

# APPRAISAL OF AND RESPONSE TO SOCIAL CONDITIONS IN THE GREAT GULF WILDERNESS: RELATIONSHIPS AMONG PERCEIVED CROWDING, RATIONALIZATION, PRODUCT SHIFT, SATISFACTION, AND FUTURE BEHAVIORAL INTENTIONS

Rudy M. Schuster  
State University of New York  
College of Environmental Science and Forestry  
One Forestry Drive  
Syracuse, NY 13210  
rschuster@esf.edu, 315-470-4863

David Cole  
U.S. Forest Service, Rocky Mountain Research Station

Troy Hall  
University of Idaho

Jennifer Baker  
SUNY ESF

Rebecca Oreskes  
U.S. Forest Service, White Mountain National Forest

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**Abstract.**—Purposes were to describe on-site social carrying capacity from the users' perspectives, provide management applications, and refine constructs of product shift and rationalization used by visitors as coping responses to crowding. Data were gathered using on-site exit surveys of hikers in the Great Gulf Wilderness and analyzed with descriptive statistics, principal components analysis, confirmatory factor analysis, and structural equation modeling. Social carrying capacity did not appear to have been exceeded based on the users' perspectives. However, coping was employed by 50 percent of the population. An acceptable model of hiker appraisal and coping response was identified. A discussion of management application and future direction for redefining product shift and rationalization within a context are offered.

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## 1.0 INTRODUCTION

The purpose of this report is to describe on-site social carrying capacity from the users' perspective and to offer refinement of recreational visitors' coping responses of product shift and rationalization. A conceptual model for understanding visitor coping response to crowding was framed using psychological stress-coping theory and recreation related stress-coping research. The theoretical

model was tested using data from backpackers and hikers in the Great Gulf Wilderness. Social carrying capacity from the visitors' perspectives, management applications, and justification for future modifications to the product shift and rationalization constructs are discussed in the closing section.

The following objectives will be met to achieve the stated purposes.

1. Test the following hypotheses. As crowding increases, the use of coping mechanisms will increase (hypotheses 1). As the need to cope with crowding increases, overall satisfaction with the experience will decrease (hypotheses 2). As satisfaction with the experience decreases, the hiker will be more likely to modify future behaviors associated with the site (hypothesis 3).
2. Identify specific indicators of perception of the experience and response to on-site conditions.
3. Provide a discussion addressing on-site conditions in relation to visitor perception of experience.
4. Provide a discussion of the coping mechanisms of product shift and rationalization.

Psychological stress/coping theory and recreation research provided a foundation and theoretical model (Peden & Schuster 2005, Schneider 1999, 2000; Schneider & Hammitt 1995, Schuster 1999, 2000; Schuster & Hammitt 2001, Schuster & Hammitt 2003, Schuster, Hammitt, & Moore 2003, 2006; Schuster, Hammitt, Moore, & Schneider 2006). Appraisal of the person-environment interaction was operationalized as perception of crowding. Coping responses were operationalized as product shift, rationalization, problem solving, intra-site displacement and physical avoidance. Outcomes were operationalized as overall satisfaction with the recreation experience and future behavioral intentions to use the site again.

## **2.0 COPING WITH CROWDING**

### **2.1 Emotion-focused Coping**

Product shift results in a change in the definition of the recreation opportunity that is offered after the on-site experience does not match expected conditions. The research herein operationalized product shift using variables adapted from previous studies (Hammitt & Patterson 1991, Hoss & Brunson 2000, Johnson & Dawson 2004, Kuentzel & Heberlein 1992, Manning & Valliere 2001, Shelby, Bregenzer, & Johnson 1988).

The rationalization process in recreation related coping typically borrows a theoretical definition from Festinger (1957) and is rooted in cognitive dissonance theory. Rationalization is viewed as a one-time event in which the individual justifies the difference between on-site conditions and expectations to maintain cognitive consistency. The most consistent operational definition of rationalization is often associated with the expenditure of resources, such as amount of time and money spent to participate in the recreational activity. The resource expenditure definition has met with mixed results. The research herein embraced the move away from the resource expenditure definition. Rationalization was defined using the results from Hoss and Brunson (2000), Peden and Schuster (2005), and Manning and Valliere (2001) along with recreation coping research (Schneider 2000, Schuster et al. 2003, Schuster, Hammitt, & Moore 2006, Schuster, Hammitt, Moore et al. 2006). Rationalization was still theoretically defined as a one-time occurrence where the individual minimized the affect by ignoring it, doing what they felt was normal in the situation, avoiding responsibility, and moving forward with the experience.

### **2.2 Problem-focused Coping**

The conceptualization of problem solving was based on recreation coping research (Schneider 2000, Schuster et al. 2003, Schuster, Hammitt, & Moore 2006, Schuster, Hammitt, Moore et al. 2006) and likely behavioral responses in typical wilderness crowding situations. We defined problem solving coping as behavioral responses that were directed at immediately reducing the impact of crowding. Solving the problem included directly addressing the individual causing the disturbance or simply moving away from the source.

Problem-focused coping mechanisms in recreation research are typically defined as displacement (Anderson & Brown 1984, Becker 1981). Sub-dimensions of displacement include inter-site displacement (leaving the site altogether), intra-site displacement (participating in the same activity at a different location on the same site), and temporal displacement (participating in the same activity at the same location at a different time of day, week or year). Displacement was conceptualized in the current model as having two components, the ability to physically avoid on-site problems as a coping effort and future intentions to exercise inter/intra site displacement (traditionally conceptualized). Physical avoidance in response to the on-site stress was defined as minor modifications in behavior to lessen the impact or avoid the problem and moving to a different area within the same site. Future intentions to use the site were akin to the traditional definitions of inter, intra, and temporal displacement. Future intention was conceptualized as a behavioral adaptation evoked by current conditions and an outcome of the process.

## **3.0 METHODS**

The research was conducted with hikers exiting the Great Gulf Wilderness, New Hampshire, USA. The Great Gulf is a 5500-acre wilderness on the White Mountain National Forest. Data were collected during summer 2005. Five hundred sixteen visitors were contacted with a 77.5 percent response rate and 400 usable surveys were collected. All hikers were asked to respond to both the crowding appraisal and coping response questions. Respondents were provided the option to indicate that the coping mechanism was not used at all. Data were analyzed for the entire sample, not a subset of those who responded that the area was highly crowded. Including hikers with all levels of crowding provided a more complete view of social carrying capacity assessment and hiker behavior as opposed to that of a subset of Great Gulf hikers who perceived a high level of crowding. Variables and rating scales are shown in Tables 1, 2, and 3. Satisfaction was measured using a single, global satisfaction indicator (1=very dissatisfied to 10=very satisfied). The social condition appraisal, coping, and future behavioral intention variables were submitted to a confirmatory factor analysis (CFA) procedure to establish

**Table 1.—Descriptive statistics and SEM results for crowding appraisal items**

ID <sup>a</sup>		SEM coefficient <sup>b</sup>	SEM error	Mean	SD
		$\Omega = .70^c$			
1	How crowded did you feel on your visit to the Great Gulf today? <sup>d</sup>	.815	.580	1.7	1.3
2	Compared to what I expected, the number of groups I saw on this trip was? <sup>e</sup>	.531	.847	-.61	1.3
3	How many other groups did you see on your visit to the Great Gulf today? <sup>f</sup>	.228	.974	5.2	4.4

<sup>a</sup>Identification number of variable corresponds to identification numbers in Figure 1

<sup>b</sup>Standardized parameter coefficient is interpreted analogous to a beta weight in regression.

<sup>c</sup>Weighted Omega reliability coefficient calculated using parameter coefficients in SEM model

<sup>d</sup>Ten-point rating scale, 1=not crowded at all to 9=extremely crowded

<sup>e</sup>Seven-point rating scale, -3=far less, -2=less, -1=slightly less, 0=what I expected, 1=slightly more, 2=more, and 3=far more

<sup>f</sup>Respondent indicated number of groups seen by selecting a number between 0 and 32+ provided on a list

**Table 2.—Descriptive statistics, results of PCA and SEM analysis of Great Gulf coping items <sup>a</sup>**

ID <sup>b</sup>		SEM coefficient	SEM error	% used <sup>c</sup>	Mean	SD
Emotion-Focused Coping						
Rationalization $\alpha=.86$		$\Omega = .92^b$				
4	Tried to view the problem in a positive way	.912	.409	23.2	.47	.95
5	Decided that the problem was a one-time occurrence	.826	.563	16.9	.30	.75
6	Learned to live with it	.787	.617	24.6	.49	.95
7	Let someone else handle it	.628	.778	11.2	.16	.50
8	Refused to get too serious about it and just had fun	.601	.799	31.2	.68	1.1
9	Went on as if nothing had Happened	.599	.800	25.2	.54	1.0
10	Acknowledged responsibility for the problem	.570	.822	11.2	.18	.57
11	Followed established trail etiquette	.510	.860	50.0	1.31	1.4
Product Shift $\alpha=.75$		$\Omega = .83^b$				
12	Decided that this should be expected in the Great Gulf from now on	.864	.763	13.0	.28	.70
13	Accepted the conditions as part of the normal Great Gulf experience	.761	.649	26.0	.53	1.0
14	Decided that my expectations for the number of other people in the Great Gulf were inaccurate to start with	.647	.504	17.1	.20	.57
Problem-Focused Coping						
Problem Solving $\alpha=.72$		$\Omega = .84^b$				
15	I tried to talk the person responsible into changing their behavior	.868	.497	4.0	.05	.26
16	I dropped subtle hints that I was being bothered	.790	.613	3.8	.38	.07
17	Left my rest, view, or lunch spot earlier than planned	.535	.845	6.5	.10	.41
18	Expressed anger to the person(s) who bothered me	.354	.935	1.3	.02	.15
Physical Avoidance $\alpha=.56$		$\Omega = .60$				
19	I stopped and waited to allow other people to get ahead so I could not see/hear them	.663	.749	30.0	.47	.82
20	I increased or decreased my hiking pace to get away from other people	.623	.775	31.0	.54	.90
21	I avoided social interaction with other hikers (e.g., eye contact, talking, answering questions...)	.327	.945	16.3	.22	.57
	I moved my campsite to get away from other people	ns		3.0	.02	.14
Intra-Site Displacement $\alpha=.82$						
	Left that part of the Great Gulf	ns		4.3	.07	.40
	Changed my intended hiking route or destination	ns		4.3	.07	.36

<sup>a</sup>All variables measured using a four-point rating scale, 0=did not use/not applicable, 1=used infrequently, 2=used occasionally, and 3=used frequently

<sup>b</sup>Identification number of variable corresponds to identification numbers in Figure 1

<sup>c</sup>Represents the percent of the population who used this coping mechanism at least one time during their trip

**Table 3.—Descriptive statistics and SEM results for future intention to displace items<sup>a</sup>**

ID <sup>b</sup>		SEM coefficient	SEM error	% likely to use <sup>c</sup>	Mean	SD
		$\Omega = .95^b$				
22	Avoid the great gulf at certain times of the year	.926	.377	15.3	-.96	1.3
23	Avoid certain trails/summits	.868	.497	16.4	-.94	1.2
24	Avoid the Great Gulf at certain times of the week	.861	.454	15.3	-1.0	1.2
25	Avoid certain camping areas	.861	.509	15.7	-.89	1.3
26	Go to a different wilderness area within the WMNF	.804	.595	11.8	-1.0	1.2
27	Avoid the Great Gulf at certain times of the day	.787	.617	6.7	-1.3	1.0

<sup>a</sup>All variables measured using a five-point rating scale, -2=very unlikely, -1=unlikely, 0=neutral, 1=likely, and 2=very likely

<sup>b</sup>Identification number of variable corresponds to identification numbers in Figure 1

<sup>c</sup>Represents the percent of the sample indicating likely or very likely to use the item in the future

factor validity. The hypothesized model was tested using structural equation modeling (EQS version 6.1).

Initial analysis of the data produced a multivariate kurtosis normalized estimate of 167 and a mean scaled univariate kurtosis of 3.8 suggesting a non-normal distribution of the data. To compensate, 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. 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 and an RMSEA less than 0.1 were considered acceptable (Hatcher 1998, Hu & Bentler 1998, Marsh, Hau, & Wen 2004). A specification search using the Lagrange Multiplier and Wald Tests (Schumacker & Lomax 1996) was used to identify possible model-modifications to generate a better fitting or more parsimonious model.

## 4.0 RESULTS

Most people traveled in groups of two (45.3%), alone (20%), or as a group of three (16.8%). Groups of four to 16 people comprised 16.7 percent of the sample. Approximately 10 percent of the sample consisted of Appalachian Trail through hikers. Most hikers (49.3%) were on a day trip, 19.3 percent were on an overnight trip, 16.5 percent camped two nights in the Great Gulf, and 6.7 percent camped more than three nights. The average trip was 1.8 days long. Forty-eight percent of the respondents were visiting the Great Gulf for the first time. Nineteen percent had visited on one or two previous occasions and 11 percent had been there three to five times. Hikers

having visited the area six or more times comprised 15.7 percent of the sample. The CFA procedures produced acceptable fitting models for the appraisal, coping, and future intention factors. A detailed description of the CFA procedure can be found in Schuster, Cole and Hall (in press).

### 4.1 Objective One: Model Identification and Hypothesis Testing

The original model did not achieve an acceptable fit (see Table 4). The variable *As a result of the number of people I encountered today I am likely to go to a different wilderness area outside of the White Mountain National Forest* (future intention factor) had two significant residual correlations greater than 0.20 with other variables and was considered a source of poor fit (Schumacker & Lomax 1996). This variable was removed and the model tested again. Model 2 without the problem variable was tested and supported (see Table 4).

**Table 4.—Confirmatory Factor Analysis and Structural Equation Modeling Process results**

	$\chi^2$	DF	CFI	RMSEA
<i>CFA Results</i>				
Appraisal	91.7	3	.988	.053
Future intentions	1537.7	21	.988	.063
Coping 1	1043.8	231	.855	.045
Coping 2	836.7	171	.749	.104
Coping 3	836.7	171	.922	.035
Coping 4	836.7	171	.923	.035
<i>SEM Results</i>				
SEM model 1	2382.3	435	.894	.044
SEM model 2	2101.5	406	.917	.038

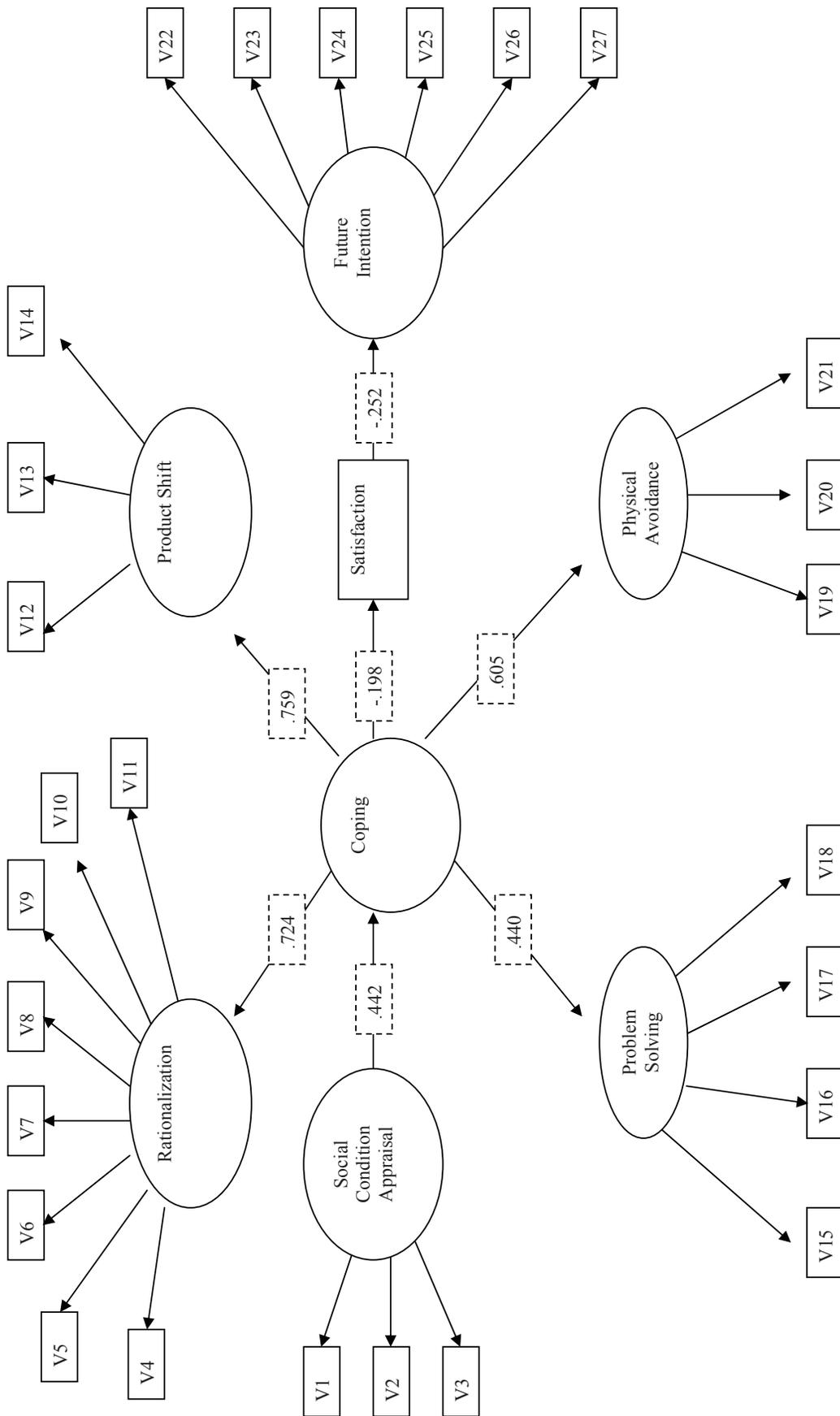


Figure 1.—Structural equation model illustrating significant parameter coefficients for crowding model. Standardized parameter coefficients for main relationships shown in dashed boxes. Manifest variable identification labels correspond to data in Tables 1, 2, and 3. Manifest variable parameter coefficients and error terms are listed in Tables 1, 2, and 3.

The standardized parameter estimates shown (see Figure 1) were used to satisfy objective two. As perception of crowding increased the use of coping mechanisms also increased (.422). Hypothesis one was accepted. A negative relationship between coping and satisfaction (-.198) indicated that as the need to cope with crowded conditions increased, hikers reported a decrease in overall satisfaction. Hypothesis two was accepted. Finally, a negative relationship (-.252) showed that as satisfaction decreased the likelihood that a hiker would modify future behavior associated with the site increased. Hypothesis three was accepted.

#### **4.2 Objective Two: Indicators of On-site Experience**

The parameter estimates and means for the crowding appraisal variables (see Table 1) can be used to identify specific indicators of perception of the Great Gulf experience and response to the on-site experience. Overall, hikers did not perceive crowding during their recreational experience. Descriptive statistics in Table 2 indicated that 50 percent of the population used the most popular coping response during that trip. While averages listed in Table 2 may seem low, clearly Great Gulf hikers are responding to on-site conditions that were not what was expected. The seeming low averages for coping are a result of using the entire sample to calculate the mean. Many other coping studies reduce the population by only including responses from people indicating that conflict existed or by creating and comparing sub populations; for example, Schneider (2000), Schuster (2006), and Vaskey et al. (1995). By including all respondents herein, this report provides a more holistic view of the on-site social carrying capacity condition at the Great Gulf. In this case, frequency of coping mechanism use may provide a better understanding of coping response.

The overall coping scheme predominantly consisted of a long-term cognitive response of redefining the experience and a short-term immediate cognitive fix using rationalization (see Figure 1). Hikers combined the cognitive responses with minor behavioral modifications that appeared to not have a large impact on the structure of their trip. The typical coping scheme in the Great Gulf consisted of combining product shift, rationalization and to a lesser extent physical avoidance.

The relationships between coping factors and manifest variables can also be used as indicators of the on-site experience. Product shift predominantly consisted of deciding that current conditions should be expected and are normal in the Great Gulf. Rationalization predominantly consisted of maintaining a positive outlook on the situation, deciding that it was a one-time occurrence, and simply learning to live with it. These cognitive responses were combined with physical avoidance of stopping and waiting for people to go away or modifying one's hiking pace to get away from others.

A high level of overall satisfaction ( $M=8.8$ ,  $SD=1.6$ ) with the Great Gulf experience was reported. The primary contributing item to the future behavioral intentions factor was to avoid the Great Gulf at certain times of the year (see Table 3). Hikers were less likely to change the time of day that their trips started. Considering frequency of response we see that 6 percent to 16 percent of the sample was likely to change their future behavior associated with the Great Gulf as a result of on-site conditions.

## **5.0 DISCUSSION AND RECOMMENDATIONS**

This section will address objectives three and four and provide a discussion of on-site conditions in relation to visitor perception of experience and the coping mechanisms product shift and rationalization.

### **5.1 On-site Conditions**

The White Mountain National Forest (WMNF) Forest Management Plan identifies four wilderness zones; the zones range from least (Zone A) to most heavily used (Zone D). The WMNF managers use the zoning system to understand both distinctions and commonalities among different areas in terms of use levels, facilities, campsites, vegetation/soils, managerial presence, and social conditions. The zone descriptions "typically represent the conditions during a particular area's peak use season or represent the highest development level within the zone. For example, some trails receive heavy use during the summer and fall months, but receive almost no use in the winter and spring. In these cases, the zones will reflect conditions during summer and fall. However, we will manage to maintain seasonal variation; that is, we will not manage to allow a trail that receives

heavy use in the summer and low use in winter to become a year-round high use trail” (WMNF, 2005, P. E-5).

The Great Gulf is designated a Zone D area. According to the Forest Plan, this zone includes areas within ¼ mile of developed facilities or 500 feet of high use trails and contains the most heavily used trails in the wilderness context. The landscape within this zone is modified by the developed trail system and associated structures, and may include bridges, primitive shelters and/or toilets, designated campsites, and impacts resulting from recurring recreation use. However, in most places the landscape still appears largely unmodified. One must remember that the term developed facilities and heavily used are relative to acceptable use levels within wilderness. Standards, monitoring methods, and management actions for perceptions of crowding and experience quality in Zone D wilderness are as follows. The area is beyond the standard if a majority of visitors indicate perception of overcrowding. In order to make this determination, a survey will be conducted once for baseline information and once halfway through the life of the Plan. Survey will focus on visitor perceptions of crowding at selected sites within the wilderness and quality of recreation experience (WMNF, 2005, P. E-5).

Our results indicated that hikers did not perceive much crowding during their recreational experience and they were highly satisfied with their experience. Based on these results the Forest Management Plan standards for visitor perception of crowding and experience quality have not been exceeded. However, it is worth noting that the strongest coping factor identified in the model was product shift. Product shift involves a change in the definition of the opportunity offered at the destination. Product shift accounted for the most variance when identifying a consistent coping scheme that influenced hiker satisfaction and their future intentions to use the area. This suggests that product shift was the most functional coping mechanism used. Descriptive statistics in Table 2 indicated that the most frequently used coping mechanism was rationalization (used by up to 50 percent of the sample). However, it did not have as consistent of a relationship with maintaining satisfaction as product shift. Finally, product shift and rationalization were used as part of a combined coping scheme. The use of product

shift and rationalization suggested that while the area was appraised as not crowded and experience quality was high that Great Gulf visitors are exercising coping to make cognitive adjustments to maintain high satisfaction levels.

These results suggested that visitors adapted to social impacts and, therefore, that the baseline for evaluating these impacts is a floating baseline. Managers will need to decide if this is a problem or not. They should be aware that visitors’ perceptions of acceptable conditions change to accommodate use level changes. Indicators based on perceived crowding are unlikely to suggest there are problems, even if use levels increase. Managers might want to consider supplementing the visitor perception indicator with an objective indicator of social condition, such as use density or number of encounters. Using an objective indicator might signal a potential problem that assessments of crowding or satisfaction are insensitive to.

The Forest Plan states that a goal is to “manage to maintain seasonal variation; that is, we will not manage to allow a trail that receives heavy use in the summer and low use in winter to become a year-round high use trail” (WMNF, 2005, P. E-5). The primary contributing item to the future behavioral intentions factor was to avoid the Great Gulf at certain times of the year (see Table 3); 15.3 percent of the sample population was likely to change their future behavior and visit at a different time of the year. WMNF should be aware that there is a potential for Great Gulf use to shift to shoulder seasons.

## 5.2 Product Shift and Rationalization

Product shift and rationalization are both important coping mechanisms used in response to crowding. While there are theoretical distinctions between the two constructs, it is often difficult to create operational definitions that are clearly independent. Theoretically, both mechanisms involve employing a cognitive shift that makes on-site conditions congruent with expectations. In the case of product shift the change is specifically defined as a shift in opportunity definition. In the case of rationalization, previous recreation research used the time and money expenditure definition. As stated, the resource expenditure definition found mixed results. The response used in the Great Gulf project was to create a more global construct that did not place cognitive change in a context

indicating how perception shifted. We found that making the construct more general sacrificed the ability to apply it in management situations. Changing from the resource expenditure definition to a general definition did not appear to improve our understanding of the situation in terms of how hikers used rationalization. It lacked sufficient context to make it a useful management tool.

Product shift is considered a process when defined as a coping mechanism. It requires having previous experience or information about the site, making an appraisal of the current situation, comparing the appraisal to the expected condition, and finally modifying the definition of opportunity offered. Theoretically, product shift may be closely associated with other components of the model. Product shift contains an element of appraisal and often shares language used in appraisal questions. However, product shift is not the appraisal process; it is the process of managing the situation that the appraisal identified as a problem. The operative distinction is that the appraisal does nothing to address the situation and product shift as a coping mechanism is an attempt to manage or solve the problem.

Using 11 questions to measure rationalization and product shift we were only able to identify that hikers were changing their mind concerning the opportunity offered based on the on-site experience. Rationalization and product shift may be too nebulous as a generalized constructs. Simply knowing that someone changed their mind about the situation does not provide manageable information. In addition, product has the potential to confound the appraisal component of the experience evaluation. We posit that additional work is necessary to create a research design that:

1. Avoids confounding appraisal and product shift as a coping mechanism;
2. Identifies theoretically and operationally distinct definitions for product shift and rationalization;
3. Identifies operational definitions for product shift and rationalization that provide usable management information.

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