

Displacement in Wilderness Environments

A Comparative Analysis

BY JOHN G. PEDEN and RUDY M. SCHUSTER

Abstract: A comparative analysis was conducted to determine how previous experience and stress appraisal influenced the potential for displacement in two wilderness environments. Visitors in the High Peaks and Pemigewasset Wilderness Areas were surveyed by mail in the summer of 2004. Stress appraisal scores were low, as was the likelihood of displacement. However, inter-site displacement was more likely among first-time Pemigewasset visitors than repeat Pemigewasset visitors. Social and managerial stressors exhibited a significant and positive influence on intra-site, inter-site, and temporal displacement in both study areas. Managerial stressors exhibited the strongest overall influence on displacement.

Introduction

Wilderness has long served as a refuge for those seeking to escape the stresses of daily life. Visitation in the National Wilderness Preservation System has increased dramatically since the Wilderness Act was passed, and direct human impacts are now considered a viable threat to wilderness character (Cole 2001; Hendee and Dawson 2002; Oye 2001). Concerns about increasing rates of visitation and associated impacts on biophysical and social conditions have resulted in numerous attempts to measure visitor satisfaction (Manning 1999). Inconsistent results led to questions about the dominant paradigms employed in recreation satisfaction research (Stewart and Cole 2001; Williams 1989). Williams argued for a transactional approach that accounted for the participant's role in creating quality experiences. Researchers have responded by applying a transactional stress-coping framework (Lazarus and Folkman 1984) to wilderness environments (Miller and McCool 2003; Peden and Schuster 2008; Schneider and Hammitt 1995; Schuster, Hammitt, and Moore 2006). These studies assume that (1) personal and situational factors influence the appraisal of wilderness environments; (2) the appraisal process results in coping responses designed to mitigate sources of stress; and (3)



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coping responses influence the short- and long-term outcomes that impact future human-environment transactions.

Stress-coping research provides wilderness managers with a better understanding of the personal and situational factors that influence visitors' perceptions of biophysical, social, and managerial conditions. For example, White, Virden, and van Riper (2008) reported that visitors with higher levels of experience use history (EUH) were more sensitive to recreation impacts. Peden and Schuster (2008) found no relationship between EUH and stress appraisal but reported that place attachment was associated with higher levels of social and managerial stress. Such findings raise questions about the effects that personal and situational

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characteristics may have on other aspects of the wilderness experience. Stress-coping research also provides insights regarding behavioral and emotional responses to the wilderness environment. The latter is particularly important since visitors often indicate high levels of satisfaction despite the presence of crowding and other stressful conditions (Hall and Cole 2007; Johnson and Dawson 2004; Manning 1999; Williams 1989). Such findings seem to suggest that visitors are able to cope with negative impacts. However, personal and situational characteristics may result in favorable experience outcomes despite the presence of stress in the wilderness environment (Cole 2004; Schuster et al. 2006). The use of coping strategies serves as a warning that management intervention may be necessary in order to maintain the quality of the wilderness experience (Hall and Cole 2007).

Displacement

The term *displacement* refers to altered patterns of visitation that result from negative appraisals of biophysical, social, and managerial conditions (Becker 1981). As stated by Becker, "displacement is a move away from an unacceptable situation rather than a move toward an optimal one" (1981, p. 262). Wilderness managers have expressed concerns that increasing visitation rates and associated impacts to biophysical, social, and managerial conditions will lead to displacement (Hall and Cole 2007; Hall and Shelby 2000; Oye 2001; Schneider 2007). Of particular concern is the possibility that unsatisfied visitors will abandon more heavily used sites in favor of lesser known and more pristine areas (Hall and Cole 2007; Oye 2001; Schneider 2007). In such instances, relatively undisturbed areas begin to lose their wilderness character, an

experience outcome that often results in use limitations and other forms of direct management that can further perpetuate the displacement of visitors (Cole 2001; Spring 2001).

A review of the literature revealed that displacement is generally spatial or temporal in nature (Hall and Cole 2007; Hall and Shelby 2000; Schneider 2007). Spatial displacement refers to changes in location of use, and may occur within the respective area (intra-site) or between areas (inter-site). For example, visitors that appraise a designated campsite as crowded may move to another campsite within the area or leave in favor of another wilderness with fewer people. Temporal displacement refers to changes in the timing of use; visitors respond to undesirable conditions by hiking earlier or later in the day, returning at a different time of the week, or a different time of the year. Absolute displacement occurs when visitors leave an area and do not return (Hall and Cole 2007; Miller and McCool 2003). Hall and Cole (2007) reported that absolute displacement is rare, and that visitors are likely to respond to negative appraisals of wilderness environments through emotion-focused coping responses or temporal displacement.

Previous studies have suggested that temporal displacement occurs more frequently than spatial displacement (Hall and Shelby 2000; Johnson and Dawson 2004, Manning and Valliere 2001). Although Hall and Cole (2007) claimed that there has been insufficient research to conclude that one form of displacement is more common than another, results of a recent study in Oregon and Washington were consistent with previous research. Hall and Cole explained their findings by arguing that spatial displacement is dependent upon the availability of

suitable substitutes. In the absence of alternative sites, visitors must change the timing of their visit or find another way to cope with undesirable conditions. Despite the frequency of temporal displacement, changes in the location of use appear to be a common response to negative appraisals of wilderness environments. Schneider (2007) noted that rates of spatial displacement may be as high as 86%.

Although the literature clearly distinguishes between intra-site and inter-site displacement, previous studies have typically employed a substitution typology that does not account for differences between these strategies (Hall and Shelby 2000; Miller and McCool 2003; Shelby and Vaske 1991). Distinguishing between intra-site and inter-site displacement will allow managers to determine where new impacts are occurring and where they are likely to be concentrated. Furthermore, different wilderness conditions are likely to result in different types of displacement (Hall and Shelby 2000). Biophysical impacts, for example, occur early in the succession of use and tend to be unevenly distributed throughout the site (Blahna and Reiter 2001). Although temporal displacement would be unlikely to mitigate most biophysical impacts, both intra-site and inter-site displacement would seem like logical responses to such conditions. Understanding when specific types of displacement are likely to occur, and the underlying reasons for such behavior, will help agency personnel develop more effective management strategies.

As previously noted, displacement implies a move away from undesirable conditions. Such changes can occur during the on-site visit, or as an anticipatory response that is based on the evaluation of previous wilderness

experiences. Displacement that occurs on-site represents an attempt to cope with undesirable conditions. Displacement that occurs after the conclusion of the on-site visit represents an experience outcome that influences future appraisals of the wilderness environment. This distinction is important because on-site opportunities for temporal displacement and inter-site displacement are limited; visitors can travel earlier or later in the day, or they can leave the site entirely. Personal and situational factors such as previous experience, place attachment, and the availability of substitute sites may limit the feasibility of such responses.

Purpose and Methods

The current study used a stress-coping framework to determine how previous experience and stress appraisal influenced the potential for displacement in two wilderness environments. In contrast to previous studies, displacement was conceptualized as an outcome as opposed to a coping response. The following research questions were addressed:

1. Are first-time visitors more likely to be displaced than repeat visitors?
2. Does stress appraisal influence the likelihood of displacement?
3. Does the likelihood of displacement vary between study areas?
4. What types of displacement are likely to occur with the respective study areas?

Data collection took place in the High Peaks and Pemigewasset Wilderness Areas during the summer of 2004. The High Peaks is a 192,685 acre (79,010 ha) wilderness managed by the New York State Department of Environmental Conservation. The Pemigewasset is the largest federally

protected wilderness area in the state of New Hampshire. This 45,000 acre (18,220 ha) wilderness is surrounded by an additional 77,000 acres (31,170 ha) of public land managed by the U.S. Forest Service. The High Peaks and Pemigewasset are characterized by mountainous terrain that is popular with hikers and backpackers.

Wilderness visitors were systematically contacted by the researchers at trailheads and designated campsites within each study area. The sampling frame included both weekdays and weekends. The purpose of the study was explained and contact information was obtained from those who agreed to participate. The survey was distributed by mail according to a modified Dillman procedure (Dillman 2000).

Wilderness has long served as a refuge for those seeking to escape the stresses of daily life

Respondents rated 20 stressors on a scale from 0 (Not a Problem) to 5 (Serious Problem). Potential stressors were identified through interviews with visitors in both study areas. Respondents were also asked to indicate whether they were likely to alter future visitation patterns in response to sources of stress experienced during the visit. Intentions were measured with a nine-item scale that ranged from -2 (Strongly Disagree) to 2 (Strongly Agree). Questions that pertained to temporal and inter-site displacement were adopted from previous research (Hall and Shelby 2000; Manning and Valliere 2001; Miller and McCool 2003). Those that addressed intra-site displacement were developed through a review of the

literature and interviews with visitors in both study areas. Visitors were also asked to specify age, gender, number of previous visits and hours traveled to reach the site.

Results

Of the 533 visitors contacted in the field, 508 (95%) agreed to participate in the survey study. A total of 396 mail questionnaires were returned for a response rate of 78%. Twenty-four questionnaires were omitted due to incomplete responses, and six questionnaires were returned as nondeliverable. An additional 31 respondents reported that they did not experience stress during their visit, and were excluded from participation in the remainder of the study. The final adjusted response rate was 66% for the combined data set ($n = 335$). There were 176 respondents in the High Peaks (69%) and 159 in the Pemigewasset (63%) who were used in the following analyses.

The average age of respondents was 36 in the High Peaks and 40 in the Pemigewasset. There were more repeat visitors (75% in the High Peaks and 79% in the Pemigewasset) than first-time visitors. Males were more prevalent than females in both study areas (66% in the High Peaks and 70% in the Pemigewasset). High Peaks visitors traveled longer to reach the site (41% > 4 hrs.) than Pemigewasset visitors (22% > 4 hrs.). Stress appraisal scores were low in both study areas. Mean scores ranged from .13 (disagreements among the group) to 1.16 (trail conditions) (see table 1). The likelihood of displacement ranged from -1.65 (I am unlikely to return to the High Peaks/Pemigewasset at all) to -0.10 (I am likely to return to the High Peaks/Pemigewasset at a different time of the year) (see table 2).

Table 1—Means for stress appraisal in the High Peaks and Pemigewasset Wilderness Areas

Stress appraisal indicators ^a	Combined	High Peaks	Pemigewasset
Trail conditions	1.16	1.51	.77
Insects	.97	.99	.96
Weather	.97	1.11	.81
Too many people	.94	.93	.96
Difficulty finding site	.74	.76	.72
Impacts (litter, fire rings, etc.)	.63	.60	.67
Designated sites too close together	.59	.68	.50
Difficulty hanging food	.59	.86	.30
Campsite/parking fees	.56	.59	.54
Behavior of other visitors	.51	.56	.46
Poorly marked trails	.50	.48	.52
Bear encounters	.38	.68	.05
Concerns about accidents	.36	.42	.30
Confusing rules/regulations	.31	.30	.33
Fitness/health/injuries	.30	.31	.29
Lack of Water	.26	.22	.31
Rules not adequately enforced	.25	.27	.22
Concerns about getting lost	.24	.29	.18
Negative interaction with mgmt. staff	.19	.20	.18
Disagreements among the group	.13	.18	.09

^aMeasured on a six-point scale; 0 = Not a Problem/Not Applicable to 5 = Serious Problem.

Table 2—Means for displacement variables in the High Peaks and Pemigewasset Wilderness Areas

Displacement indicators ^a	Combined	High Peaks	Pemigewasset
I am likely to return to (wilderness area) at a different time of the year.	-.10	-.14	-.06
I am likely to use a different access point on my next visit to (wilderness area).	-.14	-.15	-.12
I am likely to avoid certain trails/summits within (wilderness area).	-.17	-.13	-.23
I am likely to avoid certain campsites within (wilderness area).	-.20	-.15	-.26
I am likely to go to a different wilderness area in (name of region).	-.28	-.36	-.19
I am likely to return to (wilderness area) at a different time of the week.	-.33	-.40	-.24
I am likely to go to a different wilderness area outside of (name of region).	-.38	-.39	-.36
I am likely to return to (wilderness area) at a different time of the day.	-.44	-.45	-.42

^aMeasured on a five-point scale; -2 = Strongly Disagree to 2 = Strongly Agree.

Principle components factor analysis was used for data reduction purposes and factor scores were computed according to the procedure recommended by Watson and Niccolucci (1992). Stress appraisal variables factored into five dimensions, two of which were consistent between study areas (see table 3), and the other three dimensions were dropped from further analysis. The two-dimension scale accounted for 57% of the total variance, and reliability scores were acceptable for both dimensions. For additional information refer to Peden and Schuster (2008).

Factor analysis of the nine-item displacement scale resulted in a three-factor solution that accounted for 77.5% of the variance, and Cronbach's alpha was .77 or higher for all three factors (see table 4). However, one variable (*I am likely to use a different access point on my next visit*) cross-loaded on the intra-site and inter-site factors and was dropped from subsequent analyses.

Kruskal-Wallis tests indicated that inter-site displacement was more likely among first-time Pemigewasset visitors than repeat Pemigewasset visitors. Intra-site displacement and temporal displacement did not vary between comparisons groups in either study area (see table 5).

Spearman's correlations suggested that stress appraisal increased the likelihood of temporal, intra-site, and inter-site displacement in both study areas. Stress appraisal exhibited the strongest influence on intra-site displacement. Correlations were greatest in the Pemigewasset, and managerial-related stressors exhibited the strongest overall influence (see table 6).

Mann-Whitney tests revealed no significant differences in the potential for displacement between study areas. However, Friedman tests indicated

that displacement strategies varied within the High Peaks Wilderness ($p = .000$) and suggested that intra-site displacement

was more likely to occur than inter-site displacement and temporal displacement (see table 7).

Discussion

The current study used a stress-coping framework to determine how previous experience and stress appraisal influenced the potential for displacement in two wilderness environments. Inter-site displacement was more likely to occur among first-time Pemigewasset visitors than repeat Pemigewasset visitors. Previous experience did not influence the likelihood of inter-site displacement in the High Peaks Wilderness. Furthermore, temporal and intra-site displacement strategies did not vary between first-time and repeat visitors in either study area. These findings may be partially attributable to the geographic characteristics of the Adirondacks and White Mountains. High Peaks visitors traveled longer to reach the site and may have had fewer available substitutes than Pemigewasset visitors. The High

Table 3—Factor loadings for stress appraisal variables in the High Peaks and Pemigewasset Wilderness Areas

Stress appraisal indicators ^a	Social factor			Managerial factor		
	Both	High Peaks	Pemi	Both	High Peaks	Pemi
Behavior of other visitors	.763	.760	.708			
Rules not adequately enforced	.666	.682	.582			
Too many people	.666	.553	.706			
Impacts (litter, fire rings, etc.)	.660	.571	.737			
Designated sites too close together	.520	.530				
Negative interaction with mgmt. staff				.823	.791	.788
Confusing rules/regulations				.760	.699	.586
Campsite/parking fees				.563	.417	.706
Disagreements among the group				.463		.594
Difficulty finding site				.452		
Cronbach's Alpha	$\alpha = .73$	$\alpha = .74$	$\alpha = .67$	$\alpha = .64$	$\alpha = .57$	$\alpha = .60$
Eigenvalue	2.54	3.03	2.40	2.32	2.24	2.17
% variance explained	16.91	15.93	12.64	15.44	11.77	11.44

^aMeasured on a six-point scale; 0 = Not a Problem/Not Applicable to 5 = Serious Problem.

Table 4—Factor loadings for displacement variables in the High Peaks and Pemigewasset Wilderness Areas

Displacement indicators ^a	Temporal factor			Intra-site factor			Inter-site factor		
	Combined	High Peaks	Pemi	Combined	High Peaks	Pemi	Combined	High Peaks	Pemi
I am likely to return to (wilderness area) at a different time of the day.	.841	.816	.876						
I am likely to return to (wilderness area) at a different time of the week.	.870	.859	.879						
I am likely to return to (wilderness area) at a different time of the year.	.840	.861	.696						
I am likely to avoid certain trails/summits within (wilderness area).				.826	.859	.780			
I am likely to avoid certain campsites within (wilderness area).				.839	.874	.756			
I am likely to use a different access point on my next visit to (wilderness area).				.547		.664	.530	.621	
I am likely to go to a different wilderness area in (name of region).							.834	.832	.820
I am likely to go to a different wilderness area outside of (name of region).							.911	.926	.893
Cronbach's Alpha	$\alpha = .85$	$\alpha = .84$	$\alpha = .86$	$\alpha = .77$	$\alpha = .76$	$\alpha = .75$	$\alpha = .84$	$\alpha = .83$	$\alpha = .88$
Eigenvalue	2.35	2.32	2.38	1.98	1.91	1.98	1.87	2.05	1.86
% variance explained	29.36	28.99	29.75	24.72	23.84	24.80	23.43	25.60	23.76

^aMeasured on a 5 point scale ranging from -2 (Strongly Disagree) to 2 (Strongly Agree)

Table 5—Differences in displacement factor scores between first-time and repeat visitors				
Factor	EUH	n	Mean rank	p
High Peaks				
Temporal	First-time	44	94.95	.332
	repeat	132	86.35	
Intra-site	First-time	44	86.90	.810
	repeat	132	89.03	
Inter-site	First-time	44	94.36	.378
	repeat	132	86.55	
Pemigewasset				
Temporal	First-time	34	81.32	.850
	repeat	125	79.64	
Intra-site	First-time	34	85.94	.396
	repeat	125	78.38	
Inter-site	First-time	34	99.24	.006 ^a
	repeat	125	74.77	

^aSignificant at $\alpha \leq .05$.

Table 6—Rank correlations between stress appraisal factors and displacement factors			
Stress appraisal indicators	Both	High Peaks	Pemi
Social factor			
Temporal	.275 ^a	.222 ^a	.331 ^a
Intra-site	.308 ^a	.283 ^a	.340 ^a
Inter-site	.238 ^a	.223 ^a	.245 ^a
Managerial factor			
Temporal	.318 ^a	.217 ^a	.423 ^a
Intra-site	.389 ^a	.329 ^a	.461 ^a
Inter-site	.353 ^a	.303 ^a	.404 ^a

^aSignificant at $\alpha \leq .000$.

Table 7—Differences in displacement factor scores within the High Peaks Wilderness			
Factor		Mean rank	p
Intrasite—temporal	Negative ranks	161.5	.001 ^{bd}
	Positive ranks	151.0	
Intersite—temporal	Negative ranks	162.9	.149
	Positive ranks	148.9	
Intersite—intrasite	Negative ranks	146.7	.012 ^{cd}
	Positive ranks	168.1	

^bBased on negative ranks.
^cBased on positive ranks.
^dSignificant at $\alpha \leq .05$

Peaks is the most well-known and heavily visited wilderness area in the Adirondacks, due in part, to the pres-

ence of Mt. Marcy—the highest peak in the state of New York. The Pemigewasset is one of six wilderness

areas on the White Mountain National Forest. The nearby Great Gulf and Presidential Range–Dry River Wilderness Areas are adjacent to Mt. Washington—the highest peak in the state of New Hampshire. Unlike many of the wilderness areas in the Adirondacks, the Great Gulf and Presidential Range–Dry River Wilderness Areas are well-known and easily accessible to day hikers and overnight backpackers.

Social and managerial stressors influenced the likelihood of temporal, intra-site and inter-site displacement in both study areas. Although these relationships appeared to be stronger in the Pemigewasset, subsequent analyses found no significant differences in the likelihood of displacement between study areas. However, intra-site displacement was more likely than temporal displacement and inter-site displacement within the High Peaks Wilderness; a finding that is inconsistent with previous research (Hall and Cole 2007; Hall and Shelby 2000; Manning and Valliere 2001). This discrepancy is not surprising given that the current study was designed to measure differences between intra-site and inter-site displacement; furthermore, multiple indicators were used to compute stress appraisal and displacement factor scores for use in subsequent analyses—a method that has not been used in previous research.

In general, the evidence suggests that existing wilderness conditions within the High Peaks and Pemigewasset Wilderness Areas were unlikely to result in displacement. When displacement does occur it is likely to take place within the boundaries of the High Peaks Wilderness. Managerial stressors such as negative interaction with agency staff, parking fees, and confusing regulations appear to be the primary concerns. High Peaks visitors were more

likely to avoid problematic access points, campsites, and trails on future visits than to change the timing of use or the site itself. Although this may indicate that High Peaks visitors are capable of coping with existing conditions, a lack of suitable substitutes may limit the feasibility of temporal and inter-site strategies. Although there is some evidence to suggest that first-time Pemigewasset visitors may rely on inter-site displacement as a response to stressful appraisals of the wilderness environment, the percentage of first-time visitors within the Pemigewasset is relatively small (21%).

The current findings appear to be attributable to low levels of stressors within the High Peaks and Pemigewasset Wilderness Areas. However, effective coping strategies may have influenced the results (Hall and Cole 2007; Schuster et al. 2006). A noted limitation of this research is that visitors were asked about the likelihood of displacement as opposed to actual displacement behaviors. Furthermore, the study employed a post-hoc assessment that allowed visitors to cope with on-site conditions before the questionnaire was administered. If coping efforts were successful, it follows that stress appraisal scores should be low, along with the necessity for displacement. As a result, it will be important to continue monitoring visitors' perceptions of conditions in the High Peaks and Pemigewasset, along with the potential for displacement as an outcome of the wilderness experience. Future studies should employ a repeated measures design that documents displacement that occurs due to an on-site coping response, along with anticipated changes in future visitation patterns (i.e., an experience outcome). This can be accomplished through intercept surveys that occur within the wilderness boundary and a follow-up mail survey that investigates

actual changes in visitation. Researchers should also investigate the influence of personal and situational factors such as previous experience and place attachment. Peden and Schuster (2008) reported moderate levels of place dependence, place identity, and place familiarity within the High Peaks and Pemigewasset Wilderness Areas. Attachment to these sites may have been great enough to limit the likelihood of displacement as an outcome of the wilderness experience.

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author is often compromised, especially when she goes beyond documenting published evidence and uses personal stories to buttress her arguments. However, notwithstanding the bias often shown—ironically, the same complaint the author has toward the U.S. government—the book provides a fascinating glimpse at the nexus of politics, emotion, science, legal challenges, and entrenched positions of various special interest groups that emerged over the decision to reintroduce wolves in Yellowstone National Park.

The central position taken by the author is that the “reintroduction” of wolves in Yellowstone was deeply flawed, as a subspecies of wolf (*Canis Lupis irremotus*) native to the area had never been exterminated. Therefore, the introduction of wolves from Canada (subspecies *Canus Lupis occidentalis*) was a grave error by the U.S. government. The author, a newspaper reporter/farmer, accessed historic and government records that do seem to provide evidence that low numbers of

wolves continued to exist in Yellowstone before and during the reintroduction. However, there doesn't seem to be clear proof that the wolves existed in large enough numbers to maintain a coherent population, or that is was indeed the *irremotus* subspecies.

It does seem evident that the U.S. government had no interest in acknowledging the existence of any subspecies, and indeed in 1977 reclassified four subspecies of wolves into two species (*Canis lupus* and *Canis refus*), meaning that the *irremotus* subspecies was removed from the endangered species listing of 1973. Urbigkit suggests that this action, and the later redefinition of the term *population* later, was to allow for an experimental population of Canadian wolves to be introduced into the areas: the experimental designation (created in 1982) allowed the government to manage the wolf population on their own terms (i.e., with greater control and flexibility). This increased control was needed due to the controversial nature of wolf reintroduction in the region.

Yellowstone Wolves provides a wonderful example of how wilderness management issues such as the reintroduction of a predator quickly become “wicked” problems, involving multiple truths, conflicting science, bureaucratic and political pressures, special interest groups, concerned members of the public, and the legal system. On the wolf issue in Yellowstone, Urbigkit notes the government agencies have their own agenda, and change their policies and procedures to ensure this agenda is met. Although her passion for the topic may sometimes obscure her impartiality, Urbigkit provides a valuable service by highlighting the political nature of decision making and the troubling self-selection of science to serve bureaucratic and political ends in wilderness, park, and wildlife management.

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