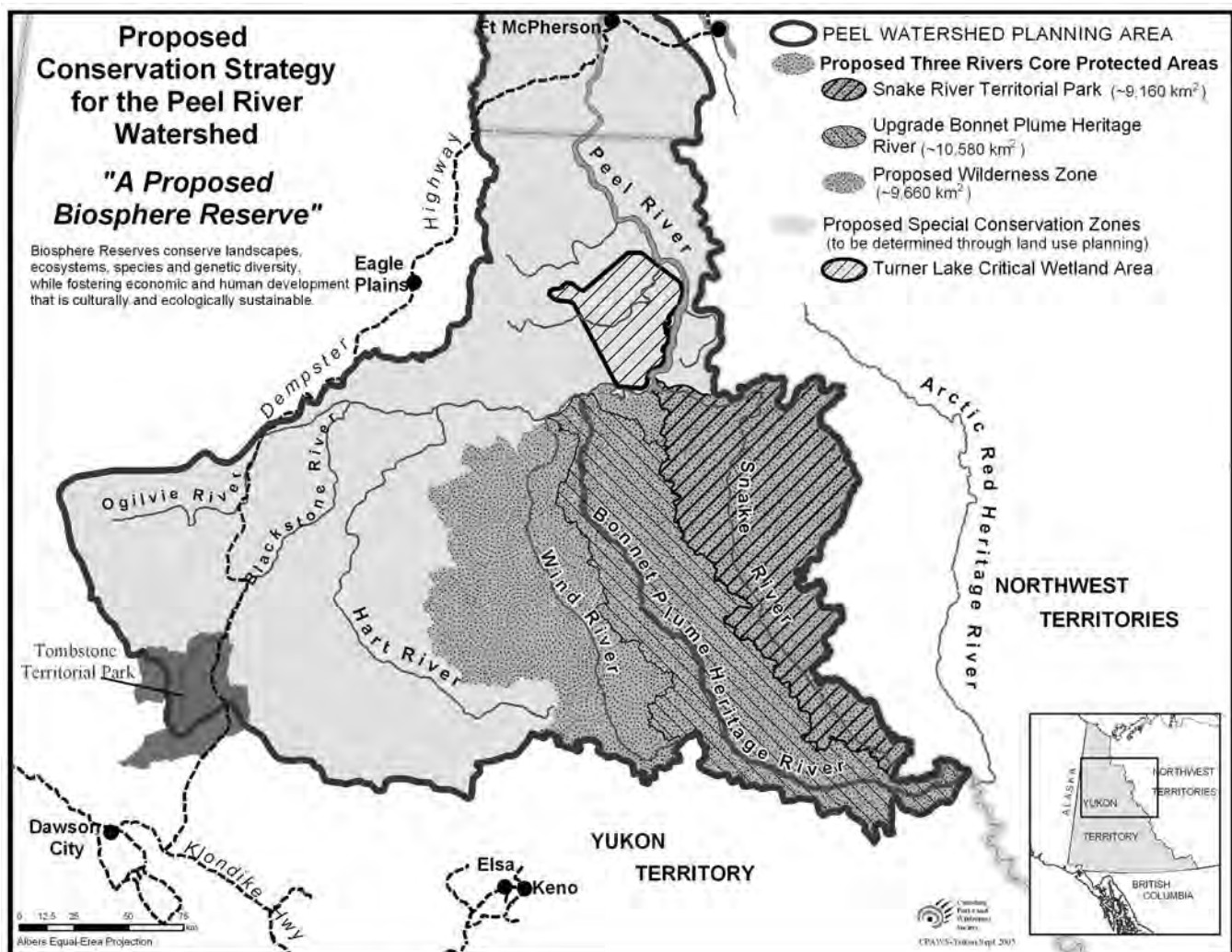


Figure 3—Proposed conservation strategy for the Peel River Watershed.

- Help ensure continued robust populations of woodland caribou, grizzly bear, wolverine, wolf, Peregrine Falcon and a host of other species;
- Protect the pristine headwaters of the Peel, large intact tributary watersheds, aquatic ecosystems and critical wetlands of territorial importance;
- Protect one of Canada's finest arrays of wild mountain river watersheds, supporting existing tourism and service businesses, and attracting new investment;
- Protect a representative part of four distinct biomes in the Peel watershed—boreal forest, Beringia, western cordillera, sub-arctic plateaus and plains; and, embody the Mackenzie Mountains and Peel Plateau Ecoregions which are not yet adequately represented in the Yukon protected areas network;
- Protect a northern Canadian cultural landscape, and support continued traditional activities and harvesting throughout the Peel watershed; and
- Help meet Yukon's commitment to complete a territorial network of protected areas, and address its obligations under the international convention to conserve biodiversity.

## A Biosphere Reserve?

The greater Peel watershed is a good candidate for nomination as a Biosphere Reserve. Biosphere Reserves conserve landscapes, ecosystems, species and genetic diversity, while fostering economic and human development that is culturally and ecologically sustainable. They are recognized by the Man and Biosphere Program of the United Nations Educational, Scientific and Cultural Organization (UNESCO).

Biosphere Reserves promote solutions for the conservation of biodiversity and sustainable use. Each biosphere reserve provides for landscape and biodiversity conservation areas; appropriate development activities that are culturally and ecologically sustainable; and support for research, monitoring, education and information exchange.

Biosphere Reserves identify core protected areas, buffer zones where compatible development can take place, and a transition zone that may allow for a variety of economic activities.

## Community and Economic Benefits of Conservation in the Peel Watershed

Conservation and protected areas are a proven way to develop local and regional economies through public investment; training, education and research; tourism and related services; transportation, facilities and infrastructure; conservation management; increased visitor spending and investment from outside the region (see table 1). In the remote Peel watershed, conservation could provide a viable economic development alternative to cyclical industries based solely on resource exploration and extraction. An economy based in part on conservation would tend to be more stable and retain economic benefits in the region.

The value of abundant clean water and air, or plentiful fish and wildlife, can be measured as ecosystem services of direct benefit to the community. The social and spiritual

**Table 1**—Examples of potential conservation-based economic activities in the Peel Region.

Activity
<ul style="list-style-type: none"> <li>• Continued traditional harvesting and other cultural activities;</li> <li>• Wilderness guiding and outfitting for canoeing, rafting, hiking, horse-back travel, photography, research, education;</li> <li>• Guided hunting, fishing, lodge-based recreation and nature or culture appreciation;</li> <li>• Wilderness tourism services such as air charters, ground transportation, supplies, operating recreation facilities, food and accommodation;</li> <li>• Professional services such as web-based businesses, natural and cultural sciences consulting;</li> <li>• Research, monitoring, education, rediscovery by local people;</li> <li>• Art, photography, local crafts, cultural activities, development of local businesses;</li> <li>• Resource and wildlife management, with public investment;</li> <li>• Enforcement, conservation stewardship, river guardians programs;</li> <li>• Development of tourism and recreation infrastructure, with public investment; and</li> <li>• Increased resident and visitor spending in the region.</li> </ul>

values of wilderness are well known, yet harder to estimate in economic terms.

## Conclusions

The work to protect the ecological and cultural integrity of the Peel watershed began with First Nations in both the Yukon Territory and Northwest Territories, who, in the early 1990s, put in place the legal framework to conserve the lands, waters and wildlife. Although these Final Agreements provided the structure and processes to address questions of land use, resource development and conservation, they did not in themselves set out a specific conservation strategy for the Peel watershed.

The Peel watershed remains vulnerable to ad hoc resource extraction and other developments such as roads, due to laws permitting free entry mining exploration, or the disposition of large tracts of land to oil and gas or coal interests. In light of recent government resistance to complete a protected areas network in the Yukon, there is an important continued role for the public and non-government organizations to engage in land use and conservation planning.

Uncertainties about future development led CPAWS-Yukon to undertake the multi-faceted Three Rivers project in support of conservation in the Peel watershed. Close to a decade of ecological surveys, community meetings and river trips, along with conservation advocacy, culminated in the Three Rivers Journey in 2003. The Journey engaged local people and invited guests from across Canada. It highlighted the importance of the Three Rivers to Yukoners, and introduced the region to the rest of Canada. The resulting national group art exhibition, *Three Rivers: wild waters, sacred places*, will tour through 2007, and the book celebrating the Three Rivers was published in 2005. The



immediate legacy of the Three Rivers project includes a broader awareness of the Peel watershed's wilderness and conservation values, re-acquaintance of local people with remote reaches of traditional lands, and fostering of a constituency for protection (see [www.cpawsyukon.org](http://www.cpawsyukon.org)). In the Three Rivers country we have a chance to protect all that is needed to retain wildness on an inspiring scale, including the full suite of native species, for generations ahead. It's a wilderness dream—protected areas and conservation dominant in the landscape, not remnants of a former ecosystem.

During the clamour to build pipelines and drill for natural gas or coal-bed methane, it would be easy to overlook the grizzly bear and wolverine as they retreat to shrinking islands of intact high country. It would be convenient to argue merely for careful management of the Bonnet Plume woodland caribou herd while seismic lines, roads and drill

pads decimate its habitat, a fate faced by many dwindling mountain caribou herds in Alberta and British Columbia.

The people of the North will need courage to decide which of the many competing values and perspectives are most important—for it is not a question they can leave to others. The future of the Three Rivers and the Peel watershed will be set during the next few years; whatever the outcome in legally protected wilderness areas, conservation demands our continued vigilance.

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# Use of *Clostridium perfringens* as a Fecal Indicator to Detect Intertidal Disposal at Backcountry Marine Campsites in Prince William Sound, Alaska

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**Abstract**—Human waste disposal is a health concern in many backcountry areas. This study measured *Clostridium perfringens* in beach sediments of Prince William Sound, Alaska, to detect fecal contamination resulting from intertidal disposal. Analysis involved holding times that exceeded eight hours. In repeatedly sampled stored sediments, *C. perfringens* did not decay for 101 days, indicating its reliability for detecting fecal contamination when stored. Fecal contamination was not detected in sediments while campers practiced intertidal disposal. Concentrations of *C. perfringens* at beach campsites did not correlate with use. The lack of detectable fecal contamination in affected beach sediments suggests that intertidal disposal of wastes may be a safe method for up to 13 campers in a group.

## Introduction

The use of backcountry recreation areas is increasing in popularity throughout the world, causing land managers to worry about the disposal of human waste (Cole 1996; Hammit and Cole 1998; Marion and others 1993). Prince William Sound (PWS), a popular destination for recreational and subsistence boat users, is no exception to the increase in use of backcountry areas. In the western Sound, the number of kayak visitor days has increased from 6,646 days in 1987 to 12,786 days in 1998 (Twardock and Monz 2000).

When packing out waste is impractical, frequently recommended methods for safe disposal of feces in the backcountry include the use of cat-holes or intertidal disposal (Hampton and Cole 1995; Twardock 2004). Cat-holes are dug 15-20 cm (6-8 inches) deep for burial of wastes at least 61 m (200 feet) from freshwater sources. Intertidal disposal involves deposition of human wastes in the intertidal zone to prevent

freshwater contamination. The chance of human pathogen contact when feces are disposed of intertidally is limited since saltwater is an inhospitable place for most enteric pathogens (Hampton and Cole 1995).

Intertidal disposal is often used in PWS because it is difficult to find an accessible location at least 61 m (200 feet) from freshwater to dig a cat-hole (Twardock 2004). Even though intertidal disposal is commonly practiced, little is known about the safety of this waste disposal method (Hampton and Cole 1995). Fecal contaminants are rarely monitored because of the difficulties in processing samples collected from remote locations (Cilimburg and others 2000). In PWS, detecting fecal contamination involves conditions unique to backcountry areas including small concentrations of fecal indicators, and long sample holding times due to remote locations.

Monitoring sediments or mussels provide the best chance of detecting human fecal contamination (Lucena and others 1994; Marino and Gannon 1991; Martinez-Manzaneres and others 1992; Velji and Albright 1985). Mussels spoil within three days if not frozen; therefore their use in this study was not practical because travel times exceeded three days. Sediments may further prolong the longevity of bacteria, creating better storage conditions for *C. perfringens* than other media (Straub and others 1992; Yeager and O'Brien 1979).

Commonly used indicators in marine systems that correlate with illness include *Enterococci*, total *coliform*, and *Clostridium perfringens* (Hurst and others 2002; Kueh and others 1995). *C. perfringens* is a suitable fecal indicator organism since it is spore forming, and therefore highly resistant to environmental stresses (Bisson and Cabelli 1979; Davies and others 1995; Hurst and others 2002). Spore forming bacteria enter a dormant life stage by forming a protective spore coat around their membrane that remains until proper conditions for growth exist. The spore forming nature of *C. perfringens* allows its use as a fecal indicator for samples that necessitate collection eight to 12 hours prior to assay (Bisson and Cabelli 1979; Fout and others 1996). Other commonly used fecal indicators must be processed within four hours of collection.

In the natural environment, *C. perfringens* is hardy compared to other bacteria of fecal origin (Bisson and Cabelli

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In: Watson, Alan; Sproull, Janet; Dean, Liese, comps. 2007. Science and stewardship to protect and sustain wilderness values: eighth World Wilderness Congress symposium: September 30–October 6, 2005; Anchorage, AK. Proceedings RMRS-P-49. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

1979; Davies and others 1995; Fout and others 1996). In one study *C. perfringens* did not show significant decay with or without predation for up to 85 days while other fecal indicators decayed to 10 percent of their original population (Davies and others 1995). *C. perfringens* persistence may lend to reliable colony counts after long storage times en-route from remote locations.

*C. perfringens* sensitivity and persistence leads to the possibility of measuring past pollution events that are not related to the current concentration of disease causing microorganisms (Bisson and Cabelli 1979; Fout and others 1996; Hurst and others 2002). In PWS, the sensitivity of *C. perfringens* for measuring use is optimal since human influence on pollutant levels is likely minimal in comparison to natural mammalian inputs. The feces of most mammals are composed of similar microorganisms including *C. perfringens*. Fecal contaminants from wildlife have made attempts to correlate human use with fecal contamination difficult (Flack and others 1988; Gary and Adams 1985; Silsbee and Larson 1982; Stuart and others 1976).

To correlate recreational and other human use with *C. perfringens* concentrations the condition of the camp area can be measured using a Campsite Inventory and Monitoring Program protocol adapted to PWS by the National Outdoors Leadership School (Kehoe 2002). This monitoring protocol was used in the Sound by researchers to classify 100 beach campsites with a discrete condition class score using observed signs of human impact (table 1) (Monz 1998). Campsites monitored in PWS tended towards moderate to high impact (Monz 1998). The correlation between fecal contaminants with the condition class score described above has not been studied. Since *C. perfringens* detects present as well as past pollution events it provides the greatest likelihood of detecting enteric bacteria accumulation affected by intertidal disposal.

This study investigates the following hypotheses regarding the use of *C. perfringens* in beach sediments as a fecal indicator organism and medium appropriate for use when sample holding times exceed 12 hours.

- Repeated subsamples of stored sediments should not differ significantly in concentration from the initial sample.
- Sequential samples of sediments taken before, during, and after camper use will detect accumulation of *C. perfringens* resulting from intertidal disposal.
- Camp condition class scores will have a positive correlation with fecal contaminants if intertidal disposal results in accumulation of *C. perfringens* in sediments.
- Heavily used areas (Blackstone Bay) will have elevated *C. perfringens* concentrations compared to low traffic areas (Icy Bay) if intertidal disposal is a significant influence.

## Methods

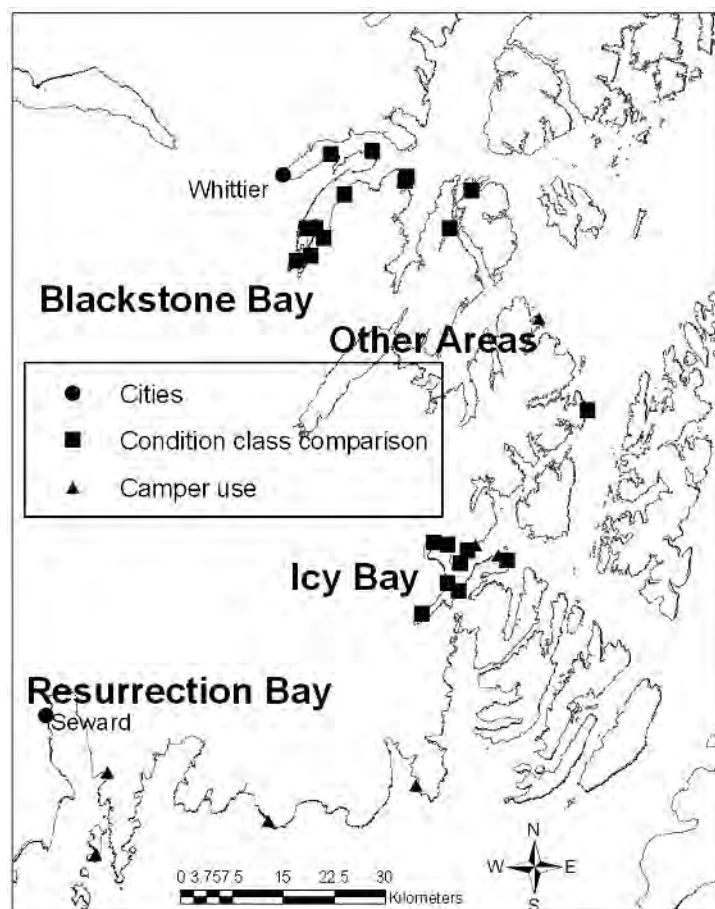
### Study Area

The study focused on the western Prince William Sound (PWS) area from Whittier to Seward. Twardock and Monz (2000) found that the total kayak visitor days spent in PWS was greatest for areas closest to Whittier. Icy Bay (low use), Blackstone Bay (high use), and the area in-between the bays (intermediate use) were included for comparisons (fig. 1). These areas are within the Nellie Juan Wilderness Study Area containing over half of the shoreline in PWS. Icy Bay is managed as a wilderness area allowing no permanent land modifications. Blackstone Bay is managed under a backcountry prescription plan, which allows for site improvements to accommodate heavier use.

The additional areas studied included two beaches in Resurrection Bay and two beaches on the outer coast area from PWS to Resurrection Bay (fig. 1). Resurrection Bay area beaches experience relatively high use, and some beach camps not included in this study have existing pit toilets. The outer coast between Whittier and Seward is a remote area on the Gulf of Alaska with minimal use and ample tidal action.

**Table 1**—Measures used to determine condition class score of a camp.

Measure Condition class	Score 0-5 (0 is no impact 5 is heavy impact)
Vegetation cover inside	1-6 (1 = 0-5%, 2= 6-25%, 3=26-50%, 4=51-75%, 5=76-95%, 6=96-100%)
Vegetation cover outside	1-6 (1 = 0-5%, 2= 6-25%, 3=26-50%, 4=51-75%, 5=76-95%, 6=96-100%)
Mineral soil exposure	1-6 (1 = 0-5%, 2= 6-25%, 3=26-50%, 4=51-75%, 5=76-95%, 6=96-100%)
Tree damage	None-slight, moderate, severe
Root exposure	None-slight, moderate, severe
# of tree stumps	Count
# of trails leaving site	Count
# of fire sites	Count
Litter and trash observations	None, some, much
Observable human waste	Yes or no



**Figure 1**—Backcountry beach campsites visited in western Prince William Sound and Resurrection Bay, Alaska.

## Experimental Design

**Correlation of Storage Time With *C. perfringens* Concentration.** To test the effect of storage time on *C. perfringens* concentration, experimentally contaminated sediments at serial treatments were stored and assayed. A composite of sediments collected from several PWS beaches were thoroughly mixed in a bucket, and subdivided into beakers. Sediments were submerged in artificial seawater (Instant Ocean®) with a salinity of approximately 33 ‰. The sediment seawater mixtures were autoclaved in a 9.5 L pressure cooker for 25 minutes at 1.25 to 1.50 kg cm<sup>-2</sup>. After sterilization, the excess water was drained.

Raw wastewater sewage, obtained from the John M. Asplund Anchorage Water and Wastewater Utility, was added to sterilized sediments in the following amounts per 100 gr sediment: 20 mL, 10 mL, 2 mL, and 1 mL. Treated sediments were stored in sterilized (20 percent bleach) 0.5 L amber Nalgene® bottles. Subsampling and assay were performed within four hours of the raw sewage treatment according to standard procedures, additional assays were performed regularly (Fout and others 1996). The treated samples were stored in a soft-shelled ice chest with ice packs added daily for the first 23 days. After storage for 23 days samples were kept in a refrigerator at 2 to 3 °C (36 to 37 °F) for the duration of the 101 and one-day experiment. This temperature regime

mimics what samples collected from remote sites and stored for later processing might experience.

**Correlation of Camper Use With *C. perfringens* Concentration.** Sampling was undertaken from 5/11-27/2004 with an Alaska Pacific University Expedition Sea Kayaking course consisting of 13 people. Students were informed of the acceptable disposal methods, and upon arrival at a beach the lead instructor and I indicated to the group a good spot to intertidally dispose of waste. I sampled sediments from the indicated location. When camping, an initial sediment sample was collected upon arrival, a second sample was taken at night once the campers had retired, and a third sample was taken in the early morning before campers awoke.

**Correlation of Area Accessibility and Camp Condition With *C. perfringens* Concentration.** Sampling was completed by kayak and charter boat from 7/11-23/2004. An area predicted to have low impact (Icy Bay) was compared to an area predicted to have high impact (Blackstone Bay), and to an area geographically between them that should experience intermediate impact (fig. 1). The level of impact at beach campsites was quantified with a condition class rating derived from the Campsite Inventory and Monitoring Program protocol (table 1) (Kehoe 2002). The condition class was used to compare beaches of high and low impact independently of their location in PWS.

Sediment Collection and Field Handling

Collected sediments were taken from the water-shore interface with a flame-sterilized trowel. Sediment samples were taken from the top 4 cm (2 inches) of beach substrate to fill a pre-washed (20 percent bleach) 0.5 L sample container (amber Nalgene® bottle, Snap-n-Seal® plastic freezer zip bags). While in the field, sediment samples were stored in a cool place such as the shade or the hull of a kayak. Upon arrival in Anchorage, sediment samples were stored in a refrigerator (2 to 3 °C) until processed for incubation of *C. perfringens*.

Sample Preparation and Lab Assays

The medium for *C. perfringens* incubation (mCP) was prepared according to published methods (Bisson and Cabelli 1979; Fout and others 1996). Prior to subsampling, sediments were thoroughly mixed by shaking ten times in a circular motion. Subsamples were aseptically removed and suspended in water using a ratio of 10 gr sediment to 90 mL de-ionized (DI) water. Once sediment was suspended in water the solution was vigorously shaken 100 times to dislodge bacteria from sediment. After shaking, the sediment water mixture was allowed to settle for 10 minutes. Then aliquots of supernatant were removed and vacuumed through membrane filters with 0.45 µm pore size (Metricel). Membranes containing filtrate were placed on mCP agar plates and incubated at 44.5 °C (112 °F) for 24 hours in an anaerobic chamber with an anaerobic atmosphere generator (Anaerocult). After incubation, the straw yellow bacteria colonies that turned pink to magenta after exposure to NH<sub>4</sub>OH fumes were considered acid phosphatase positive which indicates the presence of *C. perfringens* (Bisson and Cabelli 1979; Fout and others 1996).

Condition Class

Condition class at each sampled camp was determined from several observational measures of tent sites (table 1) (Kehoe 2002). Condition was assigned a discrete score from zero (no impact) to five (heavy impact). When multiple tent sites were present at a single beach, the mean impact was used to describe the condition of the camp.

Method Detection Limit (MDL)

The MDL determines what concentrations of *C. perfringens* were statistically greater than zero with 99 percent confidence (three standard deviations). The MDL was calculated

according to the Code of Federal Regulations (Hach 2003). Raw wastewater sewage was added to sterilized sediments at a concentration of 1.0, 2.0, 10.0, and 20.0 mL sewage 100 gr<sup>-1</sup> sediment. The MDL was calculated as the product of the standard deviation for the mean colony forming units of the replicates taken from the contaminated sediment and the upper critical student's t value for the number of replicates (table 2). The dilution used to determine the MDL was the least concentrated dilution that exhibited a mean concentration higher than the calculated MDL. When values are below the MDL the variance in these sample means is too large to determine group differences or correlations with a variable such as time (Helsel 2005). When concentrations were below the MDL for more than 60 percent of the samples, I censored the data as values below (0) or above the MDL (1), and used appropriate non-parametric test statistics (Helsel 2005; Helsel and Hirsch 1991).

Statistical Analysis

Analysis of the effect of storage time on *C. perfringens* concentration was completed using a bivariate correlation. Pearson's R was used when values were consistently above the MDL. Kendall's tau non-parametric test statistic was used when the data were grouped as detectable or not detectable because more than 60 percent of the concentrations were below the MDL (Helsel 2005; Helsel and Hirsch 1991). For the analysis of beach sediments at remote sites during use and the comparison of beach sediments by areas and condition class, differences between sample groups and detection of *C. perfringens* were analyzed using a chi-square analysis. Since more than 60 percent of the concentrations were below the MDL, the values are labeled as detectable and non-detectable (Helsel 2005; Helsel and Hirsch 1991). The frequency of detectable samples at each time, condition and area are compared with Cramer's V non-parametric test statistic.

Results

Method Detection Limit (MDL)

This study's MDL for the membrane filtration method for *C. perfringens* was calculated from the product of the student's t and the standard deviation of 8 replicates from a 2.0 mL sewage 100 gr<sup>-1</sup> sediment dilution (table 2). The product of the standard deviation and the student's t for the replicates results in a detection limit for *C. perfringens* of 9 cfu gr<sup>-1</sup> of sediment.

Table 2—Method detection limit (MDL) calculation for each dilution measured.

Sample dilution	Replicates	Upper critical Student T	Mean <i>C. perfringens</i> cfu gram <sup>-1</sup>	Standard deviation	Method detection limit
1 mL sewage/100 gr. sediment	9	2.896	9	7	20
2 mL sewage/100 gr. sediment	7	2.998	12	3	9
10 mL sewage/100 gr. sediment	8	2.896	39	4	12
20 mL sewage/100 gr. sediment	7	2.998	59	5	15

## Correlation of Storage Time With *C. perfringens* Concentration

When sediment samples experimentally contaminated with wastewater sewage were stored, *C. perfringens* concentrations were not correlated with time for the 1 mL and 20 mL treatments (fig. 2, 1 mL treatment all days not detectable, fig. 3, 20 mL treatment Pearson's  $R = -0.294$ ,  $N = 17$ ,  $p = 0.252$ ). The correlation between time and the concentrations measured for the 2 mL and 10 mL treatments was significant (fig. 2, 2 mL treatment Kendall's tau  $R = -0.485$ ,  $N = 17$ ,  $p = 0.021$ , fig. 3, 10 mL treatment Pearson's  $R = -0.638$ ,  $N = 17$ ,  $p = 0.006$ ).

## Correlation of Camper Use With *C. perfringens* Concentration

When campers practiced intertidal disposal there was no statistical differences in the *C. perfringens* detection rates among sediment sample times (Cramer's  $V = 0.218$ ,  $N = 24$ ,  $p = 0.565$ ). The two samples that detected *C. perfringens* were an initial sample and a morning sample from different beaches (table 3). This study was unable to detect *C. perfringens* during use of intertidal disposal.

## Correlation of Area and Condition Class With *C. perfringens* Concentration

The mean condition class scores indicated higher impact in Blackstone Bay (mean = 4,  $SD = 1.12$ ) than Icy Bay (mean = 0.8,  $SD = 1.19$  Post hoc  $p = 0.001$ ,  $SE = 0.755$ ). Despite the higher impact seen in Blackstone Bay beaches, no difference existed between the detection rate of *C. perfringens* at these beaches compared to the beaches in Icy Bay and other areas (table 3, Cramer's  $V = 0.333$ ,  $N = 21$  beaches,  $p = 0.311$ ). Analysis of the difference in the detection rate between beaches with a condition class score that indicated low impact (0-1), middle impact (2-3) and high impact (4-5) showed no statistically significant differences between these groups (table 3, Cramer's  $V = 0.365$ ,  $N = 21$  beaches,  $p = 0.247$ ).

**Table 3**—Detection of *C. perfringens* in samples during camper use, and for beaches in area and condition class score categories.

	% detected	Cramer's V	N	P
During camper use	8.3	0.218	24	0.565
Initial	12.5		8	
Night	0.0		8	
Morning	12.5		8	
Area Comparison	14.3	0.333	21	0.311
Icy Bay	28.6		7	
Blackstone Bay	0.0		7	
Other areas	14.3		7	
Condition Class	14.3	0.365	21	0.247
Low (score 0-1)	28.6		7	
Middle (score 2-3)	20.0		5	
High (score 4-5)	0.0		9	

## Discussion

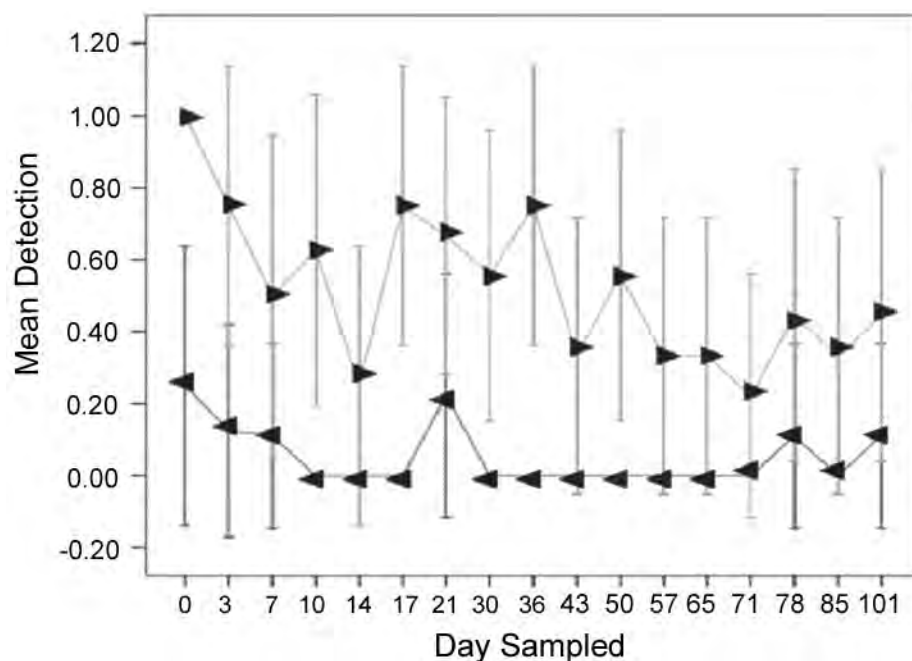
Previous researchers examined the decay of bacteria in sediments over time in semi-natural states, while this study examined the persistence of *C. perfringens* in stored sediment samples to assess the impact of intertidal disposal. *Clostridium perfringens* can be used as a reliable fecal indicator when stored for prolonged periods to detect pollution above the Method Detection Limit (MDL). The time stored did not effect detection of pollution in sediment samples, although a negative correlation between time and concentration is suggested (figs. 2 and 3). Results indicate that stored *C. perfringens* remains viable with little growth or decay for up to 101 days, which is supported by *C. perfringens*' viability in natural environments (Davies and others 1995). The use of *C. perfringens* to detect fecal pollution was not affected by storage in this study despite a statistically significant decrease in the concentration of two wastewater sewage treated sediments (figs. 2 and 3).

*C. perfringens* is an anaerobe and would be in the dormant spore form while present in aerobic marine sediments (Davies and others 1995). When stored, spores likely remained dormant since conditions were not anaerobic. While in the spore form, *C. perfringens* remains viable for an undetermined time whereas other fecal indicator bacteria decay under similar conditions (Davies and others 1995; LaLiberte and Grimes 1982; Pommepuy and others 1992).

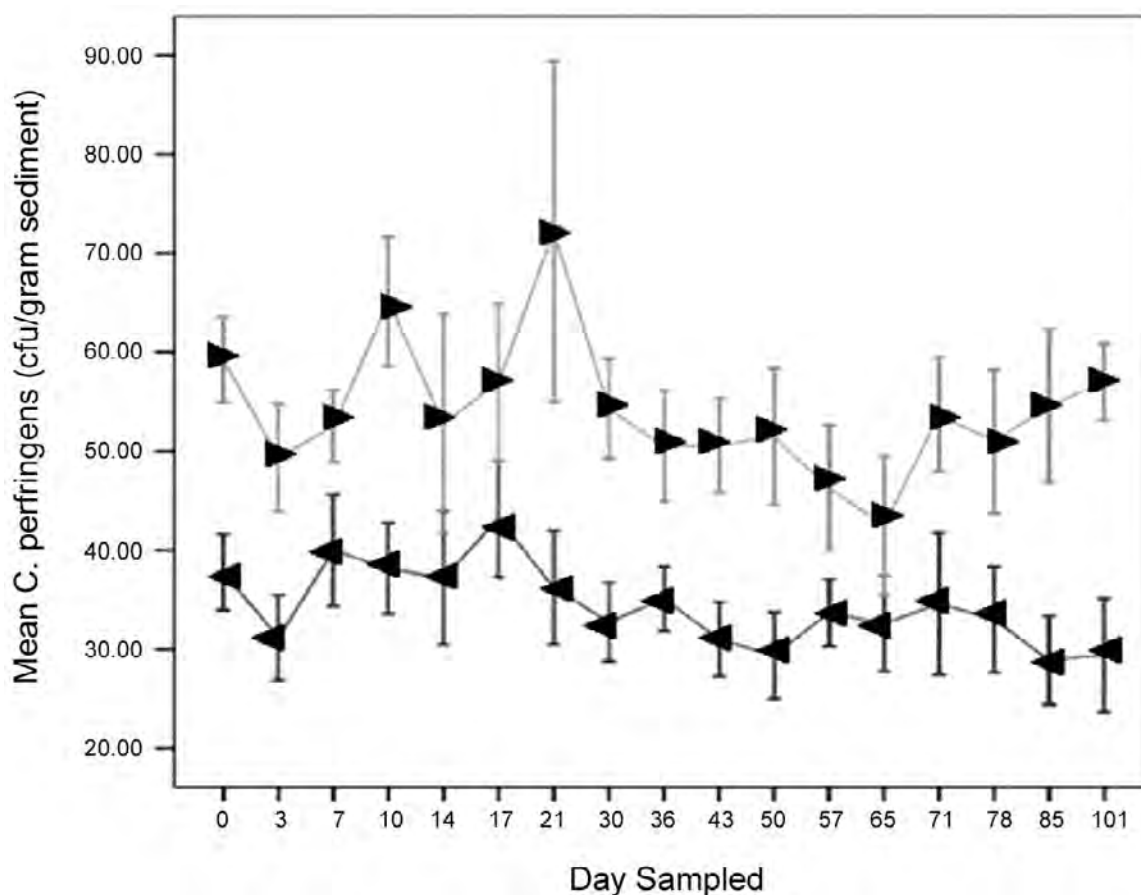
Population decay in most fecal indicators is significantly affected by protozoa predation (Davies and others 1995; LaLiberte and Grimes 1982; Marino and Gannon 1991). Predation on *C. perfringens* was not considered in this study since the presence of protozoa has been shown to have little to no effect on the concentration of viable *C. perfringens* spores (Davies and others 1995). Given the biological nature of spore forming anaerobes, it is expected that predation during storage would have no significant effect on *C. perfringens* concentration.

A statistically significant negative correlation with time was noticed in the study when two stored sediment samples had higher concentrations of *C. perfringens* occurring in the first 21 days (figs. 2 and 3). While the vast majority of *C. perfringens* are in the spore form and do not decay, the remaining vegetative cells show total decay when in marine sediments for 30 or more days (Davies and others 1995). This may explain the significant loss of *C. perfringens* in the 2 and 10 mL wastewater sewage treatments. The remaining stored sediments showed statistically insignificant negative relationships. This is likely because these samples were regularly below the detection limit, or had a higher overall concentration of *C. perfringens* resulting in a less significant proportion of the population in the vegetative form. Despite the suggested negative correlation between concentration and storage time, *C. perfringens* did not decay to the extent that pollution or a lack of pollution could not be determined.

While campers practicing intertidal disposal were present on a beach, accumulation of *C. perfringens* in beach sediments was not detected between sequential samples (table 3). The difficulty in detecting intertidal disposal with bacteria was likely due to the small and short-term effects the practice has on local bacterial concentrations. Intertidal disposal of fecal matter results in dilution of contaminants to low



**Figure 2**—Effect of storage time on the detection of *C. perfringens*. A value of zero represents concentrations below the MDL while a value of one represents detectable concentrations of *C. perfringens*. The error bars represent the 95 percent confidence interval of the means.



**Figure 3**—The effect of storage time on the concentration of *C. perfringens* for the 10 mL sewage 100gr<sup>-1</sup> sediment (O) and 20 mL sewage 100 gr<sup>-1</sup> sediment (Δ) treatments.



concentrations (Hampton and Cole 1995). Depending on site conditions, minute amounts of *C. perfringens* are likely to settle in the sediment near the disposal site. The sequential samples taken while campers practiced intertidal disposal were below the detection limit for 92 percent of the samples (table 3). These results support the assumption that intertidal disposal does not significantly affect the *C. perfringens* population.

In beach sediments collected at campsites in Prince William Sound, 86 percent of the samples had *C. perfringens* concentrations below the MDL indicating minimal human fecal contamination (table 3). Three PWS sites exhibited values 5 to 15 times greater than the detection limit indicating human or animal contamination (table 3). Low concentrations of fecal bacteria would be expected in PWS because of its size, pristine nature, constant tidal flushing, and low exposure to human wastes. The low concentration of *C. perfringens* seen in PWS beach sediments indicates little chance of exposure to pathogens through contact with intertidal waters.

The absence of detectable human contamination in the sediments does not guarantee that intertidal disposal is a safe process. If waste is disposed in the intertidal zone, bacteria are present in the area for a short period before dispersal. Given the low concentration of *C. perfringens* in beach sediments, if contaminants are present in the water there is a small potential for human pathogen contact. Disposal sites should be located far enough away from camps in areas of significant tidal flushing to ensure proper dilution and minimize transport of waste to the camping beach.

Fecal indicator concentrations did not differ by distance from the nearest access point, Whittier, to the areas studied in PWS (table 3). Measured impact at the beaches also did not correlate with *C. perfringens* concentrations (table 3). Differences between areas and beaches of various condition class scores are difficult to detect statistically in studies because the impact of human inputs on the bacterial population is minimal (Flack and others 1988; Gary and Adams 1985; Silsbee and Larson 1982). I found human use of the sampled beaches did not significantly affect the *C. perfringens* population.

Despite lack of a significant correlation between *C. perfringens* and camp conditions, a slight trend of lower *C. perfringens* concentrations at areas showing higher human impacts existed (table 3). Icy Bay, the area farthest from Whittier and consequently less impacted, had two beaches with *C. perfringens* concentrations that were 4 to 16 times the MDL. The only other sample with a similar concentration was in the intermediate use area (table 3). The same trend in detection rates holds for comparison between condition class groups of low, medium and high impact. The low impact group showed the most detection (two detects) followed by the middle impact group (one detect), and the high impact group with no detectable *C. perfringens* concentrations (table 3). This suggests that humans may possibly decrease the *C. perfringens* concentrations at beaches that are heavily impacted.

If increasing human impact is keeping *C. perfringens* concentrations down, it is possible that the primary source of *C. perfringens* at PWS beaches is from wild mammals. A similar study compared a watershed closed to recreational use with a watershed used for recreation, and found that human

impact lowered bacteria concentrations due to decreased animal inputs (Stuart and others 1976). At the use levels studied, intertidal disposal of human waste does not result in accumulation of *C. perfringens* in beach sediments.

If future studies concern the effect of intertidal disposal on bacterial concentrations while campers use a beach, then increased replication and impact is necessary. Sampling the beaches before, during and after use for two to three days would provide a picture of the normal variability as well as the duration and extent of impacts to bacteria concentrations at campsites that are used for extended periods. Increasing the number of campers and monitoring the amount of fecal input would provide information regarding the input necessary to detect contamination.

Further study of the correlation between condition class and *C. perfringens* concentration would benefit from sampling beaches with values above and below the MDL at multiple times during the season. Early, middle and late season trips to measure the condition class of camps, as well as *C. perfringens* concentrations in sediments will provide data regarding the progression of impact and bacterial concentrations. Sampling these same camps annually would further corroborate any relationship between camp condition and *C. perfringens*.

Campers sometimes practice intertidal disposal in the Sound as an alternative to disposing of feces in the uplands (Twardock 2004). In the Sound, when the uplands are accessible, it is difficult to find places that are sufficiently distant from freshwater sources to dispose of feces (Twardock 2004). These freshwater sources are ephemeral, and waste deposited on a dry surface may later become inundated by freshwater. Since pathogen populations can persist for up to 200 days in the soil, upland disposal could expose campers to pathogens the following season (Hurst and others 2002; Yeager and O'Brien 1979).

Campers practicing intertidal disposal in this study did not affect the *C. perfringens* sediment concentrations. This study suggests that recreational use of PWS does not significantly affect the population of *C. perfringens*, and may be driving wild animals away resulting in a reduction of bacterial inputs at campsites with increased human impact. These data suggest that when practiced properly intertidal disposal does not increase the chance of exposure to fecal contaminants, and may be the best method for waste removal when it is not possible to pack out wastes or use the uplands properly.

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# How the National Marine Sanctuaries Act Diverged from the Wilderness Act Model and Lost Its Way in the Land of Multiple Use

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**Abstract**—The fundamental flaw of the National Marine Sanctuaries Act is its lack of a singular focus on preservation. This conclusion is all the more obvious when it is compared to the Wilderness Act, enacted just eight years before. The stated objective of the Wilderness Act is to preserve roadless areas of “untrammelled” wilderness. More than 675 wilderness areas in 44 states have been designated under the Act’s auspices. The Wilderness Act has proved to be an effective conservation and management tool because it established: a clear national policy to preserve wilderness; a specific and practical definition of wilderness; a permanent wilderness preservation system; clear management guidelines for all wilderness areas, including a general prohibition on commercial enterprises, roads, and structures; a wilderness review process that included an inventory of all potential sites and a time limit for the executive branch to recommend suitable wilderness areas to Congress; and, Congress as the exclusive decision-maker on granting and removing wilderness area designations (Scott 2001). In contrast, the Sanctuaries Act lacks a central focus on preservation and a rigorous process to achieve it. Congress has never defined what constitutes a sanctuary system, vaguely identifies the Act’s purpose as protecting special areas of national significance, and does not outright prohibit any extractive uses. Guidelines do not exist as to where or how many sanctuaries must be established by the Secretary of Commerce, nor is there a requirement for a comprehensive survey to identify all potential sanctuaries.

## Introduction

“The oceans are in danger of dying.” (Jacques Cousteau, Time 1970)

Coastal and ocean degradation caused by pollution, industrial and commercial development, and waste dumping became salient environmental issues in the 1960s and 1970s. Public awareness of ocean problems was heightened by large oil spills, “dead seas” resulting from the dumping of dredge spoil and sewage sludge off America’s coasts, and numerous scientific reports detailing the environmental decline of coastal areas. In response, the U.S. Congress approved a

number of remedial measures to protect coasts and estuaries, including a federal program to assist states in developing coastal zone management plans, new water pollution and ocean dumping policies, and programs to create estuarine and marine sanctuaries.

Early proponents of marine sanctuaries, including President Johnson’s 1966 Science Advisory Committee, envisioned a system of protected ocean areas analogous to those established for terrestrial areas, such as national parks and wilderness areas (Panel on Oceanography 1966). Like wilderness areas, the marine preserves recommended by the Advisory Committee were intended to maintain the oceans’ natural characteristics and values and only allow uses compatible with this goal. In his 1971 testimony before the Senate Subcommittee on Oceanography, world-renowned oceanographer Jacques Cousteau warned Congress that the world faced destruction of the oceans from pollution, overfishing, extermination of species, and other causes. He called for immediate action on several fronts to reverse the situation.

In 1972, the floodgates of environmental legislation opened. Congress passed a number of environmental laws, among them the Marine Protection, Research, and Sanctuaries Act (MPRSA) of 1972 (Pub. L. No. 92-532 1972). The MPRSA authorized a trio of programs to protect and restore ocean ecosystems. Of relevance here, it authorized the Secretary of Commerce to designate national marine sanctuaries for the “purpose of preserving or restoring [marine] areas for their conservation, recreational, ecological, or esthetic values.” Unfortunately, the Sanctuaries Act as enacted did not strictly follow the model of the U.S. Wilderness Act.

For much of its history, the Sanctuaries Act has been a work in progress, largely because of ambiguity of intent. The original Act and its accompanying legislative history were incongruous in that the law directed the Secretary of Commerce, acting through the National Oceanic and Atmospheric Administration (NOAA), to establish sanctuaries for preservation and restoration purposes, but the House legislative history, especially the floor debate, allowed for both preservation and extractive uses in sanctuaries. This ambiguity produced confusion and led to implementation difficulties, triggering periodic efforts by NOAA and Congress to clarify the Act’s purposes and provisions.

Over time, Congress confirmed multiple use as one of several purposes of the Act and gave the Secretary of Commerce the discretion to determine which uses in each sanctuary are consistent with that sanctuary and the resource protection objectives of the Act. Although key areas of the oceans and Great Lakes have been protected to some degree in the 13

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sanctuaries established since 1972, the Sanctuary Program has yet to produce a comprehensive national network of marine conservation areas that restores and protects the full range of the nation's marine biodiversity, nor does it have a credible strategy for doing so. Established sanctuaries cover less than 0.5 percent of U.S. waters, and many significant marine areas and resources are missing from the system.

Meanwhile, the ocean degradation of which Cousteau warned, and which Congress sought to arrest when it passed the MPRSA and other marine conservation laws, is rapidly coming to pass. Although progress has been made on some fronts, such as bans on ocean dumping of toxic wastes and stronger protection for marine mammals, other problems, such as fisheries depletion and dead zones, have worsened.

## Early Sanctuary Bills (1967–1970) \_\_\_\_\_

In 1967, bipartisan members of Congress, including Representatives Hastings Keith (R-Mass.), Phil Burton (D-Calif.), and George E. Brown, Jr. (D-Calif.), introduced bills to direct the Secretary of the Interior to study the feasibility of a national system of marine sanctuaries patterned after the U.S. National Wilderness Preservation System (H.R.11584 and S.2415 1967). At the time, the petroleum industry was rapidly expanding its operations in offshore waters. A principal factor prompting this legislation was the desire to protect scenic coastlines and special marine places, including rich fishing grounds like Georges Bank, from oil and gas development.

The House Merchant Marine and Fisheries Committee held a hearing on the sanctuary study bills in 1968, but they were opposed by the Department of the Interior (DOI) on grounds that existing law permitted the DOI to manage the ocean for multiple uses, including environmental protection, and that sanctuaries might limit offshore energy development. Nevertheless, several members of the House continued to promote legislation to study sanctuary feasibility in the next two Congresses.

Concurrently, a second strategy for protecting ocean places was advanced by members of the California delegation who wished to designate areas on the Outer Continental Shelf (OCS) of California in which oil drilling would be prohibited. In 1968, bills were introduced but not passed in the House and the Senate to ban drilling in a section of waters near Santa Barbara. Following a massive oil spill from a ruptured well in the Santa Barbara Channel in 1969, Senator Alan Cranston (D-Calif.) became the most vocal advocate for prohibiting drilling at selected places along the California coast. The DOI opposed these bills as well, claiming that new drilling guidelines and procedures implemented after the Santa Barbara accident would be sufficient to prevent future spills. The Senate and House Interior and Insular Affairs Committees, which had authority over the OCS minerals leasing program, were sympathetic to the DOI's concerns and declined to act.

A third approach to ocean protection was spawned by concern about the effects of waste dumping in the ocean. Oil-covered beaches, closed shellfish beds, and "dead seas" around ocean dump sites prompted the introduction of bills in 1969 and 1970 to comprehensively regulate ocean dumping. A 1970 report of the President's Council on Environmental

Quality called for comprehensive regulation of dumping. However, the report made no mention of the need for a marine sanctuary system (CEQ 1970).

Despite the Nixon Administration's opposition to marine sanctuaries, the Democrat-controlled House Merchant Marine and Fisheries Committee was determined to act. The ocean dumping crisis gave the committee the opening it needed. As the 91st Congress drew to a close, momentum for an ocean dumping law had become unstoppable.

## Marine Protection, Research, and Sanctuaries Act of 1972 \_\_\_\_\_

In June 1971, the House Merchant Marine and Fisheries Committee unanimously recommended that the entire House pass the Marine Protection, Research, and Sanctuaries Act (MPRSA), which contained titles on ocean dumping, marine research, and sanctuaries. The Act's sanctuaries title (Title III) was an amalgam of concepts from various bills pending before the committee and new ones forged in executive session. The sanctuary's title did not mirror the Wilderness Act, as had been recommended by President Johnson's Science Advisory Committee. Furthermore, it lacked any prohibitions on industrial development, including energy development, within designated sanctuaries, which had been a principal goal of Representative Keith and others.

The House bill gave the Secretary of Commerce broad discretionary authority to designate marine sanctuaries in coastal, ocean, and Great Lakes waters to preserve and restore an area's conservation, recreational, ecological, or esthetic values. The Secretary was to make the first designations within two years and additional ones periodically thereafter. The Secretary was given broad power to regulate uses and to ensure they were consistent with a sanctuary's purposes, but no uses were specifically prohibited by the Act. The Sanctuaries Act was authorized for three years and granted annual budget authority of up to \$10 million.

The MPRSA passed the House overwhelmingly in 1971, despite Nixon Administration opposition to the sanctuaries title. The Senate Commerce Committee did not support marine sanctuaries and deleted the program from its version of the legislation. Nevertheless, the House-Senate conference committee on the dumping bill ultimately reinserted the House sanctuaries title, with only minor changes. President Nixon signed the MPRSA on October 23, 1972, sanctuaries title and all.

## The Rise of Multiple Use (1974–1986) \_\_\_\_\_

During House floor debate on the Act, members of the Merchant Marine and Fisheries Committee emphasized that Title III was not purely a preservation statute and that multiple use of sanctuaries was expected. The committee even considered extractive activities like oil and gas as potentially compatible with the statute's preservation and restoration purposes in certain situations. Taking this cue, NOAA's first regulations to implement the Sanctuaries Act permitted multiple uses that were compatible with the primary purposes of the sanctuaries.

Between 1972 and 1979, little money was spent to develop the program and only two small, non-controversial sanctuaries were designated. Once implementation began in earnest under the Carter Administration, controversies erupted over the scope, requirements, and impact of the program as NOAA attempted to designate larger areas. Ultimately, President Carter designated four sanctuaries, but other proposals remained mired in controversy.

Oil and commercial fishing industries were increasingly antagonistic toward the program because of its potential to infringe on their activities. The oil industry sought to have oil development allowed in sanctuaries, and the fishing industry sought to prevent sanctuaries from restricting their access to fishing grounds. From roughly 1977 until 1986, commercial fishing and oil interests and their congressional allies challenged the Sanctuaries Act's existence and battled individual sanctuary proposals. Failing an outright repeal, oil and fishing industries were largely successful in limiting the Act's application and watering down its preservation purpose.

By 1984, NOAA and Congress had made a series of regulatory and legislative decisions that emphasized balancing preservation with other human uses of sanctuaries. As applied by NOAA, the balancing doctrine has made it extremely difficult to establish fully-protected sanctuaries or even fully-protected zones within sanctuaries.

## Emphasizing Preservation (1988–2000)

The Sanctuary Program suffered greatly under the Reagan Administration, which undercut the program's funding and staffing, and considered only one tiny site for designation (Owen 2003). Meanwhile, a series of marine pollution events highlighted the continuing need for protection. These events included algal blooms, mass dolphin deaths, medical waste that washed up on the Atlantic Coast, and the discharge of copper ore and bunker fuel oil from a shipwreck near the Channel Islands National Marine Sanctuary.

Congressional frustration over the lack of new designations led to a new phase in which Congress legislatively designated four sanctuaries. Congress also passed laws protecting a total of four sanctuaries from oil extraction, but failed to amend the Act to protect all sanctuaries from this use. Congress attempted repeatedly to strengthen the Act's preservation mission. However, because Congress did not also clarify the Act's purpose and revise the multiple use provisions, the amendments passed in those years had only a modest effect on the program's preservation mission. Moreover, amendments in 2000 prohibited the designation of new sanctuaries until existing ones are inventoried and fully funded.

## Assessing the Sanctuaries Act's Effectiveness

### The Unfulfilled Preservation Mandate

The Sanctuaries Act has been used to set aside 13 key places. Although sanctuaries generally have been managed

for multiple use, preservation zones where all extractive uses are prohibited have only been established in one sanctuary. Sanctuaries also have served as focal points for educating the public about marine conservation and encouraging public involvement in banning oil and gas drilling, mining, and other intensive uses in or near special marine places.

Generally, it is against the law to "destroy, cause the loss of, or injure any sanctuary resource managed under law or regulations for that sanctuary" (Sanctuaries Act 2004). However, the prohibition applies only to resources that are specifically identified in the designation document for each sanctuary. For example, most sanctuaries do not regulate fishing or prohibit bottom-trawling, despite the fact that fish populations are depleted in some sanctuaries and that research has documented how bottom trawling has leveled the seabed and stripped vegetation at some sanctuaries (Center for the Economy and the Environment 2000; Sanctuary Program Regulations 2004). One small sanctuary (42 square nautical miles) within an oil producing area off Texas prohibits oil and gas development in some areas of the sanctuary but not others (Sanctuary Program Regulations 2004). The Sanctuaries, unlike Wilderness Areas, are not comprehensively protected from even the most intensive, potentially destructive uses.

## Marine Reserves

The Sanctuaries Act was passed to preserve places in the sea from destruction, but the Act's multiple use provisions have made it difficult to create inviolate sanctuaries where no extraction of living or nonliving resources is allowed. Scientific thinking about conserving ocean ecosystems was in its infancy at the time the Sanctuaries Act was passed, but our knowledge has evolved substantially since the 1970s. Today, scientists call for the establishment of networks of marine reserves—areas exempt from all extractive or harmful activities, including commercial and recreational fishing—as a necessary tool to conserve marine biodiversity, restore and preserve the integrity of marine ecosystems, and maintain sustainable fisheries (Ecological Applications 2003). However, the United States has moved slowly in creating fully-protected marine reserve areas, even within sanctuaries. While Congress directed that one of the sanctuaries be considered for "not-take" zones, it failed to require this throughout the Program (Pub. L. No. 101-605 1990). NOAA's response to Congress, zoning the Florida Keys Sanctuary, drew vociferous opposition from some commercial and recreational fishing interests, and eventually established reserves covering less than 1 percent of the sanctuary.

## Structural Flaws of the Sanctuaries Act

The paucity of protections resulting from the Sanctuaries Act is a result of several structural flaws:

- The Act's language makes it difficult to prohibit activities.
- Management of fisheries in sanctuaries has largely been ceded to NOAA Fisheries, not retained by sanctuary managers.
- The Act's multiple use provision can be employed by politically powerful lobby groups to trump scientifically sound regulations.

- The exhaustive consultation requirements and mandate to facilitate multiple uses “consistent with protection” are not found in national parks and wilderness protection laws.

## Holes in the System

Many ocean areas that are most desirable from a conservation standpoint, such as the Caribbean and North Pacific, are missing from the sanctuary system. In addition to geographic holes in coverage, NOAA has not adequately used the Sanctuaries Act to address protection of diverse ocean wildlife. In 2000, Congress clarified that one of the Act’s purposes is “to maintain the natural biological communities in the national marine sanctuaries, and to protect, and where appropriate, restore and enhance natural habitats, populations, and ecological processes” (Pub. L. 106-513 2000). However, little effective action has been taken. NOAA has no comprehensive program to assess the status of endangered species found within sanctuaries, address how sanctuaries should be managed to better conserve these species, or identify where additional sanctuaries are needed to protect other endangered wildlife.

The Act has been used to protect many sanctuaries from oil development and pollution, but even this success is threatened by annual attempts by some in Congress to remove these protections. Additionally, the Sanctuary Program has neither prevented overfishing within the borders of the sanctuaries nor consistently protected sanctuary bottom habitats from destructive fishing practices such as bottom trawling, and Congress continues to receive pressure to allow fisheries in sanctuaries to be managed by the National Marine Fisheries Service (NMFS) rather than the Sanctuary Program.

## Oil Development and Commercial Fishing

Oil development and commercial fishing, two of the biggest threats to sanctuary resources, have been flashpoints throughout the Act’s history. New oil development is prohibited in the system, at least for the moment. Although assertions were made that oil development could be compatible with other sanctuary uses, a number of sanctuaries specifically prohibited new oil and gas development when they were designated by either NOAA (for example, Channel Islands, Gulf of the Farallones) or Congress (for example, Monterey Bay, Cordell Banks). Public sentiment was a key reason for the limits of oil from the Monterey Bay and Channel Islands sanctuaries. However, oil and gas leases in place before a sanctuary’s designation are often allowed to continue within the sanctuary (for example, in Channel Islands).

In 1998, President Clinton issued an executive memorandum that prohibited new oil and gas leases in any sanctuary until the year 2012. However, the Clinton memorandum can be rescinded by a succeeding president. Congress can also intervene to allow oil and gas exploration (distinct from the issuance of new leases), as it did in 2003, when a proposed energy bill allowed for oil exploration throughout the entire Outer Continental Shelf, including in marine sanctuaries (Wkly. Comp. Pres. Doc. 1998). Though the measure passed the Senate, it was stopped in the House by coastal state

opposition. As oil prices rise, offshore oil development in marine sanctuaries will continue to be a threat.

Since 1972, commercial fishing has contributed to severe population declines of many fish species. Depleted populations include New England cod, snapper and grouper reef fish in the Southeast Coast and Gulf of Mexico, various species of rockfish and the nearly extinct white abalone along the Pacific Coast, and several species of lobster in Hawaii. According to NOAA, 76 populations in the United States are classified as overfished (NMFS 2004). Although sanctuaries are home to some of these depleted populations, most sanctuaries do not comprehensively prevent or even regulate commercial or recreational fishing. Eight sanctuaries do not regulate any fishing within their waters or expressly exempt “traditional fishing practices,” including bottom trawling. Bottom trawling is allowed in seven of the 13 sanctuaries even though this method of fishing causes extensive damage to seafloor ecosystems that provide vital breeding, nursing, and feeding grounds to fish.

The Sanctuaries Act requires the Secretary of Commerce to give the appropriate regional fishery management council the opportunity to draft fishing regulations for each proposed sanctuary, but the councils must meet certain standards. If a council chooses to draft regulations, it must use as guidance the national standards of the Magnuson-Stevens Act, the law under which federal fisheries are managed primarily for exploitation, “to the extent that the standards are consistent and compatible with the goals and objectives of the proposed designation.” A council’s draft regulations must also “fulfill the purposes and policies [of the Sanctuaries Act] and the goals and objectives of the proposed designation,” or the Secretary must reject the draft and prepare the regulations himself (Sanctuaries Act 2004). Any amendments to the fishing regulations must follow the same standards and process of development. Therefore, while the draft fishing regulations are guided by some provisions of the Magnuson-Stevens Act, they must be entirely compatible with and assist fulfillment of the National Marine Sanctuaries Act.

Although the Sanctuaries Act gives the Secretary the power to object to a council recommendation that would harm sanctuary resources, the Secretary has been reluctant to change the regional council’s draft fishing regulations for sanctuaries. The reluctance comes in part because of NOAA’s conflicting responsibilities to protect sanctuary resources while promoting the economic viability of fisheries. In practice, staff often resolve conflicts between the National Ocean Service, which manages the Sanctuary Program, and NOAA Fisheries before these disputes ever reach the Secretary of Commerce.

Congress also has failed to address the negative effects of fishing on sanctuaries. For example, the legislative designations of Monterey Bay and Stellwagen Bank were silent on commercial fisheries regulation, leaving it to NOAA to decide whether to cover commercial fishing as a regulated or prohibited activity (Pub. L. 102-587 1992). NOAA chose not to regulate fishing in either sanctuary because there was insufficient support for regulation. As a result, the sanctuaries have not helped stop the declines of certain resident fish populations nor have they halted the disturbance and destruction of seafloor habitat within their boundaries.

Actions in the past year suggest that NOAA's pattern of deference to the councils regarding management of fishing in sanctuaries may be changing. NOAA's draft goals and objectives for the Northwestern Hawaiian Islands, the one sanctuary currently under consideration for addition to the sanctuary system, would prohibit certain fisheries and regulate others, in order to effectively protect sanctuary resources. Furthermore, Monterey Bay National Marine Sanctuary may expand its borders to include Davidson Seamount to protect the seamount from fishing. Finally, Cordell Bank National Marine Sanctuary is considering clarifying that submerged lands are included in the sanctuary's jurisdiction, and has proposed prohibiting bottom trawling in the entire sanctuary.

Each of these proposals has garnered opposition by the councils, which argue that the Magnuson-Stevens Act and the Sanctuaries Act are incompatible, and that the Magnuson-Stevens Act should be the controlling authority. Not only is the councils' interpretation refuted by the plain meaning of the Sanctuaries Act, its acceptance would prevent the comprehensive management of sanctuary ecosystems.

## Preservation and Multiple Use

While it is true that "preservation" or "protection" (the precise word used in the Act has changed over time) has always been a purpose of the Sanctuaries Act, it is not the Act's singular purpose. More than anything, it is the provisions related to multiple use that have prevented the development of a marine sanctuary system that lives up to its name.

Even though the Act now states that "resource protection" is the primary objective, by requiring that sanctuaries facilitate all public and private uses "compatible" with this objective, the Act allows users to

. . . challenge the Secretary's decision to prohibit certain activities, and creates the expectation among resource users that their use will be facilitated. The Secretary must then defend his or her regulatory decisions by demonstrating that such activities are not "compatible" with resource protection. . . The Secretary must, in effect, answer the question: "Does this activity harm the resource enough in comparison to the benefits people get from that activity to justify regulating it?" (Turnstone Group 2003, p. 6)

If protection or preservation is the primary purpose of sanctuaries, at what point do multiple uses compromise resource protection? If most of the ocean is generally open to all uses, then the most direct and effective way to preserve ocean places is to set some of them aside for the singular purpose of preservation just as national parks and wilderness areas have been created on land. Only truly compatible uses of sanctuaries, such as education, science, and low-impact recreation would be allowed. An effective, comprehensive ocean zoning policy, if it existed, would divide the ocean into a number of different use zones, including preservation zones. This was the strategy envisioned in 1966 by President Johnson's Science Advisory Committee, which called for a marine wilderness preservation system, not the creation of multiple-use sanctuaries.

## Moratorium on New Sanctuaries

Efforts to designate additional sanctuaries came to a halt in the mid-1990s. Until that time, NOAA's designation process was driven by a list of sites that had passed a preliminary evaluation of appropriateness for sanctuary designation. NOAA inactivated the list because it was out of date and needed to be revised (Sanctuary Program Regulations 1995). Before NOAA could revise the list, Congress enacted a moratorium on new designations in the 2000 Amendments to the Sanctuaries Act.

Lifting the moratorium is contingent upon publication of a study by the Secretary of Commerce concluding that the "addition of a new sanctuary will not have a negative impact on the system," sufficient funding in the annual Commerce Department budget for an inventory of the new sanctuary's resources, and sufficient funding in the Commerce Department budget for complete site characterization studies of all current sanctuaries within ten years (Pub. L. 106-513 2000).

The moratorium is a signal that additions to the sanctuary system are not a high priority for Congress, regardless of the scientific community's urgent call for greater protection of sensitive marine areas. The moratorium has had one positive consequence—forcing NOAA to develop a management program for congressional review—but it throws a pall of uncertainty over the program. It is hard to imagine a similar no-growth injunction being placed on the national park, wilderness area, or wildlife refuge systems, all of which continue to expand.

## Conclusions

Without a singular preservation focus, the Sanctuaries Act has proved to be an unreliable vehicle for comprehensively preserving the full array of the nation's marine resources and special places. The Act's inadequacies have been obvious throughout its history. Incongruous and conflicting mandates, lack of strategic implementation guidelines, and the failure to prohibit incompatible uses and define uniform protection standards, have proved baffling to NOAA and been a source of continuing debate by the Act's authorizing committees. Furthermore, frequent reinvention efforts by Congress and NOAA have failed to fix the Act's fundamental problems.

The Act continues to lack a cohesive set of purposes and compatible uses that apply to every sanctuary in the system. Until this consistency is created, lengthy fights between user groups and conservationists are all but guaranteed each time a new sanctuary is designated or management plans are reviewed.

When such battles stymied the designation process in the 1980s, a conservation-minded Congress mandated deadlines for NOAA to designate certain sanctuaries. When that approach was unsuccessful, Congress bypassed the largely dysfunctional designation process to create the Florida Keys, the Hawaiian Islands Humpback Whale, Monterey Bay, and Stellwagen Bank marine sanctuaries. When Congress was dissatisfied with NOAA's position on minerals extraction, it again bypassed the designation process by prohibiting new oil and gas leases at Cordell Bank and Olympic Coast, oil development at Monterey Bay, and sand and gravel mining



at Stellwagen Bank. On the other hand, Congress has not been proactive in the regulation of commercial fishing in sanctuaries.

The Sanctuaries Act is now so constrained by its own architecture that it stands little chance of producing the comprehensive system of marine preservation areas envisioned by early supporters who had hoped to create a system of marine wilderness preserves analogous to the terrestrial wilderness system. The blueprint of a permanent marine sanctuary system for the sole purpose of preservation was rejected in favor of one that attempted to balance preservation with other uses. As a result, progress toward protecting America's ocean resources has not resulted in the national network of marine conservation areas that scientists and marine managers today say are needed to protect and restore ocean life.

The reauthorization of the Sanctuaries Act offers Congress an opportunity to either bolster the Act through substantial amendment or bypass it altogether and create a new overarching statute that mandates the creation of fully-protected marine conservation areas. In trying to decide what approach to take, we encourage looking back to the Wilderness Act. The Wilderness Act provides a compelling and successful model for establishing a system of areas managed to protect their inherent wild character by generally prohibiting commercial uses, while allowing low-intensity activities to continue. Regardless of whether Congress chooses to follow the Wilderness Act model in overhauling the Sanctuaries Act or drafts new legislation, a bold, vigorous and determined effort is needed to identify, protect, and truly preserve America's marine ecosystems before they are irrevocably lost.

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# Leatherback Sea Turtle Stewardship to Attain Local, Regional, and Global Marine Conservation and Management

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**Abstract**—The leatherback sea turtle (*Dermochelys coriacea*) is the largest marine reptile with one of the longest known ocean migrations in the world and an important part of marine biodiversity. It is also important to the economies of coastal communities in developing countries, especially in areas where eco-tourism has replaced unsustainable harvest and consumption of turtles and eggs. However, despite increased protection of nesting females, eggs, and hatchlings, Pacific populations have declined 95 percent during the last 20 years due to high adult mortality, caused by coastal gillnetting in South America and industrial pelagic longlining in the high seas, which annually sets approximately two billion hooks worldwide. Scientists project that leatherbacks will go extinct in the region during the next 10 to 30 years if incidental captures and mortalities of juveniles and adults during high seas industrial fishery operations are not greatly reduced. Unfortunately, in spite of the unimpeachable knowledge of the problem of unsustainable fishing practices, no plan has focused on reducing overall fishing efforts in international waters. Stewardship must include implementation of the precautionary principle, proactive efforts on the part of the Regional Fisheries Management Organizations (RFMOs), and a greater voice for local communities impacted by activities of high seas industrial fishers.

The leatherback sea turtle (*Dermochelys coriacea*) is the largest marine reptile, with one of the longest known migrations in the world. It also dives to depths greater than 1,000 m (3,281 ft), in search of its primary food items, cnidarians (Davenport and Balazs 1991). Their eggs have been consumed avidly by the local inhabitants of tropical beaches for generations as a source of protein, and harvested for sale as a source of income. In some places, like Las Baulas National Park in Costa Rica, the unsustainable practice of harvest and consumption of turtle eggs has been replaced by eco-tourism, where local inhabitants, often former poachers, are trained to provide guiding services to view nesting turtles (fig. 1) (Naranjo and Arauz 1994). In fact, this system has demonstrated that non-consumptive use of sea turtles can be far more profitable for local economies than consumptive use (Troëng and Drews 2004).

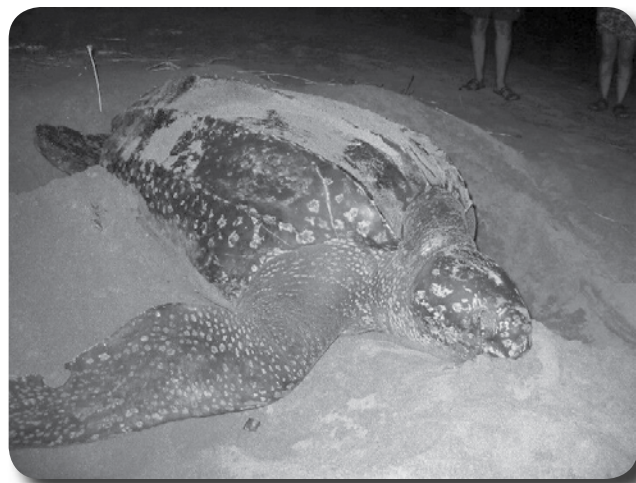
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Only 20 years ago, Eastern Pacific leatherbacks were abundant, with scattered nesting beaches from Central Mexico to Costa Rica. Unfortunately, despite increased protection of nesting females, eggs, and hatchlings, Pacific leatherback populations have crashed precipitously in the last 20 years (Spotila and others 1996). The Mexican nesting assemblage, formerly known as the largest nesting population in the world (Pritchard 1982), had a population estimated at over 70,000 females. Sadly, the Mexican population dropped to under 1000 by 1994 (Sarti and others 1996), to fewer than 250 during the 1998 to 1999 season (Eckert unpublished, in Spotila and others 2000), and finally to roughly 50 during the 2001 to 2002 season (Sarti, personal communication, 2003). At Las Baulas National Park in Costa Rica, the number of nesting females has declined from approximately 1500 to only 50 individuals (Steyermark and others 1996). If the trend continues, leatherback sea turtles may be extinct in the Pacific within the next 10 to 30 years (Spotila and others 2000). As a result of this tragedy, leatherback sea turtles are now considered critically endangered by the World Conservation Union (IUCN).

Several factors are responsible for the current extinction trajectory: long term unsustainable harvest of eggs from their nesting beaches; alteration of nesting habitat for coastal development projects; and the high mortality of adults and juveniles during coastal gillnet (Eckert 1997; Frazier and Brito 1990) and pelagic longline operations (Crowder and Myers 2001; Spotila and others 2000).



**Figure 1**—Nesting leatherback sea turtle (photo courtesy of [tor-tugamarina.org](http://tor-tugamarina.org)).

The pelagic longline fishery is the world's most widespread hunting activity, with approximately 5 million baited hooks set each day on 100,000 miles (160,934 km) of line throughout the world's oceans (Crowder and Myers 2001). Incidental capture and mortality of sea turtles associated with industrial longline operations impedes national and international efforts to recover marine turtle populations (Weatherall and others 1993). Fishery managers and sea turtle researchers have been urging the development of conservation strategies that mitigate sea turtle longline interactions (Witzel 1999) for several years. International and regional cooperative efforts are seen as a critical component, due to the highly migratory life history of the species (Sarti and others 1996).

However, leatherbacks are not the only marine species at risk from these practices, and some scientists have described this species as "the canary in the ocean coalmine." Other species, many of which are also highly migratory, such as bluefin and bigeye tuna, white marlin, false killer whales, black-footed albatross, and sharks, are also threatened by unsustainable fishery practices (Crowder and Myers 2001). In the Pacific alone, incidental captures include 4.4 million sea turtles, sharks, billfish, seabirds, and marine mammals (Ovets 2005). Large predatory fish biomass today is only about 10 percent of pre-industrial levels 50 years ago, with potential serious consequences for marine ecosystems (Myers and Worm 2003).

Recent research using satellite telemetry is providing insights into leatherback post-nesting movements and migrations in the Eastern Pacific that may serve to establish additional conservation measures (fig. 2). Morreale and others (1996) and Eckert (1997) have demonstrated the existence of a corridor for leatherbacks of the Central American region

and Southern Mexico on their southward post-nesting migration toward South America. Turtles have been tracked using satellites heading towards the Galapagos Islands, where they "taper" into higher concentrations of turtles in space and time, to disperse again towards South American waters. The clustering of many individuals in space and time along migratory corridors greatly increases the vulnerability of the species, but could also facilitate protection of regional and world stocks, simply by restricting potentially harmful activities within the spatial and temporal corridors (Morreale and others 1996).

Certain diplomatic initiatives are now being pursued to integrally conserve and manage marine resources in the Pacific. For instance, a recent diplomatic initiative called the Eastern Tropical Pacific Seascape (ETPS), seeks to implement regional management and conservation of marine habitats of Costa Rica (Cocos Island), Panama (Coiba Island), Colombia (Malpelo and Gorgona Islands) and Ecuador (Galapagos), an initiative that may greatly benefit leatherback sea turtles.

Last November, the United Nations Food and Agriculture Organization (FAO) held a Technical Consultation on Sea Turtle Conservation and Fisheries, and provided voluntary technical guidelines to reduce sea turtle mortality in Fishing Operations (FAO 2004). Bolder measures have been implemented in the United States, where aggressive litigation has resulted in increased regulation of U.S. longline vessels, limitations on incidental captures, and a four-year closure of the Hawaii swordfish longline fishery (Turtle Island Restoration Network and others versus National Marine Fisheries Service, 340 F.3d 969, 9th Cir. 2003). Fisheries research is being carried out to attempt to improve certain fishing technologies and practices, such as the use of "circle"



**Figure 2**—The leatherback sea turtle is the largest marine reptile (photo by Seapics.com).

hooks or the deployment of longlines at depths beyond 40 m (131 ft), where the possibility of reducing injury and/or the rate of hooking turtles is diminished (Watson and others 2005).

Unfortunately, diplomatic initiatives such as the ETPS are still vague concepts, and negotiations to attain consensus with all sectors of the governments involved (Environment and Fisheries sectors alike) are proving to be difficult. Ecuador, for instance, is threatening to pull out of the initiative due to the pressure from the industrial fishery sector. The United Nations FAO guidelines remain voluntary, and initiatives to strengthen the language at the General Assembly have been blocked by industrialized fishing nations, such as Japan (Robert Ovetz, personal communication, 2005). The litigation in the United States, which has resulted in more effective limitations on turtle catch and closures, is imposed only on U.S. vessels, which only represents less than 6 percent of the vessels operating in the Pacific (Crowder and Myers 2001). Furthermore, even if a combination of hook designs, type of bait, and gear deployment can be found that reduce overall leatherback capture and mortality, these new techniques may actually cause higher takes of other species of special concern, including other turtle species. It is also widely acknowledged that the applicability of experiments carried out in one ocean basin may not prove applicable to other basins. There is a great need to expand these studies to other geographic areas and to actively exchange research results (FAO 2004).

Thus, diplomatic initiatives and scientific research, although worthy, will take time to negotiate and consolidate in a regional and global framework, time that leatherback turtles do not have. Unfortunately, in spite of the unimpeachable knowledge of the problem of unsustainable fishing practices, no plan has focused on reducing overall fishing efforts. The critical situation of the leatherback calls for immediate and urgent national and international action. Currently, 1,007 scientists from 97 countries and 281 non-governmental organizations from 62 nations are urging the United Nations to declare a temporary moratorium on high seas longline fishing in the Pacific to protect leatherbacks and other marine wildlife species (Bloomberg Press 2005).

Stewardship must include implementation of the precautionary principle, proactive efforts on the part of the Regional Fisheries Management Organizations (RFMOs), and a greater voice for local communities impacted by activities of high seas industrial fishers. The critically endangered leatherback should serve as the flagship species to implement an international network of Marine Protected Areas in the Pacific under the administration of nations and stakeholders. Furthermore, the general public must be made aware of the threat to our oceans and the connection between unsustainable fishing practices, human, and environmental health concerns.

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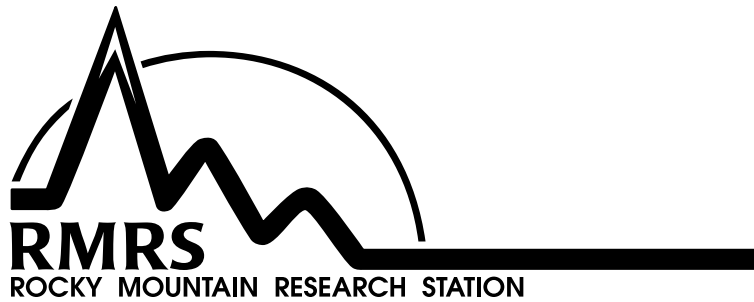
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