Announcement of New Editor

The Research Committee of the Society of Park and Recreation Educators has selected David Scott to serve a three year term as editor of the Journal of Leisure Research (2002-2004). New manuscript submissions should be sent to David beginning January 1, 2001. Ellen Weissinger will continue to receive manuscripts until that time, and will continue to serve as editor through the 2001 volume.

After January 1, 2001 manuscripts should be sent to:

David Scott, Editor
Journal of Leisure Research
Department of Recreation, Park and Tourism Sciences
2261 TAMU
Texas A & M University
College Station, TX 77843-2261

Journal of Leisure Research
2001, Vol. 33, No. 3, pp. 229-250

Articles

Wilderness Campers' Perception and Evaluation of Campsite Impacts

Tracy Farrell
Program Dean, School for Field Studies, Virginia Tech
Troy E. Hall
Department of Resource Recreation and Tourism, University of Idaho
Dave D. White
Department of Recreation Management and Tourism, Arizona State University

On-site, semi-structured interviews were conducted with 51 groups of campers in Mt. Jefferson Wilderness to understand their perception and evaluation of impacts to vegetation, soil, and trees. At campers' sites, measurements of vegetation loss, mineral soil exposure, tree damage, and site size were made for comparison with visitors' numeric evaluations of conditions. Content analysis of qualitative responses revealed that 75% of groups noticed vegetation impacts, 52% noticed soil impacts, and 51% noticed damage to trees. More than 70% of evaluative comments about conditions were positive, with many related to the functional benefits of impacts. Sites ranged in size from 13 m^2 to 453 m^2, but there were no statistically significant relationships between 6 measured impact parameters and campers' numeric evaluations of conditions. The difference between visitors' and managerial evaluations of impact conditions will present considerable challenges for selecting and successfully implementing management policies.

Introduction

According to the 1964 Wilderness Act, wilderness managers must maintain wilderness resources so as to preserve their natural condition. However, research has identified a variety of impacts that result from wilderness visitation (Hammitt & Cole, 1998). For example, camping-related impacts to vegetation and soils have been well documented, and many wildernesses have programs to monitor and/or limit such impacts. Impacts of specific concern include increased mineral soil exposure, loss of soil organic material, changes in soil moisture and density, loss of vegetation cover, alteration of species composition, and damage to trees (Marion & Cole, 1996; Stohlgren, 1986).

Wilderness managers care about such recreation-related changes because they are inconsistent with policy to maintain natural conditions, but

Address correspondence to: Tracy Farrell, Program Dean, School for Field Studies, 16 Broadway, Beverly, MA 01915-4435; (800) 989-4435 x 404 (Business); *tfarrell@fieldstudies.org* (E-mail).

apart from this, it has been suggested that site impacts are important because they may detract from the quality of visitor experiences (Hammitt & Cole, 1998; Roggenbuck, Williams, & Watson, 1993). Such assumptions have been used as arguments for site restoration, camping regulation, and even use limitation. However, few studies have tested whether impacts actually affect experience quality (Lucas, 1990), and there is reason to believe that managers and researchers may be more sensitive to anthropogenic change than visitors. This paper compares and contrasts wilderness campers' perceptions and evaluations of vegetation and soil impacts with campsite condition assessments of the type performed by managers and researchers.

Greater understanding of the relationships between visitors' perceptions and site condition assessments could: (a) identify points of convergence and divergence between campers and managers in perception and evaluation of anthropogenic changes, (b) identify the particular impacts with the greatest effects on camping experiences, (c) inform camping management policies or strategies, (d) evaluate how well campers' perceptions of vegetation and soil impacts could be used to alert managers to potential impact problems in the absence of other monitoring, and (e) guide managers in selecting impact indicators and standards as part of the Limits of Acceptable Change or other planning processes.

Perception and Evaluation of Impacts

Two questions guide this study: first, to what degree do impacts affect wilderness campers' experiences, if at all? Second, how similar are visitors and managers in their perception and evaluation of impacts? Although we did not directly measure managers' perceptions and evaluations of site impacts, there are managerial standards for indicators of site conditions in the Mt. Jefferson Wilderness that provide a basis for comparison. For example, according to management standards, campsites should not exceed 37.16 m^2 (400 ft^2). Therefore, it is reasonable to assume that managers would notice and negatively evaluate sites that exceed established standards.

Insights from landscape perception research. Whether anthropogenic change affects experiences depends on both perceptual (recognition and classification) and evaluative processes within the observer. For an impact to have an effect, it must first be perceived as a noteworthy condition, and then be evaluated as somehow detrimental or unacceptable. Research in landscape perception has shown that, when judging scenic quality, humans have an almost innate reaction to various features, with the explanation that such reactions are evolutionarily derived (Anderson, 1981; Bourassa, 1990; Herzog, 1985). Preferred landscape attributes typically include open grassy or herbaceous cover, lack of thick undergrowth, views of water, large diameter trees, distinct topographic features, and little slash or downed wood (Balling & Falk, 1982; Purcell, 1992). Similarly, recreationists prefer sites with bounded or enclosed spaces, presence of water, and grazed or otherwise removed understory and shrub layer (Freimund, Anderson, & Pitt, 1996).

These preferences exist apart from a perception of ecological significance or the origins of conditions and, depending on the site, may be found on highly impacted or completely pristine sites. Thus, "impacts" that create aesthetically pleasing landscapes may be evaluated as positive and attractive.

Prospect-refuge theory suggests that the preferences described above are deeply engrained, possibly biologically based, because of their likely evolutionary advantages (Herzog, 1985). However, others (e.g., Bourassa, 1990) have contended that there are equally important cultural elements to landscape preferences. People react to the symbolic meanings they attach to landscapes, the physical characteristics as filtered through social, cultural, or personal filters of significance (Greider & Garkovich, 1994; Nassauer, 1995). For example, photographs labeled "natural" are judged more positively than when they are labeled "treated" or "built" (Anderson, 1981; Hodgson & Thayer, 1980; Purcell, Lamb, Peron, & Falchero, 1994). Symbolic evaluations are "constructed through social interactions among members of a culture" (Greider & Garkovich, 1994, p. 5). Thus, an individual's reaction to a scene will depend both on enculturation or socialization and personal background (Purcell et al., 1994). In the context of site impacts and their effect on experiences, such studies suggest that whether or not individuals perceive conditions, they way they classify impacts (especially as caused by humans or not), and the symbolic meanings they attach to them will all influence judgments about the conditions. The type of evolutionarily adapted or biologically-based determinants of behavior that are suggested by landscape perception research may help to explain campers' perception and evaluation of site impacts. However, such variables are likely to be more distal influences, and were not directly measured in this study.

Evidence from recreation research on evaluation of site impacts. Given managerial and research attention to describing and ameliorating site impacts in wilderness, it is surprising how little research has investigated recreational visitors' reactions to such impacts. There appears to be little agreement about whether visitors perceive and categorize impacts according to the parameters used by managers, or whether impacts have the purported negative effect on experiences.

People may or may not be aware of use-related anthropogenic changes of the type described by ecologists or managers (Cole & Benedict, 1983). Indeed, much larger-scale changes, such as clearcuts, have been found to be mistaken as "natural" by some observers (Magill, 1994). One study found that campers rated sites completely denuded of vegetation cover as in satisfactory to excellent condition, while failing to recognize any of the extensive instances of damaged trees (Knudson & Curry, 1981). That is, impacts failed to make it past a perceptual screen.

In general, recreationists appear to be most aware of conditions clearly linked to human use, like litter, rather than to less visually obvious impacts such as soil compaction (Stankey, 1973). One interesting study, though employing artistic renderings shown to students and therefore perhaps not representative of wilderness campers, concluded that the students were more

likely to rate fire rings and tree damage as "heavy amounts" of impact than were managers (Martin, McCool, & Lucas, 1989). Conversely, managers rated bare ground as more severe. These findings are consistent with the trend for recreational visitors to be aware of obviously and intentionally-caused human impacts.

More research has investigated visitors' reactions to impacts than whether or not impacts are perceived. One element that has arisen repeatedly in these studies is the functional quality of a site. Campers sometimes prefer more impacted sites, primarily because impact is correlated with desirable amenity values (Brown & Shomaker, 1974; Heberlein & Dunwiddie, 1979; Shelby, Vaske, & Harris, 1988). For example, larger campsites with minimal vegetation cover are sometimes evaluated positively because they provide ample space for larger parties (Lucas, 1990). Simon (1959) proposed that people first look for required features, in this case, features like level ground and good drainage, and only then take into consideration other, less critical attributes, such as soil erosion. Similar hierarchies have been proposed by other researchers, including Clark and Stankey (1986), who characterized conditions as requisites, facilitator/attractors, and contrainers/detractors. In a study of campers in the Alpine Lakes Wilderness, Brunson and Shelby (1990) confirmed that necessity and amenity attributes such as proximity to water, level ground, and adequate size were most important among site attributes. Thus, visitors may perceive changes and recognize them as created by human use, but evaluate them positively because of aesthetic or functional qualities.

The evidence cited above suggests that visitors generally do not react negatively to site impacts, at least those that are unintentional, like vegetation loss or soil changes. However, other researchers have argued that site impacts do adversely affect experiences. For example, Martin et al. (1989, p. 626) concluded that visitors evaluated "tree damage and fire rings as more objectionable than managers." Roggenbuck et al. (1993), found that the number of trees at campsites that had been damaged by people ranked second among 19 attributes in effect on the quality of a wilderness experience, while amount of vegetation loss and bare ground ranked sixth. The reasons for the different conclusions across studies is not clear. One possibility is that those finding negative evaluations among visitors focus on specific impacts like litter, campfires, and tree damage, which may evoke different symbolic meanings and evaluations than other impacts. Alternatively, it is possible that different methods may account for some of the differences in findings. Laboratory or off-site research with verbal questions may trigger different reactions than evoked in situ or with different question framings (Kroh & Gimblett, 1992).

Managers versus visitors. The process by which people perceive, assign meanings to, and evaluate settings is complex. People are not passive perceivers/receivers; rather we actively construct settings to fit within larger personal and cultural understandings of ourselves and the environment (Greider & Garkovich, 1994; Nassauer, 1995). An individual's reaction to site impacts in wilderness, then, is likely to be shaped by his/her past experiences in wilderness, immediate goals, influences of socialization derived from peer groups and others, and deeply held values.

Ample evidence suggests that one important factor that promotes differential perceptions and judgments is professional training (Kennedy, 1985; McCool, Benson, & Ashor, 1986). In the context of recreation, previous studies have shown that managers often misjudge public concerns, or that managers' and visitors' values differ [Absher, 1988; Vining & Ebreo, 1991; Wellman, Dawson, & Roggenbuck, 1982). Although it is difficult to trace the mechanisms and processes by which different groups and individuals in society come to hold different values, many have attended to the processes that occur in academic institutions or in land management agencies that promote internal consistency and distancing from the public (Brunson, 1992; Kennedy, 1985; Wellman, 1987). These studies lead us to suspect that managers and wilderness campers may have different lenses through which they perceive and evaluate wilderness site conditions.

Methods

Study Area

Interviews and site assessments took place at forested lakes (1,000 to 1,500 m elevation) in Mount Jefferson Wilderness, Oregon, in July and August, 1999. Destination lakes ranged from three to eight kilometers from trailheads and had between 20 and 100 campsites each. Annual overnight use ranged from about 300 to 500 groups, with substantially higher levels of day use. A 1993 study of visitors to Mt. Jefferson described overnight visitors as moderately experienced wilderness users, with a mean of 13 previous visits to Mt. Jefferson Wilderness (Cronn, Watson, & Cole, 1992). On average, overnight users in 1993 had made their first trip to Mt. Jefferson 10 years prior to the study, had visited 13 other wildernesses during their lives, and spent 14 days in wilderness in the past year.

Vegetation at the study lakes was dominated by *Pseudotsuga menziesii* (Douglas fir), *Tsuga mertensiana* (mountain hemlock), and *Pinus contorta* (lodgepole pine) with a shrub layer comprised largely of *Vaccinium* species. Groundcover species varied, from dense *Xerophyllum tenax* at some lakes to *Cornus canadensis* and leafy forbs at other lakes. In areas not used for recreation, groundcover was dense, except beneath fully closed canopies.

Interview data and matching campsite condition data were gathered for 41 campsites. A single condition assessment was conducted for each site, but because different groups sometimes camped at the same site on different occasions, the final sample size was 51 interviews. Because of the relatively minor change in impact conditions that occurred from any single group's usage of a site, and due to the inability of the rapid assessment procedure to detect small changes, it was determined unnecessary to perform multiple impact assessments for sites where more than one group camped. The selection of respondents, and thus corresponding sites, was opportunistic. In-

terviewers approached all groups who had already selected a campsite at the study site during the specified interview times.

Camper Perceptions and Evaluation of Impacts

Open-ended structured interviews were conducted with each group encountered at a campsite on study days. Interviews were selected as the method rather than written surveys, because of concerns that other methods do not detect important elements of perception and evaluation, or may cue visitors to "proper" responses by using words such as "damage" or "destruction."

Campers were informed that the researcher was conducting a study about camping and were invited to participate. Permission to tape-record interviews was solicited (and only one group declined to be taped). The first questions asked why respondents selected their particular site and what factors influenced that decision (White, Hall, & Farrell, 2001). The questions of interest for this study followed. Respondents were asked "what do you think of the condition of the vegetation, the plants, at this site?" Subsequent questions asked the same about soils and trees. In each case, after articulating their evaluations, respondents were probed to give a numeric rating (1 = excellent, 5 = poor) and to provide reasons for their ratings.

Interviews were transcribed verbatim, without intonation or other linguistic features, but retaining pauses and hedges (such as "um" or "mmm"). Two coders independently read a random sample of 10 interviews to develop initial coding categories, using standard content analytic procedures. Discussion and clarification resulted in a merged codebook which each evaluator used to independently code a different sample of 10 additional interviews. Resolution of discrepancies resulted in a final codebook. Both researchers then coded all interviews, with a final inter-coder reliability of .84.

Responses to the open questions about vegetation, soil, and tree conditions were classified in two ways. First, they were sorted by whether the group members were aware or unaware of anthropogenic changes in conditions, or whether they misattributed naturally occurring conditions as human caused (see Table 1). Awareness could be ascertained from direct statements ("it looks well-used, kind of trampled down, or whatever they call it"), or inferred. For example, a respondent who said "with as many people that come up here, this is actually pretty good, I mean I've seen a lot worse really" was judged to have noticed impacts. Second, evaluations were classified as positive, negative, or noncommittal, with separate categories for types of rationales underlying this overall evaluation. For example, a positive evaluation of the condition of the trees at the site might be based on the logic that the campsite "looks like the surrounding forest." On the other hand, a noncommittal evaluation could be inferred from statements that the trees looked "so-so" or "typical, as expected."

TABLE 1
Campers' Awareness of Site Impacts

Condition	Level of Awareness			
	Unaware	Aware	Misattribution	Total
Vegetation				
n	9	33	2	44
%	20	75	5	100
Soil				
n	23	25	0	48
%	48	52	0	100
Trees				
n	16	25	8	49
%	32	51	16	100

Campsite Condition Assessments

At the sites where campers were interviewed, several campsite conditions were assessed after campers had left, using a multi-parameter method (Cole, 1989a): campsite size, percent vegetation cover on and off-site, percent mineral soil exposure on and off-site, and number of scarred and felled trees on campsites and in surrounding areas (within sight). Campsite boundaries were identified by changes in vegetation cover, height, composition, surface organic litter and/or topography. Campsite area was measured using the geometric figure method: one or more geometric figures were superimposed on campsites and the area of each figure was calculated, based on its paced dimensions (Marion, 1991). For a detailed review of literature and procedures related to recreational impact assessment see (Cole, 1989b); Hammit & Cole (1998); Leung & Marion (2000); and Marion (1991). Campsite condition assessments were conducted by three research technicians, and, although no overall measure was calculated, periodic checks of inter-rater reliability were conducted and measurement error was not significant.

Vegetation cover included herbs, graminoids and other live, non-woody plants. Campsites and off-site control areas were assigned to one of five percentage classes: 0-5%, 6-25%, 26-50%, 51-75% and 76-100%. Absolute vegetation cover loss was calculated by subtracting on-site cover class midpoint values from off-site midpoint values. Relative vegetation cover loss (absolute loss as a proportion of off-site cover) was calculated. Area of absolute vegetation loss (absolute loss multiplied by the site area) was also calculated to provide a synthetic variable incorporating both reduction in vegetation cover and site area (Cole, 1989a). It seemed reasonable to expect visitors' evaluations of vegetation conditions to be influenced by both factors (intensity and extent).

Mineral soil exposure included areas with less than 1% organic litter. The same classes for vegetation cover were used for mineral soil exposure: (0-5%, 6-25%, 26-50%, 51-75% and 76-100%). Absolute mineral soil increase was calculated by subtracting off-site midpoint values from on-site midpoint values. The area of absolute mineral soil exposure (absolute mineral soil exposure multiplied by campsite area) was also calculated.

The total number of felled trees, stumps, and scarred trees within campsite boundaries and in surrounding areas were counted and summed. We combined numbers from campsites with surrounding areas because we expected campers to base their tree ratings on all nearby trees visible from within the site. Felled trees included trees cut down by recreationists or by Forest Service managers. Trees felled by windthrow, lightning or other natural causes were excluded. Scarred trees had axe marks, graffiti, broken or cut branches, nails or girdling.

Descriptive statistics and frequency information were computed for campsite area, absolute area of vegetation cover loss, absolute area of mineral soil exposure, total number of felled trees and total number of scarred trees. To compare camper evaluations (ratings) with measurement data, sites were divided among categories of approximately equal size for each measurement variable. One-way analysis of variance (ANOVA) was used to examine whether campsite conditions were related to campers' ratings of vegetation, soil, and tree conditions. Although regression analysis is also appropriate for such data, we felt ANOVA to be more immediately interpretable.

Results

This section presents descriptive information from site assessments, which provides context concerning the level of impacts at these sites. This is followed by analysis of respondents' qualitative assessments of each parameter (vegetation, soil, and trees). Finally ANOVA results compare measurements with respondents' numeric ratings.

Site Measurements

The sites at which people camped exhibited a broad range of conditions. Some were quite small with minimal impacts; others were very large with significant erosion and tree damage. Campsites ranged in size from 13 to 453 m^2, with a mean size of 145 m^2 (Figure 1). All 41 campsites assessed had lost most of their vegetation. The area of absolute vegetation loss ranged from 4.5 m^2 to 335 m^2, with a mean of 98 m^2 (Figure 2). Two-thirds of the sites assessed for soil condition had greater amounts of exposed mineral soil than off-site control areas. The area of absolute mineral soil exposure ranged from 0 to 59 m^2, with a mean of 17 m^2 (Figure 3).

Tree damage at study sites was considerable. Although a few sites had no felled trees, the mean was 9, and one site had 34 stumps (Figure 4). There were up to 37 scarred trees, with a mean of 16 (Figure 5). All but four sites had more than 5 scarred trees.

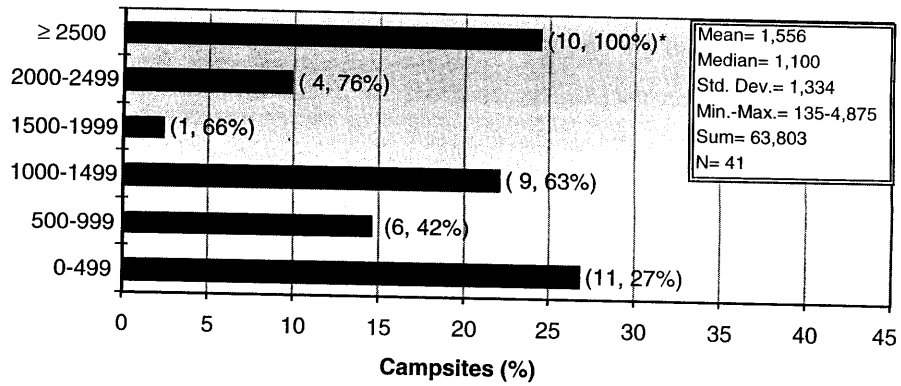

Figure 1. Area of campsites (ft^2)

Campers' Perceptions and Evaluations of Site Impacts

Awareness of impacts. Most groups were aware of vegetation changes created by wilderness use (Table 1). Others' comments suggested a lack of awareness; for example, one said, "everything looks pretty healthy, I don't see anything wilting or being trod on too much." Two groups gave responses we categorized as "misattributions." That is, they referred to naturally occurring conditions as "problems." Among those who noticed human-caused vegetation changes, 12 groups made comments that displayed awareness of some change, without characterizing the change (e.g., "for as well populated as it gets during the summer, I don't think it's that bad" or "It looks pretty good. I mean, it definitely has a used look to it . . . but other than that, it

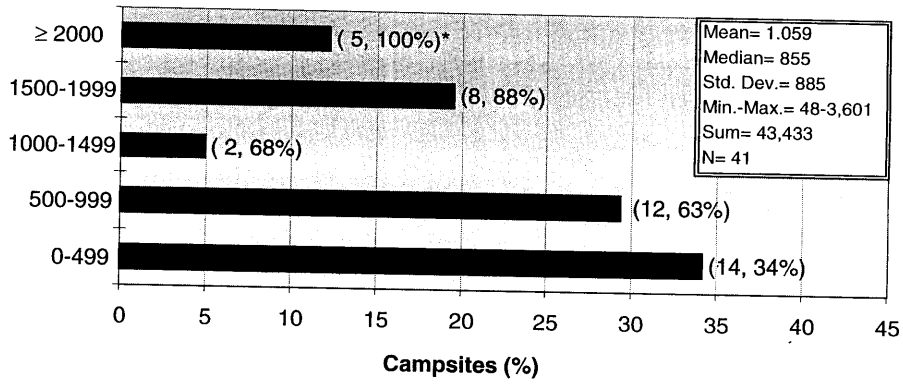

Figure 2. Area of vegetation cover loss on campsites (ft^2)

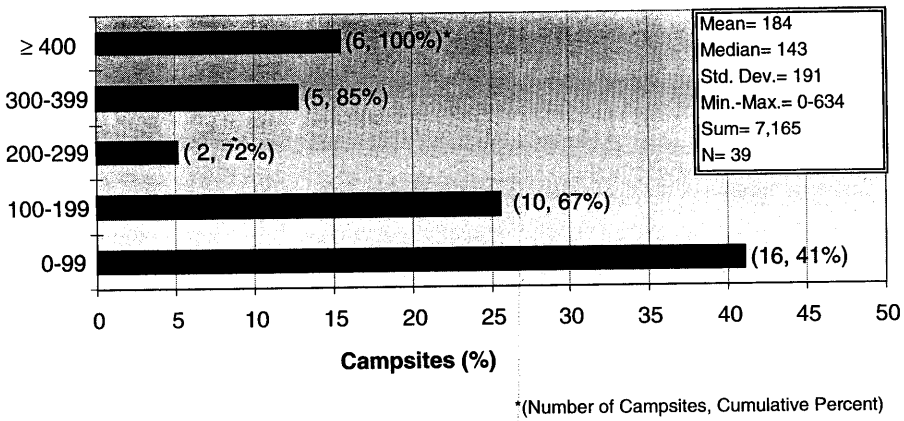

Figure 3. Area of mineral soil exposure on campsites (ft^2)

looks pretty natural"). Several groups specifically mentioned reductions in vegetation cover (Table 2). Usually these were general statements, such as "there's not too much left, it's all pretty barren," or statements about vegetation loss being restricted to the site ("well, there's nothing here, but all around the campsites everything looks nice").

Respondents were almost evenly split among those who observed impacts to soils and those who did not. Specific impacts observed tended to be soil compaction (e.g., "it's packed in pretty good") and loss of vegetation ("it looks like it might be hard for things to grow here. It [soil] must be bad because there's nothing growing in it. There's probably no rotting going on because people are picking everything up and burning it"). A few people

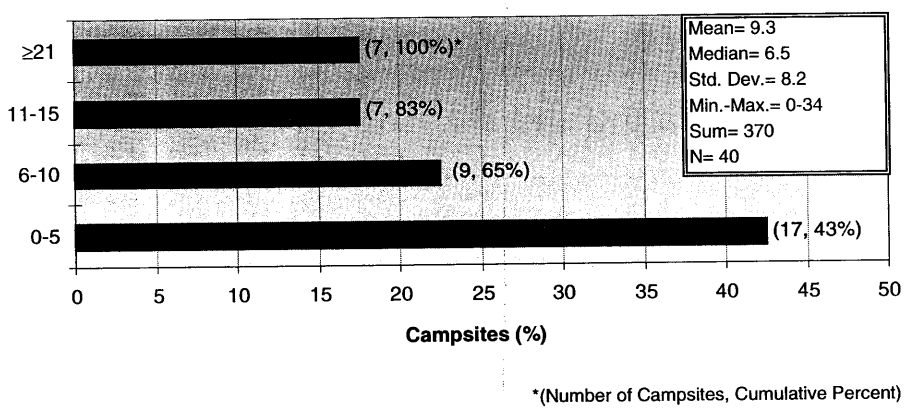

Figure 4. Number of felled trees on campsites and in surrounding areas (#)

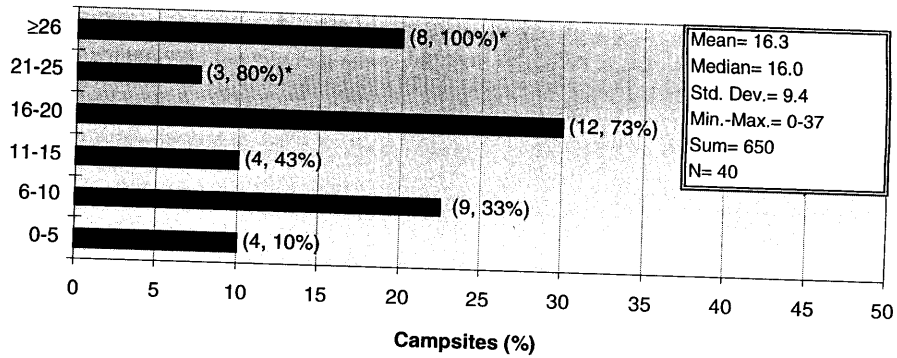

Figure 5. Scarred trees on campsites and in surrounding areas (#)

did not mention specific impacts (labeled "unspecified" in Table 2), but were clearly aware of changes ("it's really used. It has an affected look to it").

Campers were less likely to be aware of tree damage. Those who observed tree damage described a variety of impacts, including chopped or felled trees, removal of lower limbs, and nails ("on almost every single tree

TABLE 2
Impacts Perceived by Campers

Impact Category	Percent of Comments Within Category
Vegetation (n = 33 comments)	
Reduction in cover	58
Reduced diversity	3
Multiple trails	3
Unspecified	36
Soils (n = 26 comments)	
Compacted	35
Vegetation loss	23
Reduced organic matter	12
Dusty	4
Unspecified	27
Trees (n = 22 comments)	
Chopped/Felled	32
Cut lower limbs	18
Nails	18
Removal of bark	9
Root exposure	5
Unspecified	18

out here there's a nail that's in there; I thought that was kind of odd. I mean it was really helpful, but it was just odd"). Eight groups identified poor tree health, but referred only to features such as the presence of snags in the forest or lichen on trees. For instance, one said, "a lot of them look like they may be suffering from some kind of illness there's an awful lot of moss all over them." Another said that the tress are "pretty good. I see dead and rotting one's around here, but otherwise not too bad." These natural forest conditions are labeled as "misattributions" in Table 1, because they are not impacts caused by recreation and in fact are typically considered indicators of healthy mature forests. In addition to those eight groups, seven other groups had members who made such misattributions about forest conditions, but who also observed recreation-related impacts.

Campers' qualitative assessments of site conditions. Respondents were generally willing to evaluate vegetation, soil, and tree conditions, and—although some gave vague answers, especially for trees and vegetation—most evaluated conditions positively (Table 3). Many of the judgments were qualified with some form of contextual caveat, but only one respondent evaluated conditions in the context of *wilderness.* Others evaluated conditions in the context of use levels or surrounding forests. For instance, 8 respondents described vegetation impacts as acceptable considering existing amounts of use: "Ob-

TABLE 3
Evaluation of Impacts Perceived, Percent of Evaluative Comments

Evaluation	Vegetation $n = 54$	Soils $n = 59$	Trees $n = 49$
Positive			
Non-specific "good" or "fine"	22	14	47
Good, considering use	15	2	5
Pretty natural, healthy	7	0	0
All but immediate site is fine	11	3	0
Looks like surrounding forest	2	0	8
Impacts are ok or good at sites	13	14	4
Good drainage	0	12	0
Good organic layer	0	10	0
Not dusty	0	8	0
No mortality from use	2	0	8
Other positive evaluations	0	5	8
Negative			
Non-specific bad	26	14	16
Non-committal			
So-so, not too bad	0	0	4
Typical, as expected	0	5	0
Don't know or No opinion	2	14	0
Total	100	100	100

viously it's been trampled out some time ago, but for a high use camp area, I guess I'm not too surprised, you see, because the campsites are fairly well defined, it doesn't seem to create too much of a problem." Referring to the soil, one said it "seems to be in pretty good shape. Water seems to be percolating really well . . . Even though this is a designated campsite, and the ground is quite hard packed, the water seems to be percolating downward pretty well." Others judged the level of impact as insignificant given the surrounding forests: "other than the immediate area around the tent site that everybody tramples down, it seems to be growing just fine." Another remarked, "these trees here at this campsite are no different than just about any other location around the lake."

Several groups felt that vegetation and soil impacts were acceptable or even desirable at campsites: "there isn't much [vegetation] there. That's part of what makes it a good site." Referring to the nails in a tree, one commented, "thank God somebody put a couple of spikes in the trees." Another said, "I like it that you don't have so much vegetation. I mean, I like how it's cleared out here and then even down there by the water." One noted that "it's obvious that people have been around here—not much vegetation at this spot—but it would be kind of inconvenient if this is where we wanted to camp and it was all full of stuff." These respondents were aware that changes came from use, but felt they improved the experience.

Although most comments were wholly or largely positive, some respondents did feel impacts were negative. Although the basis for such reactions was not always clear, it appeared that most often the problem was the impact to ecosystems or processes, rather than to the aesthetic or experiential ramifications. For example, one answered, "on the campsite itself, it's ruined, there's not a whole lot of vegetation." One insightful respondent observed that the judgment depends on the question. In reference to vegetation, he responded, "Well, there is none, um, and what do I think about that? I guess for a campsite, I think that's OK. From a campsite point of view, I'd say it was toward the excellent . . . But from an ecosystem point of view, it's pretty poor."

Interestingly, evaluations and their rationale varied depending on the impact. The contextual or relative evaluations displayed toward vegetation and soil conditions typically did not extend to tree damage: "the trees are in pretty bad shape, they're pretty chopped up. People [are] abusing them, and as you can see, they're dripping all over the place, people chopping on 'em". This hints at the possibility that the motive or intentionality behind the impact was important to respondents. Another respondent observed that "you can see where the people have chewed off the bark in here and there's nails in the trees and they've been chopped on a hundred times. People come up here, they don't take very good care."

Whereas people were comfortable evaluating vegetation and tree impacts, they were least comfortable passing judgment on the condition of soils. As one put it, "I have no opinion, I know nothing about the soil. It's dirt."

The prevalence of comments about good drainage and lack of dust was interesting. These are not typically features monitored by managers, but appeared important to campers.

Campers' quantitative ratings of site conditions. In addition to the qualitative evaluations, campers rated the condition of vegetation, soil, and trees on their campsites from 1 (excellent) to 5 (very poor). Vegetation ratings had a mean of 2.7, tree ratings had a mean of 2.4, and soil ratings had a mean of 2.2. Thus, on average, campers evaluated each condition as slightly better than the scale midpoint.

General attractiveness of sites. After giving their opinions about specific impacts, campers were asked for their "opinion about the general attractiveness of this site" (Table 4). Most found their sites attractive ("top notch, beautiful") or at least acceptable ("It's pretty good. I'd say about I guess average"). A few said the site was perhaps what they expected, but not ideal ("it's about as good as you're going to get with as many people as are going to be up here," or, "it's not the greatest . . . I mean I don't think it's that bad really, I mean I've seen worse, so it's pretty lush down here . . . there's stuff in the camp [that] isn't so great"). Only a few respondents said their site was unattractive: "I don't think it's all that attractive. There's a number of campfires, and a lot of the trees have the bark off of 'em, I'm assuming to start fires. So it just looks used and one of the reasons we like backpacking is that it's not like car camping, and you can get away, and of course, I did know that this is one of the more popular lakes . . . but the attractiveness isn't quite what we would want."

Relationship of Campsite Conditions to Campers' Ratings

Respondents' ratings of vegetation and soil conditions might conceivably be influenced by both the areal extent of a site and the intensity of impact

TABLE 4
General Attractiveness of Site

	Percent of All Comments
Positive (n = 30 comments)	68
Pretty good	27
"Great site"	23
Beautiful views	11
"Looks natural"	7
Impacts are good	7
Positive, with caveats (n = 8 comments)	18
Ok, but not ideal	11
Good for use level	7
Better than expected	2
Unattractive (n = 6 comments)	14

to resources. Thus, we explored the relationship between camp area and vegetation ratings, as well as between area of vegetation loss and vegetation ratings. Similarly we investigated the relationship between camp area and soil ratings and area of soil exposure and soil ratings. Finally, counts of felled and scarred trees were each related to campers' tree ratings (Table 5).

Despite substantial variability in site sizes, vegetation impacts, soil exposure, and tree damage, visitor evaluations of conditions showed no relationship to measurements. For example, at a site with 4,100 ft^2 of bare

TABLE 5
Mean Values and One-way Analysis of Variance (ANOVA) Findings for Campsite Conditions and Campers' Ratings of Campsite Conditions

	Campers' Ratings of Campsite Conditions			
Campsite Conditions Assessed	N	Mean Rating	ANOVA F Value	ANOVA p Value
Campsite Area (ft^2)	*Vegetation Rating*			
0-999	17	2.8		
1000-1999	10	2.7		
≥ 2000	14	2.7		
Totals and ANOVA values	41	2.8	0.08	0.92
Campsite Area (ft^2)	*Soil Rating*			
0-999	14	2.2		
1000-1999	7	2.0		
≥ 2000	12	2.2		
Totals and ANOVA values	33	2.2	0.14	0.87
Vegetation Cover Loss (ft^2)	*Vegetation Rating*			
0-499	14	3.1		
500-999	12	2.5		
≥ 1000	15	2.6		
Totals and ANOVA values	41	2.7	1.14	0.33
Mineral Soil Exposure (ft^2)	*Soil Rating*			
0-99	12	2.1		
100-199	8	2.5		
≥ 200	11	2.0		
Totals and ANOVA values	31	2.2	0.74	0.49
Felled Trees (#)	*Tree Rating*			
0	16	2.5		
1-2	9	1.8		
≥ 3	14	2.8		
Totals and ANOVA values	39	2.4	2.08	0.14
Scarred Trees (#)	*Tree Rating*			
0-4	17	2.3		
5-8	14	2.8		
≥ 9	8	2.1		
Totals and ANOVA values	39	2.4	1.19	0.32

ground, a camper responded that the vegetation was "great. I don't see anything wrong with it." About the soil, he said "it's nice, it's good, it's good drainage and it doesn't get muddy." On the other hand, at a different site with 700 ft^2 of bare ground, a camper said, "on the campsite itself, it's ruined, not a whole lot of vegetation." For tree impacts, too, ratings were unrelated to conditions. At a site with 23 scarred and 8 felled trees, a respondent said "I think they're good. There's no dead, not much dead timber." However, a camper at a site with 6 scarred and 4 felled trees said that the trees were "not in very good shape. People are beating them up pretty badly." Thus, in each of the statistical tests in Table 5, there was no relationship between objective conditions and campers' numeric evaluations.

Discussion

Managing impacts from recreational use consumes a substantial amount of time and resources. Wilderness managers have identified impacts to vegetation, soils, and trees at sites as significant concerns (Marion, Roggenbuck, & Manning, 1993; Washburne & Cole, 1983). Our goal was to ascertain whether visitors notice impacts and whether those impacts adversely affect campers' experiences. Although previous research has addressed these questions, much is limited by the inclusion of atypical subjects (students or interest group members), use of hypothetical questions, leading survey language (such as "destruction of vegetation"), or methods that prime respondents to attend to impacts out of context (photos or verbal descriptions). We agree with Beaulieu and Schreyer (1985) that open-ended questions presented in the wilderness setting itself provide a more valid assessment.

The sites included in this study were significantly altered by human use, and if visitors are to notice and be bothered by impacts, this is a place where that should happen. Impacts varied in severity and extent, although overall conditions were quite degraded compared to other parks and wilderness areas. Mean campsite size in our study (approximately 150 m^2) was large compared to sizes measured at Isle Royale National Park (68 m^2), Shenandoah National Park (37 m^2), and high-use destinations in Alpine Lakes Wilderness (70-100 m^2) and Three Sisters Wilderness (70-170 m^2) (Cole, Watson, Hall, & Spildie, 1997; Farrell & Marion, 1998; Williams & Marion, 1995). Mean area of vegetation loss in our study was also substantially larger than areas recorded at Caney Creek, Upper Buffalo, Hercules Glades, Garden of the Gods, Eagle Cap and the Grand Canyon Wilderness areas (Cole, 1986a, 1986b; McEwen, Cole, & Simon, 1996). Mean mineral soil exposure was greater in our study than measured at Delaware Water Gap National Recreation Area (Marion & Cole, 1996), and the mean number of felled and scarred trees on campsites in our study was more than the numbers recorded at Great Smoky Mountain National Park and at the Boundary Waters Canoe Area (Marion & Leung, 1997; Marion & Merriam, 1985). In Mount Jefferson itself, managers have established standards limiting the devegetated core of sites to 400 ft^2 and tree damage to minimal levels (i.e., no felled trees). Most sites in this study exceed those standards and are considered managerially unacceptable.

How Do Campers Evaluate Impacts?

The main impacts observed were reductions in vegetation cover, compacted soils, and chopped or felled trees. Each of these impacts was perceptually salient in contrast to the dense surrounding vegetation. Interestingly, visitors did not mention the size of campsites, a factor typically very important in management assessments. (Of course, we do not know if this represents a failure to mention versus a failure to perceive. Nevertheless, the preponderance of comments referred to reductions in the amount of vegetation cover, rather than the areal extent of loss.)

Although it is difficult to draw firm conclusions from these brief interviews, it appears that the functionality of sites is of paramount importance to wilderness campers. Even these highly altered sites do not appear to be aesthetically displeasing to most current users. Indeed, only one respondent described and evaluated impact conditions as being inconsistent with desired experiences. Many more found the impacts to create comfortable, attractive campsites. Of course, enjoying a site may be different from considerations of appropriate conditions in *wilderness*. Other research has shown that wilderness visitors are unaware of many provisions of the Wilderness Act and often don't know when they are in wilderness as opposed to another type of land (Kendra & Hall, 2000). It is possible, indeed likely, that the campers interviewed in this study know little about wilderness and therefore did not base their answers on some informed notion about acceptable conditions in wilderness.

Specific evaluations were usually qualified on the basis of context: the context of use levels or of the surrounding environment or landscape. The relativity of judgments should not be surprising. Humans rarely have absolute standards, and opinion research has repeatedly demonstrated that context and temporally salient beliefs influence attitudes expressed (Eiser, Reicher, & Podpadec, 1993; Sudman, Bradburn, & Schwarz, 1996; Tourangeau, Rasinski, Bradburn, & D'Andrade, 1989). Although the technical, uniform standards employed by managers in Mount Jefferson Wilderness (e.g., 400 ft^2 of bare ground is acceptable but 401 is not) appear to be blind to the contextual factors of use or larger landscapes, even these reveal underlying values and contextually-dependent elements. For example, trails are accepted, even though they may contain cumulatively far more bare ground than a handful of campsites. In the case of campsites, the bare ground is a "problem" in need of correction; in the case of trails it is simply unquestioned. The problem arises when the managerial standards are promoted as unchallenged and obviously "right," at the same time that public values are dismissed or demeaned.

An important element revealed in interviews was that the intentionality of the act that creates impacts appears to be important in its evaluation. Litter and tree damage are clearly avoidable and intentional. Visitors react

negatively to these impacts, because they are taken as a sign of disrespect or care for the environment (Nassauer, 1995). From a manager's perspective this implies that such impacts might be given priority as indicators of experience quality over the types of impacts that visitors do not perceive. This issue was not the focus of our research, so conclusions are tentative; the issue deserves further research.

How Might Campers and Managers Differ?

Respondents were able to assign ratings to impacts, as they are often asked to do on written, forced-choice questionnaires. On average, these ratings were positive and entirely independent of the magnitude of impacts. The lack of relationship between measurements and campers' ratings may have emerged because individuals used different decision rules than managers. To one, a large site may be fine because it will recover, or because it allows comfortable use. To another, a small site may be bad because most of the vegetation is gone. Managers use strict, limited, and consistent decision rules in forming their judgments; visitors apparently do not. Wilderness managers are trained to perceive and minimize impacts. Bureaucratic processes including training, adoption of consistent methodologies, and promulgation of regional standards, can lead to a certain level of consistency and stringency of evaluation within the managerial culture. Managers should be wary of assuming that visitors will share these perceptions.

Implications for Managers

If visitors accept, even desire, "impacts" at wilderness campsites, what does this mean for wilderness management? One response, is that the public is uneducated about the special nature of wilderness, and therefore should not be allowed to override or counter professional judgments. This stance effectively eliminates the public's role in shaping management. Alternatively, some have argued that management should incorporate public opinion in management but should give preference to purists (who are defined as holding values akin to managers' interpretations of the Wilderness Act), regardless of whether they dominate the population of wilderness users. Many, if not most, wilderness users have little or no awareness of the Wilderness Act and its provisions, and their views would not be considered legitimate input according to this stance. Perhaps, with greater knowledge, such users might come to see impacts as do managers. However, the same users love wilderness, define wilderness essentially the way the Wilderness Act does (large, remote, unpopulated areas where natural processes operate), and feel that they have wilderness experiences in places such as Mt. Jefferson. Managers must be very cautious if they choose to tell visitors that they are not having the type of experiences visitors themselves believe they are having. The interviews conducted in this study, albeit limited in number and perhaps representative only of users who go to popular areas, suggest that most do not feel campsite impacts have the negative effect on experiences that some managers have believed occur.

Campers' perceptions of ecological impacts differed greatly from the judgments of conditions that managers would form on the basis of our condition assessments. Campers cannot, therefore, provide managers with accurate objective information about ecological impacts, as defined by recreation ecologists. Conversely, management standards such as those adopted in Mt. Jefferson Wilderness do not match the "typical" visitors' assessment of conditions. In the context of planning and management frameworks (e.g., the Limits of Acceptable Change), about the same number of campers will perceive the most impacted campsite conditions to be acceptable as will accept lightly impacted sites. This suggests that it will be difficult to arrive at consensus about standards for indicators related to vegetation, soil, and tree conditions.

If visitors and managers differ in their perception and evaluation of impacts, as was the case in this study, managers could encounter active resistance or mere uninformed oversight when promoting site choice behaviors or implementing policies. Education programs could be designed to explain the potential ecological, social and managerial significance of campsite impacts to campers. Increased awareness about campsite ecological impacts might then result in increased interest in impact mitigation. Findings from landscape setting and campsite preferences studies have indicated that—at least in the abstract—people are concerned about human-related alteration of natural environments, and that concern might be extended to include campsite impact management. However, the findings here suggest a large gap between visitor perceptions and managerial evaluations, and therefore education would not be simple or straightforward.

Information about impact perceptions and evaluations from campers, recreation ecologists and mangers are all useful and necessary components of effective campsite management programs. Managers are charged with carrying out diverse policy directives. One of these is maintaining experience quality. Our findings suggest that—within the range of impacts studied here managers' attention to reducing impacts for the purpose of enhancing experiences may be misplaced. However, they may choose to address and minimize impacts to meet resource protection mandates, to ensure visitor safety, and to prevent long-term management costs. The divergence between campers' and managers' perspectives and goals suggests that the management challenge will be considerable.

References

Absher, J. D., McAvoy, L. H., Burdge, R. J., & Gramann, J. H. (1988). Public and commercial managers predicting recreationist opinions. *Journal of Park and Recreation Administration, 6,* 66-77.

Anderson, L. M. (1981). Land use designations affect perception of scenic beauty in forest landscapes. *Forest Science, 27*(2), 392-400.

Balling, J. D., & Falk, J. H. (1982). Development of visual preference for natural environments. *Environment and Behavior, 14*(1), 5-28.

Beaulieu, J. T., & Schreyer, R. (1985). Choices of wilderness environments—Differences between real and hypothetical choice situations. In Stankey, G. H. & McCool, S. F. (Eds.), *Proceed-*

ings—Symposium on recreation choice behavior (pp. 38-45) (General Technical Report INT-184): USDA Forest Service.

Bourassa, S. C. (1990). A paradigm for landscape aesthetics. *Environment and Behavior, 22,* 787-812.

Brown, P. J., & Shomaker, J. H. (1974). *Final report on criteria for potential wilderness campsites* (Supplement No 32 to 12-1-204-3). Logan, UT: Utah State University, Institute for Study of Outdoor Recreation and Tourism.

Brunson, M. (1992). Professional bias, public perspectives, and communication pitfalls for natural resource managers. *Rangelands, 14*(5), 292-295.

Brunson, M., & Shelby, B. (1990). A hierarchy of campsite attributes in dispersed recreation settings. *Leisure Sciences, 12,* 197-209.

Clark, R. N., & Stankey, G. H. (1986). *Site attributes—A key to managing wilderness and dispersed recreation.* Paper presented at the Proceedings—National Wilderness Research Conference: Current Research.

Cole, D. N. (1986a). *Ecological changes on campsites in the Eagle Cap Wilderness, 1979 to 1984* (Research Paper INT-368): USDA Forest Service, Intermountain Research Station.

Cole, D. N. (1986b). Recreational impacts on backcountry campsites in Grand Canyon National Park, Arizona, USA. *Environmental Management, 10*(5), 651-659.

Cole, D. N. (1989a). *Area of vegetation loss: A new index of campsite impact* (Research Note INT-389): USDA Forest Service, Intermountain Research Station.

Cole, D. N. (1989b). *Wilderness campsite monitoring methods: A sourcebook* (General Technical Report INT-259): USDA Forest Service, Intermountain Research Station.

Cole, D. N., & Benedict, J. (1983). Wilderness campsite selection—What should users be told? *Park Science, 3*(4), 5-7.

Cole, D. N., Watson, A. E., Hall, T. E., & Spildie, D. R. (1997). *High-use destinations in three wildernesses: Social and biophysical impacts, visitor responses, and management options* (Research Paper INT-RP-496): USDA Forest Service, Intermountain Research Station.

Cronn, R., Watson, A. E., & Cole, D. N. (1992). *Three Sisters, Mt. Jefferson, and Mt. Washington Wildernesses: A survey of Oregon wilderness visitors* (unpublished report): USDA Forest Service, Intermountain Research Station.

Eiser, J. R., Reicher, S. D., & Podpadec, T. J. (1993). What's the beach like? Context effects in judgements of environmental quality. *Journal of Environmental Psychology, 13,* 343-352.

Farrell, T. A., & Marion, J. L. (1998). *An evaluation of camping impacts and their management at IsleRoyale National Park* (Research/Resource Management Report). Blacksburg, VA: USGS Patuxent Wildlife Research Center, Cooperative Park Studies Unit.

Freimund, W. A., Anderson, D. H., & Pitt, D. G. (1996). Developing a recreation and aesthetic inventory framework for forest planning and management. *Natural Areas Journal, 16*(2), 108-117.

Greider, T., & Garkovich, L. (1994). Landscapes: The social construction of nature and the environment. *Rural Sociology, 59*(1), 1-24.

Hammitt, W. E., & Cole, D. N. (1998). *Wildland Recreation: Ecology and Management* (2nd ed.). New York: John Wiley and Sons.

Heberlein, T. A., & Dunwiddie, P. (1979). Systematic observation of use levels, campsite selection and visitor characteristics at a high mountain lake. *Journal of Leisure Research, 11*(4), 307-316.

Herzog, T. R. (1985). A cognitive analysis of preference for waterscapes. *Journal of Environmental Psychology, 5,* 225-241.

Hodgson, R. W., & Thayer, R. L. (1980). Implied human influence reduces landscape beauty. *Landscape Planning, 7,* 171-179.

Kendra, A. M., & Hall, T. E. (2000). Is there a shared American cultural model of "Wilderness"? Evidence from surveys of recreational visitors at three sites. In McCool, S. F., Cole, D. N., Borrie, W. T. & O'Loghlin, J. (Eds.), *Wilderness science in a time of change conference—Volume 3: Wilderness as a place for scientific inquiry* (pp. 188-195) (Proceedings RMRS-P-15-VOL-3). Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Kennedy, J. J. (1985). Viewing wildlife managers as a unique professional culture. *Wildlife Society Bulletin, 13*(4), 571-579.

Knudson, D. M., & Curry, E. B. (1981). Campers' perceptions of site deterioration and crowding. *Journal of Forestry, 79,* 92-94.

Kroh, D. P., & Gimblett, R. H. (1992). Comparing live experience with pictures in articulating landscape preference. *Landscape Research, 17*(2), 58-69.

Leung, Y.-F., & Marion, J. L. (2000). Recreation impacts and management in wilderness: A state-of-knowledge review. In Cole, D. N., McCool, S. F., Borrie, W. T. & O'Loughlin, J. (Eds.), *Wilderness science in a time of change conference—Volume 5: Wilderness ecosystems, threats, and management* (pp. 23-48) (Proc. RMRS-P-15-VOL-5). Ogden, UT: USDA Forest Service, Rocky Mountain Research Station.

Lucas, R. C. (1990). *How wilderness visitors choose entry points and campsites* (Research Paper INT-428): USDA Forest Service, Intermountain Research Station.

Magill, A. W. (1994). What people see in managed and natural landscapes. *Journal of Forestry, 92*(9), 12-16.

Marion, J. L. (1991). *Developing a natural resource inventory and monitoring program for visitor impacts on recreation sites: A procedural manual* (Natural Resources Report NPS/NRVT/NRR-91/06): Cooperative Park Studies Unit, National Park Service.

Marion, J. L., & Cole, D. N. (1996). Spatial and temporal variation in soil and vegetation impacts on campsites. *Ecological Applications, 6*(2), 520-530.

Marion, J. L., & Leung, Y.-F. (1997). *An assessment of campsite conditions in Great Smoky Mountains National Park* (Research/Resources Management Report). Blacksburg, VA: USGS Patuxent Wildlife Research Center, Cooperative Park Studies Unit.

Marion, J. L., & Merriam, L. C. (1985). Predictability of recreational impact on soils. *Soil Science of America Journal, 49,* 751-753.

Marion, J. L., Roggenbuck, J. W., & Manning, R. E. (1993). *Problems and practices in backcountry recreation management: A survey of National Park Service managers.* Denver, CO: USDI National Park Service, Natural Resources Publication Office.

Martin, S. R., McCool, S. F., & Lucas, R. C. (1989). Wilderness campsite impacts: Do managers and visitors see them the same? *Environmental Management, 13*(5), 623-629.

McCool, S. F., Benson, R. E., & Ashor, J. L. (1986). How the public perceives the visual effects of timber harvesting: An evaluation of interest group preferences. *Environmental Management, 10,* 385-391.

McEwen, D., Cole, D. N., & Simon, M. (1996). *Campsite impacts in four wildernesses in the south central United States* (Research Paper INTxxxd): USDA Forest Service, Intermountain Research Station.

Nassauer, J. (1995). Messy ecosystems, orderly frames. *Landscape Journal, 14,* 161-170.

Purcell, A. T. (1992). Abstract and specific attritubutes and the experience of landscape. *Journal of Environmental Management, 34,* 159-177.

Purcell, A. T., Lamb, R. J., Peron, E. M., & Falchero, S. (1994). Preference or preferences for landscape? *Journal of Environmental Psychology, 14,* 195-209.

Roggenbuck, J. W., Williams, D. R., & Watson, A. E. (1993). Defining acceptable conditions in wilderness. *Environmental Management, 17*(2), 187-197.

Shelby, B., Vaske, J. J., & Harris, R. (1988). User standards for ecological impacts at wilderness campsites. *Journal of Leisure Research, 20*(3), 245-256.

Simon, H. A. (1959). Theories of decision-making in economics and behavioral science. *American Economic Review, 49*(3), 253-283.

Stankey, G. H. (1973). *Visitor perception of wilderness recreation carrying capacity* (Research Paper INT-142): USDA Forest Service, Intermountain Research Station.

Stohlgren, T. J. (1986). *Variation of vegetation and soil characteristics within wilderness campsites. In Proceedings—National wilderness research conference: Current research* (General Technical Report INT-212): USDA Forest Service, Intermountain Research Station.

Sudman, S., Bradburn, N. M., & Schwarz, N. (1996). *Thinking about answers: The application of cognitive processes to survey methodology.* San Francisco: Jossey-Bass.

Tourangeau, R., Rasinski, K. A., Bradburn, N., & D'Andrade, R. (1989). Carryover effects in attitude surveys. *Public Opinion Quarterly, 53,* 495-524.

Vining, J., & Ebreo, A. (1991). Are you thinking what I think you are? A study of actual and estimated goal priorities and decision preferences of resource managers, environmentalists, and the public. *Society and Natural Resources, 4,* 177-196.

Washburne, R., & Cole, D. N. (1983). *Problems and practices in wilderness management: A survey of managers* (Research Paper INT-304): USDA Forest Service, Intermountain Research Station.

Wellman, J. D. (1987). Foresters' core values and cognitive styles: Issues for wildland recreation management and policy. *Policy Studies Review, 7,* 395-403.

Wellman, J. D., Dawson, M. S., & Roggenbuck, J. W. (1982). Park managers' predictions of the motivations of visitors to two National Park Service areas. *Journal of Leisure Research, 14,* 1-15.

White, D. D., Hall, T. E., & Farrell, T. (2001). Influence of ecological impacts and other campsite characteristics on wilderness visitors' campsite choices. *Journal of Park and Recreation Administration, 19*(2), 83-97.

Williams, P. B., & Marion, J. L. (1995). *Assessing campsite conditions for Limits of Acceptable Change management in Shenandoah National Park.* Blacksburg, VA: USDI National Biological Service, Cooperative Park Studies Unit.

Journal of Leisure Research
2001, Vol. 33, No. 3, pp. 251-271

Respondent Self-Assessment of Research on Crowding Norms in Outdoor Recreation

Robert E. Manning, Peter Newman, William A. Valliere, Ben Wang, and Steven R. Lawson
School of Natural Resources, University of Vermont, Burlington, VT

This study explores the validity of measuring crowding norms in outdoor recreation through the use of respondent self-assessment techniques. Review of the literature on crowding norms, and the related topic of contingent valuation, suggests a number of theoretical and methodological issues that can influence validity. Based on this literature review, measures of respondent self-assessment of crowding norms research are developed and applied at multiple sites within three national parks. Study findings suggest that most respondents are confident in their ability to understand and answer questions on crowding norms, and support the use of such data by park managers. Few differences in crowding norms were found between respondents who were confident in their answers and those who were less confident. These findings, along with findings from other, related studies, offer some support for the validity of measures of crowding norms in outdoor recreation, and suggest research approaches to maximize validity.

KEYWORDS: *Crowding; crowding norms; validity; national parks*

Introduction

Indicators and standards of quality have emerged as integral elements of contemporary frameworks in park and outdoor recreation management. Indicators of quality are measurable, manageable variables that help define the quality of the visitor experience. Standards of quality define the minimum acceptable condition of indicator variables. Once indicators and standards of quality are formulated, indicator variables can be monitored and management action taken to ensure that standards of quality are maintained. Indicators and standards of quality play a central role in contemporary park and outdoor recreation management frameworks such as Limits of Acceptable Change (LAC) (Stankey et al., 1985), Visitor Impact Management

Address correspondence to: Dr. Manning, School of Natural Resources, 356 George D. Aiken, Center, University of Vermont, Burlington, VT 05405, (802) 656-3096, rmanning@nature.snr.uvm.edu.

The studies reported in this paper were partially funded by the U.S. National Park Service and the McIntire-Stennis Forestry Research Program. The authors gratefully acknowledge the contributions of several people in the studies reported in this paper. David Lime, University of Minnesota, Wayne Freimund, University of Montana, and Karen McKinlay-Jones, Arches National Park, participated in the study at Arches National Park. William Stewart, University of Illinois, David Cole, Aldo Leopold Wilderness Research Institute, Jonathan Taylor, U.S. Geological Survey, and Martha Lee, Northern Arizona University, participated in the study at Grand Canyon National Park.