

A VISUAL APPROACH FOR GENERATING NORMATIVE STANDARDS OF QUALITY FOR TWO SQUAM LAKE, NH HIKING TRAILS

Micah Hall
Center for Rural Partnerships
Plymouth State University
Plymouth, NH 03264
mchall1@plymouth.edu

Ben Amsden
Plymouth State University

Abstract

Agencies that manage lands for recreation are often tasked with dual objectives: providing quality recreation opportunities for current visitors, while protecting natural resources for future generations. Certain levels of recreation use detract from the visitor experience by causing crowding. Impacts to natural resources (ecological impacts) and the visitor experience (social impacts) occur wherever recreation use occurs, meaning the decision facing recreation managers is how much, and what type of, impact is acceptable - not whether or not to allow impact. This study used a visual survey to measure visitors' norms, or personal standards, used to evaluate recreation conditions. Survey respondents were shown photographic simulations depicting different levels of recreation use on two Squam Lake area hiking trails. The goal of this research was to determine the amount of social impact visitors find acceptable, in order to help inform management decisions regarding how much recreation impact to allow.

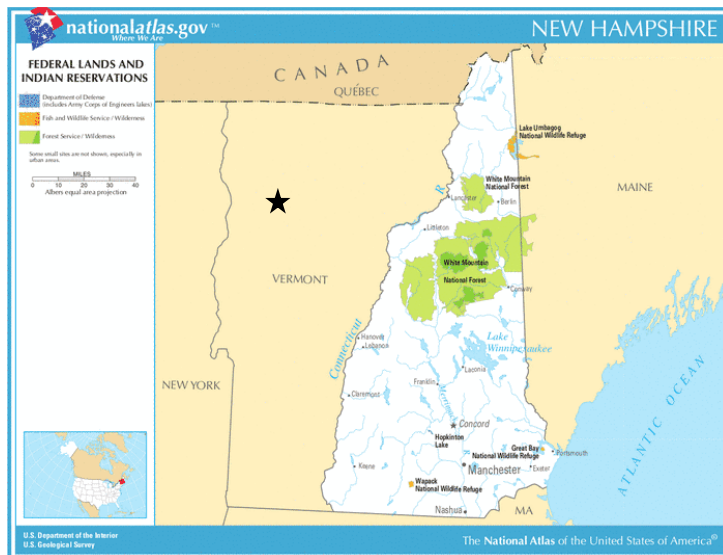
1.0 Introduction

Agencies that manage lands for recreation are often tasked with dual objectives: providing quality recreation opportunities for current visitor, while protecting natural resources for future generations (Manning, 2001). Recreation use causes undesirable changes, or impacts, to soil, vegetation, wildlife, and water resources (Hammitt and Cole 1998). Certain levels of recreation use detract from the visitor experience by causing crowding, a negative evaluation of the amount of use encountered (Shelby, 1980). Impacts to natural resources (ecological impacts) and the visitor experience (social impacts) occur wherever recreation use occurs, meaning the decision facing recreation managers is how much, and what type of, impact is acceptable- not whether or not to allow impact (Cole, 2004; Frissell & Duncan, 1965; Hammitt & Cole, 1998).

The Squam Lake area of New Hampshire is a popular destination for recreational pursuits. Local year-round or seasonal residents, day-trippers from nearby population centers, and summer tourists all converge on this area to enjoy the lakes, forests, and mountains of the region. One of the biggest threats to places like the Squam Lake area is its increasing popularity. Approximately 25,000 to 30,000 people per year make the climb to the summit of West Rattlesnake Mountain alone (Morse, 2001). With such high levels of recreation use, local land managers need to ask how much use is too much.

Figure 1. Squam Lake Region Location in New Hampshire

Source: <http://www.worldofmaps.net/en/north-america/new-hampshire-usa/map-federal-lands-indian-reservations-new-hampshire.htm>. Public domain.



The Squam Lakes Association (SLA) manages 50-plus miles of hiking trails in the Squam Lake area, including the Old Bridle Path to the summit of West Rattlesnake and the Mount Morgan Trail. SLA is tasked with the dual objectives of quality recreation and resource protection. SLA must make decisions regarding the amount of ecological and social impact they are willing to accept- decisions that should be based on scientific information, including social science research (Manning & Lawson, 2002).

An effective means to manage for acceptable impact levels is by developing management objectives, indicators, and standards of quality. Management objectives are broad, narrative statements that describe the type of recreation experience to be provided. Indicators of quality are measureable variables that reflect those objectives, while standards of quality define the minimum acceptable condition of indicators (Manning, 2011). This study used a visual survey to measure visitors' norms, or personal standards, used to evaluate acceptable levels for two indicators of crowding: People at One Time (PAOT) on the summit (Manning, Freimund, Lime, & Pitt, 1996) and Persons Per Viewscope (PPV) on the trail (Jacobi & Manning, 1999). Data generated can be used to inform management decisions regarding standards of quality for these indicators.

1.1 Site description

This study was conducted in the Squam Lakes region in central New Hampshire between July and September 2013. Visitors to two trails, the Old Bridle Path to West Rattlesnake and the Mount Morgan Trail, were the subjects of this study. Both trails are located in Holderness, New Hampshire and are managed by SLA.

The Squam Region is home to many seasonal residents, and has a history of very long-term land tenure. For example, 71 rustic camps (i.e. cottages or summer homes) built before 1920 survive

at Squam today. Of these, 21 have been owned and used by the same family since they were built, with several Squam families now in their seventh or eighth generation (Brereton, 2010).

The Old Bridle Path to the summit of West Rattlesnake is the most heavily used trail in the Squam region (Morse, 2001). It is a 0.94 mile hike from the trailhead to the summit (elevation 1243'), with a gradual ascent and takes 20-30 minutes to complete. The rocky, open summit provides a spectacular view of Squam Lake below.

The Mount Morgan trailhead is located across Highway 113 from the Old Bridle Path. It is 2.1 miles from the trailhead to the summit of Mount Morgan (elevation 2220') and takes 1.5-2 hours complete. There is an open view point at the top that provides an excellent view of the lake and surrounding forests. While exact usage data is not available, the Mount Morgan Trail is relatively heavily used, popular as a standalone hike or as a loop trip with neighboring Mount Percival. It is a steeper, more difficult ascent than the Old Bridle Path but still relatively gradual.

2.0 Methods

This study, and most other research on norms, is based on Jackson's (1965) methodology for measuring norms: the *Return Potential* model. Respondents evaluate the acceptability of a range of resource impacts (in this case PAOT and PPV). Individual responses are aggregated and can be illustrated graphically with the level of impact on the x-axis and the acceptability rating on the y-axis, resulting in an *impact evaluation curve* (Manning, 2011). Jackson's (1965) approach identified important characteristics of norms: The *preferred condition* is the highest point on the impact evaluation curve. *Norm intensity* refers to how far above or below the neutral acceptability rating the curve reaches and is a measure of the strength of the norm. The *range of acceptable conditions* includes all points on the curve above the neutral acceptability rating. *Norm crystallization* refers to the level of agreement amongst respondents.

Respondents were surveyed using *Visual Research Methods*. Visual Research Methods use images to depict a range of conditions for indicator variables. Visual Research Methods offer potential advantages over traditional narrative or numerical descriptions of resource conditions, including the ability to study indicators that are difficult or awkward to describe narratively, and the ability to depict conditions that are difficult to find or do not currently exist in the field (Manning & Freimund, 2004). Furthermore, visual methods have special appeal in higher use areas (such as West Rattlesnake and Mount Morgan), where high degrees of norm crystallization, or high levels of agreement amongst respondents, have been difficult to come by using traditional narrative approaches (Manning et al., 1996). Potential respondents were approached at the conclusion of their hike and asked if they would be willing to participate. Fifty surveys were administered at each trailhead.

The *Overall Photo Evaluation Method* (OPEM) (Kim & Shelby, 2005) was used for this survey. OPEM asks respondents to rate each photograph in a series, as opposed to the *Single Photo Evaluation Method* which asks respondents to identify the photo that represents the maximum acceptable impact. Respondents were asked to evaluate a series of five photographs for each indicator variable, on a response scale from -4 (very unacceptable) to +4 (very acceptable), as in Manning et al. (1996). Baseline photos were taken of the two summits and trails with no people in them, then manipulated using Adobe Photoshop. Twenty people were added to the PAOT photos and 10 people were added to the PPV photos. Care was taken to make sure people in the

photograph were not identifiable, and to use a mix of genders and people facing towards or away from the vantage point. Working with one photo at a time, each person in the photo was assigned a number. The order in which people were removed from each photo was selected using an online random number generator. The series of five PAOT photographs had 20, 15, 10, 5, and 0 people in them. The series of five PPV photographs had 10, 8, 5, 2, and 0 people in them. These evaluations identify an acceptability-based standard of quality. Sample photographs are shown in Figures 1 and 2.

Figure 2. Mount Morgan PAOT Study Photographs



Figure 3. West Rattlesnake PPV Study Photographs



Furthermore, respondents were asked to select the photo that best represents: 1) the number of people they prefer to see (preference-based standard of quality), 2) the number of people that is so unacceptable that they would no longer use the trail (displacement-based standard of quality), 3) the highest number of people that should be allowed before use of the trail is restricted (management action-based standard of quality), and 4) the number of people they saw today (existing conditions), as in Manning, Leung & Budruk (2005).

Individual responses were aggregated and graphed into impact evaluation curves using mean responses to determine norm intensity and the range of acceptable conditions. Curves were also generated using mode and median responses. Standard deviations from the mean were calculated to determine crystallization.

3.0 Selected results

3.1 Acceptability-based standards of quality

Figure 4 shows PAOT impact evaluation curves for the two summits, created using mean responses. The range of acceptable conditions includes all PAOT conditions for West Rattlesnake and 0-15 PAOT for Mount Morgan. The optimum condition for West Rattlesnake is 5 PAOT with a mean acceptability rating of 3.36. The optimum condition for Mount Morgan is 0 PAOT with a mean acceptability rating of 3.74.

Figure 5 shows PPV impact evaluation curves for the two trails, created using mean responses. The range of acceptable conditions includes 0-8 PPV for West Rattlesnake and 0-5 PPV for Mount Morgan. The optimum condition for both trails is 0 PPV, with a mean acceptability rating of 3.44 at West Rattlesnake and 3.92 at Mount Morgan.

Figure 4. PAOT Impact Evaluation Curves Using Mean Responses

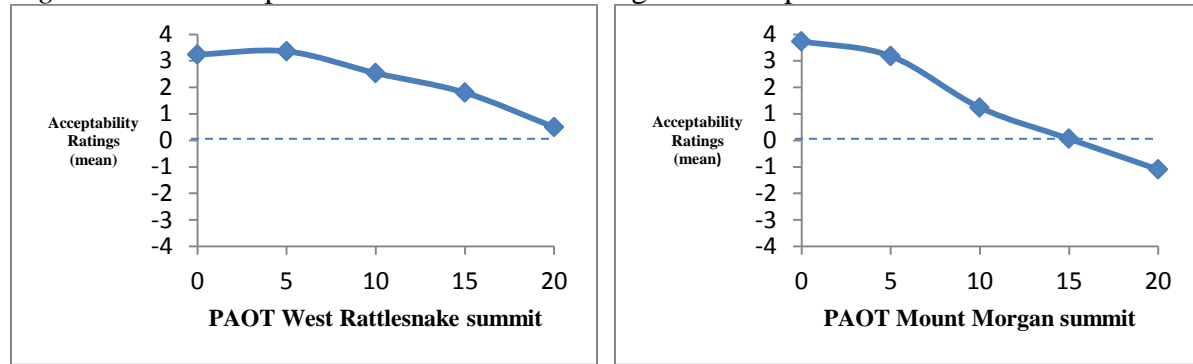
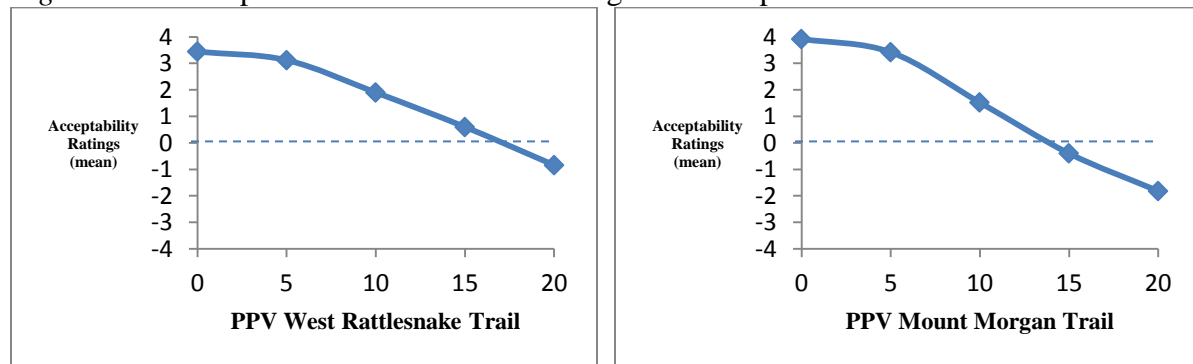


Figure 5. PPV Impact Evaluation Curves Using Mean Responses



3.2 Preference, displacement, and management action-based standards of quality

Data for preference, displacement and management action-based standards of quality is summarized in Table 1. These data only include those responses who identified a standard, not those who answered “none” or “don’t know.” This is significant because an overwhelming majority of respondents chose “none” for a displacement or management action based standard of quality. Eighty percent and 82% of respondents chose “none” for PAOT on the summit of West Rattlesnake that would result in them no longer using the trail, or where they thought use of the trail should be restricted, respectively. Sixty-two percent and 80% of respondents at Mount Morgan identified “none” as their displacement and management action based standards for PAOT, respectively. This means that for the majority of respondents at both trails, either displacement and management action-based standards do not exist, or they exceed the 20 people at one time in the highest impact photograph. Similar results were found for PPV standards.

Table 1

Preference, Displacement, and Management Action-Based Standards of Quality

Type of Standard	Type of Impact			
	PAOT West Rattlesnake	PAOT Mount Morgan	PPV West Rattlesnake	PPV Mount Morgan
Preference	4.78 (n=46)	2.55 (n=49)	1.83 (n=46)	1.16 (n=49)
Displacement	17.78 (n=10)	17.50 (n=19)	9.79 (n= 20)	8.68 (n= 24)
Management Action	16.11 (n=9)	15.00 (n=10)	7.67 (n= 13)	5.83 (n= 8)

3.3 Crystallization

Norm crystallization, or the level of agreement on norms among respondents, was measured by standard deviations, as in Shelby (1981). These data are detailed in Table 2. For both locations, norm crystallization is generally higher at lower PAOT or PPV levels. Crystallization decreases as the PAOT or PPV numbers go up. This means that respondents generally were in more agreement with their ratings of lower PAOT and PPV levels and less agreement with their ratings of higher levels. This trend is slightly interrupted at West Rattlesnake, where agreement was higher for the second lowest PAOT and PPV levels than for 0 PAOT and PPV. The general trend holds true however, as the higher PAOT and PPV levels foster less agreement amongst respondents.

Table 2
Norm Crystallization Expressed as Standard Deviations from the Mean

Level and Type of Impact	Standard Deviation	
	West Rattlesnake	Mount Morgan
0 PAOT	1.76	1.25
5 PAOT	0.97	1.31
10 PAOT	1.45	1.90
15 PAOT	1.80	2.19
20 PAOT	2.20	2.39
0 PPV	1.47	0.56
2 PPV	1.14	0.72
5 PPV	1.64	1.98
8 PPV	2.19	2.26
10 PPV	2.58	2.32

4.0 Conclusions and Implications

Several conclusions can be drawn from the information gathered in this study. First, SLA should use caution before restricting use on these trails. Visitors to the Old Bridle Path and Mount Morgan Trail did not respond well to the idea of restricting use. The majority of respondents chose “none” in response to the question, “which photo best represents the highest number of people that should be allowed before use of the trail is restricted?” One of the purposes of the question is to force visitors to consider the tradeoff between solitude and access. It is likely that visitors to West Rattlesnake and Mount Morgan are willing to sacrifice some solitude in order to ensure continued access. Opportunities for solitude may not even be an experience sought on these trails, or the numbers of people seen may not be an impact important to visitors. Furthermore, ratings remained fairly positive even at higher impact conditions, particularly for West Rattlesnake PAOT where ratings never crossed into unacceptability.

Since West Rattlesnake and Morgan receive a relatively high amount of use, the temptation may be to attempt to disperse use on to lesser-used trails in the area, such as other peaks in the Squam range which receive much less visitation. While this is certainly a viable option, SLA should also use caution when encouraging visitation to these lesser-used trails. Current visitors to these other mountains may be using that trail seeking a specific experience (i.e. solitude) that is provided by current use levels. Should use be encouraged on that trail and some use be dispersed from West Rattlesnake and Morgan, that opportunity for solitude may be lost leading to the displacement of current visitors. So while this action may lead to some reduction in the social impacts on West

Rattlesnake and Mount Morgan, it may result in impacts that are unacceptable to current visitors of other trails in the area. Therefore, SLA should consider these tradeoffs before encouraging use on other trails. It may in fact be better to concentrate use on these already popular trails, where social impacts are high, rather than try to disperse use to other trails, especially since solitude may not be an experience desired.

Generally, there are two ways to reduce the overall impact of recreation to an area—reducing the number of users or reducing the amount of impact of each user (Hammit & Cole, 1998). Since reducing the number of users may be an undesirable option, reducing the impacts of individual users may be a more desirable and realistic one. A possible strategy here would be to target the characteristics of visitors that tend to influence perceptions of crowding in other users, such as group size and behavior (Manning, 2011). Direct strategies that regulate visitor behavior or indirect strategies that attempt to influence or modify behavior, yet leave the ultimate freedom of choice up to the visitor are possible, however indirect strategies may be better received (Manning, 2011). An example of a possible indirect strategy would be a program designed to educate visitors on nuisance behaviors, such as shouting, or to encourage visitors to hike in smaller groups. A direct strategy may also be possible here, i.e. regulating the maximum allowable group size, but given the response to the idea of restricting use on the trails it is likely that group size restrictions would be negatively perceived as well. However, it has been found that visitors are receptive to direct management action, if it is perceived as necessary (Shindler & Shelby, 1993). It would be wise therefore, to determine visitors' perceptions of the necessity of direct management actions before instituting them.

That being said, a second possible implication of this study is the potential misleading nature of the “average.” While the mean acceptability ratings remained relatively positive at higher impact levels, crystallization was also low at these levels. In previous research, a lack of crystallization at high levels of social impact was attributed, at least in part, to a potential methodological issue with traditional narrative research methods (Manning et al., 1996). In this case I see it as a significant conclusion: there was generally less agreement across the group of respondents at higher PAOT and PPV levels. Some respondents rated the highest impact levels very favorably, others very unfavorably. One rating of +4 and another rating of -4 will average out to a neutral rating of 0, but that does not accurately describe the feelings of the respondents. There are a significant number of low ratings at high impact levels, for example the mode response for 20 PAOT at Mount Morgan was -4. The mean response at that impact condition was -1.82. Some respondents rated the condition they identified as the existing condition unfavorably. This begs the question: are recreation activities self-selected?

It is intuitively reasonable, and has been pointed out by researchers who are critical of visitor survey research (Stewart & Cole, 2001), that recreation activities are self-selected and therefore people will generally go where they want to go and do what they want to do, in order to have the recreation experiences they desire. However, practical limitations may present barriers to ideal experiences. For instance, the Old Bridle Path provides a relatively easy hike to a summit with a nice view, perfect for someone with physical limitations. These visitors may not prefer, enjoy, or even find acceptable the social impacts present on this trail, but it may be the only trail in the area suitable to their physical capabilities.

Other temporal or financial limitations may also affect the way recreation destinations and activities are selected. Sometimes the so-called “ideal” location for a preferred recreation experience is not realistically possible. For example, those seeking a solitary recreation experience may be best served to visit a remote Alaskan wilderness, however they may lack the necessary time or money to do so. West Rattlesnake and Mount Morgan are easily accessible from Interstate 93 and NH Route 113, making them convenient destinations for year round or seasonal residents, vacationers, or day- trippers from a variety of locations. They are highly visible and well-known trails that can be visited with a substantially lower investment of time, money, and effort. Certain visitors may prefer an experience with fewer People at One Time or Persons per Viewscope but continue to hike West Rattlesnake or Mount Morgan out of convenience and/or familiarity.

Another issue of concern when considering the self-selected nature of recreation activities is place attachment, the affinity bond that develops between recreationist and place (Hammit & Cole, 1998). As discussed earlier, the Squam Lake area attracts many seasonal short-term residents, many with long-term ties to the region. This type of regional loyalty may lead to at least some extent of place bonding, and visitors to these two trails may have formed emotional attachments to these specific places, that have no suitable substitute. Again, these visitors may not find the current social conditions acceptable, but that does not deter them from pursuing recreation opportunities on these trails.

The final conclusion to be drawn is that the judgment of managers must be the final determinant in formulating standards. Managers of recreation areas need to consider impacts to the resource and the visitor experience, as well as legal mandates, agency policies or mission statements, and financial or personnel resources (Manning, 2011). Therefore, SLA needs answer some fundamental questions before ultimately deciding where to set standards of quality for People at One Time and Persons per Viewscope.

First, are there ecological concerns with the current level of use, or the level of use suggested by respondents’ normative standards of acceptability? In general, ecological impacts of recreation are quite intense but also quite localized – in that recreation impacts, particularly on trails, are small from a landscape or ecosystem perspective (Hammit & Cole, 1998). What managers need to determine is whether there are areas of special ecological concern that may be threatened by recreation impacts including those that could potentially impair overall ecosystem function or destroy unique ecological features.

A second question facing managers is whether there are unique experiences to be had on these trails that may be negatively affected by current levels of use, or the level of use suggested by respondents’ normative standards. For example, near the summit of Mount Morgan, hikers have the option of completing the final ascent via a set of ladders affixed to the cliff wall. Increased demand for this potentially unique experience could lead to congestion around these ladders and significant wait times for ascent. West Rattlesnake is a relatively short and easy hike with a spectacular view of Squam Lake. Managers need to assess whether these kinds of specialized experiences are the reason people seek out these trails, and the degree to which the trails may be impacted by current use.

This question may best be answered by conducting a region-wide assessment of recreation opportunities (Stewart & Cole, 2003). For SLA this may consist of an inventory of the 50-plus

miles of hiking trails they manage. Possible questions could include: What recreation opportunities are available (e.g. opportunities for solitude, scenic beauty, social interaction, physical challenge, etc.)? What types of experiences do you want to provide? How do West Rattlesnake and Mount Morgan fit in to these objectives? What opportunities do they provide now? What opportunities can and/or should they provide? Again, this fits nicely with a management by objectives type framework. Management judgment is the final determinant as to the role of West Rattlesnake and Mount Morgan in the provision of recreation opportunities on a regional scale.

5.0 References

- Brereton, D. P. (2010). *Campsteading: family, place, and experience at Squam Lake, New Hampshire*. London; New York: Routledge.
- Cole, D. N. (2004). Impacts of hiking and camping on soils and vegetation. In R. Buckley (Ed.), *Environmental Impacts of Ecotourism* (pp. 41–60). Wallingford: CABI.
- Frissell, S. S., & Duncan, D. P. (1965). Campsite preference and deterioration in the Quetico-Superior Canoe Country. *Journal of Forestry*, 63(4), 256–260.
- Hammit, W. E., & Cole, D. N. (1998). *Wildland Recreation: Ecology and Management*. New York: John Wiley and Sons.
- Jackson, J. M. (1965). Structural characteristics of norms. In I. D. Steiner & M. F. Fishbein (Eds.), *Current Studies in Social Psychology* (pp. 301–309). New York: Rinehart and Winston.
- Jacobi, C., & Manning, R. E. (1999). Crowding and conflict on the carriage roads of Acadia National Park: An application of the Visitor Experience and Resource Protection framework. *Park Science*, 19(2), 22–26.
- Kim, S.-O., & Shelby, B. (2005). Developing standards for trail conditions using image capture technology. *Leisure Sciences*, 27(3), 279–295.
- Manning, R. E. (2001). Visitor experience and resource protection: A framework for managing the carrying capacity of National Parks. *Journal of Park & Recreation Administration*, 19(1), 93–108.
- Manning, R. E. (2011). *Studies in Outdoor Recreation: Search and Research for Satisfaction* (3rd ed.). Corvallis: Oregon State University Press.
- Manning, R. E., Freimund, W. A., Lime, D. W., & Pitt, D. G. (1996). Crowding norms at frontcountry sites: A visual approach to setting standards of quality. *Leisure Sciences*, 18(1), 39–59.
- Manning, R. E., & Lawson, S. R. (2002). Carrying Capacity as “Informed Judgment”: The Values of Science and the Science of Values. *Environmental Management*, 30(2), 157–168.
- Manning, R. E., Leung, Y.-F., & Budruk, M. (2005). Research to support management of visitor carrying capacity of Boston Harbor Islands. *Northeastern Naturalist*, 12, 201–220.

Morse, E. (2001). *Squam Trail Guide* (5th ed.). Holderness: Squam Lakes Association.

National Atlas of the United States of America (n.d.). *Map of New Hampshire (map federal land and Indian reservations)*. Retrieved from <http://www.worldofmaps.net/en/north-america/new-hampshire-usa/map-federal-lands-indian-reservations-new-hampshire.htm>.

Shelby, B. (1980). Crowding models for backcountry recreation. *Land Economics*, 56(1), 43.

Shelby, B. (1981). Encounter norms in backcountry settings: studies of three rivers. *Journal of Leisure Research*, 13(2), 129–138.

Shindler, B., & Shelby, B. (1993). Regulating wilderness use: an investigation of user group support. *Journal of Forestry (USA)*. Retrieved from <http://agris.fao.org/agris-search/search.do?recordID=US9331683>

Stewart, W. P., & Cole, D. N. (2001). Number of encounters and experience quality in Grand Canyon backcountry: consistently negative and weak relationships. *Journal of Leisure Research*, 33(1), 106–120.

Stewart, W. P., & Cole, D. N. (2003). On the prescriptive utility of visitor survey research: A rejoinder to Manning. *Journal of Leisure Research*, 35(1), 119.