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# Visitor Use Density and Wilderness Experience: Proceedings

**Missoula, Montana  
June 1–3, 2000**



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## Abstract

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The workshop was convened to assess progress and offer further ideas regarding scientific contributions to (1) understanding relationships between visitor use density and wilderness experiences and (2) applying such knowledge to decisions about use limitation in wilderness and parks. The first paper provides an overview of the topic and the papers presented at the workshop. Subsequent papers include reviews of previous research, discussion of issues related to use limitation, exploration of the solitude concept and of visitor conflict, and explications of alternative research methodologies.

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Keywords: carrying capacity, recreation management, solitude, use limits, visitor density, wilderness experience, research methods

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**David N. Cole**

## **Preface**

The Visitor Use Density and Wilderness Experience Workshop was held at the Lubrecht Experimental Forest near Missoula, MT, in June 2000. The workshop was founded on the assumptions that (1) relatively low use densities are a fundamental desirable attribute of wilderness, (2) use limits are needed at least in some portions of the wilderness system, and (3) science can contribute to better decisions about use limits. Given these assumptions, the workshop focused on what science has contributed or could contribute to decisions about where limits are needed, what those limits should be, and on what they should be based. Answers to these questions depend, in turn, on understanding the nature of wilderness

experiences and the influence of use density (and related variables such as encounters) on both the nature and quality of experiences. Participants were invited to present the papers included in this proceedings, to discuss progress to date on these issues, and to suggest research needs.

Financial support for the workshop was provided by The Wilderness Institute, School of Forestry, University of Montana, and by the Aldo Leopold Wilderness Research Institute, Rocky Mountain Research Station, USDA Forest Service. In addition to those participants who presented and reviewed papers, we appreciate the contributions of other participants: Laurie Ashley, Chris Barns, Anne Hoover, Sue Matthews, Mike Patterson, Dave Parsons, Jack Potter, Chris Ryan, and Vita Wright.

**The Compilers**

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# **Section I.**

## **Overview of the Workshop**



# Use Density, Visitor Experience, and Limiting Recreational Use in Wilderness: Progress to Date and Research Needs

Wayne A. Freimund  
David N. Cole

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**Abstract**—Recent increases in demand have revitalized interest and controversy surrounding use limits and the effect of visitor density on wilderness experiences. A workshop held in Missoula, Montana, in June of 2000 addressed the potential for social science to contribute to understanding and managing increasingly populated wilderness conditions. Scientists identified progress in our understanding of use density impacts on the wilderness visitor. Management frameworks such as Limits of Acceptable Change have proven beneficial in assisting managers. Science has also advanced the ability to assess and interpret visitor opinion about use density. However, several limitations to our understanding and research needs emerged from this workshop. Contemporary visitor assessments have largely been constrained to current visitors of individual management units. Visitor opinion tends to focus on indicators rather than the actual experience of individuals. We need an improved understanding of the multidimensionality of the wilderness experience and how solitude is defined as one dimension of experience. Poor understanding of the impacts of use limits on visitor experiences and population dynamics is also a problem. The absence of information about visitors, at regional scales, poses problems to understanding how visitor populations are affected by use limits or why objections to limits are prevalent in some places and not others. To address these issues, the science community will need to be inclusive of additional research methods based on a broader suite of conceptual frameworks that can be integrated at multiple scales.

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## Introduction

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Wilderness means different things to different people. Virtually everyone would agree, however, that to be wilderness (in the context of public lands) a place must be relatively uncrowded. To use the particular words contained in the Wilderness Act, wilderness should provide “outstanding opportunities for solitude.” Wilderness need not be completely deserted. There can be other people around—just not too many. If there are too many, those visitors who desire solitude, privacy, opportunities for contemplation, and so

on, may have difficulty achieving these. Certainly, attributes other than uncrowdedness are also essential to wilderness. Relative naturalness, lack of development and modifications, for example, are also necessary for a place to be wilderness. Nevertheless, the density of recreation use is without question among the primary attributes of the wilderness setting.

As the population of the United States has increased, total recreation use of wilderness has increased, as has the density of recreation use in most wilderness areas. As early as the 1930s, a few people were expressing concern about overuse of wildlands and asking how much use wildlands could sustain (Sumner 1936). Recreation use of wilderness increased exponentially during the 1950s and 1960s. By the 1960s, both the social and ecological impacts of recreation use were being studied and the concept of recreation carrying capacity had been advanced. By the early 1970s, some wilderness areas began limiting recreation use. The first use limits were highly targeted. In 1972, boating use was limited on the Middle Fork and Main Salmon Rivers in what is now the Frank Church—River of No Return Wilderness and overnight use was limited at one popular lake basin (Rae Lakes) in Kings Canyon National Park. By 1973, use limits were more widespread. Use was limited on more rivers, throughout the backcountry of Yosemite and Kings Canyon National Parks, in the San Geronio and San Jacinto Wildernesses and at Aravaipa Canyon (a BLM area designated as wilderness in 1984). Outside the Western United States, use limits were imposed at Linville Gorge Wilderness in 1974 and within a few years in the Great Gulf and Boundary Waters Canoe Area Wildernesses and at Isle Royale National Park. By 1980, recreation use was limited in 23 areas that currently are designated as wilderness.

About the time wilderness managers began adopting use limits, recreation researchers began advising against the widespread implementation of use limits. Use limits were to be used only as a last resort (Hendee 1974). Arguments advanced against use limitation included the nonlinear relationship between amount of use and amount of impact and the potential to control impact in other ways (Lime and Stankey 1971). In the late 1970s, use dispersal was widely promoted as a strategy that might alleviate the need to limit use (Stankey and others 1976). By the early 1980s, as some of the problems with use dispersal emerged (Cole 1981), low-impact education was advanced as the means to avoid use limitation (Bradley 1979). Hope that use limits might be the exception rather than the rule was furthered by reports that wilderness use was no longer increasing (Lucas 1989).

By the late 1990s, the pendulum had swung back and management interest in use limitation is on the upswing

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again. It is now clear that wilderness recreation use is increasing (Cole 1996) and probably always will unless it is controlled. Activities that favor wildland settings (such as hiking, backpacking, cross country skiing) are increasing in popularity at the national level (Cordell and others 1997). Moreover, people are migrating to places with abundant outdoor recreational opportunities and natural scenery (Cordell 2000). Increased populations in close proximity to wildland resources will likely result in increased use levels.

Recreation impacts have spread across many wilderness areas over the past several decades (Cole 1993), despite increased attention to low-impact education. Crowding has increased greatly at popular wilderness destinations. Concern about day-users and their impacts, typically unmanaged in the past, have also increased. Many managers are considering limits on day-use and a few limits on day-use are already in place.

Lime and Buchman (1974), in a paper extolling the virtues of mandatory permits, noted that we were on the verge of instituting a system-wide wilderness permit system. That same year, Al Wagar (1974) stated “For wilderness, use limits are inevitable.” Two and a half decades later, permits are required and recreation use is limited in most National Park Service wilderness areas but in only a handful of the wilderness areas managed by other agencies. These other agencies have spent much of the past several decades trying to avoid these actions—hoping that increasing demand could be accommodated within an expanding wilderness system or on lands outside wilderness, and that impacts might be controlled by reducing *per capita* impacts. Increasingly, however, wilderness managers perceive the limits of these strategies and realize they may need to eventually limit use. Use density is increasing faster than *per capita* impacts are decreasing and, therefore without use limits, social and ecological impacts will increase endlessly.

Ironically, now that managers are seriously considering use limits again, public outcry against such limits has become more shrill and perhaps more widespread. Requirements for public involvement in management planning have increased, as have calls to base controversial management decisions on science. The implications of research are not always straightforward. For example, visitor studies in high-use wilderness destinations show that visitors encounter more people than they prefer but do not support the imposition of use limits at this time (Cole and others 1997). Should managers veto most visitors’ opinions about appropriate management prescriptions in order to provide preferred experiences? Or should they honor most visitors’ opinions about management, recognizing that the result will be experiences that differ from preferred experiences? How can science best inform management decisions related to use limits and wilderness experiences?

## An Example: Wilderness on the Mt. Hood National Forest, Oregon

Controversy surrounding management of three wilderness areas on the Mt. Hood National Forest illustrates the importance of these issues. All three of these wilderness

areas are located within a one to one-and-a-half-hour drive from the Portland metropolitan area. The Salmon-Huckleberry Wilderness is lightly used, with the exception of heavy day use along the Salmon River. The Hatfield Wilderness also receives relatively light use, except for the Eagle Creek trail corridor that leads to several lakes that are popular overnight destinations. In contrast, much of the Mt. Hood Wilderness is heavily used. Day use is particularly heavy at Ramona Falls—several easy miles from the trailhead. Moreover, Mt. Hood is one of the most frequently climbed mountains in the world. On an average weekend, more than 200 people per day summit Mount Hood *via* the South Climb route. On some days, over 400 people attempt the summit.

The Mt. Hood National Forest Land and Resource Management Plan, completed in 1990, adopted regional wilderness standards for total encounters per day, campsite encounters, and campsite conditions. In 1994, the Forest began a “Limits of Acceptable Change” (LAC) planning process for these wildernesses. As monitoring data became available it was clear that conditions were often out of compliance with these standards. Compliance was most problematic for the encounter standards and in the Mt. Hood Wilderness. In 1998, the Forest issued the first LAC Wilderness Protection Environmental Assessment. That document proposed a management alternative that would have cut use by as much as 90 percent on peak-season weekends both at day-hiking destinations such as Ramona Falls, and on the South Climb of Mt. Hood. Public outcry was profound and seemed to catch the Forest Service off guard.

Responses to the Mt. Hood proposal—and similar ones at places such as Alpine Lakes Wilderness outside Seattle—clearly show that wilderness advocates harbor diverse opinions about solitude, desirable wilderness experiences, and the place of use limitation. Some take what might be considered a traditional “purist” approach to use limitation. They support limits wherever increasing use threatens outstanding opportunities for solitude. Many of these people believe that wilderness should be managed according to the “nondegradation” principle. This principle posits that wilderness conditions at the time of designation provide a minimally acceptable standard. Wilderness should be managed such that the quality of conditions (including opportunities for solitude) does not decline at all over time.

Other wilderness advocates, however, state that solitude is only one desirable quality of a wilderness experience and it is not always expected. They point out that the Wilderness Act mandates “outstanding opportunities for solitude *or* (emphasis added) a primitive and unconfined type of recreation.” One could have a high quality wilderness experience—the trip of a lifetime—even without experiencing an outstanding degree of solitude. Many note that it is more important for them to have access to places like Ramona Falls and the South Side Climb than to have solitude on every trip. They note that—if they want solitude—they can find a place or a time where they can find it. Even in a popular area, on a popular weekend, solitude can be found simply by leaving the trail. Outstanding opportunities need not be provided on every acre of wilderness at all times. Many suggest that they would support use limits needed to maintain the ecological integrity of the wilderness but not in order to provide solitude everywhere at all times. Ira Spring,

a longtime wilderness advocate from the Seattle area, went so far as to work with Senator Slade Gorton to get language written into the Forest Service's Appropriations Bill advising against the use of "subjective" solitude standards in wilderness.

At Mt. Hood, Alpine Lakes, and elsewhere, the Forest Service is reconsidering their wilderness recreation policies in the light of this experience and the divergent opinions of wilderness advocates. The Mt. Hood National Forest has issued a second Environmental Assessment with a new preferred alternative. It strives for a compromise between divergent opinions. This alternative seeks to be responsive to the solitude mandate by emphasizing the preservation of solitude in the portions of wilderness that currently receive little use. In popular places, however, the focus of management efforts is on avoiding excessive resource damage and minimizing the need to curtail use of these places. Overnight use will need to be limited immediately, based on the number of existing acceptable campsites; but day use might be allowed to increase further. This is a 180 degree change from early use limitation programs with highly targeted limits applied to just the most highly used locations. It reflects recognition that such programs can displace use and problems, as well as the philosophy that all wilderness acres need not be managed to the same standard.

Is this appropriate? The wilderness management watchdog group, Wilderness Watch, doesn't think so. They have appealed the new plan. Even with this new direction, use will still need to be limited—but on what basis? Should we listen to visitors and attach more credence to ecological integrity as a limiting factor than to social conditions? These questions are not only applicable to popular places. Many lightly used wildernesses, still offering outstanding solitude and near-pristine conditions, are being discovered and used more frequently. How can we decide whether or not to limit use of low-density wilderness to keep it that way—as was done, for example, on the Selway River? More broadly, how can wilderness stewardship be implemented in a more systematic, less incremental way? And how can social science contribute to improved stewardship?

## The Visitor Use Density and Wilderness Experience Workshop

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To address the role of social science in informing decisions about appropriate visitor use densities and the implementation of use limits, a workshop was held in Missoula, Montana, in June of 2000. The workshop was founded on the assumptions that (1) relatively low use densities are a fundamental desirable attribute of wilderness, (2) use limits are needed at least in some portions of the wilderness system, and (3) science can contribute to better decisions about use limits. Given these assumptions, the workshop focused on the question of what science has and can contribute to decisions about where limits are needed, what those limits should be and on what they should be based? Answers to these questions depend, in turn, on understanding the nature of wilderness experiences and the influence of use density (and related variables such as encounters) on both

the nature and quality of experiences. Participants were invited to present the papers included in this proceedings, discuss progress to date on these issues and to suggest research needs. It was noted that this focus on use limits does not mean that use limits are the only or even among the more useful wilderness recreation management techniques.

## Use Density and Use Limit Research: Contributions to Date

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### From Carrying Capacity to Tradeoffs

Several papers described early research on carrying capacity and use density, as well as experience with setting use limits. In an historical review, Cole describes how much of the work on carrying capacity stemmed from the early conceptual work of Wagar (1964). Following Wagar's lead, social research moved from descriptive studies to assessments of relationships between use levels, setting (social and biophysical) attributes and experiential quality. Conceptually, the attempt to borrow carrying capacity from range sciences was limited in success due to the difficulty of adjusting for human values using a purely technical calculation. In his paper, Manning describes recent progress in assessing appropriate use levels based on the normative approach. This can be viewed as a shift from technical calculation to making informed judgments. By using the term "informed judgment," Manning draws attention to the fact that in making decisions about appropriate use levels, managers must reconcile numerous and often contested human values.

The Limits of Acceptable Change (LAC) process (Stankey and others 1985) provided a technical framework within which to make use density decisions. Complimentary approaches to defining acceptable levels of use density have also been developed by the National Park Service, The National Park and Conversation Association and Parks Canada. Central to each of these processes are indicators and standards developed for setting attributes, including attributes such as visitor density that seem to influence visitor experiences. When conditions approach or are beyond standard, management actions are invoked to bring conditions into compliance with standards. Various forms of use limits are often among those designed actions.

Despite the existence of such technical frameworks, defining human acceptability and setting standards remains a challenge to managers. Frequently, managers turn to the research community for help with this challenge. In early research, scientists described the relationship between (1) visitor evaluations of the "acceptability" of the conditions they encountered, and (2) visitor reports of how many people they encountered. From this early focus on description, research approaches added an evaluative dimension. A social norm approach, described in Manning's paper, has been dominant. At the heart of the norm concept is the notion that visitors share, on some level, agreement on what managers "ought" to provide in a setting and to what extent they should impose sanctions (such as use limits) to ensure those conditions. Recently, research approaches are evolving in an attempt to assess how visitors make personal tradeoffs between acceptable numbers of

encounters and their ability to gain access to wilderness. Ultimately, while the tradition of evaluative assessment can assist managers in understanding how visitors may be affected by a use limit decision, any decision must still be based on the judgment of managers.

## Research on Limiting Use

During the 1970s and 1980s, a parallel path of research and conceptual development explored the notion of perceived freedom and unconfined recreation. This work focused on the concept of obtrusiveness and the principle of keeping management presence as indirect as possible. The influence of education appeals, interpretive programs, and environmental attitudes was the focus of many of these studies. This focus on unobtrusive measures helps explain the reduced popularity of the use limit policies that had been commonplace in the 1970s.

Papers by Hall and by McCool (this proceedings) point out some further concerns about the implementation and efficacy of use limits. First, the concept of solitude has become more highly contested. Second, the wisdom of distributing use is being challenged. These two concerns are especially intertwined in the management of high use places in wilderness such as those on the Mt. Hood Forest. Should solitude be a mandated setting condition on all areas of each Wilderness? What can research on solitude offer to the discussion?

Contemporary wilderness managers face a number of solitude specific questions. Should some forms of solitude be sacrificed in high use areas of wilderness to safeguard the integrity of the remaining areas? Should there be a solitude opportunity spectrum? In their paper, Hollenhorst and Jones argue that existing research on solitude is not definitive enough to offer much guidance on these questions. They assert that the typical social-spatial (encounters within time or place) operationalization of solitude is an overly simplistic view of the concept. To support this contention, they look to the conflicting explanations of solitude within the existing wilderness literature. There they find interpretations of solitude related to norms, attitudes, desired privacy and involvement with the place or experience. They recommend that researchers “turn their gaze away from crowding and encounter norms towards the visitor’s capacity to realize solitude.” By tracing the humanist roots of solitude, they identify a moral rather than transcendental underpinning to the concept. They contend that solitude is a complex construct that is deeply internal to the Wilderness visitor. If so, perhaps we have underestimated the visitor’s ability to attain outstanding opportunities for solitude even within areas of high use density.

Moreover, providing opportunities for solitude is not the only experiential goal of wilderness managers. In this proceedings, Watson discusses research related to visitor conflict. Substantial visitor conflict reduces the quality of wilderness experiences at least as dramatically as loss of solitude. Moreover, conflict may often be related to visitor densities, suggesting the desirability of manipulating visitor densities to keep conflict to acceptable levels.

In summary, while social science has progressed in developing understanding of the wilderness visitor, the research foci have largely been constrained by mandates in the Wilderness Act that call for “solitude” and “unconfined

recreation.” Solitude has generally been operationalized as encounter levels and considered within the framework of an LAC type process. Studies of unconfined recreation have utilized the concepts of obtrusiveness and illustrated the importance of education and persuasion. Research approaches have evolved and gained sophistication, moving from descriptive studies to studies that are theoretically grounded and predictive. Use limits themselves, however, have had relatively little direct study.

## Research Needs

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Adoption of the Limits of Acceptable Change framework marked a movement from managing numbers of people to managing setting quality. The diffusion of LAC and subsequent frameworks has strongly influenced research related to visitor density and use limitation. At the workshop, we identified three problems with the way research has approached the issues of visitor density and use limitation within the LAC framework. First, research has focused primarily on questions related to defining indicators and standards rather than to questions of implementing management actions. Second, the unit of analysis is usually a single park or wilderness and confined to the current visitors of that area. Third, research has tended to focus on indicators or surrogates for the experience rather than the wilderness experience itself. These limitations point to some critical research needs.

## Research on the Consequences of Use Limits

In addition to research on defining desirable or acceptable conditions, indicators and standards, research on the consequences of use limits is needed. In his paper, McCool points out several concerns reflecting inadequate research. First, the distributional consequences of use limits are unknown. Limiting use in one area may shift the burden to other areas that do not have the capacity to manage it. Are use limit policies a sledge hammer approach to solving impact problems? Do they treat symptoms or fundamental problems? The research community should evaluate the before and after effects of policy changes. For example, the current changes at the Mt. Hood or Three Sisters Wilderness provides a opportunity for testing hypotheses about the distributional affects of use limits or the lack thereof.

As Hall points out in her paper, use limits favor certain experiences. We do not know who is affected by use limits, to what extent or for how long. Many of the use limits established in the 1970s were based more on efficiency than equity. While efficiency is an important component of management, equity is a more important criterion for much of the public. The need to understand equity effects points out a need to determine how best to segment the population of wilderness visitors. Visitor segmentation raises many questions for the research community. Can people be segmented? Do we allow visitors to self identify? Do we marginalize people by segmenting them? Should we use the notion of purism or resource dependency to determine segmentation? Are there legitimate users of wilderness who are not purists? To what extent is the desire for

solitude a worthy means of segmenting visitors? If so, is solitude defined differently by different groups of people? We must also provide processes for everyone to make their voice heard. Is there a difference between who is listened to and who is managed for?

## Research at Larger Scales

As just noted, imposing use limits implicitly favors some visitors over others. Depending on the situation, favoring may be geographic (locals versus tourists), financial (those who can afford access via outfitted groups), philosophical (those in closest line with the intention of the Wilderness Act), or political (those with the greatest influence on the planning process). As Cole points out in his paper, favoritism can be reduced if planners and managers can provide a diversity of opportunities. In such a system, different tastes are catered to in different places. This demands research and planning at scales larger than the norm.

Current area-by-area approaches provide insights into the preferences of current visitors. However, if every place is managed for the preferences of the average current visitor we will tend to provide relatively homogeneous recreational opportunities. We need to conduct research that will help managers of individual parks or wildernesses make decisions about standards and appropriate experiences that will maximize the benefits provided by a regional system of parks and wildernesses.

This type of research and planning will be challenging. Institutional incentives are typically directed toward the single unit that is a manager's unit of responsibility. We do not know the appropriate size for analysis or the properties of the larger spatial systems that should be studied. We are unaware of how visitors define spatial systems. Attention should be given to how research on constraints, incentives, place attachment, and conflict could inform our understanding of these systems.

## Research on the Multiphasic Wilderness Experience

In their paper, Borrie and Birzell suggest that the dominant approaches to understanding wilderness experiences have followed the traditions of satisfaction, importance-performance, and benefits-based assessment of the experience. They criticize the tendency for these approaches to reduce experiences to a select number of scale items that depict motives, setting attributes or experience evaluations. Assessments of central tendency remove the individual's perspective. Survey approaches trend to be one-shot case studies that lose the dynamic (temporal and spatial) nature of the experience.

While these dominant reductionistic, group centered and reflective research methodologies have produced manageable measurement techniques, they are less helpful in producing an understanding of fundamental constructs of the wilderness experience, such as solitude. At a minimum we want to know what's lost by a management decision. A better understanding of the values that flow from wilderness experiences will assist in monitoring change. In the Mount Hood example, where much of the public has embraced the

concept of high use zones, we do not know if the importance of solitude has decreased, its definition has changed, or if there has been a substantial change in the people visiting the place. We do not know if encounter levels act as meaningful surrogates for the complex assessment of solitude offered by Hollenhorst and Jones. Does this vary by time of day, point in the trip, or from trip to trip?

To address these issues, we need more and different research focused on the "wilderness experience." This is a way to isolate what's unique about the "wilderness" as opposed to a "good" experience. What are the phases of contemporary wilderness experience and is there something unique about the experience that could be included in instruments to help understand dynamics across places and time? With a better understanding of the experience, a better understanding of the tradeoffs associated with use limits will be developed.

In their paper, Borrie and Birzell describe techniques available for this type of research. Generally qualitative in method, these approaches focus on particular moments in people's lives. People's voices are much more clearly heard and the meanings they attach to wilderness can be fleshed out. Properly collected, qualitative data can provide a deeper understanding of the wilderness experience than quantitative data.

There are several methodological obstacles to measurement of the experience. Qualitative interviews are limited by the respondent's vocabulary. There are also challenges in the degree to which results can be generalized and incorporated into management decisions. While we can get at the nature and character of the experience by talking to many people about their experience, we are unsure of the monitoring techniques that would work with this level of individual analysis. What are the characteristics of a qualitative monitoring system? Instead of focusing on the magnitude of quality, it is also important to look at responses over time and note changes in experience. How would we know if the experience has qualitatively changed? How do we best confront the relative subjectivity of various research methodologies?

## Conclusions

This workshop offered the opportunity to reflect on a large body of research and ask what we are currently contributing as scientists to understanding visitor use density and wilderness experience and the application of such understanding to decisions about use limits. We recognized that with some exceptions, research relative to use limits has occurred in distinct eras. The first era was descriptive and occurred coincidentally with the aggressive application of use limit policies in the late 1960s and 1970s. Research at the time was largely focused on issues of efficiency of visitor redistribution. Recreation research in general sought an improved understanding of general wildland experience motives. In the next era, research focused on the parallel paths of defining acceptable conditions and understanding unconfined experiences. Much of this research was organized by the need to define indicators and standards within LAC type frameworks. Work on unobtrusive methods encouraged management to be mindful of the conflicts its presence could

create. During the 1980s and 1990s, the application of use limits was less common.

The sentiment of our workshop was that it is timely to embark on another era of research. Research should move beyond the spatial and temporal scales of past research and embrace the complexity of regional analysis. Tools are now available to facilitate understanding the connectivity of wildland resources in a regional context. Computer programs such as travel pattern modeling and geographic information systems can be combined with survey research to assess relationships among areas with varied policies on use density. This research should be complimented by studies of organizational barriers to regional thinking.

Similarly, increased attention should be given to understanding the individual wilderness visitor. For efficiency sake, models have been adopted to simplify the understanding of visitor experiences. The scientific and management community will benefit from the increased understanding of the experience that is emerging from hermeneutic and other experienced-based research approaches. With work, the results of these types of studies can be incorporated into management applications, complimenting the types of information being generated at other scales of analysis.

Finally, those involved in studying the social dynamics of wilderness must identify a framework for organizing a multiscale research agenda. By combining the strengths of diverse social sciences such as cultural geography, sociology, political science, and social and environmental psychology, an integrated understanding of issues as complex as those that influence use limit policy will be developed.

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**Section II.**  
**Invited Papers**





# Visitor Use Density and Wilderness Experiences: A Historical Review of Research

David N. Cole

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**Abstract**—Considerable research on the relationship between use density and wilderness visitor experiences has been conducted over the past four decades. This paper focuses on early work on this topic, tracing the development and languishing of different research themes suggested by this early work. Research—particularly that conducted in the normative tradition—has contributed useful information to managers grappling with the imposition of use limits. However, traditional research approaches need to be supplemented with research conducted at both smaller and larger scales. Research on the opinions of communities of onsite recreation users needs to be complemented by research capable of better articulating the nature of the recreation experience, differentiating between subpopulations of users, and placing individual protected areas within larger regional contexts.

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For a long time, researchers have been interested in the relationship between use density and visitor experiences and the policy implications of this relationship. This theme was among the first explored by social scientists interested in recreation and the resultant literature is large. Some of this research is primarily conceptual in nature (for example, much of the work on carrying capacity); some of it is empirical. Much of it is applied, being driven by a desire to help managers make better decisions about appropriate use levels in recreation areas.

This paper provides an historical review. I begin with early writings on the concept of carrying capacity and principles to guide the management of use density. A section on empirical research follows. Prominent themes are identified in early research—some of which have been well developed by subsequent research and some of which have been largely neglected. Progress is traced over time and significant conclusions are highlighted. The emphasis is on applied research and research conducted in wilderness settings, although I recognize the value of basic knowledge that can be gained by better understanding visitor experiences and their relationship to use density. Finally, I comment on the ability of science to contribute to management decisions about appropriate use densities and use limits and suggest research approaches capable of making worthwhile contributions.

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## The Concept of Recreation Carrying Capacity

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Although alluded to since the 1930s, the concept of recreation carrying capacity was first developed in detail in the early 1960s. Reflecting early conceptions of carrying capacity, LaPage (1963) asserted that the central issue was one of quality *versus* quantity—the choice between restricting “the number of persons using a given area, in an attempt to maximize present individual satisfaction” and accommodating “more people currently, at the expense of a reduction in the quality of individual experience, in an attempt to maximize total satisfaction” (p. 34). Anticipating future findings and even terminology, he noted that “an increase in numbers of people accommodated may not necessarily result in a linear decrease in the quality of the individual experience” (p. 33) and asked questions such as “what are the indicators that carrying capacity has been exceeded?” (p. 34) and “what are the ‘critical levels’ of satisfaction...which must be exceeded” (p. 36) for the experience to be acceptable?

## Early Writings

Wagar (1964) developed the first formal exploration of the recreation carrying capacity concept. Based on his 1961 doctoral dissertation, this monograph laid the conceptual groundwork for much subsequent research and writing. Among the important ideas presented were the following: (1) In contrast to earlier characterizations of carrying capacity as an inherent property of a place that can be determined, carrying capacity is not an absolute value; (2) Carrying capacity depends on the needs and values of people and can only be defined in relation to some management objective; and (3) The conflict between quality and quantity—the need to limit use—can be reduced through other management actions such as zoning, engineering, persuasion, and the management of biotic communities.

Once it was agreed that carrying capacity was not an inherent property of a place—something that could be determined—the term lost much of its intuitive meaning. Consequently, Wagar (1974) and numerous other authors have suggested that the term was a bad choice and should be dropped. This advice has never been followed. The term continues to be used in legislative and policy mandates by managers and even some scientists. So, as Manning (1999) notes we will probably have to live with it—despite the problems it causes. Today, most scientists refer to carrying capacity more as a topical heading than a property of a place or even a management tool.

Even as a topical heading, there is considerable confusion about what carrying capacity is. In the writings of some early

scientists, such as George Stankey and Dave Lime, the topic of carrying capacity is treated very broadly. Lime (1976), for example, says that carrying capacity is about “how to plan and manage a particular recreation resource” (p. 123). Many early articles about carrying capacity are either reviews of research on recreation impacts and management techniques (for example, Lime and Stankey 1971) or lists of extremely general principles and propositions (for example, Lime 1976). Such treatments did much to organize information about recreation impacts and management techniques. Particularly helpful were the discussions of the numerous approaches for managing recreation use—only one of which is use limitation.

More germane to this paper are articles that confined the topic of carrying capacity to the issue of prescribing appropriate use levels, an approach that is more in line with the original meaning of the term in wildlife and range management. For example, Wagar (1974), in his further writings on carrying capacity, felt that the salient issue was clearly one of use limitation—when they are appropriate and how one could decide what they should be. Insightful early writings about carrying capacity by Heberlein (1977), Schreyer (1979), and Shelby and Heberlein (1986) also focused primarily on building a conceptual and/or empirical basis for setting use limits.

One of the few specific theoretical frameworks for assessing carrying capacity was presented by a National Park Service policy officer, Rendel Alldredge (1973). In the tradition of LaPage’s observation that carrying capacity decisions involve a choice between quantity and quality, Alldredge proposed a means of setting carrying capacity based on the economic concept of marginal utility. He hypothesized that total satisfaction (aggregated across all visitors) should increase as more visitors enter an area but that the individual satisfaction of each user should decline due to increased crowding. If the rate of decrease in individual satisfaction is great enough, there will come a point when total satisfaction starts to decline as use increases. This would be a logical point to restrict use. The fundamental assumption of this theory is that experience quality will decline substantially with increases in use density.

Wagar (1974) also drew on analysis of marginal utility to discuss how limits might be set. In contrast to Alldredge, however, he asserted that the difference in quality between low and high density recreation sites would never be substantial and, therefore, “mass use would always appear to be justified (in terms of maximizing human benefits) if we examine one area at a time” (p. 276). Numerous empirical tests have supported Wagar’s assertion. They fail to show a pronounced inverse relationship between use density and satisfaction (described in a subsequent section), invalidating the central thesis of Alldredge’s conceptual framework.

Wagar’s primary point is not that use limits are unjustified. His point is that to make good decisions about use limits we need to enlarge the scale of analysis. “Examining one area at a time may be the trap that has caused so much confusion about use limits for specific areas.” (Wagar 1974: 276). He goes on to show how the concept of decreasing marginal utility can be used to conclude that benefits are optimized by providing some low-density recreational opportunities within a system dominated by high-density opportunities.

## Points of Agreement

Most students of carrying capacity agree on several important points. First, recreation carrying capacity is not an inherent value; it must reflect value judgments. Decisions about appropriate use must include what Shelby and Heberlein (1986) call an evaluative component. These evaluations can be explicit or implicit. Managers are making subjective judgments—reflecting their values or those of others—even if they decide not to limit use. Limits on use can be set without specifying desired ecological and social outcomes and without much understanding of the relationship between use density and ecological and social conditions. Examples include decisions to limit use to current levels (as was done on the Colorado River in Grand Canyon) or to the number of currently available campsites (as has been done in the backcountry of many national parks) or to some other density, such as the one launch per day allowed on the Selway River.

Alternatively, use limits can be based on explicit evaluative decisions about conditions that are or are not acceptable. In this context, use limits are means rather than ends; they represent the limits that must be set in order to maintain specified acceptable conditions. This is the approach that has been advocated by most recreation researchers. Such evaluative descriptors are usually called standards (Shelby and others 1996) and are the basis of recent “carrying capacity” processes, such as Limits of Acceptable Change (LAC) (Stankey and others 1985) and Visitor Experience and Resource Protection (VERP) (Manning and others 1996a). Clearly, research can be helpful to management if it provides descriptive information that can be used by managers making decisions about acceptable conditions. As described in a later section, considerable attention has been devoted to research designed to provide such information.

A second point of agreement is that because any decision about use limits will favor certain users and certain types of experiences (Schreyer 1979), decisions must be made about which recreation users and which experiences should be favored in any given place. This suggests the value of science that helps managers of individual parks and wilderness areas make decisions about which users and experiences to favor in their area. It also suggests that research needs to give managers insight into the attitudes and preferences of a variety of different potential interest groups. Unfortunately, little research of this type has been conducted.

The important implication of this second point is not that managers need to give preference to certain users. Rather, it demonstrates the importance of a third point of agreement. In order to avoid giving unfair preference to certain users and experiences, managers need to make use limitation decisions within the context of a large system perspective. As Schreyer (1979) notes, the systems approach is important because “the equity of any allocation decision is dependent upon a broad picture in which one seeks to maximize as wide a range as possible of individual definitions of quality” (p. 264). A decision to give preference to one user group over another is less discriminatory if the other user group is given preference somewhere else. This suggests that science directed at regional analyses should be particularly helpful in making decisions about which users and experiences to favor and, therefore, in making decisions

about acceptable conditions and appropriate use levels. Again, little research taking a regional perspective has been conducted.

## Empirical Research

The first substantial empirical study of use densities and visitor experiences in wilderness was Bob Lucas' (1964) study in the Boundary Waters Canoe Area. Despite the lack of any formal theoretical foundation, this study is remarkable in the degree to which it laid the foundation for further work. Lucas asked different user groups to decide where "the wilderness began" on their trip. He then correlated the percentage of groups that perceived a lake to be wilderness with actual use of that lake. This allowed him to assess the effect of use density on experience, without having to ask visitors directly about crowding or their response to other people (avoiding concerns about leading questions and the ability of respondents to adequately assess their personal responses and evaluations).

This relationship varied depending on which user group was assessed and what type of user was encountered (paddle canoeist, motor canoeist, or motorboater). For lakes without motorboats, almost all canoeists felt themselves to be "in wilderness" if use of that lake was under about 300 groups per 3-month season. Lucas also asked visitors for their personal evaluations, asking questions about (1) whether they were bothered by crowding, (2) the number of groups seen and whether the number seen was too many, about right, or too few, and (3) how many groups "could you meet in a day before you would feel there was too much use." A majority of canoeists felt they had seen too many people when they encountered more than five groups of canoeists per day.

Lucas (1964) went on to suggest how such data could be used to inform decisions about use limits. He began with several explicit assumptions—that paddling canoeists were the recreational group whose opinion was most critical and that a wilderness experience was the appropriate experience for the Boundary Waters. He justified these assumptions by asserting that the type of recreation to emphasize (wilderness canoeing) should be the type with the fewest alternative possibilities. This assertion would be supported by a regional marginal utility analysis, as Wagar (1974) proposed. Lucas concluded that "full wilderness" could be maintained (all canoeists would perceive such places to be wilderness) where there were less than about 300 groups per year. Places with less than 600 groups per year would seem like wilderness to 50 percent of canoeists, but not to the other 50 percent. Finally, he suggested that density ought to vary, particularly in relation to proximity to access points. These "capacities" would be much lower on lakes where the groups encountered were in motorboats; they would be much higher if the area were to be managed according to the preferences of motorboaters.

Lucas clearly recognized that capacity decisions must begin with decisions about which interest groups' opinions to favor and what type of experience to provide. In his analysis, he decided that canoeists were the group to be favored and a "wilderness experience" was the type to be provided. So he used research to describe how use density affected the wilderness experience of canoeists and based his analysis on

this information. He used a regional systems analysis to justify his decision about which group and experience to favor. Motorboaters, auto campers, and resort guests had many alternative places to obtain nonwilderness experiences. And he built further diversity of opportunity into the system by suggesting spatial variation within the Boundary Waters Canoe Area itself.

## Relationship Between Use Density and Experience Quality

The fundamental goal of this line of research is to answer questions about how important use density (or measures of social interaction such as encounters) is to experience quality and visitor satisfaction. The value of use limits seemingly should increase to the extent that encounters have a pronounced and negative effect on the quality of visitors' experiences. Most studies of this topic have (1) used survey techniques, (2) been conducted after the trip—often as much as two weeks or more, and (3) required visitors to generalize about the entire trip—as opposed to individual events. Despite this reliance on post-trip questionnaires, three different approaches to this topic have been taken, with differences reflecting the dependent variable selected and whether relationships are assessed under hypothetical or actual conditions.

Studies have also varied as to whether the ultimate independent variable is use density or some measure of interaction between groups (encounters). Although these variables are usually correlated, use density is likely to be less directly related to experiences than actual interactions. Therefore, this review will emphasize the relationship between encounters and experience quality.

The first approach involves assessing, under actual conditions, the extent to which quality of the entire experience (often referred to as total satisfaction) declines as encounters increase. Shelby's study of boaters on the Colorado River at Grand Canyon (Shelby and Nielsen 1975; Shelby 1976, 1980; Shelby and Heberlein 1986) was the first of a number of studies of the density/encounters-satisfaction relationship based on actual experiences in wilderness-like environments. For Colorado River boaters, there was no evidence of a relationship between encounters and satisfaction with the total experience. Subsequent studies in other places have generally come to the same conclusion (see reviews by Kuss and others 1990; Manning 1999). In a few cases there is a statistically significant inverse relationship, but the magnitude of effect is never pronounced. Where  $r^2$  has been used, density and encounter measures have never explained more than 10 percent of the variation in total satisfaction. Lucas (1980) used gamma as a measure of association in a study of visitors to nine wilderness areas. He found that the percent of variation in satisfaction explained by encounters exceeded 10 percent in six of nine wilderness areas, with one value as high as 31 percent. It is unclear, however, whether this very different result reflects differences in instrumentation and statistical analysis or differences in the relationship between encounters and satisfaction in these wilderness areas.

The second approach, also based on evaluations of actual conditions experienced on each visitor's trip, uses a more

elaborate “crowding model.” Crowding is a personal negative evaluation of interaction with other people. Theoretically, more encounters should result in increased levels of crowding, which, in turn, should be associated with reduced experience quality or satisfaction. Numerous studies—beginning with Shelby’s work in the Grand Canyon—report either no relationship or a weak relationship between encounters and perceived crowding. Again, in park and wilderness settings, density or encounters typically explain less than 10 percent of the variation in crowding (Kuss and others 1990; Manning 1999). Antecedent variables (expectations and feelings about crowding) typically have a greater influence on perceived crowding than density or encounters (for example, Shelby 1980). Stronger relationships between encounters and crowding ( $r^2$  as high as 0.36) have been found in a few studies of heavily-used rivers (Heberlein and Vaske 1977; Hammitt and others 1984; Tarrant and others 1997), but not in wilderness-like settings. Moreover, most studies report little or no relationship between crowding and experience quality.

In a variation on this approach, Hammitt and Rutlin (1995) explored the relationship between encounters and “privacy achieved” among visitors to Ellicott Rock Wilderness. They reported an inverse relationship between encounters and privacy achieved, but provided no statistical data to help interpret the consistency of this relationship. They also did not attempt to assess the extent to which privacy achieved was an important aspect of visitors’ experiences.

The third approach has been to ask visitors directly, but in a hypothetical manner, how they think different levels of interaction would affect their experience. This has been operationalized in several different ways. Visitors have been asked about preferred numbers of encounters and maximum acceptable numbers of encounters. They have been asked to assess their likely response to different numbers of encounters, presented either verbally (Stankey 1973) or visually (Manning and others 1996b). They have been asked to give their highest tolerable contact level (Shelby 1981). Analyses of such data, referred to variously as satisfaction curves, preference curves, acceptability curves, or encounter norms, show that most visitors prefer relatively low use densities and encounter levels. They perceive that their experience quality would be negatively influenced by increased encounters.

These are the sorts of results originally anticipated by managers and many researchers, given that some people complain about encountering too many other people. However, it is important to note that (1) these are hypothetical self-reports, the validity of which has been questioned (Lee 1977; Williams and others 1992) and (2) the dependent variable in this approach is “satisfaction with the number of people seen rather than satisfaction with the entire experience” (Shelby 1980: 47). There is still no empirical evidence that encountering more people than one prefers has a substantial adverse effect on the quality of most visitors’ experiences.

Numerous reasons for the apparent weak relationship between encounters and experience quality have been advanced. One potential explanation is that there are important mediating variables, mostly beyond the control of managers (such as weather or expectations regarding encounters) that

have not been included in the analysis. While this is likely the case and such variables are clearly of academic interest, this explanation has little management application. If manipulation of use levels has little effect on experience quality—regardless of why this is the case—managers need to be careful that the costs of limiting use do not exceed the benefits.

Other explanations have been methodological criticisms—particularly about lack of variation in total satisfaction measures, lack of variation in number of encounters, the need to remember how one felt several weeks ago, the need to condense an evaluation of an entire trip into a single rating, and, particularly, the limitations of generalizing across different individuals. Wilderness visitors vary greatly in motivations, expectations and other characteristics likely to influence their response to any setting attribute such as use density. The cross-sectional research designs used to address this issue have been unable to “factor out” all this variation. In essence, all the variation between individuals becomes “error,” making it very difficult to detect relationships, within individuals, between density and experience quality.

In a recent study at Grand Canyon (Stewart and Cole 2000, in press), many of these methodological shortcomings were mitigated, with the use of onsite, daily diaries. Analysis of resultant data showed highly consistent relationships between encounters and crowding, crowding and experience quality, and encounters and experience quality. The magnitude of influence was small, however. For example, for 60 percent of respondents there was a significant negative relationship between number of groups encountered and experience quality—assessed using a five-item measure modified from Ditton and others (1981). For 20 percent of respondents, there was a positive relationship between encounters and experience quality. For the average person with a negative relationship, encounters per day would have to increase from 1 to 80 per day to reduce quality 50 percent (the independent variable was square root of encounters/day). Only 5 percent of respondents had strong negative relationships (arbitrarily defined as a slope steeper than  $-1.0$ , equivalent to a 50 percent reduction in quality if encounters increased from 1 to 16 per day).

This study provides increased insight into the relationship between use density and experience quality but does not alter earlier conclusions. For a few people, meeting increasing numbers of people has a strong adverse effect on experience quality. A few others respond positively as encounters increase. Most wilderness visitors are adversely affected by meeting many other people but the effect of meeting many people on the overall quality of their experience is minor. Most people prefer to see few people—as the results of hypothetical studies indicate—but are not highly bothered when they cannot have their preferred experience.

Different factions of the research community have interpreted these results in different ways. Some largely dismiss these results as irrelevant, asserting that satisfaction or overall experience quality is the wrong dependent variable to examine. Shelby and Heberlein (1986) state, for example, that although people are equally satisfied at low and high use levels, managers should not forget about carrying capacity. They and others (Manning 1999) note that high satisfaction among current users may result from coping behaviors

such as visitor displacement, rationalization and “product shift.” They conclude that the result of managing for satisfaction “will be loss of diversity in outdoor recreation opportunities, particularly low use alternatives” (Manning 1999: 120). These researchers assume that crowding is a problem that must be managed and have turned to the “normative approach” (discussed below) as an empirical basis for setting use limits.

Other researchers have criticized this search for “scientifically determined restrictions” (Burch 1981: 223). Burch (1981) goes so far as to suggest that the situation is one of “organized irresponsibility where managers point to the ‘scientific’ data as reason enough for preferred decisions, and the scientists have the pleasure of both defining and ‘proving’ the value of certain wildland policies held by personally compatible social strata” (p. 224). These critics suggest that managers should be concerned about denying visitors access to recreational opportunities, particularly when available empirical evidence suggests that denying access will not result in higher quality experiences—just different experiences. Both Burch (1984) and Becker and others (1984)—echoing Wagar (1974)—argue that better justifications for carrying capacity decisions lie in systems analyses, “placing the characteristics of a specific site into a regional context and... (arriving) at an agreement as to what a specific site could and should reasonably be” (Becker and others 1984: 482). Several of the stronger critics also suggest that more insight might be gained by studying how visitors *behave* when experiencing different use densities (Lee 1977; Burch 1984)—a recommendation first made by Alldredge (1973).

## Visitor Assessments of Appropriate Use Levels and Conditions

The first attempt to obtain visitor opinions about appropriate use levels in wilderness—what has come to be called the normative approach—was Lucas’ (1964) study in the Boundary Waters Canoe Area. He asked visitors “how many other groups could be met in a day before you would feel there was too much use?” Most canoeists wanted to encounter no motorboats and zero to five canoes. Stankey (1973), in the second such attempt, asked a different type of question. He asked visitors to evaluate their feelings—on a five-point scale from “very pleasant” to “very unpleasant”—about meeting increasingly large numbers of groups. He found that, for a majority of overnight users in four different wilderness areas, experiences were no longer reported to be “pleasant” once more than two or three other groups were encountered. He also illustrated how such evaluations varied between user groups (canoeists, motorboaters, hikers, and horseback riders), as well as with the type of group encountered.

In describing his results, Stankey (1973) casually described them as “norms regarding use encounters” (p. 23). It was Heberlein (1977), however, who proposed that a formal normative approach might be a worthwhile perspective for carrying capacity research. He promoted Jackson’s (1965) return potential curve as a model for portraying visitor opinions about appropriate use levels as norms. Despite recommending that return potential curves be generated, Heberlein (1977: 76) noted this was not necessary:

By going to various groups and asking if the contacts are too few or too many, the manager can get a rough idea of the described curves. It is *very* important, however, that a variety of potential users and nonusers (such as managers) be consulted. It is also necessary that this input be presented according to the various user groups rather than by simply adding them all together in a ‘vote’. This will give the manager a sense of the variety of norms that exist for visitor density in a particular setting, for a particular activity.

Heberlein and Vaske (1977) subsequently modified Stankey’s question and developed return potential curves (later called impact acceptability curves) from visitor assessments of the “pleasantness” of encountering different numbers of groups on the Brule River. The point at which these curves crossed the neutral line—where the mean response to that number of encounters was neither pleasant nor unpleasant—was interpreted as the encounter norm. This metric was proposed to represent the upper limit of what people will tolerate or accept (Vaske and others 1992; Manning 1999), an interpretation that has been adopted in many subsequent research projects. This interpretation has been widely criticized, however, for reasons ranging from questions about whether respondents are providing valid self-assessments (Williams and others 1992) to concerns about whether such assessments are really norms (Heywood 1996) to criticism of the use of the neutral line to define the norm rather than some other point on the curve.

Numerous subsequent refinements to this “normative” approach have been developed. Among the more important refinements was Shelby’s (1981) attempt to develop different encounter norms for different potential experience types that might be provided in Grand Canyon. He asked respondents to think about the Grand Canyon as offering three different types of experience: a wilderness, a semiwilderness, and an undeveloped recreation area experience. Then respondents were asked to state the highest number of encounters they could tolerate before the experience would no longer be that kind of experience. Unfortunately, the value of the resultant data is limited by the fact that each of these three types of experience was defined in the questionnaire using terms that suggest appropriate levels of social interaction. Results would have been more useful if a richer and more varied vocabulary had been used to describe each experience. Roggenbuck and others (1991) asked people to state the maximum number that would be acceptable, replacing the notion of tolerance with the notion of acceptability and reflecting the terminology of LAC-type processes even more precisely.

In Shelby’s (1981) study, respondents were given the response option “encounters make no difference to me.” This option is now commonly given. Interestingly, when it comes to analysis, such respondents are typically excluded, as if they have no tolerance level. For some applications, at least, it seems more appropriate to assume that respondents who do not care how many people they meet have an extremely high tolerance—and adjust median responses upward accordingly. Roggenbuck and others (1991) went a step further and also provided the option to state that encounters do make a difference, “but I don’t feel I can suggest an acceptable number.” Including this option can substantially reduce the number of respondents who say “encounters make no difference to me” (Hall and others 1996).

Many of these refinements—particularly recent ones—are described in Manning (1999, this proceedings). Examples of various types of question formats are presented in Donnelly and others (1992). Studies have evaluated variation in the norms derived from different question formats (Hall and others 1996; Manning and others 1999a).

Much of the controversy about the normative approach concerns the prescriptive utility of resultant metrics. When Lucas (1964) first asked people for their opinions about how many people they could meet before they would feel there was too much use, he clearly viewed the resultant data as self-assessments of likely responses to encounters. He presented these data as being descriptive (what is) more than evaluative (good versus bad) and certainly not as prescriptive data (what ought to be). He referred to the question as an “informal” one, suggesting little confidence in the results.

This interpretation changed, however, when it was asserted that such data could be used to identify social norms, defined as societally shared judgments of what conditions “ought to or should be” (Vaske and others 1992). In recent dialogue responding to criticism of the norms approach, Doug Whittaker and Bo Shelby asserted that questions about acceptability measure norms rather than attitudes and that “norms are about degrees of should/should not... while attitudes are about degrees of good/bad” (Heywood 2000: 261). This assertion has not been tested, however. It is quite possible that visitors are merely responding in terms of good or bad, even though they were asked to evaluate acceptability. While this may appear to be largely a semantic argument, this debate has important implications for how such data are interpreted and used.

Ever since processes like LAC and VERP emerged as recommended frameworks for resource management, managers have struggled with developing the prescriptive standards that are the foundation of such processes. They have been uncomfortable making subjective judgments about what ought to be. Proponents of the normative approach often represent norms as providing an empirical basis for developing management standards (Shelby and others 1996). The terminology used and the way norms and standards are described often leave the impression that data, such as that first collected by Lucas, if analyzed and displayed as an impact acceptability curve (Vaske and others 1986) can be translated directly into management standards.

LAC-type management standards are clearly prescriptive in nature. They represent carefully crafted compromises between conflicting goals (Cole and McCool 1997)—such as concern for providing access and concern for protecting wilderness experiences. In setting a standard, such as a maximum number of encounters per day, managers must consider the management actions that will be needed to comply with standards. An understanding of the costs of such a standard, such as reduced access, is as important to the process of defining standards as an understanding of beneficial effects of meeting fewer people on experiences.

The “social norms” derived from asking visitors about the acceptability of conditions, though often referred to as standards and presented in units identical to LAC standards (such as maximum number of encounters per day), are very different. Visitors are not presented with conflicting goals and asked to make tradeoffs. Instead, they are asked to evaluate acceptability without any explicit information about

the costs of alternative choices. Such unconstrained choices provide, at best, only half of the equation—information about how visitors evaluate the effect of density on their experience—needed to set LAC standards. These data can inform the subsequent prescriptive process. However, the difficult decision—how to balance concerns about experiences with concerns about access—still remains.

In a study of day-hikers at Grand Canyon, Manning and others (1999b) attempted to interject a more prescriptive element by asking visitors about the maximum number of people “the National Park Service should allow on this section of trail. In other words, at what point should hikers be restricted from using this trail.” Norms derived from this question were compared with norms from a traditional question about the maximum number of people that would be acceptable, where “acceptable” was not defined. For hikers on the wilderness-like threshold trails, the mean response, when a consequence was stated, was more than 50 percent higher than the mean response to the traditional question. The mean respondent felt the National Park Service should allow a use density substantially higher than the current density, if access might have to be restricted in order to keep densities within acceptable levels.

## Visitor Opinions About and Responses to Use Limits

Further insight into the effects of use density on experiences can be gleaned from studies that asked visitors about their support for use limits. Typically, visitors support restricting the number of visitors to an area “if it is being used beyond its capacity” (Lucas 1980). However, visitors are reluctant to ever conclude that an area is being used beyond its capacity. Starting with a study of three eastern wilderness areas (Roggenbuck and others 1982), visitor support for use controls has been assessed by asking them to select one of the following responses: (1) controls are needed to lower use, (2) controls are needed to hold use at current levels, (3) controls not needed now, but should be imposed in the future if overuse occurs, or (4) controls not needed now or in the future. Virtually everywhere this question has been asked, including some of the most densely used destinations in the wilderness system (Cole and others 1997), most people have responded that “controls are not needed now but should be imposed in the future if overuse occurs.”

The one exception in the literature—Linville Gorge Wilderness—already has a permit system. Most visitors there also support the *status quo*, which in this case, means they think use should be held to current levels. Shortly after the implementation of use limits, visitor opinions about limits were assessed at Rocky Mountain National Park (Fazio and Gilbert 1974), Denali National Park (Bultena and others 1981), and San Gorgonio and San Jacinto Wildernesses (Stankey 1979). In each case, most people who visited these places after use limits had been imposed supported that management action. They supported the current management regime.

Hall and Cole (2000) examined visitor response to the imposition of use limits in the Obsidian Falls area of the Three Sisters Wilderness. Prior to the imposition of use limits in 1991, 60 percent of visitors opposed use limits. After

implementation of limits in 1997, 60 percent of visitors supported the use limits. One might want to interpret this as evidence that visitors changed their opinion about use limits once they experienced the benefits that accrue from a reduction in use density. This does not appear to be the case, however. Prior to the imposition of use limits, most visitors were repeat visitors. Following the imposition of use limits the clientele had changed dramatically. Most visitors were first-timers, more amenable to regulation and, interestingly, no less tolerant of encounters or ecological impacts. One of the effects of use limits was to displace many traditional users who were replaced by people who were less bothered by being regulated. Consequently, the majority of visitors supported the current management regime, regardless of what that regime was. Use limits were not imposed at Green Lakes—a nearby wilderness destination that was even more heavily used than the Obsidian Falls area. The portion opposed to use limits there increased from 60 to 70 percent between 1991 and 1997.

## Discussion and Conclusions \_\_\_\_\_

### What Have We Learned?

**Density Affects the Nature of the Experience More Than the Quality of the Experience**—These various empirical studies present a relatively consistent picture. Most visitors prefer low-density wilderness with infrequent encounters—although some do not. If they meet lots of people—particularly if they meet many more than they expect—most visitors' experience is adversely affected. However, the magnitude of effect is small. Even in crowded situations, most wilderness visitors still have high quality experiences. We must conclude, therefore, that use density has little effect on the quality of recreation experiences. One of the implications of this conclusion is that we ought to be more careful with our terminology—avoiding reference to higher density experiences as being lower quality experiences. What density probably does affect is the nature of the experience—what the experience is like. A visit during which social interaction is nearly continuous is clearly different from one in which there is no interaction with other groups.

**Decisions About Appropriate Use Limits Require Decisions About Which Type of Recreation Experience to Favor**—Such decisions are best articulated in statements about appropriate conditions and in standards for setting attributes—either for density or for variables related to density. One of the important contributions of Shelby and Heberlein (1986) is their set of rules for establishing social carrying capacity. To set carrying capacity, it is critical to (1) decide which type of recreation experience to provide, (2) define this experience with specificity, using parameters such as appropriate numbers of encounters, and (3) decide who should make these decisions (who the relevant groups are). Decisions about use limits, made for individual areas, will enhance the experiences of some and eliminate opportunities for others. Some of the criteria that should be used when making such decisions include a concern for equity and consideration of aggregate benefits, both of which are best considered within a systems context.

**Consequences of Choice**—When the consequences of choices are made clear, current onsite visitors tend to support the current management regime and accept existing biophysical and social conditions (unless the costs of a change in management are all borne by some other user group). Since density has little effect on experience quality, few visitors are willing to forego the opportunity for access in order to have fewer encounters when they do visit. Although visitors tend to support the concept of limiting use to avoid certain problems, they seldom conclude that problems are severe enough to warrant limits at this time—perhaps because they recognize that such limits would hinder their own access. Those who do not like the current management program—either the existing regulations or resultant conditions—are likely to have already gone elsewhere. They are not likely to make up a large proportion of any sample of onsite users. Therefore, if use levels are increasing and managers make decisions about tradeoffs the way that empirical studies suggest most visitors would, there will almost always be a constant evolution toward higher density experiences. This suggests that the rationale for use limits is more likely to come from some careful evaluation of legislative and administrative mandates or the unique value and purpose of any given area than from a survey of current visitors.

**Visitor Response**—Most visitors are willing to answer questions about appropriate experiences and setting attributes, including density and encounters. (However, there is considerable disagreement about the extent to which such responses provide an empirical basis for making decisions related to use limits). Most visitors are willing to make choices when asked whether a place ought to provide a wilderness experience or an undeveloped recreation experience. Most will also state the maximum number of encounters that is tolerable or acceptable to them. However, these numbers tend to increase dramatically when visitors are informed of the consequences of their choices. As Manning (this volume) argues, such judgments provide a rich resource for managers charged with making decisions about appropriate use levels. Such data will be most useful if all relevant interest groups are given a voice, if important subgroups within the population are differentiated, and if respondents are well informed about the possible management implications of their judgments. However, information about the opinions of current onsite users is only one of many types of information needed by decisionmakers.

### What Information Should Managers Possess When Making Decisions?

Most students of the use limitation issue agree generally on the kinds of information and thought processes that should lead to good decisions about use limits. Managers need to decide which types of experience and which recreationists to favor. They need to understand how use density affects these favored experiences and to set use limits accordingly. Processes such as LAC and VERP, with their descriptions of appropriate conditions and experiences and their indicators and standards, provide a framework for documenting and implementing such decisions. Research

can contribute worthwhile information to such decisions. Progress to date, however, has been limited.

The primary research contribution to such decisions has been normative information about the opinions of current onsite users about appropriate density-related conditions. Information of this type has been gathered in innovative ways and is of considerable interest. However, such information is only a small part of the information needed to make good decisions. Consider that the range of potential use limits is dependent on decisions about which groups should make decisions, which experiences are most appropriate, and which condition or impact levels are appropriate to those experiences. Most normative research targets only the last of these three decisions—the portion of the model that probably explains the least amount of variation.

Over time, researchers have tended to forget many of the suggestions of their elders. Wagar (1974) warned against the trap of studying one area at a time. He and others (Stankey 1974; Schreyer 1979) stressed the need to base decisions on a regional perspective on recreation supply and demand. Virtually every available study, however, is confined to a single location. Several early researchers warned about excessive reliance on visitor surveys, since the validity of self-reports is difficult to verify (Alldredge 1973; Lee 1977) and because visitors are seldom likely to be fully informed about the availability of resources (Wagar 1964) or the complexities and potential prescriptive consequences of their decisions. And yet, most available information comes from self-reports and assessments derived from visitor surveys. Moreover, little attempt is made to inform visitors of the likely consequences of the alternative choices they are presented.

Wagar (1974) also warned that managers need the courage to override the prescriptive preferences of visitors who “may have difficulty understanding that total recreational benefits can be increased by limiting use on selected areas and forgoing certain benefits” (p. 278). When we do inform visitors of consequences and ask their opinions about prescriptions, they usually support the *status quo*. This raises serious questions about how useful such information is to deciding what is most appropriate. Heberlein (1977) stressed the need to seek the opinions of various user and nonuser groups and to keep the input of each group separate. Most normative research, in contrast, is confined to current onsite users and little attempt is made to identify the opinions of different user groups. Shelby and Heberlein (1986) stress the importance of tying standards to particular experience types and yet this too is seldom done. When visitors are asked their opinions about different experience types, the vocabulary that is used to describe experience types is impoverished. Respondents may conceive of the experience type in completely different ways or in ways that are unrelated to proposed standards.

## Needed Research

Traditional research approaches, based on the normative tradition, have and can continue to contribute information useful to managers making decisions about use limits. Manning (this proceedings) describes some of the ways that line of research can be refined and extended. However, more attention needs to be given to alternative types of research,

particularly research conducted at different scales. Research has focused almost exclusively on an intermediate scale of analysis, assessing the community of onsite users at a single protected area as if it were a single population. This is not surprising since it is the community of onsite users that will be managed and most research funding comes from individual parks or wilderness areas. However, this community consists of numerous individuals who might usefully be aggregated into subpopulations at a level of analysis below that of the community. Moreover, the individual protected area is part of a larger landscape of protected areas and other lands. Just as our understanding of biological systems has been enhanced by studying the biology of individual organisms, populations, communities and landscapes, our understanding of how best to manage recreation use will be enhanced through complementary work at all these levels.

If managers are to choose between alternative experiences, they must understand more about the nature of experiences and how density influences the nature of experiences. This requires more attention to the experience of individuals. Qualitative research methods provide an opportunity to more fully explore dimensions of the experience of wilderness (Borrie and Roggenbuck 1998; Patterson and others 1998). In addition to effects of density on perceived crowding, other effects of density need to be explored. Research on privacy has been initiated (Hammit and Brown 1984), as has research on the achievement of solitude (Hollenhorst and others 1994). Density affects experiences through its effects on biophysical impacts, which represent both evidence of others and evidence of inappropriate behavior by others. Density is also likely to influence the frequency and nature of conflict between groups, which in turn influences experience.

A better understanding of visitor experiences is also likely to create a richer vocabulary with which to articulate and differentiate between alternative experiences. If we want to gather opinions about the relative appropriateness of alternative experiences, it is not very helpful to simply describe the alternatives as a wilderness experience or a semiwilderness experience. Such descriptors can be interpreted in many different ways. Moreover, when those experiences are described, the attributes used are largely confined to numbers of encounters or other density-related variables.

Finally, large-scale regional analyses of recreational supply and demand must be developed as the basis for individual areas deciding which experiences and user groups they should favor. Stankey (1974) suggests a number of criteria that might be used to make decisions about appropriate experiences: irreplaceability and relative abundance, substitutability, demand-preference relationship, complimentary-competitiveness relationship, and costs. The emerging interest in the concept and importance of place—and its implications for substitutability—has important implications for such work.

## Limitations of Science

In his 1964 treatise, Wagar (p. 23) concluded with the following comment on the ability of science to provide an empirical basis for carrying capacity decisions and the dangers of overvaluing the opinions of current recreationists:

Finally, it is concluded that, while research can provide various types of information for guidance, final definitions of recreational carrying capacity must be of an administrative nature. Ecological studies can show how biotic communities will change with use, but someone must decide how much change is acceptable. Research surveys...can measure current public opinion and analyze human motivation. But such motivation and opinion will seldom be based on a thorough understanding of availability and productivity of the resource. Someone must decide which combination of needs and desires it is most desirable to satisfy from our limited resources.

On public lands...policy decisions should be by legislative directives and by public servants striving to achieve the public good. Recreational quality gained by limiting use must be weighed against values lost when such limits reduce the number of people served. Present values must be weighed against values of future generations.

In other words, science can produce helpful descriptive information. It can inform the evaluative and prescriptive stages of the decisionmaking process but it cannot make those stages any less subjective and judgmental in nature. People must decide what ought to be and someone must decide which people can participate in those decisions.

Managers are likely to continue to look to researchers for help in providing a scientific basis for management standards and use limits. Given the value-laden nature of such decisions, scientists need to be careful not to mislead managers about the utility of their empirical research. They should communicate the dangers of any analysis not done at large spatial and temporal scales. They should communicate the importance of understanding the needs and interests of diverse user and nonuser groups. If they do so and also give managers an increased appreciation of the pros and cons of alternative choices, they should contribute to better decisions.

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# Carrying Capacity as “Informed Judgment”: The Values of Science and the Science of Values

Robert E. Manning

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**Abstract**—Contemporary carrying capacity frameworks, such as Limits of Acceptable Change and Visitor Experience and Resource Protection, rely on formulation of standards of quality, which are defined as minimum acceptable resource and social conditions in parks and wilderness. Formulation of standards of quality involves elements of both science and values, and both of these elements must be integrated into “informed judgments” on the part of park and wilderness managers. That is, managers must ultimately make value-based judgments about the maximum acceptable level of visitor-caused impacts to the resource base and the quality of the visitor experience. However, such judgments should be as informed as possible by scientific data on the relationships between visitor use and resulting impacts, and the degree to which park and wilderness visitors and other interest groups judge such impacts to be acceptable. Such information represents the “values of science” to managing carrying capacity in parks and wilderness. A growing body of literature has begun to address the corresponding “science of values,” and how this type of information might be integrated in park and wilderness management. Visitor-based research has employed normative theory and techniques to explore the acceptability of a range of social and biophysical impacts related to visitor use, and findings from these studies are being integrated into a body of knowledge and applied in management decisionmaking. Conceptual and methodological extensions of the normative approach are currently being explored in a variety of park and wilderness contexts, and new theoretical and empirical approaches are being adapted to address tradeoffs inherent in carrying capacity. In these ways, the science of values is progressing to meet the opportunities and challenges of the values of science to park and wilderness management.

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## Crowding and Carrying Capacity

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Crowding constitutes a long-standing issue in the field of park and wilderness management, and this issue often is addressed within the context of carrying capacity. In its most generic form, carrying capacity refers to the amount and type of visitor use that can be accommodated within a park or wilderness. Recent experience with carrying capacity suggests that it can be applied most effectively through

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formulation of indicators and standards of quality for biophysical conditions (resource carrying capacity) and for the visitor experience (social carrying capacity) (Graefe and others 1990; National Park Service 1997; Stankey and others 1985; Stankey and Manning 1986). Social carrying capacity focuses principal emphasis on defining the type of visitor experience to be provided and maintained. Indicators of quality are specific, measurable variables that define the quality of the visitor experience. Standards of quality define the minimum acceptable condition of indicator variables.

By formulating indicators and standards of quality, carrying capacity can be defined and managed. Indicator variables are monitored over time, and if standards of quality have been violated, management action is required. This approach to crowding and carrying capacity is central to contemporary park and wilderness management frameworks, including Limits of Acceptable Change (Stankey and others 1985), Visitor Impact Management (Graefe and others 1990) and Visitor Experience and Resource Protection (National Park Service 1997).

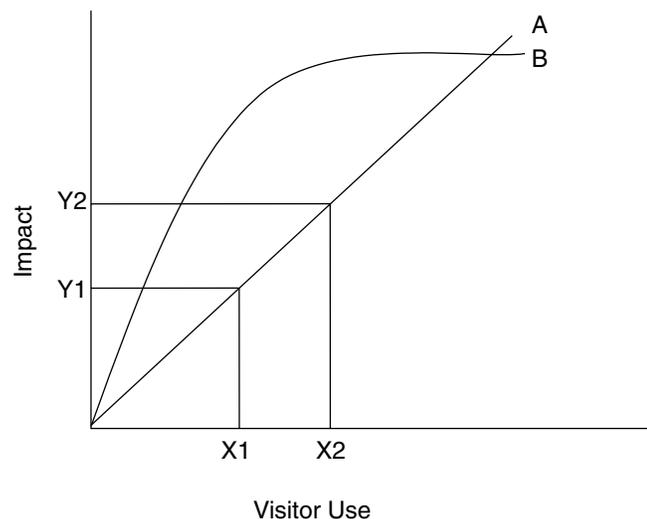
## “Informed Judgment”

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The contemporary carrying capacity frameworks noted above rely (either explicitly or implicitly) on a foundation of “informed judgment.” That is, park and wilderness managers must ultimately render judgments about the level of impacts and related visitor use levels that are acceptable. A growing body of research illustrates that, while such relationships may be complex, increasing use levels of parks and wilderness may lead to increasing impacts to biophysical resources and the quality of the visitor experience (Hammitt and Cole 1998; Manning 1999). To what degree are such impacts and associated visitor use levels acceptable?

This issue can be illustrated graphically as shown in figure 1. In this figure, hypothetical relationships between visitor use and impacts to the biophysical and social environments are shown. These relationships suggests that increasing recreation use can and often does cause increasing impacts in the form of damage to fragile soils and vegetation and crowding and conflicting uses. However, it is not clear from these relationships at what point carrying capacity has been reached. For relationship A, X1 and X2 represent alternative levels of visitor use that result in corresponding levels of impact as defined by points Y1 and Y2, respectively. But which of these points—Y1 or Y2, or some other point along the vertical axis—represents the maximum amount of impact that is acceptable?

To emphasize and further clarify this issue, some studies have suggested distinguishing between descriptive and



**Figure 1**—Hypothetical relationships between use and impact to the recreation environment.

prescriptive components of carrying capacity (Shelby and Heberlein 1984, 1986). The descriptive component of carrying capacity focuses on factual, objective data such as the relationships in figure 1. For example, what is the relationship between the amount of visitor use and perceived crowding? The prescriptive component of carrying capacity determination concerns the seemingly more subjective issue of how much impact or change in the recreation environment is acceptable. For example, what level of perceived crowding should be allowed?

From this discussion, it is apparent that carrying capacity management requires a strong element of “informed judgment.” Park and wilderness managers must ultimately render judgments about acceptable levels of biophysical and social impacts, and associated use levels, but such judgments should be as “informed” as possible. Findings from scientific studies represent an important approach to informing such judgments.

## Values of Science

Science can inform management judgments about carrying capacity in at least two ways. First, research findings should serve as the basis of the descriptive component of carrying capacity. As noted above, the descriptive component of carrying capacity concerns the relationships between visitor use and the biophysical and social impacts of such use. A substantial body of scientific literature has been developed on both the resource and social components of carrying capacity, and recent meta-analyses have begun to integrate and synthesize this growing body of knowledge (Hammit and Cole 1998; Manning 1999).

Second, research findings can also help inform the prescriptive component of carrying capacity. The prescriptive component of carrying capacity concerns the maximum acceptable level of biophysical and social impacts. Again, a substantial body of scientific literature has been developed on the degree to which park and wilderness visitors are

perceptive of such impacts and their subjective evaluations of these impacts. This research explores the park and wilderness-related values of visitors, and can be integrated with other types of information (for example, legal and administrative mandates, agency policy, historic precedent, interest group politics) to help inform management judgments about carrying capacity.

## Science of Values

Within the context of carrying capacity, scientific approaches to park and wilderness-related values have been applied primarily to formulation of standards of quality. Earlier in this paper, standards of quality were defined as the minimum acceptable levels of indicator variables. Research on visitor-based standards of quality has increasingly focused on normative theory and techniques.

## Normative Approach

Developed in the disciplines of sociology and social psychology, the concept of norms has attracted considerable attention as a theoretical and empirical framework in park and wilderness research and management. In particular, normative theory has special application in helping to formulate standards of quality for park and wilderness experiences. As applied in outdoor recreation, norms are generally defined as standards that individuals and groups use for evaluating behavior and social and environmental conditions (Donnelly and others 1992; Shelby and Vaske 1991; Vaske and others 1986). If visitors have normative standards concerning relevant aspects of recreation experiences, then such norms can be measured and used as a basis for formulating standards of quality. In this way, carrying capacity can be determined and managed in a more informed manner.

Application of the normative approach to formulating visitor-based standards of quality in park and wilderness management is most fully described in Shelby and Heberlein (1986), Vaske and others (1986), and Shelby and others (1996). These applications have relied heavily on the work of Jackson (1965), who developed a methodology—return-potential curves—to measure norms. Using these methods, the personal norms of individuals can be aggregated to test for the existence of social norms or the degree to which norms are shared across groups. Normative research in outdoor recreation has focused largely on the issue of crowding (for example, Heberlein and others 1986; Patterson and Hammit 1990; Shelby 1981a; Vaske and others 1996; Whittaker and Shelby 1988; Williams and others 1991), but also has been expanded to include other potential indicators of quality, including ecological impacts at wilderness campsites (Shelby and others 1988), wildlife-management practices (Vaske and Donnelly 1988), and minimum stream flows (Shelby and Whittaker 1995). Research findings from published studies of recreation-related norms have recently been compiled in Manning (1999).

A hypothetical social norm curve is shown in figure 2 to illustrate the methodology described above. The norm curve traces the average acceptability ratings of a sample of recreationists for encountering a range of groups of other

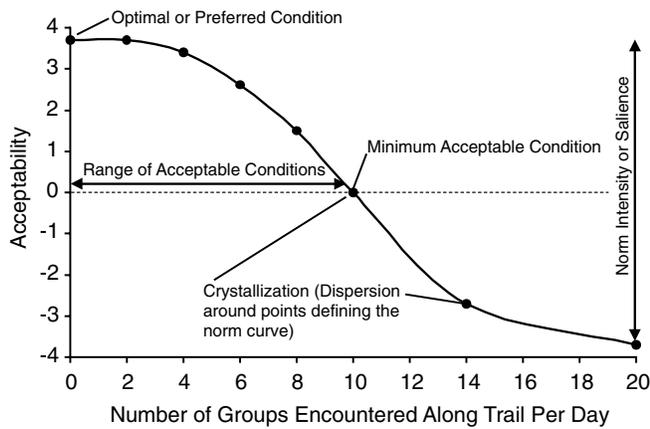


Figure 2—Hypothetical social norm curve.

visitors along a trail per day. The highest point on the norm curve represents the optimal or preferred condition. The range of acceptable conditions includes all points on the norm curve above the zero point of the acceptability scale. The minimum acceptable condition is defined by the point at which the norm curve crosses the zero point of the acceptability scale. The degree of consensus among the sample is indicated by the dispersion or variance of individual responses around the means that define the norm curve. This issue often is referred to as “crystallization.” Finally, the distance of the norm curve above and below the zero point of the acceptability scale defines norm “intensity” or “salience,” and is a measure of the degree to which the impact under study is important to respondents.

## Extending the Normative Approach

As research on normative standards has proceeded, several approaches to measuring norms have evolved. Traditionally, outdoor recreation-related norms have been measured using a “numerical” or “narrative” approach. For example, respondents might be asked to evaluate a range of encounters (0, 5, 10, 15, and so forth) with other groups per day along trails. The personal normative data derived are aggregated and graphed (as illustrated in figure 2) to construct a “norm curve” from which social norms might be identified. This numerical or narrative approach often is shortened to reduce respondent burden by simply asking respondents in an open-ended format to report the maximum acceptable number of encounters with other groups per day. These two approaches might be called the “long” and “short” versions of this measurement technique.

More recently, visual approaches to measuring crowding and other outdoor recreation-related norms have been developed. Two of these studies used photographs of wilderness campsites that illustrated a range of ecological impacts (Shelby and Harris 1985; Shelby and Shindler 1990). Two other studies have used artistic renderings of alternative use levels and related impacts (Heywood 1993a; Martin and others 1989). More recently, computer software has been used to edit and produce photographs depicting a range of use levels and environmental impacts (Hof and others 1994; Manning and others 1996a,b, 1995). As with the numerical/

narrative approach described previously, long and short versions of this measurement technique can be used. The long version asks respondents to evaluate each image in a series of photographs. The short version asks respondents to select the photograph that illustrates the highest impact or use level acceptable.

An issue implicit in all of these measurement approaches concerns the evaluative dimension used in these questions. When respondents have been asked to evaluate a range of use levels and related impacts, the response scale has included terminology specifying a variety of evaluative dimensions, including “acceptability,” “preference,” “pleasantness,” “desirability,” “satisfaction,” and “tolerance.” These alternative evaluative dimensions may have substantially different meanings to respondents, and may result in significantly different personal and social norms.

A related issue concerns the normative nature of evaluative dimensions. Application of normative theory and techniques to outdoor recreation has noted several important elements of norms as they traditionally are defined (Heywood 1993a,b, 1996a,b; McDonald 1996; Noe 1992; Roggenbuck and others 1991; Shelby and Vaske 1991; Shelby and others 1996; Williams and others 1991). One of these elements suggests that norms have a strong obligatory nature. That is, norms define what “should” be. This suggests that norms might be measured by asking respondents about what recreation conditions or level of impacts they feel managers “should” maintain.

Recent studies of crowding-related norms for several national parks have allowed comparisons of findings among the norm measurement approaches described above (Manning and others 1998, 1999a,b,c, 1997a,b,c, 2000). These comparisons suggest that alternative measurement approaches can affect resulting norms in a statistically significant and substantive way (Manning and others 1999d). The most powerful effects concern the evaluative dimension used and more explicit introduction of the normative notion of the recreation conditions that managers *should* maintain.

Examples of these findings are shown in table 1 and figure 3. Table 1 summarizes findings from several comparable studies, and figure 3 presents findings from one study in a graphic format. These findings suggest three important points. First, a range of personal and social norms can be estimated using a spectrum of evaluative dimensions that range from “preference” to “absolute tolerance.” Second, the “management action” evaluative dimension may be of special interest to park and wilderness managers because it more explicitly addresses tradeoffs inherent in crowding-related issues (in other words, a desire to avoid crowding while also maintaining public access), and therefore may more closely approximate the traditional prescriptive nature of norms. For example, the “management action” question for the carriage roads of Acadia National Park, Maine, asked respondents “Which photograph shows the highest pattern of visitor use that the *National Park Service should allow* on this section of the carriage roads? In other words, at what point should visitors be restricted from using the carriage roads?” (Respondents were given options to report that visitor use should not be restricted at any point shown in the photographs, or that visitor use should not be restricted at all.) It is important to note that “management

**Table 1**—Alternative evaluative dimensions of crowding norms.

	Evaluative dimensions				
	Preference	Acceptability (short form)	Acceptability (long fom)	Management action	Absolute tolerance
<b>Cariage roads, Acadia National Park (persons/viewscape)</b>					
1995 (visitors)		10.7	12.7	17.8	25.2
1996 (visitors)	5.4	9.7		17.5	20.9
1996 (residents)	7.0	10.1		15.6	19.1
<b>Hiking trails, Grand Canyon National Park (1997) (persons/viewscape)</b>					
Corridor Trails	3.4	6.9	9.0	9.1	12.8
Rim Trails	3.0	6.0	10.0	9.0	18.0
Threshold Trails	1.1	3.6	5.0	5.1	7.9
<b>Attractions, Yosemite National Park</b>					
Trail to Yosemite Falls (1998) (persons/viewscape)	18	32	40	46	60
Base of Yosemite Falls (1998) (people at one time)	43	75	92	100	126
Trail to Vernal Fall (1998) (persons/viewscape)	11.2	20.6	26	29.7	38.6
Trail to Bridalveil Fall (1999) (persons/viewscape)	7	13	18	20	26
Base of Bridalveil Fall (1999) (people at one time)	8	15	20	19	25
Glacier Point (1999) (people at one time)	19	34	42	49	61
Trail to Mirror Lake (1999) (persons/viewscape)	10.4	18.5	24	26.0	33.9
<b>Statue of Liberty National Monument (1998)</b> (waiting time in minutes to get into the Statue of Liberty)					
			45	64	61
<b>Alcatraz Island, Golden Gate National Recreation Area (1998)</b> (people at one time in cell house)					
	25.1	36.0	44	43.9	
<b>Arches National Park</b>					
Delicate Arch (1997) (people at one time)	12	33	37	49	67
North Window (1997) (people at one time)	8	23	23	30	47
Devils Garden (1997) (persons/viewscape)	6	13	13	8	23

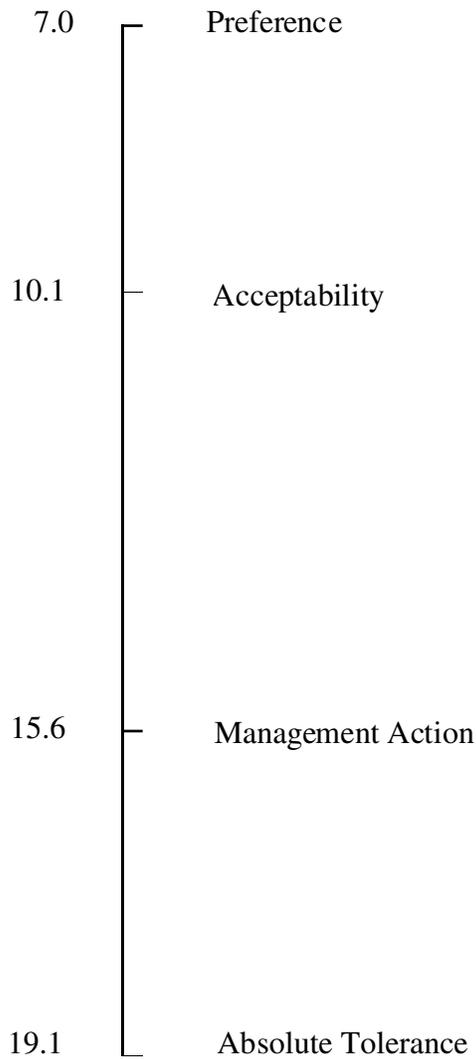
action"-related norms are consistently and substantially higher than "preference"- and "acceptability"-based norms. Finally, the range of crowding-related norms developed in the literature based in alternative evaluative dimensions may be useful to researchers and managers as it facilitates a more comprehensive understanding of the prescriptive component of carrying capacity.

## Beyond the Normative Approach

Data derived from the normative approach can be useful in helping managers formulate crowding-related standards of quality. However, such studies have also illustrated the complex nature of this research, as well as the strengths and weaknesses of normative theory and empirical techniques.

In particular, conventional studies designed to estimate crowding-related norms may substantially underestimate such norms because these studies fail to explicitly (or even implicitly) introduce tradeoffs between the desire to avoid crowding and the desire to maintain reasonable public access to parks and wilderness.

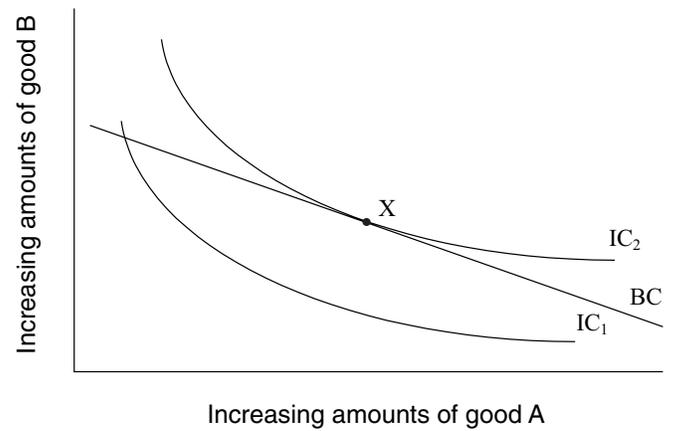
Research on park and wilderness-related values might be strengthened through adaptation of alternative theoretical and empirical approaches, especially those that more explicitly address inherent tradeoffs in outdoor recreation. For example, indifference curve analysis developed in the discipline of economics, provides a model representing the tradeoff decisions an individual makes in allocating a fixed level of income between two consumer goods (Nicholson 1995). There are two primary components to the indifference curve model,



**Figure 3**—Relationships among alternative evaluative dimensions (taken from 1996 Acadia National Park community survey).

the individual's indifference curves and their budget constraint. A single indifference curve represents all possible combinations of two goods (for example, A and B ) that provide the individual with the same level of utility (Pindyck and Rubinfeld 1995). The curves labeled  $IC_1$  and  $IC_2$  in figure 4 are examples of indifference curves. The budget constraint represents the possible combinations of goods A and B the individual can purchase, assuming the individual spends all of his/her income (Pindyck and Rubinfeld 1995). For example, the budget constraint labeled BC in figure 4 represents all possible combinations of the two consumer goods A and B, for a fixed income level.

According to indifference curve theory, the optimal combination of goods A and B for a given income is located where the budget constraint is tangent to one of the individual's indifference curves (Nicholson 1995). This represents the highest level of utility the individual can achieve from the consumption of goods A and B, given a fixed level of income. In figure 4, the optimal condition is represented by point X. A more



**Figure 4**—Indifference curve theory.

complete discussion of indifference curve theory is represented in Lawson and Manning (2001a,b, in press a,b,c).

An initial application of indifference curve analysis to park and wilderness management was conducted within the context of social carrying capacity at Arches National Park, Utah, by substituting lack of crowding at Delicate Arch and accessibility to Delicate Arch for consumer goods (in other words, goods A and B in figure 4). Specifically, the number of people at Delicate Arch was substituted for good B along the y-axis, and the percent chance of receiving a hypothetical permit to hike to Delicate Arch was substituted for good A along the x-axis.

Indifference curves were estimated following a procedure adapted from MacCrimmon and Toda (1969). In this procedure, respondents are presented with a series of pairs of crowding and accessibility conditions. The first component of each pair of conditions is a fixed reference condition, against which respondents evaluate an alternative condition. Respondents are asked to indicate their preference within each pair of conditions they evaluate. In the Arches National Park example, respondents were asked to express their preference between a first set of conditions—having a 100 percent chance of receiving a permit to hike to Delicate Arch and seeing 108 people at Delicate Arch—and a second set of conditions—having a 50 percent chance of receiving a permit to hike to Delicate Arch and seeing 36 people at the Arch. Study methods are described more fully in Lawson and Manning (in press a,b,c).

Regression analysis was used to estimate an indifference curve for each respondent based on the data points derived from the respondents' evaluation of a series of access and crowding conditions at Delicate Arch. For each respondent, a hyperbolic, semilog, or quadratic curve was fit to the data points. The functional form for each individual indifference curve was selected based on the goodness of fit (R-square) of the regression equation, and the explanatory significance of the access variable (chance of receiving a permit) on the number of people at Delicate Arch.

A simulation model of visitor use at Arches National Park was used to estimate points defining the budget constraint, representing the possible combinations of visitor use levels and accessibility at Delicate Arch. Computer simulation

models have been successfully applied to a variety of park and outdoor recreation areas (for example, Potter and Manning 1984; Wang and Manning 1999; Schechter and Lucas 1978). Additional information about the inputs used to develop the simulation model can be found in Lawson and Manning (in press a,b,c).

The simulation model was run at three levels of daily visitor use. The first level of use represented the Park's average daily use in the peak summer season, which was used as a proxy for a 100 percent chance of receiving a permit to hike to Delicate Arch. The second level of use was 50 percent of the Park's average peak daily use, which was used as a proxy for a 50 percent chance of receiving a permit to hike to Delicate Arch. The third level of use was 25 percent of the Park's average peak daily use, which was used as a proxy for a 25 percent chance of receiving a permit to hike to Delicate Arch.

For each use level, the model was run multiple times to account for variability in model parameters. The outputs from the simulation model runs were used to estimate the highest number of people any visitor would see at one time at Delicate Arch, for each of the three accessibility conditions. A linear budget constraint was estimated from the three resulting data points.

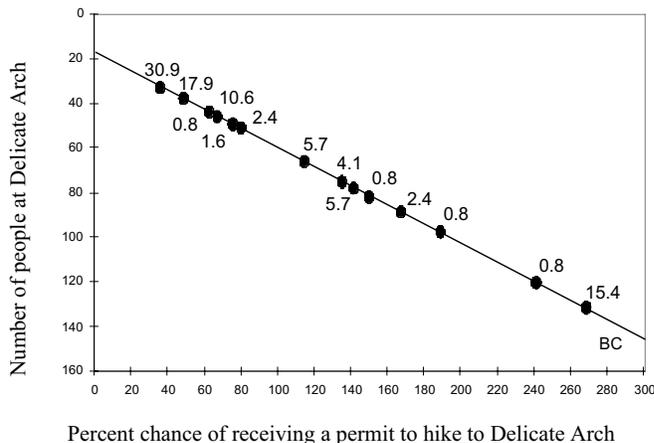
Lastly, each individual's indifference curve was mathematically adjusted to find the point where the indifference curve is tangent to the budget constraint. The point of tangency between the adjusted indifference curve and the budget constraint reveals the respondent's preferred combination of visitor use and accessibility, given the possible conditions at Delicate Arch.

Study data were gathered from a survey of 124 visitors to Delicate Arch in September of 1999. The study used computer-generated photographs representing a range of the number of visitors at one time at Delicate Arch (Manning and others 1996b). The survey was administered on a lap top computer.

Study findings are shown in figure 5, which presents the percent of respondents with each of the preferred combinations of access and visitor use at Delicate Arch. The budget constraint for Delicate Arch is represented by the line labeled BC. Each point noted along the budget constraint represents a preferred combination of access and crowding at Delicate Arch for at least one respondent (the point of tangency between a respondent's indifference curve and the budget constraint). The number beside each point indicates the percent of respondents with the corresponding preferred combination of access and crowding. Data analysis and study findings are described in more detail in Lawson and Manning (in press a,b,c).

Study findings suggest that indifference curve analysis may provide a useful tool for park and wilderness managers to evaluate tradeoffs inherent in crowding and carrying capacity decisions. This research approach gathers data concerning crowding-related norms of visitors, but places such norms within a more realistic and applied management context regarding the tradeoffs inherent in such normative judgments.

Conjoint analysis represents another research approach to quantifying tradeoffs inherent in park and wilderness management. Conjoint analysis is a statistical procedure that has been developed in marketing research to measure



**Figure 5**—Findings from indifference curve analysis for Delicate Arch.

consumer preferences and tradeoffs among such preferences (Louviere 1988; Green and others 1988), and has recently been extended to applications in nonmarket and environmental policy contexts (Opaluch and others 1993; Dennis 1998). A standard research design involves assigning a range of performance levels to selected product or service attributes, then developing alternative scenarios that represent permutations of such attribute levels. Respondents then rate their preferences among scenarios and resulting data indicate which attributes are most important. In the context of park and wilderness recreation, indicators and standards of quality can be substituted for performance levels of product or service attributes (Lawson and Manning, in press a,b).

## Conclusion

Crowding and carrying capacity are important issues in park and wilderness management, and they are likely to increase in urgency as the popularity of parks and wilderness continues to grow. Research on these issues, along with management experience, has developed a number of planning and management frameworks and research approaches for addressing these issues. It is clear from the literature that management of crowding and carrying capacity involves matters of both science and values, and that both of these elements must be integrated into "informed judgments" on the part of park and wilderness managers. That is, managers must ultimately make value-based judgments about the maximum acceptable levels of visitor-caused impacts to the resource base and the quality of the visitor experience. However, such judgments should be informed to the extent possible by scientific data on the relationships between visitor use and resulting impacts, and the degree to which park and wilderness visitors and other interest groups judge such impacts to be acceptable. Such information represents the "values of science" to managing crowding and carrying capacity in parks and wilderness.

A growing body of literature has begun to address the corresponding "science of values," and how this type of information might be integrated into park and wilderness

management. Visitor-based research has employed normative theory and techniques to explore the acceptability of a range of social and biophysical impacts related to visitor use, and findings from these studies are being integrated into a body of knowledge and applied in management decisionmaking. Conceptual and methodological extensions of the normative approach are currently being explored in a variety of park and wilderness contexts, and new theoretical and empirical approaches are being adapted to address tradeoffs inherent in crowding and carrying capacity management. The science of values is progressing to meet the opportunities and challenges of the values of science to park and wilderness management.

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# Approaches to Measuring Quality of the Wilderness Experience

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**Abstract**—Wilderness is a special place that provides opportunity for unique and profound experiences. An essential task for the maintenance of these recreational opportunities is the definition and monitoring of experience quality. Four approaches to the measurement of the wilderness experience have developed in over 30 years of research: satisfaction approaches (which focus on evaluation of onsite conditions), benefits-based approaches (focusing on psychological outcomes), experience-based approaches (describing cognitive states experienced in wilderness), and meanings-based approaches (documenting socially constructed meanings ascribed to the experience). Each approach has its strengths and weaknesses. Given that the wilderness experience is a multifaceted phenomenon, it is not surprising that no single method adequately serves the needs of managers trying to preserve the quality of the wilderness experience in the context of rising use density levels. However, a linear and direct relationship between use density conditions and experiential quality should not be assumed.

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## Introduction

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Attempts to define the quality of the wilderness experience have varied. Managers have struggled to define the unique qualities of the very opportunities they are charged to provide and protect. While impact upon, or loss of, ecological qualities has received a good deal of attention, and frequently initiates management agency response (Hammit and Cole 1998), the loss of experiential quality seems less noticeable and less urgent. However, that Congress and the public in general directed managers to secure the opportunity for quality wilderness recreation is clear in the Wilderness Act of 1964 (PL 88-577, Sec. 2(a)) where it defines the National Wilderness Preservation System to be:

...administered for the use and enjoyment of the American people in such a manner as will leave them unimpaired for future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character, and for the gathering and dissemination of the information regarding their use and enjoyment as wilderness.

And while it is acknowledged that onsite recreation is only a portion of the American public's use and enjoyment of the National Wilderness Preservation System and that offsite

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benefits such as heritage, bequest, and option values deserve greater attention, it has been visitor use and user characteristics that have dominated wilderness researchers' attention (Roggenbuck and Lucas 1987; Cole 1996).

Wilderness legislation provides broad guidance for the types of visitor use that is to be fostered in wilderness areas. The most frequently cited is the Wilderness Act of 1964 (Sec. 2.(c)), which defines wilderness to be:

...protected and managed so as to preserve its natural conditions and which (1) generally appear to have been affected primarily by the forces of nature; (2) have outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) have at least five-thousand acres or are of sufficient size to make practicable their preservation; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.

The so-called Eastern Wilderness Act of 1975 (PL 93-622, Sec. 2.(b)) further directs that wilderness areas be:

...managed to promote and perpetuate the wilderness character of the land and its specific values of solitude, physical and mental challenge, scientific study, inspiration, and primitive recreation for the benefit of all of the American people of present and future generations.

Both of these pieces of wilderness legislation speak of the need to secure the character of wilderness in the face of large-scale industrial development, expanding growth and settlement, and growing mechanization. Undoubtedly these threats have increased in the intervening decades and efforts to protect the quality of wilderness recreation are urgent indeed. Wilderness use is increasing (Cole 1996) and popular support and demand for the National Wilderness Preservation System continues. The language used by Congress implies that wilderness is a special place, offering unique recreational opportunities. Research into this area has suggested that wilderness does indeed provide rare experiences and outcomes (Kaplan and Kaplan 1989; Scherl 1990; Driver and others 1987). The challenge, then, for researchers and managers is to more clearly define the nature of the wilderness experience that produces these benefits. Elsewhere in this proceedings, Cole discusses some of the influences of levels of user densities on experience quality, and stresses the need for a better understanding of visitor experiences. In our paper we set out to provide a roadmap to more than three decades of inquiry into the nature of the wilderness experience. Throughout this period of time varying concepts or approaches to the composition of that experience have evolved, much of it reflecting changing perspectives of outdoor recreation research in general.

The earliest research in outdoor recreation tended to be descriptive in nature (Manning 1999). During this initial phase, researchers were primarily interested in the numbers

of outdoor recreation participants, the activities in which they participated, and their basic socio-demographic makeup. Although this information provided a base line for use levels and the beginnings of an empirical foundation, the lack of a theoretical framework limited its contribution to our understanding of the recreation experience. In many ways, recreation research has been a search for the most effective framework for representing the value of quality recreation experiences and protecting that value through planning and management actions.

It was perhaps LaPage (1963) and Wagar (1964) who first called for a “logically consistent framework that will guide us towards quality recreation” (Wagar 1966: 9). In doing so, they explicitly linked quality of the recreation experience with the numbers of people seeking that experience, thus initiating discussion of a recreational carrying capacity and its usefulness for effective recreation management. Lime (1976) and Hendee and others (1978), for example, described the possible application of a carrying capacity model for the planning and management of particular wilderness recreation resources. However, recent authors have questioned the application of carrying capacities to protected area planning and management (Borrie and others 1998). Thus, in many ways much recreation research has been a search for the most effective framework for identifying and protecting the experiential values of recreation given the numbers of visitors wishing to enjoy those values. This paper discusses four lines of research that attempt to measure the recreation experience: satisfaction approaches, benefits-based approaches, experience-based approaches, and meaning-based approaches.

## Satisfaction Approaches

It is not surprising that “the principle measure of quality in outdoor recreation has traditionally been visitor satisfaction” (Manning 1999: 8). Visitors are the premier sources of information concerning the conditions of the recreational opportunity they experience, and their evaluations are an important source of feedback for managers. However, reliance on satisfaction measures assume a number of characteristics of the visitor, including their ability to deliberately, accurately, and consistently perceive (and base evaluations upon) the conditions experienced.

Most satisfaction measures in outdoor recreation have been adapted from the expectancy-valence theory, with users considered to be rational decisionmakers that evaluate satisfaction as a comparison between desired and actual outcomes (Williams 1989). Outcomes that meet or exceed expectations result in high satisfaction while those experiences that fall short of expectations are considered less satisfying.

Initial hypotheses concerning satisfaction suggested that it was solely correlated to use levels. Alldredge’s (1973) model proposed that increasing numbers of users would result in diminishing satisfaction for each individual user. In the case of wilderness, it was suggested that the first user in an area enjoyed the maximum satisfaction and additional users reduced this level of satisfaction. One survey of relevant research found little empirical evidence for this intuitive relationship between actual use density and satisfaction (Graefe and others 1984). These findings

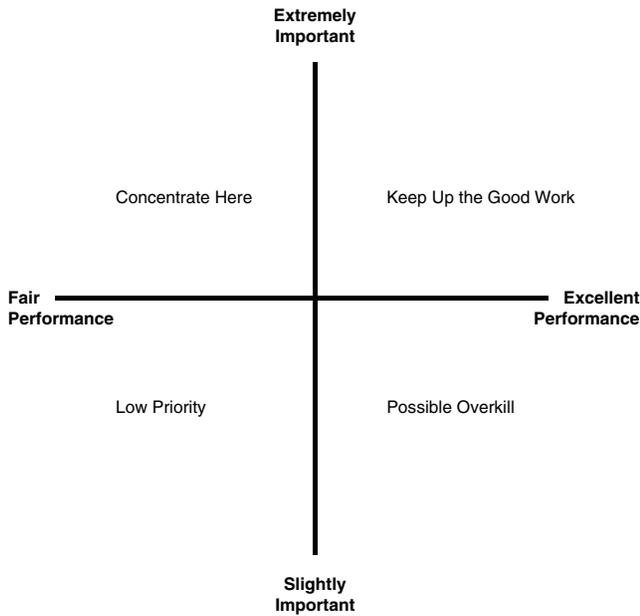
suggested that a multidimensional model of satisfaction that incorporates various setting and experience attributes might be more appropriate.

Thus, the ability of single measures of visitor satisfaction must be questioned. Single item measures assume the respondent’s ability to cognitively combine all the various components and evaluations of a visit into a single opinion. Furthermore, since single item measures are a more generic-level evaluation, they are more prone to generic level influences such as mood, self-presentation concerns, and strategic responding. Finally, single item satisfaction measures, by their very nature, fail to filter out the influence of experience components such as the weather, group dynamics, and level of visitor preparation over which the manager has little, if any, control. This is understandable if the aim is to provide a single measure of satisfaction, but less directly informative of what is leading to that satisfaction. Single-item scales offer little in the way of accurate description of the recreation experience and the role that management plays in fostering and encouraging satisfying experiences. Thus, in recognition that satisfaction is a multidimensional construct, multiple-item scales began focusing on situational determinants of satisfaction (Graefe and Fedler 1986). One of the most prominent multidimensional approaches is the use of importance-performance scales, which is described below. However, no standardized sets of multidimensional measures of satisfaction have been developed or commonly adopted (Manning 1999).

## Importance-Performance Measures

One popular approach to multidimensional measurement of satisfaction is that of importance-performance (I-P) measures. This technique was developed in the field of marketing research as an approach to measure customer evaluations of service attributes and easily convey this information to managers (Martilla and James 1977). In application, customers are asked to report the importance they place on an attribute as well as their perception of the service provider’s level of performance in delivering that attribute. Scores from all the respondents are then aggregated to find the mean importance and mean performance rating for each attribute measured. Thus, the link between expectations and evaluations is made explicit. That is, if visitors consider a particular attribute or condition to be particularly important to their visit, visitors are likely to expect those attributes or conditions to be satisfactorily present. Any discrepancy between expectations and outcomes will clearly represent their unmet motivations or expected satisfaction.

Particularly for managers, one of the desirable features of the I-P approach is its presentation of the data. The mean importance and mean performance scores are plotted on a two-dimensional grid to graphically illustrate customer satisfaction with the service provider. For example, attributes that receive high importance scores and high performance scores would fall into the “Keep up the Good Work” quadrant, indicating that managers are effectively providing a worthwhile service. On the other hand, high importance scores with low performance scores indicate that management is failing to devote enough attention to a valued attribute and should “Concentrate Here.” This graphical depiction allows managers to easily identify the areas on which they should focus their efforts (fig. 1).



**Figure 1**—An example of an importance-performance grid.

Mengak and others (1986) found the I-P approach to be a valuable tool that makes use of easily obtained information to guide land management efforts. Clear guidance is given as to which facilities and conditions deserve attention given a mismatch between expectations and experience. It should be cautioned that respondents rather than reporting actual conditions were reporting perceived quality. The fact that visitors typically perceive the quality of national parks and wilderness areas as high suggests that results may be somewhat skewed and the range of variation not adequately captured by these measures. (It is not surprising that visitor evaluation of outdoor recreation experiences is high given the voluntary nature, the high emotional and financial commitment, and the social desirability typically associated with them).

Hollenhorst and Gardner (1994) have proposed a modification of importance-performance measures called the indicator performance estimate (IPE). They note that the relative nature of performance measures in the typical I-P model do not offer managers guidance for improving conditions nor are they necessarily comparable because each indicator is based on a different scale. For example, low performance levels on the indicator “number of parties of people seen each day” would not tell managers how many parties were actually encountered or the preferred encounter level. Also, the different scales of the indicators such as “number of fire rings per campsite” and “number of parties of people seen each day” would confound any efforts to compare the performance of these indicators.

To ameliorate these deficiencies, the IPE model reconceptualizes the performance dimension of the I-P model as the standardized difference between visitor standards and actual or perceived conditions. In the case of physical indicators, such as number of fire rings or percentage of vegetation loss, actual physical inventories were used to determine status of the indicators. To determine the status of social

indicators, such as number of parties seen each day, respondents were asked to report their perceptions of current conditions. For each indicator ( $i$ ), the indicator performance estimate ( $IPE_i$ ) is calculated by comparing the mean preference ( $p_i$ ) to the actual condition ( $a_i$ ) dividing by the standard deviation of the preference rating ( $sp_i$ ), for example,

$$IPE_i = (p_i - a_i)/sp_i$$

Each  $IPE_i$  represents a standardized performance level that is comparable between various indicators and is plotted on an I-P grid similar to that shown previously.

This model has been applied to the Cranberry Wilderness in West Virginia (Hollenhorst and Gardner 1994) to better understand the monitoring of indicators within the Limits of Acceptable Change (LAC) process. The IPE method was suggested to allow managers to prioritize management actions based on the perceived importance of each indicator and the amount of deviation from standard for each indicator. This study found that four of the five indicators that fell into the “Concentrate Here” quadrant were related to social conditions and perceived crowding. It is interesting to note that although users felt that use level indicators were very important to their overall experience, they typically chose to hike and camp along the most highly used trails in the wilderness area. Although visitors typically prefer low use levels, it is unclear whether the departure from preferred conditions adversely affects experience quality.

Another recent approach to measuring visitor satisfaction is that of a “performance measures only” test (Absher 1998). In that study, visitors were asked to rate the performance of 22 indicators developed across three performance domains: facilities, services, and information. With visitors sampled across two National Forests, it is interesting to note that wilderness users, on average, reported higher performance levels for the U.S. Forest Service than front country users did. The three reasons offered to explain this difference illustrate the difficulty of interpreting these sorts of studies: (1) the Forest Service may be doing a good job of providing for wilderness users, (2) the Forest Service may be ‘over-performing’ by providing services and facilities beyond the expectations of wilderness users, and/or (3) wilderness users, who are generally more experienced, may have more crystallized perceptions of conditions and services.

## Strengths and Weaknesses

Although customer service measures were originally developed for use by private commercial service providers, there is justification for its application in the area of wilderness management. First, as taxpayers, wilderness users can be seen as “customers” that are paying for the “product” of the wilderness recreation experience. Second, because wilderness recreation users are an important part of the constituency that supports wilderness, it is advantageous to ensure that their needs are being met.

As a methodological concern, it should be pointed out that satisfaction measures are rarely reported at the individual visitor level and are therefore less informative of the quality of individual experiences. In most satisfaction or I-P studies the results are aggregated across visitor groups and averages are then used to guide management. Shafer (1969) first cautioned that the “average camper” does not exist, and that

recreation managers should strive to maintain a diversity of opportunities and experiences. The aggregated data may fail to adequately guide the broad range of conditions the visitors are seeking.

I-P approaches tend to focus on the facilities and setting conditions that can play an important role in determining both the type and quality of the recreation experience. However, it has been questioned whether it is valid to express settings as a collection of individual attributes (Schreyer and others 1985). Alternatively, settings could be viewed holistically, as “more than the sum of their parts.” In which case, visitor satisfaction in respect to setting attributes does not equate to satisfaction with the recreation experience. Furthermore, considering the unique emotional and spiritual qualities of the wilderness recreation experience, customer service approaches would appear to be measuring only one component of the experience. However, it is that component that managers may perceive to be most under their control.

While this type of information can prove to be an efficient evaluation of management performance, it does offer little insight into the nature of the wilderness experience. Rather than measuring the quality of the experience we gain information on perceptions of quality of various setting attributes.

## Benefits-Based Approaches

An alternative to directly measuring visitor satisfaction is provided by the benefits approach, which is based on the foundations of Driver and Tocher (1970). The benefits approach differs from the satisfaction approach in three fundamental ways. First, instead of measuring visitor satisfaction with attributes, the benefits approach focuses on visitor satisfaction with the psychological outcomes of the recreation experience. Second, the benefits approach, as operationalized in the Recreation Opportunity Spectrum (ROS) framework, expands the notion of the setting for recreation experience to include physical, social and managerial conditions. Third, in acknowledging that management shouldn't focus on “the average camper who doesn't exist” (Shafer 1969), the benefits approach focuses on a diversity of recreation experience opportunities and less on mean evaluations.

Along with the development of ROS, much work was done to identify which components of the recreational experience are most important to participants. The recreation experience preference (REP) scales, developed through the combined work of Driver, Knopf, Brown, and Haas, identifies 16 domains that are considered to be important to the recreation experience (Driver and others 1985). These scales have been used to measure visitor preferences in a good number of wilderness areas, undesignated wilderness areas, and nonwilderness areas (Driver and others 1985). The results indicated that visitors to wilderness areas consistently chose “enjoy nature,” “physical fitness,” and “reduce tensions” as the three most important preference domains. It is also important to note that visitors to three nonwilderness areas studied rated different experience preference domains as most strongly adding to satisfaction. This is a key finding in that it adds support to the claim that wilderness users are in search of experiences that are unique from other outdoor

recreation pursuits and provides some insight into the nature of the wilderness experience.

The benefits approach is still based on the expectancy-valence theory, in that satisfaction is defined as the extent to which actual psychological outcomes of the recreation experience compare to those desired. Accordingly, it is suggested that visitors are motivated to seek out particular activities in specific settings in order to receive specific psychological outcomes. It is this theoretical link between preferred experiences and recreation setting that have become both axiomatic but also problematic for recreation research.

For example, a study of wilderness recreationists in the Wind River Range of Wyoming examined this link between setting preferences and desired experiences (Manfredo and others 1983). The authors hypothesized that there exist definable segments of wilderness recreationists and that setting preferences and activity choices differ among these various user segments. The findings of this study showed limited support for the motivational model. Specifically, only a slight degree of correlation was found between preferences for activities and settings, and experience preferences. The differences between the defined user segments, while not large, were also found to be significant.

Furthermore, the ROS management framework assumes that similar groups of psychological outcomes are grouped into “bundles” that represent “experience opportunities” that can be arranged along a continuum generally ranging from the urban to the primitive. As mentioned above, it is assumed that visitors select the setting as the appropriate experience opportunity to realize specific psychological outcomes. Yuan and McEwan (1989) examined the relationship between visitor experience preferences and setting characteristics at four private and eight public campgrounds in western Kentucky. Results from this study showed little evidence of differences in mean experience preferences between the three ROS settings (rural, roaded, and semiprimitive-motorized). In other words, it did not appear that visitors were seeking out particular settings in order to satisfy desires for particular experiences. Thus, support for this key assumption of the benefits-based approach, as operationalized in the Recreation Opportunity Spectrum, is not as strong as it should be. REP scales, or other measures of expected benefits, would therefore appear to be insufficient descriptors of the significance of the recreation experience.

## Strengths and Weaknesses

Although research has failed to conclusively confirm the setting-experience preference relationship, managers have found the ROS to be a useful management framework. ROS has been useful in inventorying, classifying, allocating, and evaluating recreational resources (Haas and others 1979). Indeed, the ROS planning framework has been widely adopted by the USDA Forest Service and the USDI Bureau of Land Management (Driver and others 1987). The rationale for this approach is that while recreation managers may not be able to manage experiences per se, they can manage settings that provide opportunities for certain experiences (Driver and Brown 1978).

Furthermore, using ROS to describe and prescribe a diversity of recreation opportunities, and similarly using

REP scales to describe a variety of visitor motivations and visitor groups, have been important developments in recreation research. However, difficulties in establishing a consistent link between setting and recreation experience preferences indicate that this may not be an adequate representation of the recreation experience. It is also unclear how social conditions, such as use density, relate to the provision and attainment of recreation experience preferences. Perhaps, in the same way that it may be more appropriate to view settings holistically rather than as a collection of setting attributes, it may be more useful to envision experiences holistically rather than as a collection of psychological outcomes.

## Experience-Based Approaches

Another current line of recreation research focuses on the nature of the experience as it is experienced. This line of research has emerged from some of the most basic questions about leisure and recreation, such as: What is recreation? How is recreation different from other types of human engagement? What are the cognitive and psychological processes involved in recreation experiences? How do these processes shape our perceptions of the recreational experience? This approach more directly asks the visitor to describe their experience instead of asking them to evaluate components of the recreation setting. It assumes less cognitive processing on the respondent's behalf in that they are often questioned closer in time to the experience and they are not asked to explicitly link setting conditions with satisfaction. In doing so, it is argued that respondents more accurately report the wilderness experience as it unfolds and are less influenced by bias and assumed relationships (Borrie and others 1998). In addition, since the wilderness experience can change across the course of the visit (Borrie and Roggenbuck, in press), respondents are sometimes asked at multiple points in time for their description of the experience instead of having to collapse the entire experience into a single evaluation.

One of the foundations for this line of research is the theoretical work of Clawson and Knetsch (1966) who proposed that recreation is a multiphase experience. Their model of the experience includes five phases: anticipation, travel-to, onsite, travel-back, and recollection. They propose that various satisfactions can be achieved through each of these phases and that each phase is important in determining the overall satisfaction with a recreational experience. Although managers have traditionally focused on the onsite phase of the experience, Clawson and Knetsch indicate that by providing proper information managers can also influence the offsite phases of the experience. Noting the intuitive appeal and the lack of empirical tests of this model, Hammitt (1980) conducted a study of a university field trip to Mud Lake Bog in Michigan and found significant changes in mood across the five phases of the experience.

While the five-phase model of the recreation experience has been widely known (and to some degree widely accepted) for some time, only more recently have researchers begun to investigate the multiphase nature of the *onsite* experience. In this way, cognitive and psychological states have been found to ebb and flow over the course of the onsite experience (Hull and others 1996). In a study of brief leisure experiences

of university students in Italy, Hull (1996) found support for the dynamic and complex nature of the recreation experience. Over a 7-week period, participants were asked to report their moods (at 20-minute intervals) when engaging in any one of four leisure activities: walking in a natural setting, walking within a city center, sitting indoors with a panoramic window view, and sitting in a room with no windows. It was found that regardless of the activity participated, mood dimensions changed across time, thus confirming the dynamic nature of the experience.

Another study examined the experience patterns of day hikers in the White River National Forest bordering the Maroon Bells Wilderness Area, Colorado (Hull 1992). In this study, hikers were asked to respond to items measuring mood, satisfaction, and perceived scenic beauty at 12 predetermined points along the trail. Analysis of the experience patterns indicated that both mood and satisfaction varied over time. Much of this variation was explained by the perception of landscape beauty indicating that the natural setting is an important factor effecting both mood and satisfaction. However, the direction of causality is not clear. For instance, is it the perception of landscape beauty that influences mood, or is it mood that effects the perception of landscape beauty?

As the focus of recreation research efforts change towards a greater emphasis on the experience itself, the methods used have also had to change (Stewart and Hull 1996; Stewart 1998). In particular, the techniques of the Experience Sampling Method (ESM) have been investigated. For example, ESM techniques were used to examine the multiple aspects of the wilderness experience in the Okefenokee National Wildlife Refuge of southern Georgia (Borrie and Roggenbuck 1995). This method calls for participants to carry beepers throughout a recreation experience. At random times the beeper sounds, indicating that the respondent should complete a survey describing the content of the experience at that point in time.

In doing so, the wilderness experience was viewed as a multidimensional event. Not only does the experience change across time, but these changes can be observed across a number of dimensions. While some studies have focused on solitude as the dominant indicator of the wilderness experience, the Okefenokee study examined five other dimensions of the wilderness experience (primitiveness, humility, timelessness, oneness with nature, and a caring relationship with nature). Kaye (1999) has also called for the description of salient wilderness experience characteristics such as humility, mystery, sacredness, and restraint. Searching for defining wilderness experience characteristics is a natural extension of the work of Roggenbuck and associates who were searching for potential indicators of a quality wilderness experience (Williams and others 1992; Roggenbuck and others 1993).

Not only has there been effort to better dimensionalize and measure important and essential qualities of the wilderness experience, but attention has also turned to a broader range of factors, conditions, and modes of experience that may be influencing the experience the wilderness visitor gets. As Watson and Roggenbuck (1998) mention, in much wilderness research "we measure very little about the experience beyond crowding influences (encounters along trails or at campsites). In this case we believe there are other

aspects at least as important or more important than crowding, and the effects of management actions on these aspects of the experience should be monitored" (p. 269). One of the challenges facing researchers is to explicitly demonstrate the influence of wilderness conditions on the experiences received. Borrie and Roggenbuck (in press) and McIntyre (1998) both measured focus of attention at multiple points in the wilderness experience, mapping the influence of others in the group, activity being undertaken, and degree of focus on the environment. Similarly, Jones and others (2000) measured nine dimensions of the flow experience, including concentration on the task at hand, on a whitewater river in West Virginia. Extending analysis to include the influence of focus of attention upon the wilderness experience should yield a richer analysis of the person-environment transaction and of the internal dynamics of the wilderness experience itself (Roggenbuck and Driver 2000). The influence of setting conditions at specific times and places throughout the wilderness experience, and the interrelationship of the various dimensions, remains a promising path of investigation.

## Strengths and Weaknesses

Experience-based approaches have expanded our concept of the visitor experience. Rather than viewing experiences as mere responses to setting attributes, the research into the multiphasic nature of the wilderness experience indicates that participants are continually interpreting and incorporating various aspects of the experience. In other words, emotions and cognitive functions, such as mood and focus of attention, shift and change throughout the flow of the experience. Furthermore, as our attention has shifted closer to the experience itself, greater attention can be given to the qualities that define that experience. Not only does this turn to better conceptualization of the wilderness experience, the relationships between situations conditions and experience dimensions may become more apparent, as Stewart and Cole (1999) have demonstrated. Thus, three separate contributions have been a focus of experience-based approaches: first, mapping different phases of both the offsite and onsite wilderness experience; second, documenting the dimensions of the experience and the ebb and flow of those dimensions; and third, the inclusion of cognitive and affective attributes of the experience such as mood and focus of attention.

However, three managerial cautions emerge from these approaches. First, attention to the offsite phases of the experience may not only improve the quality of the onsite experience, but also produce satisfaction that extends beyond the spatial and temporal boundaries of a wilderness experience. Managing and preserving the quality of only the onsite experience may be insufficient to protect the meanings and influence of that experience. Second, attention to the multiple phases and dimensions of the onsite experience may suggest that many of the determinants of quality experiences are beyond the control of management. Third, it could be argued that even as we gain a greater understanding of the internal dynamics of the wilderness experience that wilderness managers may wish to be less prescriptive or controlling of those very dynamics. Perhaps an overly reductionistic approach to understanding and

managing the wilderness experience robs the experience of some of its mystery, meaning, and profound significance.

## Meaning-Based Approaches

Unlike the previously discussed approaches, which focus on discrete recreational engagements, meanings-based approaches attempt to understand the wilderness experience in terms of the role that it plays in the broader context of the participant's life (Arnould and Price 1993). It has been suggested "that what people are actually seeking from their recreation experiences are stories which ultimately enrich their lives" (Patterson and others 1993: 449). That is to say, satisfaction is not the result of positive comparisons between desired and actual outcomes nor the actual multidimensional, multiphasic experience, but rather the extent to which the experience produced a fulfilling narrative that is consistent within the context of the participant's life. Thus, it may be that the visitor contributes more to the significance of the experience than the setting or manager ever does. This is not to lessen the importance of the experience, but rather to acknowledge the transaction that occurs between the participant and the environment when they visit the wilderness area. Neither is the transaction prescribed entirely by the setting, nor is it predictable given the visitor's motivations. Rather, the meaning and significance of the experience is constructed before, during, and after the experience and only has relevance within the overall condition and life-course history of the wilderness visitor. Meanings-based approaches have generally become apparent through the investigation of two closely related concepts, self-affirmation and sense of place.

## Self-Affirmation

Self-affirmation refers to a process through which individuals come to confirm aspects of their identity that they perceive as positive (Haggard and Williams 1992). Recreation and leisure are considered to be the ideal situations in which identities can be confirmed. As Kelly (1983) states, "There is something about the activity that produces the 'right' context for the working out of identities" (p. 97). Just as the lack of constraint inherent in leisure can facilitate self-affirmation, the unrestrictive nature of the wilderness experience can provide a context that is especially conducive to development of the self. "Wilderness affords the individual maximum opportunity to perform one's selected activities in order to create one's personal opportunity structure" (Schreyer and others 1987: 24). In this way, wilderness can be seen to play an important role in the development of the self-concept. It seems that in order for wilderness recreation participation to improve self-concept, it involve a long-term relationship and some sense of centrality to the participant's life (Schreyer and others 1987). Thus, for both leisure in general, and for wilderness recreation in particular, recreation experiences can be seen as more than just satisfaction with activity, experience, setting attributes, or fulfillment of unmet psychological needs and wants. Instead, recreation experiences are viewed as significant components of a person's identity, and perhaps relationship to place.

## Sense of Place

Sense of place refers to the meanings ascribed or endowed to a specific place, including the feelings and subjective perceptions an individual has to that place. It is suggested that participants develop a sense of place that becomes intertwined with their sense of self. Tuan (1977), for instance, described place as space with meaning constructed upon experience. In other words, the place becomes a part of the self and the self becomes part of the place. Williams and others (1992) note that "attachment is likely to be stronger among individuals who focus on the setting itself relative to other aspects of the recreational engagement" (p. 33). Moore and Graefe (1994), for example, studied the attachment to place of rail-trail users at three locations in Florida, Iowa, and California. This study demonstrated that, over time, recreationists did develop attachments to familiar trails. It also confirmed both functional and affective dimensions of place attachment.

Williams and others (1992) suggested that just as people can develop an attachment to, or dependence on, a particular place, they may also become attached to a certain *type* of place such as wilderness. This study, which included four wilderness areas (in Arkansas, Georgia, Montana, and Texas), found that place attachment was directly related to use history of a particular place while wilderness attachment was dependent on both experiences with a particular place and general wilderness experience. These findings suggest that long-term wilderness recreation participants create unique meanings for wilderness that may not be available in nonwilderness areas and that these meanings are a result of both specific place-based experiences and attachments, but also the development of attachment to the general concept and values of wilderness.

## Strengths and Weaknesses

If we accept that the goal of wilderness recreation management is to provide quality wilderness experiences, then the meanings that people associate with those experiences may be one of the best measures of that quality. In the context of these approaches, "quality is better understood as the extent to which a recreation engagement succeeds as an expression of one's self" (Williams 1989: 433). If we are to more fully understand the relationship between the visitor and the wilderness environment as Williams and Patterson (1999) argue, we need better efforts at identifying those wilderness and landscape meanings. Outside of such documentation of subjective and symbolic meaning, the assessment of the quality of the wilderness experience may be superficial or reductionistic at best.

While meanings-based approaches may offer important insights into the values that people hold for wilderness and recreation in general, this kind of knowledge has yet to be widely accepted. Current planning frameworks and paradigms call for knowledge that is prescriptive and predictive. Within such a framework, meanings-based information is of limited value. It could be suggested that meanings-based information is most useful in identifying emergent issues that are then best examined in detail with rigorous, quantitative research. Given less of an emphasis on generalizability, meanings-based approaches instead prioritize higher levels

of validity for the information gathered. Meanings-based research cannot give us prescriptive directions, but perhaps having more valid information is better than having exact, yet less valid, information. Certainly, the strengths of the meanings-based approach complements those of other approaches and the application of more than one approach to any situation (as Watson and Roggenbuck 1998 describe for Juniper Prairie Wilderness in Florida) can yield greater insight into the experience provided than a single approach.

## Conclusion

This paper has summarized four broad lines of current recreation research in an attempt to provide an overview of measurement of the wilderness recreation experience. While each approach can offer useful information, each is best suited to answer particular kinds of questions. With this in mind, however, it becomes clear that certain approaches, although providing useful information to managers, do not begin to unearth the nature of the wilderness recreation experience.

The customer service measures seem to be especially appropriate for front country recreational areas. Their focus on facilities and service provision is most suited to situations of intensive site and infrastructure management. However, this approach may not be as effective in the context of wilderness. For example, what are the "services" provided in wilderness? Even more to the point is the question of what customer service measures tell us about the wilderness recreation experience. In other words, can customer service measures help us to define the qualities of recreation experiences that are unique to wilderness? We believe that they cannot. Instead, they distill a multifaceted and unique experience to a very small subset of its parts. Furthermore, they reduce the visitor into a consumer or consumptive role that equally seems at odds with the notion and symbolism of the wilderness experience.

The benefits approach comes one step closer to describing the nature of the wilderness experience. By conceptualizing recreation as experience rather than activity, it recognizes the dynamic nature of recreational engagement. This approach also recognizes that people may choose to participate in certain activities in certain settings for a variety of different reasons. In particular, the ROS has proven to be particularly useful to managers in terms of allocation and inventory of a diverse array of recreation resources. However, research into the personal benefits of wilderness recreation have not been able to conclusively identify those benefits that are wilderness dependent (Driver and others 1987). If confirming evidence were found, then it would be reasonable to conclude that the wilderness experience can be characterized by an aggregate of certain motivations, however such confirmation continues to elude.

Experience-based approaches have explored the dimensions of various emotional and cognitive states within the context of wilderness. This research has shown that evaluation of the experience does not necessarily follow a rational/logical expectancy-valence model. Recreationists' conceptions of quality and satisfaction may be so subjective and individual-dependent that they defy prediction. The fact that the quality of the experience may be more dependent on mood or functioning of the social group than on setting attributes indicates that managers may have little control over the

psychological outcomes of recreation participation. While these are important insights into the dynamics of the wilderness experience, these aspects of human experience are not necessarily exclusive to wilderness. Thus, experience-based approaches that focus on aspects such as mood and degree of social interaction offer less guidance for managers in the provision of quality experiences. However, the potential for development of indicators and standards based upon other measurable dimensions of the experience that are more wilderness-dependent holds much promise.

The meanings-based approaches also seems well suited for capturing the unique elements of the wilderness experiences. The complexity that is assumed in these approaches reflects the idea that wilderness experiences are special merely because they occur in wilderness. As people carry with them their socially constructed meanings of wilderness, the entire experience is viewed through a lens that has been shaped by the same ideas and philosophies that lead to the creation of the National Wilderness Preservation System in the first place. This is not to say that other approaches cannot offer important information about managing wilderness, but rather that meanings-based approaches look more specifically at the nature and quality of the experience. Understanding the multiple meanings that people have for wilderness can help us to identify the activities, benefits, and experiences that managers should aim to provide. However, the development of quality indicators for those meanings provides one of the most challenging tasks for recreation researchers.

### Wilderness Experiences and Managing Use Density

There is a clear need for knowledge of the wilderness experience when managers consider implementing use limits. It is quite possible that by implementing a use limit policy, perhaps as a move to influence crowding densities, that important qualities of the wilderness experience are altered in the process. Without thorough identification and documentation of those qualities, managers may be less aware of the compromises and tradeoffs they are making. Cole and Hammitt (2000) argue, for instance, that management of wilderness is faced with two such choices: to either emphasize wildness of conditions or to emphasize naturalness, and the choice between wildness and solitude. It is hoped that the explicit identification and prioritization of dimensions of the wilderness experience, and the subsequent development of indicators and standards to match those qualities, that managers will be better able to monitor the improvement or deterioration in recreation opportunities. Wilderness research can help not only with both the identification of dimensions of the wilderness experience and with the development of indicators and standards to help protect those qualities, but also with an examination of the impacts of management actions on the same dimensions.

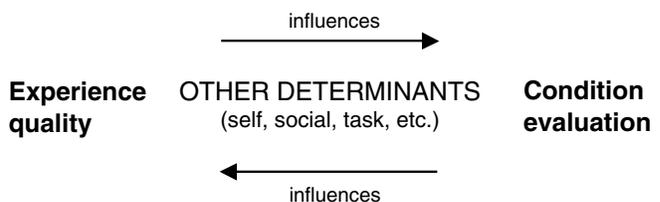
In contemplating the link between maintenance of the quality of recreation experiences in wilderness and the use of management tools such as limits on the numbers and distribution of visitors, there are two particular relationships research should help clearly demonstrate:

1. A clear link between use density conditions and experiential quality.
2. A clear link between implementation of use limits and experiential quality.

In the absence of such documented relationships, implementation of use limit policies may have a range of untoward consequences without necessarily improving the recreational experience in wilderness.

One of the comments made in discussing the strengths and weaknesses of satisfaction approaches to measuring the quality of the wilderness experience was that they tended only to measure visitor perceptions of the quality of various setting attributes. This evaluation of conditions is only one factor that influences the evaluations that visitors make of their experience in wilderness. Other determinants might include the influence of personal characteristics such as mood, the influence of others within the visitor's group, and the influence of the activities that the visitor undertakes in wilderness. That is, the evaluation of the wilderness experience may have less to do with site conditions and more to do with the self, with others in your group, and with the physical challenges and tasks of the visit. Further, it could be expected that the evaluation of the experience quality will itself influence the evaluation of conditions encountered (fig. 2). We suggest, therefore, that when bringing research findings to management decisions that care be taken to represent the specific domains that have been measured and the relationships that have been shown or assumed. The link between evaluation of use density and experiential quality may not be as simple or influential as assumed.

The second link that research information can help with is the relationship between use limits and experiential quality. It is sometimes assumed that high levels of visitor use leads to a decrease in experiential quality. And yet, in some circumstances, visitors do not seem to change their behavior in response to this supposed decline in the quality of the visitor experience. We might expect, for instance, that fewer visitors would return to a wilderness they found to have high levels of use. However, changing the location of their visit is not the only behavior that visitors can employ to cope with a mismatch between expectations and conditions. Visitors may, for instance, alter their expectations or they may tolerate the mismatch given the significance of other aspects of the experience. In which case, use limits designed to lower levels of use density may not be loudly welcomed by those visitors the policy is supposed to serve.



**Figure 2**—The inter-relationship of experience quality and condition evaluation.

Based on some research in Yellowstone National Park (Davenport 1999) a four-stage model may help explain why visitors are not necessarily supportive of management actions such as the implementation of use limit policies. Each stage represents a test or filter through which proposed management actions need to successfully pass:

1. Is there sufficient evidence of an impact that justifies management action?
2. Is there a causal link between visitor behavior and the impact that justifies management actions that directly impact visitors?
3. Is the proposed management action the *best* way to solve the impact?
4. Can the proposed management action be successfully and fully implemented?

Considering each of these questions in turn, use limits may not be the best approach to maintaining the quality of the wilderness. At the first instance, the visitors may not perceive there to be a problem needing management intervention. That is, in their perception and evaluation of use density levels, visitors may not be as concerned as managers might assume them to be. Furthermore, depending on how the wilderness experience is conceptualized, use density levels may not be a significant influence on the quality of the experience. This flows into the second question, in that there may not be a simple and direct relationship between use levels and experiential quality. There may be other temporal, spatial, and behavioral components of visitor use that impacts experiential quality that use limit approaches do not address. Thus, as illustrated by the third question, use limits may not be effective at ameliorating the impacts of use density. Indeed, there may be other, more significant, causes of a decline in experiential quality. However, managers do implement use limit policies in the hope they help maintain visitor experience quality. Lastly, as Borrie and others (1998) have suggested, the management agency must have the authority, support, and resources to successfully administer a use limit policy. Given a tradition of free and unfettered access to their wilderness lands, the American public may not be entirely willing to grant the management agencies active support and endorsement of use limit approaches. Logistically, too, it may be difficult to implement such an approach with dispersed patterns of use typically associated with wilderness areas.

Finally, then, it becomes apparent that not just one of the four approaches to documenting the wilderness recreation experience will completely meet the informational needs of wilderness managers. A satisfaction/importance-performance approach may be useful for the measurement of perceptions of onsite conditions and their influence on subsequent evaluation of those conditions. The benefits-, experience-, and meanings-based approaches may be most useful in defining qualities of the wilderness experience and for documenting the link between experiential quality and the impact of proposed or recently implemented management actions. Given that the wilderness experience is a complex and emergent phenomenon, it is not surprising that multiple approaches are needed to best serve the needs of wilderness managers as they act to preserve the quality of these profound and important recreational experiences.

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# Use Limits in Wilderness: Assumptions and Gaps in Knowledge

Troy E. Hall

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**Abstract**—As wilderness use levels have changed, managers have often considered implementation of use limits to control the impacts of use density. Use limits are generally intended to protect natural qualities and/or to ensure opportunities for solitude, although the second goal appears to have become more common over time, and may be the central use-related concern for certain high-use wildernesses. The goal of this paper is briefly to review the evolution of use limit systems in wilderness and then raise three key questions about use limits, with which managers and researchers must grapple before setting use limits. In posing these questions, unquestioned assumptions that have guided policy are revealed, and gaps in knowledge are highlighted. The first question concerns which users benefit from use limit policies. One common response to this question—choosing to favor wilderness-dependent users—has been openly debated, but another very common judgment, to apply use limits only to overnight users has not. The second question concerns selection of the appropriate scale for deciding whether use limits are needed. As managers consider whether outstanding opportunities for solitude exist and whether natural systems have been unduly compromised, and therefore whether to limit use, the scale of analysis has a critical effect on their decision. Policy provides little guidance for the choice of scale, but looking at a single site, an entire wilderness, or an entire land base within a region may change the decision of whether to limit use. The final question asks whether existing use limit systems achieve their intended goals and objectives, and concludes that evidence is largely absent. This review and set of questions demonstrates that the decision to limit use entails a number of important value judgments, many of which are not—but should be—explicitly discussed.

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Since early in the history of the National Wilderness Preservation System (NWPS), managers and researchers have debated the merits of imposing limits on wilderness visitation. Although many types of regulations on use have been implemented, including group size restrictions, prohibitions on stock, or area camping closures, this paper focuses on restrictions on the number of entrants permitted in a wilderness. Such regulations may be termed use limits or quotas. This paper reflects critically on use limitations, in an attempt to uncover basic assumptions, gaps in knowledge, and needs for future research. The paper begins with a brief description of the history of use limit regulations in Federal wildernesses, concentrating primarily on the rationales that have been articulated for implementing such limits. The

paper then turns to a discussion of two basic questions managers must answer as they implement use limits, namely decisions about which experiences to favor in management decisions and on what analytic scale such decisions should be formulated. Because management should learn from past action, the next section raises the question whether use limits achieve their intended short-term and long-term goals. The paper concludes with possibilities for future research.

Many authors have described the complex details of implementation of use limit policies, rationing, and allocation methods, and those are not discussed here. The reader may wish to consult Bates (1992), Cable and Watson (1998), Shelby (1991), Shelby and others (1982), Stankey and Baden (1977), and Wikle (1991) for discussions of rationing and allocation techniques.

## Evolution of the Rationale for Limits on Recreation Use

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During the 1970s, wilderness use everywhere appeared to be skyrocketing (Lucas and Stankey 1988). As a Federal land designation, wilderness was rather new, and interpretation of the Wilderness Act had not yet been formalized into specific, uniform policies. Various researchers stepped in to help articulate a vision that could guide management decisions. Pointing out that wilderness is a unique land classification, they suggested that policy should permit certain recreation uses, so long as natural conditions or natural forces remained unimpaired (Hendee and Stankey 1973). Because wilderness was mandated to be managed at the most primitive end of the spectrum of public lands, managers and researchers feared that increasing use would compromise the goals of naturalness and primitive experiences of solitude that were mandated by the Wilderness Act. Furthermore, they feared that a common response among recreation managers to increasing demand, that is, increasing developments to accommodate such demand, would change the basic character of wilderness. They argued that use limits might be a better way to protect the unique conditions and experiences of wilderness than other types of regulations or approaches (Bury and Fish 1980). Hendee and Lucas (1974: 100) argued that

...one can let unregulated, free access to an area destroy its wilderness character through physical impacts of heavy use and loss of opportunities for solitude, or one can regulate use and preserve the chance for a wilderness experience...We feel, as do most wilderness visitors we have sampled, that regulation is the better of the two options.

In response to increasing use and such philosophical stances, some wilderness managers began to put ceilings

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on use levels. The rationale for these limits was usually twofold: to help prevent deterioration of biophysical resources (usually camping-related impacts such as soil compaction, erosion, and vegetation loss) and to help maintain the unique quality of the wilderness experience, especially solitude. Many assumed that it was merely a matter of time before limits were imposed everywhere: "Rationing of wilderness use will become increasingly common. In our judgment this will be necessary if the significant ecological and social values of such areas are to be fully protected" (Stankey and Baden 1977: 15).

During the 1970s, use limits were imposed in several areas, including the Desolation, Okefenokee, Boundary Waters Canoe Area, Linville Gorge, and Isle Royale Wildernesses. Limits became especially common on whitewater rivers, such as the Selway and Colorado. By the time Washburne and Cole (1983) conducted their system-wide study of the NWPS in 1980, 10 percent of the wildernesses in their study limited the number of overnight users, and 3 percent were limiting all use. An additional 5 percent planned to limit use within the next few years. However, there were significant differences among management agencies. For example, 36 percent of National Park Service areas limited overnight users, compared to only 4 percent of Forest Service areas. Generally, limits took the form of trailhead or travel zone quotas (or, on rivers, daily launches). Almost without exception, use limits were imposed only on overnight visitors (only six units had limits for all day users, and four others limited one type of day use). Often the initial quota was based upon use occurring during the previous year or years. Though such numbers were arbitrary (Cole, this proceedings), the rationale was that such limits were an immediate and necessary measure to prevent deterioration and would give managers time to develop more systematic, defensible ways to manage problems.

Of course, use limits were not the only management technique used to cope with density-related problems. Half of all areas in 1980 attempted to deal with perceived high-density problems by encouraging people to disperse throughout the wilderness, and 24 percent encouraged dispersal to other areas (Washburne and Cole 1983). Many campsite restoration techniques were also pioneered and many educational programs were developed. Nevertheless, use limits were an important tool, especially in high-use areas. Rapidly accelerating use levels, and the availability of few other proven methods to slow that growth, left managers with little choice but to consider imposing use limits.

A shift in thinking about the need for and purpose of use limits began in the 1980s. Although existing limitation systems were typically continued, some managers began to feel that limits were not needed, and the number of units implementing new limits dropped off. For example, as of 1991, 38 percent of National Park Service units used permits to limit any kind of use, a number virtually unchanged from 1980 (Marion and others 1993). As discussed below, the change was brought about by several factors, including slowing growth in wilderness use, articulation of a managerial preference for indirect management approaches, research on the relationship between recreational use and site impacts, and declining budgets.

First, in the 1980s use levels appeared to be stabilizing or declining, lessening the apparent immediate threat to

wilderness values (Lucas and Krumpel 1985; Stankey and McCool 1991). Consequently, some managers may have felt either that problems would not deteriorate further or that they had gained some breathing room to consider alternative approaches. Moreover, debates among the research community, public, and managers had led to a more fully articulated, and somewhat different, philosophical position serving as a foundation for evaluating the need for use limits. Many researchers had begun to argue that indirect (nonregulatory) techniques should be attempted before regulatory measures, because indirect methods might succeed in alleviating problems and would maximize visitor freedom, an important wilderness value. Although they still maintained that limits were the only alternative in some cases, many researchers now felt that "direct rationing of use should be a last resort after every other appropriate approach has been exhausted" (Hendee and others 1990: 406). Consistent with this philosophy, planning processes such as Limits of Acceptable Change directed attention away from use limits as an automatic or necessary response to increased density.

Research was beginning to show that other approaches were likely to be superior to use limits in preventing unacceptable impacts, giving managers another reason to reconsider whether use limits were appropriate. For example, Cole's (1982, 1986) research demonstrated that the relationship between use and many impacts such as vegetation loss was curvilinear, with most impact occurring at relatively low levels of use. By the time use levels at a site reached, say, 25 nights of camping per year, the impacts were substantial, but generally stable. Use levels would have to be cut considerably to bring about noticeable improvements. Such dramatic cuts were difficult to endorse and might lead to the displacement of problems to other areas. At the same time, other research (for example, Krumpel and Brown 1982; Roggenbuck and Berrier 1982) offered hope that education might be equally as effective, and more acceptable, than use limits in reducing use or impacts from use. If so, this might present an effective indirect way to alleviate environmental impacts or impacts to visitors' sense of solitude.

In addition to these arguments weighing in against use limits, management budgets became inadequate to undertake expensive programs such as permits and rationing needed to implement a use limit policy. Continued shrinking budgets through the 1990s effectively prohibited the option of use limits for many units, even where managers might believe they were necessary or justified. Use limits require long term planning, adequate resources for allocating and delivering permits, and staff for enforcement, among other costs. Managers must have sufficient resources to implement a program comprehensively and must have confidence that future budgets will be sufficient to continue the program. These conditions were increasingly difficult to meet.

For at least these four reasons, new use limit programs were less common in the 1980s and early 1990s. However, by the late 1990s, use levels had again risen (Cole 1996), and questions about declining experience quality and loss of naturalness are again common today. In the Pacific Northwest, for example, public debate has often been heated regarding whether or not quotas are needed to maintain experience quality. Managers of several wildernesses, including the Alpine Lakes, Mt. Hood, Mt. Adams, Three

Sisters, and Mt. Jefferson Wildernesses, have considered use limits, especially as monitoring has revealed that site impacts and encounter levels are out of compliance with standards specified in wilderness plans (Hall and Cole 2000; Hall and others 1998).

Today's discussions about use limits include many of the points and positions that have conventionally been argued, but there are some differences. In particular, the issue of solitude, and the role of day users in affecting solitude, is more central than in the past. Recent wilderness planning documents from Mt. Hood, for example, note that, although total use of the wilderness has increased by as much as 100 percent in recent years, 85 percent of visitors are day users, and overnight use has actually declined (Mt. Hood National Forest 2000). As day use has increased, encounters have increased at popular destinations and trails. In parts of the Alpine Lakes Wilderness, a hiker may meet another group every few minutes throughout the day (Cole and others 1997). Responding to such conditions, and mindful of the mandate to provide opportunities for solitude, managers of Three Sisters and Mt. Jefferson Wildernesses in Oregon implemented use limits at two popular areas in 1995, after a prolonged process of monitoring and public involvement. There, use limits were implemented expressly for the purpose of reducing encounters and improving opportunities for solitude, and were applied to day users as well as overnight users.

The Pacific Northwest movement to take a fresh look at use limits has sparked larger questions about the desirability of limits when those limits are based explicitly and solely on the goal of providing solitude, as opposed to ecological protection. Articles in regional newspapers, even in *Backpacker Magazine* (Nelson 1997) and the *Washington Post* (September 5, 1997), have challenged Forest Service reasoning. Concern about proposals for Alpine Lakes Wilderness was so widespread that congressional representatives threatened to take action to prevent the agency from managing for solitude. Research and management leaders responded by convening meetings to try to craft a uniform, defensible policy, but the issue remains unresolved.

Given that use continues to rise, resolution of this conflict between goals of access and solitude is needed. Managers need a clearer understanding of the effect of rising use levels on social conditions and on the experiences of visitors who have different motivations for their trips. Focused deliberation is also needed about whether management policies such as use limits should differ depending on the users' length of stay.

Another way in which dialog about use limits today differs from earlier discussions concerns the use of rhetoric justifying use limits on the basis of their ability to accommodate all users by dispersing them more equally throughout a wilderness. Virtually all wildernesses receive highly uneven use, with a few trailheads or destinations receiving most of the use. Early use limitation systems were praised for their ability to increase overall use of a wilderness, while reducing use of problem areas, that is, for their ability to redistribute use (Hennessey 1991; Hulbert and Higgins 1977). This objective—described as increasing the overall efficiency of the system—was a clearly stated goal for systems including the Boundary Waters Canoe Area Wilderness and Yosemite National Park. “The manager's objective is to decrease use

at overused locations and to avoid excessive levels of various types of encounters...while reducing total use as little as possible” (Schechter and Lucas 1980: 12).

Today, this sentiment appears to be undergoing reconsideration, and managers and researchers are questioning the desirability of policies that disperse use, either within a small area or across larger areas. In fact, some have suggested that the total amount of use should be unlimited in popular zones (for example, climbing routes on Mt. Shasta and Mt. Hood), with use limits to protect experiences at low-density areas. The reasoning underlying this reversal in policy is that, at high-use areas, limits would have to be remarkably stringent to achieve meaningful reductions in encounters or improvements in environmental conditions (Cole and others 1997). The net effect would be considerable inconvenience to users and probable displacement of the “problem” to new areas. On the other hand, low-density areas still offer the opportunities for solitude and pristine conditions mandated by the Wilderness Act and, therefore, should be protected. Experience has shown that proactive actions may be easier to implement than reactive measures that adversely affect large numbers of devoted users who have become accustomed to access. Thus, the reasoning goes, one should consider use limits only at low-use areas.

This section has shown how the rationale for use limits has evolved over time, retaining the over-arching concerns about ensuring wilderness solitude and protecting naturalness. Debate has deepened thinking about the processes and criteria to be used in deciding whether to adopt use limits. However there are a number of unresolved issues, and some unexamined assumptions, that require open discussion and ultimate resolution. As managers respond to increasing user density, they deliberately or instinctively resolve a series of questions. Among the more important and difficult questions are: (1) Which types of experiences (and thus, which user groups) should be the focus or beneficiaries of management? (2) What temporal and geographical scales should be relevant in analysis and planning? and (3) What can be learned from use limit systems already in place in other areas about the ability of use limits to accomplish the objectives for which they are established? These issues are discussed in the next section.

## Three Key Questions Regarding Use Limits

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### 1. For Whom Should the Wilderness be Managed?

Any time managers choose to take action or not to take action, they favor some users at the expense of others. Decisions about use limits are no different. Choosing not to limit use when use levels rise may favor those who enjoy higher density recreation, but may disenfranchise those who seek solitude. On the other hand, imposition of use limits in the same situation may favor those tolerant of regulation and desirous of solitude, but displace those who value freedom or spontaneity (Hall and Cole 2000). Sometimes managers have made explicit statements about the users whose experiences they wish to protect through use limits, but other times they have not. Two examples illustrate the

issues involved: so-called “wilderness dependent” users and day users.

**Wilderness-Dependent Users**—One example of an explicit commitment to benefit one type of user is the case of “wilderness-dependent” users. A continuing theme in wilderness policy and management has been the importance of these lands in providing rare experiences. From quite early on, many researchers argued that management should benefit those who can only find their desired experiences (for instance, solitude, challenge, or primitive settings) in designated wilderness (Bultena and others 1981; Hendee and Stankey 1973; Lucas and Krumpke 1985). This judgment has even become a primary wilderness management principle in a leading wilderness management textbook: management should ensure that “people who prefer a wild and pristine setting [are] not displaced in favor of users whose tastes can be met in many other locations” (Hendee and others 1990: 20). Management actions (including use limits) are therefore commonly justified by being able to point to at least some segment of the public that requires the type of solitude or naturalness that can only be found in wilderness. Use limits ensure that such conditions will persist and thus that opportunities for this segment of the user population are protected. Presumably, those who object to use limits but whose tastes can be met elsewhere suffer little net adversity, whereas those who require low-density areas will still have such places available, albeit at the cost of having to obtain a permit.

As McCool (personal communication) has noted, managers probably have no choice but to favor wilderness-dependent use or users, given the types of experiences described in law as appropriate in these areas. However, managing for these uses is not straightforward, and a discussion about the issue is needed. Surprisingly little attention has gone into understanding what “wilderness-dependence” means. Are there experiences that can only be found in designated wilderness? To begin to address the question, one must examine wilderness users and their goals, evaluate what types of settings and opportunities are available for those users, and identify where those settings are. This necessitates a perspective that goes beyond a single wilderness and beyond a single land classification, because one can only answer the question when one knows if other settings exist that can provide the same opportunities.

Even if one is able to define wilderness-dependence adequately, managing according to this criterion is still difficult, because wilderness-dependent uses may be in conflict with one another. An illustrative example can be found at Mt. Hood Wilderness. There, managers developed policies that were intended to protect the wilderness-dependent experience of solitude. Because use was increasing rapidly, the only action deemed likely to achieve this objective was to limit use, and thus a quota was proposed for several trails, including the primary climbing route up the peak. In this case, solitude-seekers were to be privileged. However, the action would at the same time disenfranchise two other types of users (those seeking freedom from regulation and mountain climbers seeking the challenges of climbing glaciated peaks). Interestingly, this dilemma was not mentioned or discussed; solitude was assumed to take precedence. One could reasonably argue that the challenge of climbing glaciated peaks is a wilderness-dependent experience, especially

in the Northwest, where all such peaks are in Federally designated wilderness. Similarly, freedom (although perhaps not explicitly mentioned by name in the Wilderness Act) is a value very much in harmony with the intent of the Act. In this example, a case could probably be made that experiences of climbing are more difficult to obtain than experiences of solitude within the region. One might also argue that the day users bearing the brunt of the proposed use limits might value freedom and spontaneity more than solitude during their trips to Mt. Hood. Weighing and resolving these competing values of wilderness will not be easy. An open discussion of opportunities, and their dependence on wilderness, is needed.

**Day Versus Overnight Users**—Despite the lack of clarity and direction regarding how to manage for wilderness-dependent users described above, at least the philosophical rationale for doing so has been explicit. In the case of disparity in treatment between day and overnight visitors, no clear rationale has ever been explicitly articulated or defended. In virtually all permit systems, even where the issue at stake is solitude and a majority of users are on day trips, use limits are set for overnight visitors only. We seem almost to have a collective blind spot in this regard, if the titles of research studies are any indication. For example van Wagendonk and Coho’s (1986) paper “Rationing use to keep wilderness wild,” Bultena and others’ (1981) “Closing the gates: A study of backcountry use-limitation at Mt. McKinley National Park,” and Fazio and Gilbert’s (1974) “Mandatory wilderness permits: Some indications of success” all dealt exclusively with overnight users. These titles, however, simply refer to “use,” suggesting to the reader that they encompass all types of use. Similarly, Hendee and others (1990: 416) asserted that “considerable evidence suggests that recreationists often accept regulations [on use levels] fairly well, particularly if their necessity is explained,” but they failed to mention that the studies forming the basis of this conclusion were usually of and about overnight wilderness use. The point is not that these authors have been somehow negligent or careless, it is rather to show that researchers and managers alike have generally—for whatever reason—not considered day users to be a threat to wilderness values.

Given the concerns about protecting rare wilderness experiences, it is troubling that virtually all use limitation systems focus exclusively on overnight users, and it is even more troubling given the high proportions of day use and the relative growth in day versus overnight use (Hall and Shelby 1998; Marion and others 1993). Even in 1980, across the NWPS as a whole, almost half of all parties were day users (Washburne and Cole 1983), yet limits rarely applied to them. It seems plausible (but should be tested) that those staying overnight in wilderness might seek experiences more dependent on wilderness than those out for a day hike, who may be motivated by factors other than being in wilderness. Thus, using “dependence” reasoning, overnight visitors might deserve preferential treatment, rather than being the sole focus of restrictions. It is true that use limits have often been implemented to address ecological concerns, and overnight users may have disproportionate per capita impacts on sites. If so, differential limits on overnight users might be justified. However, when limits are considered for the purpose of ensuring solitude, there seems no a priori reason to exclude

day users. Encountering day users may have as much impact on solitude as encountering any other user.

The issue of limiting day use raises a number of practical concerns. Although data are sparse, it appears that visitors do not support limits on day use to the extent that they support limits on overnight use. For example, Watson (1993) reported that 67 to 95 percent of day and overnight visitors supported “restrictions on use if the area is used beyond capacity,” but only 17 percent of day users and about 30 percent of overnight users supported limitations on day use. Bultena and others (1981) reported that although 91 percent of overnight permit holders supported the existing limits on overnight use, 71 percent opposed limits on day use. Such findings suggest that managers may face serious opposition if they attempt to impose limits on numbers of day users, at least for social reasons. (Other research suggests that there may be greater levels of support for limits based on biological need.) Indeed, this is precisely what has happened in some Forest Service wildernesses in the northwest.

## 2. What Scale Is Relevant When Deciding Whether Opportunities for Solitude Exist and, Therefore, Whether Use Limits Are Needed?

Once managers decide on the experience or experiences they will attempt to facilitate through management, they must then judge whether or not opportunities for those experiences are available. These management decisions always entail a temporal and geographic scope. Rarely is the scope articulated or defended, but decisions about scale have important implications for judgments about whether to impose use limits.

**Temporal Scales**—Several issues surround temporal scale. First, there is a fundamental debate about whether the managerial definition of a “wilderness experience” should evolve as public tastes and attitudes change. Many managers assume that solitude was definitively characterized as what those who drafted the Wilderness Act felt was solitude. For such managers, it does not matter whether today’s visitors *believe* they are experiencing solitude; what matters is whether that experience meets the test of consistency with historical definitions. Management culture, at least within the Forest Service, has tended to perpetuate this type of permanent, inflexible definition. For example, in the Pacific Northwest Region of the Forest Service, there are regional standards for what is acceptable in terms of numbers of encounters, and those standards have not changed in over 20 years. The Wilderness Act is notably silent in specifying the meaning of “solitude” or how it should be measured, leaving it up to managers to provide a definition as management plans are written. When considering whether opportunities for solitude exist and, therefore, whether to limit use, the manager must decide this temporal issue: should one adopt a strict historic definition or standard (whatever that might be), or should one allow the definition of solitude (and other experiences) to evolve over time?

An unchanging standard will inevitably lead to use limits at least in some locations. This has the merits of ensuring

that a truly primitive experience will always be available, despite increasing population and development, but if society’s “tastes” evolve, the proportion of people desiring such experiences may be declining. This could mean that more and more people bear negative costs associated with managing for a smaller and smaller segment of the public. Furthermore, rigid standards can be difficult to defend to visitors, who may truly feel that they experienced solitude, despite having numerous encounters. On the other hand, allowing standards to evolve alongside society’s tastes means that use limits may not be imposed. Wilderness visitors will encounter more other people and the impacts of their cumulative use, and those who seek very low-density experiences will presumably be increasingly displaced. Judging from discussions among managers in recent years, there appears to be little consensus about which position to adopt.

Another important issue of temporal scale surrounds the Wilderness Act requirement of “outstanding opportunities for solitude.” Hende and others (1990: 21) contend that the Act should be interpreted to mean that there “should be places and times within the NWPS and within individual wildernesses where visitors find little or no contact with others.” This is useful guidance, but managers are still left to decide several questions: Does a wilderness that is heavily used every weekend, but lightly used on weekdays, meet the intent of the Act? Does heavy summer use but light fall use violate policy? One’s stance on these matters will obviously have considerable effect on whether one would decide to impose use limits in a given situation. Planning documents generally have not provided explicit direction, and individual managers are left to make these critical value judgments.

**Geographic Scales**—One of the most perplexing issues in deciding whether to limit use is interpreting the geographical scope of the Wilderness Act provisions (McCool and Lime 1989). Are managers charged with providing solitude on all acres in all wildernesses? If there are substantial trailless sections of wilderness where no one goes, does that wilderness provide “outstanding opportunities for solitude?” Behan (1976: 23) argued 25 years ago that “our wilderness land, with some significant exceptions, is not crowded today—only our wilderness facilities are: the trails, campsites, trailhead accommodations.” Is this position still viable? Most of the acres of most wildernesses receive virtually no use, because visitors almost never leave the trail. Is that sufficient to meet the solitude mandate, even if there are extremely heavily used destinations in the same wilderness? One might answer “yes,” and conclude that no use limits are needed in specific destinations or entire wildernesses. Alternatively, one might argue from a national scale that wilderness—all wilderness—is the anchor point on a continuum of primitiveness, and every acre should be managed for solitude. Again, there appears to be little consensus among managers, researchers, and the public about this critical issue.

The need to specify, geographically and temporally, what constitutes “outstanding opportunities for solitude” should be dealt with explicitly before imposing use limits, because most wildernesses have highly uneven use (Lucas and Krumpke 1985). Although many have at least a few high-use destinations, there are usually many acres of trailless

wilderness, and many acres of low-use trailed wilderness. These areas probably *do* provide outstanding opportunities for solitude. If users choose, on their own volition, to visit a high-use destination, that does not necessarily mean that *opportunities* for solitude do not exist. Sometimes, the way issues of use density are discussed can blur this distinction. For example, when we assert, as we often do that “wilderness use is increasing,” we rarely clarify whether use is increasing on all trails and acres equally. In the Three Sisters Wilderness, where total visits have risen dramatically, the increases have been primarily on a limited number of trails and primarily within five miles of trailheads (Shelby and Hall 1992). Therefore, many destinations have not experienced use increases. Such factors should be taken into account when considering the need for use limits.

Although managers must weigh many factors besides public opinion in reaching a conclusion about such matters, visitor input is one important consideration. Standard approaches to surveying visitors have not provided much insight into their views on the scale at which “opportunities” should be provided. One study of Shenandoah National Park wilderness hikers investigated attitudes about the geographic scale at which solitude should be provided in wilderness, by asking visitors to select the optimum from four possible ways to “balance visitor freedom with opportunities to experience solitude” (Hockett and Hall 1999). That study found that wilderness visitors *did* care about solitude, but that most did not support adopting a single course of action everywhere:

- Nine percent said the NPS “should provide outstanding opportunities for solitude everywhere in the wilderness, even though this may mean that use will be restricted at several trails and some people will be turned away.”
- Twenty-five percent of day users and 35 percent of overnight users said the NPS “should provide outstanding opportunities for solitude at a majority of wilderness trails. The number of people using some trails will be limited, but a few will have unrestricted use. Use levels might be very high at these trails.”
- Fifty percent of day users and 38 percent of overnight users said the NPS “should provide outstanding opportunities for solitude along a few trails, in the more remote areas of the wilderness. The number of people allowed to use these few trails will be limited, but the majority of trails will have no use limits.”
- Fifteen percent of day users and 19 percent of overnight users said the NPS “should not manage for outstanding opportunities for solitude by restricting use anywhere.”

Apart from these issues about the appropriate geographical and temporal scales from which to judge whether opportunities for solitude (or other experiences) exist, when use limits are proposed, there arise additional issues of geographical scale. For example, there are questions about whether use should be limited at all trails/zones or just where problems occur. Early use limit systems, such as the Boundary Waters Canoe Area, Yosemite, and Kings Canyon Wildernesses limited overnight use everywhere. But research appears to suggest that people support limits where problems exist, not where there is no “need.” On the grounds of desiring to maximize freedom, Hendee and others (1990)

argued that attention should focus on threatened sites only. This has led some managers (for example, Willamette and Mt. Hood National Forests) to implement or propose limits at problem areas only.

This approach raises concern, because of the potential for the displacement of problems to new areas (Cole 1993). Use limits are an implicit displacement strategy—users who are denied access must find somewhere else to go. There is strong evidence that, at least at the destination level, other management policies that displace users cause biophysical impacts to worsen, because recovery occurs so much more slowly than deterioration. Although there is little or no direct evidence about whether use limits lead to widespread displacement and therefore to increased biophysical impacts at other locations, such outcomes seem possible. It also seems highly plausible (though specific examples are generally lacking) that displacing large numbers of users to new areas will cause social conditions to worsen at those other areas, without providing meaningful improvements at the destination itself (Cole and others 1997). Such factors have caused some to recommend just the opposite of others’ advice, namely consideration of use limits at low-use areas, but not at high-use destinations, to prevent low-density areas from becoming highly used in the first place.

### 3. Have Use Limits Been Employed Effectively to Achieve Short and Long-Term Objectives?

The first two questions above—which experiences to provide and at what scale to assess provision—must be addressed before use limits can be adopted. The final question discussed in this paper is also critical for managers to ponder: Have use limits achieved their purpose(s)? In general, evaluation of the efficacy of wilderness use limits has been minimal. Indeed, so little is known that much of this section serves primarily to highlight gaps in knowledge.

Among the immediate objectives for which use limits are imposed are protecting experience quality, managing so that wilderness-dependent users have priority, and protecting natural resources. Longer term goals include having an efficient management decisionmaking process and maximizing net benefits. Each of these is discussed briefly below.

**Protecting Experience Quality**—Many questions can and should be asked about the efficacy of use limits in protecting experiences. In a general sense, many researchers and managers believe that use limits can and do ensure experience quality. For example, the limits on use for the Selway and Colorado Rivers must surely have protected rare, high-quality experiences. Despite this general faith, many other concrete, localized questions should probably be asked. For example, campsite solitude is a very important aspect of overnight wilderness trips, probably more important than solitude along the trail. Does solitude at campsites improve when use is reduced? Or do people still tend to congregate by choice, thereby “defeating” the purpose of the regulation? Another very basic question might be whether people feel that—overall—they have a substantially more “wilderness” type of experience with limits than without.

The attitude that use limits are a last resort has led to a mindset that limits are the best or only way to resolve most

types of problems when other techniques fail. This has impeded critical examination of whether use limits are more effective at protecting certain kinds of experiences (for example, campsite solitude) than others (for example, solitude along the trail, or reduction in visitor conflict). To be a useful tool, there must be a strong relationship between use density (the variable directly manipulated by use limits) and the experience to be protected. Research to date has shown that the relationship between density and experience quality is weak, at least within the range of use levels and experiences studied (Cole, this proceedings). Lowering use may lower the number of contacts, but wilderness visitors may have several motives or desired experiences, and solitude may not be the most significant component. Even solitude is affected by much more than just the number of encounters one has (Hall, in press). Other experiences may be even less tightly linked to use density than is solitude. In an environment in which wilderness managers readily admit that they do not or cannot establish a carrying capacity, and few monitor for use levels or experience attributes (Marion and others 1993; Washburne and Cole 1983), intuition, rather than science, informs quotas.

The previous remarks cast doubt upon whether use limits are likely to be effective in achieving at least some of their intended experiential objectives. An additional consideration, related to the specific limits or quotas adopted, deepens that doubt. In most wildernesses, when limits are imposed, they are established at existing use levels. If limits tend to be adopted after problems arise and other efforts have failed, then it seems likely that maintaining current use levels will not resolve the problems. For example, in Three Sisters Wilderness, use limits were adopted because encounter rates exceeded those deemed to provide opportunities for solitude. As one would expect with limits set at approximately the prior year's number of trips, encounter rates were largely unchanged the following year. One is forced to wonder, at least in the short term, whether the imposition posed by rationing use outweighed any experiential benefit.

**Favoring Wilderness-Dependent Users**—Although many have discussed the issue of wilderness-dependence, it is unclear whether the form of existing use limit systems actually serve the needs of wilderness-dependent users. Consider the following. If wilderness-dependent users should have first priority, then, when limits are imposed, permits should be given to these users before other, nondependent users. Otherwise the system cannot be accomplishing its intended function. However, in practice this does not happen (Hennessey 1991). Indeed, it is difficult to envision a system in which such priority would be practicable and publicly supported. Although merit systems exist that serve to eliminate unqualified visitors, no systems exist that categorize expected benefits, determine whether these are uniquely available in wilderness, and then allocate permits to those seeking such benefits. Presumably the commitment to wilderness-dependent users in theory, but the abandonment of this commitment in practice, reflects a conflict between the desire to protect the needs of the minority across an entire land base, but to treat all equally (rather than equitably) in a particular circumstance. Certainly there is a reluctance to differentially limit those who could find their desired experiences elsewhere.

**Protection of Natural Resources**—Use limits may also be implemented to protect biophysical conditions. Although there is little published evidence, it seems likely that use limits by themselves are relatively ineffective at reducing impacts to vegetation and soils. Unless additional regulations are in effect to concentrate use or alter impactful visitor behaviors, even low levels of use can maintain impacts across a large number of sites. Thus, limits probably do not lead to recovery of sites in many situations. However, many managers contend that quota systems have helped prevent further deterioration of conditions, particularly at campsites, and this outcome seems plausible, especially if the limits put a halt to rapidly increasing use. In cases where impacts are linearly related to use density—human waste accumulation, for example—use limits probably do have a notable effect on environmental impacts. Certainly use limit systems, such as area closures, can be designed that have clear positive effects on natural conditions.

At broader scales than the site or destination, little is known about how recreational use levels affect natural processes across larger landscapes, and it is unknown whether existing use limitation systems have discernible effects on naturalness, especially when taken in the context of all other anthropogenic induced changes that are occurring across the land.

**Efficient Management and Maximization of Net Benefits**—One possible goal of public land management is efficiency—to maximize benefits (improved experience quality and protection of naturalness) relative to costs (including staff and funding, but also costs to visitors) over the long run. Depending on the era and the author, various arguments have been advanced about the efficiency of use limits. Some have claimed that they are cost effective and benefit users and managers alike. Others have claimed the impositions to visitors outweigh any benefits. Not surprisingly, given the broad scope and multiple dimensions of the question, there has been little research on whether limits accomplish this goal. Various researchers and managers have raised the issue over time (for example, Lucas 1983), but few have devoted attention to studying it.

Today's conventional wisdom that use limits should be used only as a last resort, if nonregulatory alternatives exist, demonstrates a belief that the costs of use limits are high relative to their benefits (Cole 1995; Hende and others 1990; Lucas and Krumpel 1985). In theory, this admonition recognizes an array of possible management alternatives, each of which should be evaluated in turn, beginning with the least intrusive, for its likelihood of resolving a particular problem. Managers would select the least intrusive actions capable of achieving objectives with relatively high assurance. In practice, however, one can rarely be certain a priori whether an action will be effective or not, and the reluctance to regulate leads managers to try indirect actions even if the chances that they will work are remote. Ultimately, this may lead to an inefficient investment of resources and inconsistency in management year-to-year. For example, at Green Lakes in the Three Sisters Wilderness, increasing use levels caused encounter rates to exceed Forest Plan standards. In response, managers tried various indirect techniques, such as removing a highway sign and stationing a trailhead host at the trailhead to inform visitors that the area was heavily used. Neither effort was successful in reducing visitation. In

hindsight this is not terribly surprising—visitors love this particular area and do not go with an expectation of being alone. Nevertheless, the reluctance to regulate meant that indirect, but ineffective efforts were made.

In evaluating the overall efficiency and costs of use limits, one must ask whether other management actions are more effective, cost less, or have other benefits when compared to use limits. Consideration of certain types of site manipulation as an alternative to use limits, and a systematic evaluation of the respective costs and benefits, is conspicuously absent from the literature (Hennessey 1991). When use limits are proposed for high-density areas, this assumes that limits are “better” (more effective, efficient, and/or acceptable) than closing roads, removing trails, or building new trails, which ideas tend to be readily dismissed. Hendee and others (1990) sensibly caution against site manipulation, for fear that areas might lose their unique wilderness character and become like front-country campgrounds. But fear about these rather extreme possibilities forestalls important discussions about less obtrusive measures. If trails (themselves engineered) are acceptable and legal in almost all wildernesses, and shelters, fire grates, and toilets are accepted in many, then site hardening approaches may be reasonable, unobtrusive alternatives whose costs and benefits should be systematically weighed in contrast to the costs and benefits of use limits. Survey research has consistently shown that the majority of visitors are accepting or even desirous of at least some site manipulation techniques (Cronn and others 1992; Hockett and Hall 1999). Managers might ultimately decide to impose use limits, but the decision should be based on a careful, rational weighing of all factors and possible tools.

Finally, there is the question about whether use limits achieve their longest-term aim, “maintenance of the natural order” (Hendee and others 1990: 20). For this goal there is the least evidence. It seems difficult to know where to begin to evaluate achievement of this goal, as laudable as is the goal itself. The value judgments and data required to establish limits of acceptable change for individual campsites are difficult enough; how much more difficult it would be to establish a limit of acceptable change for wilderness-wide natural processes.

Paradoxically, though, this is probably the criterion for which managers have the strongest faith regarding use limits. Many feel that limits are the best or perhaps only effective way to maintain areas with little evidence of human-caused impacts that provide outstanding opportunities for solitude or primitive and unconfined recreation over the long run. Thinking long-term, if wilderness use were to continue to rise indefinitely, it seems that there would come a point at which few of us would deem an area “wilderness” any longer. Use limits—whatever their immediate outcomes—can prevent such a scenario.

## Conclusions

Since the first wildernesses were established, the rationale for limiting use has undergone refinement and evolution. Early use limit systems were conceived as necessary, almost desperate, steps to address rapidly escalating pressures on wilderness, and it was hoped that they would ameliorate both the social and biophysical impacts associated with use.

Today, managers have many more tools available to them and have begun to recognize that in some cases these other tools may be more effective or acceptable than use limits. Nevertheless, as use—especially day use—continues to rise, some managers have felt that the only tool that can effectively ensure opportunities for solitude is a limit on use.

However, the foundations of use limits have not been sufficiently well articulated or defended, so that managers who are considering use limits face a host of challenges from highly involved wilderness enthusiasts. Whereas many visitors could evidently accept the “need” for limits on overnight use in the past, today public reaction demonstrates that, at least in some areas, visitors are unwilling to sacrifice access for experiences of managerially-defined solitude on day trips. These issues, provoked initially by discussions of day use, raise more general questions about value-laden decisions that managers will be increasingly called upon to make.

Many of the issues raised in this paper hint at the lack of an adequate framework for deliberation and decisionmaking about wilderness use limit policies. When limits are to be imposed for the protection of experiences, managers and researchers need to explore the development of specific policies that state which groups are to be favored by management and why. Use limits will by their very nature benefit some and inconvenience others; the rationale in each case should be clearly reasoned and defensible. A first step in this process is for managers to identify which experiences are dependent on wilderness. This will require examination of visitors’ motives and the opportunities provided within the wilderness itself, nearby wildernesses, and probably other adjacent lands. It will also entail decisions about who should be entitled to define the protected experiences and how those experiences can be measured.

When one asks whether outstanding opportunities for solitude (or other experiences) exist, one implicitly demarcates the relevant time and place. Therefore, a next step for managers considering use limits will involve deciding upon the geographical and temporal scale of analysis. Wilderness planning approaches such as the Recreational Opportunity Spectrum and Limits of Acceptable Change that involve zoning embrace flexibility to adopt different objectives and standards for different areas (Haas and others 1987). This guidance implies that not all areas must supply the same opportunities. Beyond that, however, managers are left to grapple with deciding how one decides whether “outstanding opportunities” for solitude or other experiences exist.

A third step will involve gaining a better understanding of how use limit systems do or do not achieve their aims and what their relative costs and benefits truly are. Lessons about successes and failures are important inputs to ongoing planning efforts. In cases where experience opportunities are deemed to be sufficiently impaired as to warrant managerial intervention, this information will help managers decide if use limits are the appropriate and most efficient, effective solution.

In each of these three steps, there is a role for research. One critical need is for a deeper understanding of the nature of the wilderness experience, and how that experience may differ from other types of recreation experiences. Managers need to understand how different factors contribute to the quality of a wilderness experience, and how visitors themselves define and value experiences such as solitude. Linked

to this basic research should be research investigating the extent to which wilderness-dependent experiences (including solitude) are enhanced or affected by use limits.

Managers generally operate under a policy that indirect management is preferable to direct management techniques such as use limits. A number of assumptions about visitor preferences and experiences underlie the promotion of indirect techniques with use limits as a last resort, and these could also be the subject of research. Some have explicitly stated that externally imposed limits that allow complete freedom within the wilderness are more protective of the "wilderness experience" than a myriad of behavioral controls within the wilderness (Cole 1995). (Interestingly, many use limit systems combine an external limit with internal controls on behaviors—fire bans, designated site camping, and so on—which arguably presents the most intrusive situation, because it mixes direct and indirect controls.) Such statements suggest that the wilderness experience begins and ends at the boundary of the wilderness, so that difficulties imposed before the trip do not influence the wilderness quality of the trip itself. Furthermore, there is an assumption that externally imposed use limits are more *acceptable* to the public than a myriad of behavioral controls. Neither of these assumptions has been well-tested. One could make the case that use limits improve the quality of a wilderness experience by highlighting the rare, valuable nature of the experience; alternatively one could argue that limitation itself is anathema to the sense of freedom intrinsic to wilderness.

Much existing research has been sponsored by individual management units, and therefore has been of limited utility in helping address questions of scale, especially geographical scale. Recent attempts to synthesize findings from diverse studies (for example, Cole and others 1997; Watson and others 1992) have made important steps in this direction. However, additional research is needed, particularly to understand wilderness visitors in relation to people who recreate on other lands, to learn how wilderness visitors (and others) define and value wilderness, and to understand whether differential motivations underlie trips to different types of places. Useful research might ask whether, when informed about the nature and extent of the NWPS, wilderness visitors endorse different management regimes for wilderness and what tradeoffs they would be willing to accept.

One of the areas where research could make its most immediate impact is in evaluation of existing and proposed use limit systems. Unfortunately, beyond studies of the acceptability and functioning of allocation methods, little research or even documentation has occurred to evaluate existing use limits. There is a strong need for quasi-experimental designs that involve baseline research to characterize visitors, experiences, and biophysical conditions before use limits are imposed and then evaluate changes after the imposition of limits. Other research might test the effects and effectiveness of use limits versus other techniques in a comprehensive, systematic way.

As our population grows, incomes rise, and wilderness-type experiences are increasingly in demand, wilderness managers must make difficult decisions about how to carry out their mandate to protect wilderness values. This will entail, among other things, addressing and balancing short

term visitor interests and long term societal needs. These decisions will be made in an arena of increasing public divisiveness. There is a need for researchers, managers, and citizens to come together to forge a workable framework for making such decisions.

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# Limiting Recreational Use in Wilderness: Research Issues and Management Challenges in Appraising Their Effectiveness

Stephen F. McCool

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**Abstract**—Limits on the overall number of recreationists permitted to enter or visit wilderness, national park backcountry or whitewater rivers have been formally established for about 30 years. Such limits have usually been established to protect biophysical or social conditions from unacceptable impacts in the face of rapidly rising amounts of visitation. Use limits are one of a number of tools available to managers, but represent a particularly intrusive and controversial one. Use limit policies may have significant negative displacement effects, are implemented within a regional context—even if not recognized in the decision—and must meet the criteria of effectiveness, efficacy, and efficiency in order to be useful in managing impacts. Unfortunately, evaluations of use limit policies using these criteria do not exist within the literature. The paper suggests that evaluations encompass four major domains, consider effects within a regional context, and research move from one-shot case study experimental designs to those that are more conducive to better understanding of the consequences of use limit policies.

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## Introduction

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The development of policies that limit access to recreational resources is one of the most controversial actions implemented for managing recreation on the public lands but one of the least understood. Some managers, confronted with a seemingly insatiable demand for high quality recreational opportunities occurring in magnificent natural environments with little evidence of human use and influence, have responded by restricting access to these settings through a variety of means, but frequently through a use limit policy based on a conception of an area's carrying capacity. Implementation of a use limit policy leads to development of use rationing and allocation regimes once demand exceeds the limit.

A use limit policy is a formalized regulation that restricts the number of visitors that may enter an area over a given time period—day, week, month, or season. Such policies became popular with accelerating growth of whitewater river recreation in the 1960s and 1970s. These limits were aimed at controlling or preventing impacts either to the

biophysical setting or to the recreational experience. While whitewater river managers dominated the initial implementation of use limit policies, terrestrial wilderness managers have also adopted limits on recreational use. Use limits administered in terrestrial areas often come in forms different from those used on rivers (which usually involve limits on the number of groups launching per day), often featuring limited campsite availability. Regardless of the form, use limit policies remain controversial as they carry significant distributional consequences that are often viewed as unfair by visitors. Following their initial implementation in the 1970s, they were repeatedly accompanied by litigation and civil disobedience, recurrently triggered by important issues of equity.

Despite their widespread application and a rapidly growing interest in many venues, questions about the efficacy of use limit policies remain. Do such policies really control, confine, or reduce impacts? Does their implementation provide for higher quality experiences? Are they the “best” way of reducing or controlling impacts? How do their positive and negative consequences compare? Since people are directly affected, how do visitors respond to them? What issues are confronted by managers when they are implemented?

A large number of studies have examined visitor *preference* for use limit policies (see McCool and Christensen 1996 for a brief review of some of this research). In general, this research shows that when given a reason for limiting use, visitors sampled at individual areas agree to such limits—hardly a startling conclusion (see Hall, this proceedings for additional comments about such preference studies). However, such research has avoided evaluations of how visitors view the *acceptability* of use limit policies within the context of the potential tradeoffs between the quality of the experience (or biophysical character) and access restrictions involved. For example, mitigating biophysical impacts through a use limit policy may achieve a gain in resource quality, but comes at the expense of restricted access to the area. The extent to which visitors would perceive biophysical or social conditions so objectionable that they would find a use limit policy acceptable has not been reported in the literature.

Reports evaluating the effectiveness of use limit policies in confining, controlling and reducing visitor-induced impacts do not appear in the literature. While implementation of a use limit policy raises an abundant number of managerial (Warren 1977), economic (McCool 1978), experiential (Schreyer and Roggenbuck 1978), political (Dew 1984), and philosophical issues (McAvoy and Dustin 1983), the lack of evaluative mechanisms, frameworks and reports evoke still others.

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The growing, apparently inevitable, implementation of recreation use limit policies occurs within the context of accelerating demand for recreation opportunities that are rapidly declining in availability, a poorly developed scientific arena, and a reduced institutional capacity to manage recreation. A widening interest in privatization of public recreation opportunities fueled primarily by conservative political agendas also serves to magnify the complexity of use limit policies. These conditions all suggest that a significant, critical examination of recreation use limit policies is not only appropriate, but essential to addressing many of the fundamental issues currently confronting wildland recreation managers. Such an assessment could assist in developing a policy-relevant research agenda for scientists. Implementation of use limit policies raises several additional questions: Under what conditions are such policies appropriate? What benefits may accrue and what costs ensue? What pragmatic barriers and issues are elicited when use limits are proposed? How can the success of these policies be appraised?

These are important questions; they can be addressed only within the context of appropriate scaffolding that outlines general issues and evaluative frameworks. The overall goal of this paper is to advance our understanding of these issues and frameworks. The paper is organized around three major themes. First, I advance several questions that stem from the application of use limits. In general, use limit policies are both controversial and costly; we should be clear about the benefits to both recreational experiences and resources prior to their implementation. I will briefly outline three principal questions arising out of their implementation. Second, I suggest a framework that would be productive for evaluating use limit policies as tools for controlling biophysical and social impacts resulting from recreation. The current lack of evaluative frameworks severely limits the social and managerial learning needed to advance the state of the art. This framework can serve as a starting point for evaluation of existing use limit policies through development of policy relevant research and may serve as a foundation for considering limiting use in areas where such policies don't currently exist. In both cases, a rich field of research is indicated. Finally, I review potentially useful elements of a framework to guide research on use limit policies and to refocus their implementation at the regional level.

## Important Questions in Use Limit Policy Implementation

There are three significant questions raised when use limit policies are under consideration, in addition to their overall effectiveness in controlling, confining or reducing impacts from recreational use. How these questions are addressed in the design of a specific use limit policy suggests what social costs are potentially involved when implemented. Again, these questions are addressed in reference to the potential benefits that such policies are designed to achieve and represent differing potential tradeoffs.

**Distributional Consequences of Use Limit Policies Are Unclear**—Restricting access to public recreation opportunities leads to significant distributional consequences that raise fundamental questions about the equity of use

limit policies and how those restrictions are implemented. Restriction of access, particularly in how such restrictions are implemented through design of rationing systems, affects different groups differently. A major issue here is the potential mismatch between the recreational opportunities an area offers and the opportunities visitors seek. Stankey and Baden (1977), in their early evaluation of issues associated with implementation of use limit policies, identified this question as one of suboptimization. Suboptimization occurs when there is a mismatch between the preferences of recreationists for particular settings and the settings they are actually allowed to visit as a result of a use limit policy. Thus, some visitors are seeking an experience in a specific place while others may be seeking an experience anywhere. Suboptimization results when the latter replaces the former, which can occur in some rationing systems. When suboptimization occurs, visitors receive some, but not all, the benefits a particular recreation setting can offer. Suboptimization is not only an efficiency question, it is an equity one as well. Allocations that are suboptimal result in a smaller flow of benefits to the public because access is denied to opportunities sought by segments of the recreating public.

Use limits are accompanied by rationing and allocation mechanisms when demand exceeds the supply defined in the limit. Each mechanism (for example, lottery, queue, reservation) discriminates against a certain type of user, thus raising the question of what specific goals should be established for these policies (Stankey and Baden 1977). For example, a queue discriminates against those who don't have time to wait in the line while a reservation system favors those who can plan ahead.

In addition, implementation of a use limit policy in the face of growing demand cannot be considered separate from the decision of how to ration and allocate use, if only because such decisions are inevitable. These decisions are inextricably linked and are inherently political in character (McCool and Utter 1981). Shelby (1981) has suggested four goals of rationing systems: (1) equality—every one has the same chance for entry; (2) social efficiency—people willing to pay the highest price have a better chance to enter; (3) equity—rationing favors those individuals favored by society; and (4) need—visitors with expectations closely aligned with area goals or who are members of a special class have a higher chance of entry. The distributive effects on expected wilderness experiences of the mechanisms to attain each goal are different.

**Use Limit Policies Occur Within Regional and Managerial Systems That May Not Be Well Defined or Accounted for When Decisions Are Made**—Two types of systems are involved in use limit policies: a spatial system, in which different Wildernesses are spatially related within a specific region and a management system centered on the decision and implementation procedures for use limit policies. Both types of systems interact and will be discussed below.

## Regional System

Recreational use of Wilderness and other similar back-country areas occurs within the context of a system of areas.

The operative system is neither obvious because recreation user preferences are not known nor easy to manage because adjacent protected areas may be administered by agencies with differing objectives. For example, the Glacier National Park backcountry is administered by the National Park Service while the adjacent Great Bear Wilderness is managed by the Forest Service. Both agencies have distinctly different approaches to managing backcountry use.

While each wilderness is managed under the mandates of the Wilderness Act to provide “outstanding opportunities for solitude and a primitive and unconfined experience,” because of existing use patterns, administrative traditions and resource characteristics, this does not necessarily translate into exactly the same value of setting attributes among and within wildernesses. Each wilderness is different enough to justify varying standards of solitude and human-induced impacts; thus, each wilderness provides opportunities for somewhat different experiences that include, but are not limited to solitude or primitive and unconfined experiences.

Wildernesses therefore are not necessarily substitutable, yet management actions in one area have effects on another. These effects may not be visible for some time, and may affect different types of recreationists, displacing some while others replace them. For example, a use limit policy (implemented through rationing) that is excessively bureaucratic and potentially restrictive may negatively affect visitors seeking escape from the pressures of society, and thus they may choose not to enter that particular Wilderness but another one instead. Others who are not as sensitive to bureaucratic procedures may replace these visitors. Thus, use limits may inadvertently lead to visitor successional processes, leading to not only development of dissatisfaction, but to differing expectations of what each of the areas should provide in terms of setting attributes.

While all Wildernesses are governed by the same legislative mandate, each is managed under plans that frequently recognize idiosyncratic characteristics, are influenced by individual manager philosophies toward recreation, and reflect the specific institutional capacity to manage. Since the notion of a system is not explicitly recognized, wilderness plans—and the use limit policies contained within them—developed independent of each other carry the potential of duplicating goals, objectives and standards or of leaving gaps in the range of wilderness related experiences that recreationists seek, leading to unanticipated surprises, and encouraging unplanned visitor succession.

This system is complex, involving areas, as well as users, managers, agencies, outfitters and so on. Effective management can occur only with an understanding of each element of the system, the behaviors of each element, and how management actions and the response of visitors affect these elements. Lime (1977) recognized the relevance of regional studies nearly 25 years ago. In a river management context, the importance of regional analysis has been well-stated by these managers:

We now do our planning on a river-by-river basis. Alternatives are usually selected without consideration of opportunities afforded by other rivers; the planning process is often locally oriented... It is doubtful that our present river-by-river approach can effectively cope with an increasing demand for a decreasing resource. Should we evaluate viable management alternatives for a specific river without considering management on other rivers? (Yearout and others 1977: 191).

A variety of other authors have recognized that management of recreational use must occur within the context of a regional system of opportunities, and that limiting recreational use in one of these areas without considering the management regime in others carries a variety of significant negative consequences (for example, Stankey 1977; Schreyer 1977).

The notion of a system of areas suggests that fundamental decisions about what areas should provide what kinds of experience opportunities need to be made. While this is an intrinsically political question, science plays an important role in providing information to decisionmakers. Some of that information would revolve around better understanding the population of wilderness users, their motivations, expectations and willingness to make the tradeoffs between protection of biophysical/social conditions and access that use limit policies imply. Since a system exists, data collection to be helpful to management of the system must be conducted at the system level, rather than at the individual area level, which is highly susceptible to visitor succession and replacement biases.

## Management System

Anticipation of the distributional and regional consequences of use limits requires that we have a better understanding of the management system within which use limit policies are implemented. Implementation of a use limit policy triggers effects that occur, as argued earlier, elsewhere in a geographical sense, and often are identified only after a significant time delay. Such decisions are systemic in character, and dealing with them requires a systemic process.

Senge (1990) has classified different decisionmaking systems that confront organizations. A use limit policy, implemented without reference to the regional context within which the area is situated, is representative of a “shifting the burden” type of system. In a shifting the burden type of system, an underlying problem generates issues that need attention, but for a variety of reasons, confronting symptoms of the problem is easier than dealing with the root causes. So, shifting the burden of implementing an underlying solution to something that is easier and more visible to implement takes place. The underlying problem remains unsolved. In some respects, there may not be awareness that there is a fundamental underlying problem—managers may view use impact problems as simply an operational issue associated with wilderness management. If so, then they are more likely to adopt an operational remedy (Caldwell 1990). If a problem is defined at an operational level but is in reality a systemic one, then managers will continue to be confronted with new versions of the problem, and the burden of solving the problem may be shifted to others.

Use limit policies represent a shifting the burden type of system in that the questions of underlying causes of impacts, the acceptability of impacts and how they can be managed are never really addressed. Limiting use focuses on only one of the causes of human-induced impacts—and probably a minor one at that. When use limit policies are implemented, visitors denied access shoulder the burden of management that has not addressed fundamental problems. Visitors granted access are not necessarily selected on the basis of

merit (in this case ability to engage in minimum impact behaviors) and thus benefit from the burden shouldered by others.

By shifting the burden, the problem appears solved in the short-run, but in the long-term, it resurfaces. Visitors desiring experiences dependent on the wild character of wilderness may be displaced (and thus endure the burden) as more and more rules on entry are implemented. Other areas—as noted above—may see increases in use as visitors seek other places without the restrictive environment. As Senge argues, following implementation of a symptom solution when the problem reoccurs, “there is increased pressure for symptomatic response. Meanwhile, the capability for fundamental solutions can atrophy” (p. 104).

A major issue here is that the problem—human-induced impacts—may never be framed in a way that leads to fundamental solutions being considered. Bardwell (1991) insists that much of land management activity is directed toward solving solutions, solving the wrong problem, defining problems in such a way that they cannot be solved, and solving non-problems, simply because not enough attention has been paid to framing the problem. As Clark and Stankey (1991) suggest, asking the right question is critical to developing responses to real problems and issues. Use limit policies generally emanate from a problem framed as “how many are too many for this area?” when the more fundamental problem can be succinctly stated as “what are the appropriate or acceptable conditions for this area, given its regional context and legislative mandate?” Once that question is addressed, managers can turn to the more pragmatic, yet still controversial decisions of what management tools are appropriate. Reframing the question in this manner is consistent with legislative and policy direction to protect important biophysical characteristics and experiential values, and may eventually lead to implementation of a use limit policy, but only following extensive analysis.

## Use Limit Policies May Displace the Problem

The net effect of implementing use limit policies without understanding the regional context is to initiate suboptimization effects or to displace the problem spatially. The problem (of unacceptable impacts) has been displaced to other places (most likely to other wildernesses or protected areas) or to other users. The other places may not have the institutional capacity to respond to increased use-induced impacts, and the other users may be unfairly restricted in access to their favorite sites, resulting in suboptimization as they seek opportunities in settings that are not necessarily preferred ones. Use limit policies as now implemented provide no incentive for visitors to reduce impacts (since merit is generally not a basis for rationing use), thus exacerbating the problem. This now occurs in some wildernesses where some areas are closed to camping because of impacts, so people camp elsewhere. Generally, the places that are closed show some level of impact, so visitors are forced to camp in other places where impacts are relatively low. This leads to increased overall degradation, because new places are impacted and the old places are not adequately restored.

Wilderness managers are faced with a difficult job. Cole and Hammit (2000) argue that the Wilderness Act mandates three competing objectives: wildness (untrammelled character), naturalness (unmodified environments), and solitude (being alone with others). Use limit policies represent attempts to achieve naturalness and/or solitude (depending on the rationale for their implementation), but hamper achievement of the wildness objective. Since not all three objectives can be fully achieved under the demand and supply conditions facing most wildernesses, choices have to be made. What is important is explicitly identifying what goals managers are seeking, recognizing that tradeoffs are occurring and identifying the rationale for those tradeoffs.

## Frameworks and Considerations for Evaluation and Implementation of Use Limit Policies

The above discussion raises significant questions about the efficacy of use limit policies, but was not intended to suggest they should never be employed. Use limit policies may lead to distinctive and improved changes in biophysical and experiential quality. Properly implemented, they protect, maintain or create unique, highly valued and increasingly rare experiences. Their implementation reflects a growing scarcity of recreation opportunities, and thus point to the need for fundamental change in how society may wish to change its behavior or allocates resources.

## A Proposed Framework for Evaluation

Largely, implementation of a use limit policy, as with other land management practices, is an experiment. As a management experiment, the outcomes, in terms of biophysical impacts, visitor satisfaction, and problem displacement need to be monitored and evaluated to determine the success of the policy. Such evaluation would help managers understand the effectiveness of use limit policies (for example, do they work?), as well as provide a needed perspective on their efficiency in accomplishing management objectives. Without evaluation to go along with their implementation, managers have no idea if the tool worked, the consequences of it on other dimensions of management, and effects at larger temporal and spatial scales.

A proper framework for evaluation requires not only specification of objectives, but also a monitoring system that focuses on outputs, rather than inputs. This is particularly important with respect to policies that restrict access since this is one of the most intrusive and potentially harsh actions that an agency can take.

What might such a framework look like? One suggestion proposed by Brewer (1973) is to address four major questions:

1. Conceptual soundness—is there a defensible theoretical foundation?
2. Technical—is it translated into practice well?
3. Ethical—who wins and who loses?
4. Pragmatic—does it work?

What is outlined below represents the types of issues, questions and potential approaches such an evaluation

may involve. It is designed to be suggestive rather than definitive.

1. *Conceptual soundness—*is there a defensible theoretical foundation? Here a defensible theoretical foundation would involve scientifically sound assumptions underlying use limit policies. Listed below are several such assumptions:

a. *There is a definitive relationship between use level and impact.* There must be a definitive, predictable relationship that demonstrates the amount of impact caused by a given level of recreational use. This is particularly important for use limit policies that are directed toward reducing, limiting, or controlling recreation induced biophysical or social impacts.

b. *Social and biophysical conditions are stable.* An implicit assumption is that the social and biophysical conditions are, or should be stable. Since use limits lead to a single capacity, such a capacity assumes that both conditions are stable (Seidl and Tisdell 1999). If such conditions are not stable, multiple capacities and, therefore, multiple use limits exist, suggesting that such limits are informed by science but are social judgments.

c. *A specific normative definition of carrying capacity has been established.* As use limits have been proposed and implemented, they carry the implication that a specific definition of carrying capacity for recreation has been established.

2. *Technical—*is it translated into practice well? Implementation of use limit policies leads to a large number of practical problems that managers have traditionally been ill-equipped to address. These problems include the type of rationing system to use to administer use limits when demand is in excess of the limit, how to implement the rationing system (for example, mail, telephone), staffing and enforcement resources, legal resources needed to respond to challenges to the system, and so on.

3. *Ethical—*who wins and who loses? As indicated earlier, there are significant issues about equity and fairness. Some argue that highly regulatory actions are fairer than voluntary adoption of appropriate behavior (Dustin and McAvoy 1984). What is important though is developing a better understanding of how use limit policies affect different types of visitors and how might those effects be mitigated. While some research on this question has been conducted, it is primarily conceptual in focus and needs to be examined within the context of real people responding to real use limit policies. Because of the lack of research on these questions, the current state-of-knowledge about these effects is highly speculative.

4. *Pragmatic—*does it work? Here, we are interested in the practical utility of use limit policies. Such pragmatism can be assessed by using three criteria developed by Checkland and Scholes (1990): efficacy, efficiency, and effectiveness. Efficacy, in this sense, means does a use limit policy confine, control, or mitigate human-induced impacts? This criterion suggests that monitoring of key impact variables is an essential—not optional—component of a use limit policy. Without such monitoring and evaluative action, managers have no idea if the use limit policy worked and visitors and others interested in wilderness will have paid certain costs without the advantage of understanding the benefits. Efficiency deals with relationship between inputs

(usually defined as staff and funding) for a given output (reduction in impacts). Generally speaking, managers and citizens want tools to be efficient so that waste is minimized. Effectiveness concerns whether a given management activity meets a longer term aim—in this case a wilderness that shows little evidence of human-induced impacts.

This type of appraisal process would seem to be incredibly informative to managers and would lead to a better understanding of not only what conditions lead to successful use limit policies but also would speak to their design as well.

## Research and Managerial Considerations

Understanding the overall value of use limit policies requires a regional approach that would be integrative in character and involve assessments at several scales. Research would occur on both biophysical and social aspects at both regional and local scales to better understand how use limit policies control, mitigate, or influence impacts of recreational use, how people make decisions about what sites they visit, and the objectives for which areas within the region are established. Such a research project would need to address several questions:

1. *What is the region of interest?* Scientists would need to define the region—the set of interacting areas and the population upon which they draw for recreational use. This is made difficult because many areas draw upon a national population for visitation. The region would be defined, not so much by administrative characteristics, but by the areas that provide the roughly similar types of recreational opportunities.

2. *What choice mechanisms are involved in selecting areas to visit?* Visitors go through some type of process to make decisions about what areas to visit (Stankey and McCool 1985). In this process, solitude and other expectations dependent on use density play varying roles in site selection. Scientists would determine how significant such motivations or expectations were in anticipated experiences, how these are related to other expectations, the perception of how well a specific area provides opportunities to meet these expectations, and the willingness of visitors to make tradeoffs.

3. *What recreational opportunities exist?* Research would inventory existing management policies and objectives to determine the supply of density dependent opportunities and access to them. This would help identify how such opportunities are related to the demands established earlier, the appropriateness of use limit policies in achieving these objectives, and the potential impacts of implementing a policy in one area on others.

4. *How much change in biophysical conditions has occurred?* In this component, scientists would inventory conditions—impacts—across all the areas involved in the regional system. This component provides scientists and managers with the data necessary to determine the biophysical effects of use limit policies and to make the necessary tradeoffs that will occur explicit in management.

5. *What criteria will be used in determining what opportunities will be provided and management actions will be implemented where?* Once we know how the system works, then the next question concerns how decisions will be made. This component requires that explicit criteria be developed so that they can be debated.

Given the above, what alternative frameworks might there be to examine use limit policies at a regional scale? The Limits of Acceptable Change framework (Stankey and others 1986) and its derivatives (such as VERP), implemented at a larger, system wide scale, could help managers identify the potential issues and consequences of implementing a use limit policy. Specifically, the notion of wilderness recreation opportunity classes, applied to several wildernesses connected in a systems context can help identify specific goals and priorities for protecting wilderness threatened by recreational impacts. An example might help describe how this would work. A region might contain several wildernesses, some heavily used and impacted, others showing little relative evidence of human-induced impacts. The current management approach is to limit to protect the heavily impacted wildernesses first, and then develop plans for those that show less impact. This approach has the consequence of doing nothing to limit and control impacts in the heavily used wilderness (because those impacts have already occurred), but potentially endangering less impacted wildernesses as visitors—engaging in suboptimizing behavior—seek alternatives. Using an approach based on the notion of a system in a regional context, the wildernesses with the least impact may receive management attention first, then those with the most impact, assuming of course, development and acceptance of appropriate goals (Cole 1997).

## Conclusion

Recreation use limit policies are but one alternative in the manager's box of tools to limit, control, and mitigate human-induced biophysical and social impacts in wilderness and similar protected areas. They have been adopted in a variety of situations, beginning initially with whitewater rivers in the West, but often with little attention to the validity of their theoretical foundations, distributional effects on users, and displacement of problems to other similar regional resources. Their implementation without formal evaluation leads open a number of questions, particularly those dealing with their efficacy in confining, controlling, and limiting impacts and their effects at larger temporal and spatial scales.

Protected areas exist and should be managed within a regional context, a proposition well established in the outdoor recreation management and research literature. Continuing to ignore this proposition will have potentially severe impacts on relatively pristine resources as visitors attempt to find acceptable substitutes for the places they originally sought to access. Most problematic is the lack of knowledge that prevents definitive conclusions about the efficacy of use limit policies.

The academic community has been slow to study the efficacy of recreation use limit policies. Substantial research has been conducted on visitor perceptions of use density and encounters and how these relate to feelings of satisfaction. Other scientists have examined relationships between visitor use and biophysical impacts. The literature in these two areas has increased our knowledge about the character of recreational use, experiences and impacts with accompanying generic implications for management.

Scientists have important roles in management decisions, ranging from helping to identify the acceptability of the various tradeoffs involved in use limit decisions through identifying appropriate frameworks for their use, implementation and evaluation to advising managers on the regional system affected by a use limit policy. We also need science to help managers (and their affected publics) pursue venues that will determine what wilderness experience opportunities will be provided where.

Overcoming these issues requires that not only management understand and account for the regional context, but that research be conducted at a regional level too. Doing things at a regional level requires that a number of barriers be overcome—conflicting mandates, differing agency cultures, academic territories, functionalism and disciplinarianism, and inadequate funding. But in the long run, it is the only way in which the functionality of use limit policies can be adequately assessed.

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# Wilderness Solitude: Beyond the Social-Spatial Perspective

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**Abstract**—The current scholarly and management approach to wilderness solitude has relied on substitute measures such as crowding and privacy to measure solitude. Lackluster findings have been only partially explained by additional social-spatial factors such as encounter norms, displacement, product shift, and rationalization. Missing from the discussion has been an exploration of the meaning of solitude and a questioning of the basic assumption of its social-spatial structure. In this paper, the concept of solitude is approached from an attitudinal perspective that emphasizes psychological detachment from society. We argue that solitude may result more from lack of management regulation and control than from low visitor use density.

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## Introduction

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Scholarly treatment of solitude in the natural resource and leisure literature has been approached from a largely ahistorical perspective. Our intellectual framework for solitude is grounded almost exclusively in the social-spatial perspective of privacy, crowding, and encounter norms. From this perspective, solitude is assumed to be either: (1) physical isolation, seclusion and withdrawal, or (2) the ability of the individual to control what, how, and to whom information about the self is communicated.

Similarly, wilderness managers and researchers faced with interpreting the “outstanding opportunities for solitude” clause in the Wilderness Act have focused on setting attributes assumed to be conducive of solitude. This approach assumes that solitude is a psychological response to social conditions experienced in the wilderness setting. If crowding is low or encounter norms are not exceeded, opportunities for solitude are presumably high.

We suggest that this approach only hints at the complex symbolic and metaphoric meaning that has historically linked solitude with wilderness. Outside of the natural resource literature, the intellectual framework for solitude is rooted in philosophical elements of the romantic and transcendental movements, which in turn were passed down from classical antiquity. Within this framework, solitude is viewed as a striving for independence and detachment from social constraints, norms, and expectations.

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As the wilderness idea became a means for exploring the relationship between nature and industrial society, so too solitude has been a powerful theme for exploring the role of the individual self in relation to society. Drawing on this tradition, we suggest an alternative definition of solitude that captures this contemporary meaning:

Solitude is *psychological detachment* from society for the purpose of cultivating the inner world of the self. It is the act of *emotionally isolating* oneself for self-discovery, self-realization, meaning, wholeness, and heightened awareness of one's deepest feelings, and impulses. It implies a morality that values the self, at least on occasion, as above the common good.

In this paper we explore the contemporary meaning of solitude in relation to wilderness. We begin by looking at social-spatial treatment of solitude that has predominated the natural resource literature. We then present a humanistic perspective of solitude and describe how our contemporary understanding of solitude is informed by this tradition. Implications of this perspective for policymaking and management are then discussed.

## A Social-Spatial Perspective of Wilderness Solitude

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Conceptualization of solitude in the natural resource literature has focused primarily on the examination of social conditions experienced in the wilderness setting, including concepts such as territoriality, personal space, crowding, social carrying capacity, social norms, encounter norms, and structure of the built environment (Patterson and Hammitt 1990; Shelby and Heberlein 1986; Shelby and Vaske 1991). A key assumption of this perspective was that the ability to achieve solitude is a function of onsite social conditions and the acceptability of these external conditions. If the conditions are unacceptable, the result is psychological distress in the form of a crowding perception and dissatisfaction, which in turn are assumed to be indicative of a lack of solitude.

In the early recreation research, it was suggested that solitude was dependent upon relatively low numbers of encounters with other visitors, and later as the lack of negative reaction to the densities encountered (in other words, “not at all crowded”; Hammitt and others 1993). Typically, these measures have been correlated against other social-spatial variables such as demographic characteristics and the resource and social conditions of the site in an attempt to identify recreation carrying capacities. However, contrary to expectations of both resource managers and researchers, inconsistent findings have been reported (Graefe and others 1984; Manning 1986; Shelby and

Heberlein 1986). Some studies report that social and psychological factors explained more of the variance in crowding than use levels while others revealed that use levels explained an equal or greater proportion of the variance in crowding as compared to user evaluations and expectations (Heberlein and Vaske 1977; Shelby 1980; Hammitt and others 1984).

In response to these inconsistencies, the focus of study shifted to encompass a normative explanation of solitude (Shelby 1981; Vaske and others 1986). Investigators have proposed two types of norms that influence wilderness solitude: social norms and encounter norms. Social norms are defined as rules of acceptability shared among members of a social group (Shelby and Heberlein 1986). A large number of studies have revealed that social norms do exist for social conditions in wilderness-type settings and include some degree of consensus (Lucas 1964; Stankey 1973, 1979; Shelby and others 1993; Whittaker and Shelby 1988). The concept of encounter norms concerns the question of whether people will be able to express a norm when asked whether the number of encounters is acceptable. Stronger consensus for encounter norms has been found among certain subgroups, with these norms being more crystallized for lower density wilderness experiences (Shelby 1981).

Despite previous generalizations about wilderness solitude from normative consensus data, recent evidence of considerable inconsistency among normative assessments has been argued by a number of researchers. Roggenbuck and others (1991) found that an overall lack of encounter norms and low consensus among norms for whitewater rafters was in contradiction to the preponderance of normative research findings and explain that underlying methodological and theoretical issues may have accounted for these results. Furthermore, Patterson and Hammitt (1990) suggest that encounter norms may not actually predict perceptions, behavior, or experience in wilderness. They found that 61 percent of the visitor sample whose encounter norms were exceeded, failed to react negatively when actual encounters exceeded personal norms. They interpret that these results reflect the notion that wilderness users are unable to express a salient conception of encounter tolerance, visual-social encounters are less relevant to overall solitude, and that, while encounter numbers may be important, predicting behavior by a hypothesized adherence to norms is a less than clear relationship.

A number of researchers have suggested that solitude is not simply the opposite of perceived crowding, but rather a multidimensional construct more closely related to privacy (Hammitt 1982; Patterson and Hammitt 1990). As an alternative to the social-spatial perspective, researchers have investigated solitude through the concept of privacy, which includes a number of dimensions that are characterized by societal detachment as discussed below (Hammitt 1982; Hammitt and Brown 1984; Hammitt and Madden 1989).

Westin (1967) defines privacy as “the claim of individuals, groups, or institutions to determine for themselves when, how, and to what extent information about them is communicated to others.” For example, privacy in wilderness may involve an adjustment of one’s perceptions of the experience as a contrast or reflection of social experience in daily life and a voluntary and temporary societal withdrawal. Defining the dimensions of literal solitude, intimacy, anonymity, and

reserve, Westin states that societal withdrawal may be reflected in one’s privacy when engaging wilderness alone, as a small intimate group or while one is reserved among larger groups.

Adapting Westin’s concept of privacy to the wilderness setting, a study by Hammitt and Brown (1984) revealed dimensions of wilderness privacy that are characterized by societal detachment including emotional release, personal autonomy, reflective thought, and limited communication. Furthermore, Hammitt and others have identified a number of cognitive benefits of wilderness privacy that focus more on introspection of the self than concerns for direct social conditions including: cognitive freedom, self-evaluation, personal autonomy, self-identity, emotional release, and reflective thought (Hammitt and Brown 1984; Hammitt 1982; Westin 1967; Altman 1975).

Beyond the notion of “literal solitude,” benefits of shared-solitude have included feeling alone while sharing the experience with special others and feeling alone mentally (Marshall 1974). For example, this notion of a shared form of solitude has been described by the concept of intimacy. Lee (1977) found that intimacy with others in wilderness was more definitive of privacy than experiencing aloneness.

Recently, Hollenhorst and others (1994) set out to actually measure solitude and explore its relationship with various social-spatial and attitudinal variables. Relying on earlier work by Hammitt (1982), Hammitt and Brown (1984), and Hammitt and Madden (1989), the researchers developed a Wilderness Solitude Achievement Scale (WSAS) with five ordered levels, beginning with the physical and proceeding through the emotive, volitional, intellectual, and spiritual. Unlike the earlier work, however, the levels were used to measure the amount or degree of solitude experienced during a single wilderness outing. The hierarchical structure was confirmed using a Guttman scaling approach. No relationship was found between solitude achievement and social-spatial variables like crowding and encounter norms. Significant relationships were identified between solitude and attitudinal variables such as wilderness involvement. These findings cast further doubt on the social-spatial perspective and give tentative credence to the need for a more attitudinal approach.

## A Humanistic Perspective

Outside of the natural resource literature, the intellectual framework for solitude is rooted in philosophical elements of the romantic and transcendental movements, which in turn were passed down from classical antiquity. From the Greeks, Romans, early Christians, and Medieval writers, to the European Romantics and American Transcendentalists, solitude has been a powerful theme for exploring the tension between two forces: the idealization of the state and the individual’s duty to the common good, versus the importance of the private, inner world of the individual.

To the Greeks, social solidarities and attachments were profoundly important. To be solitary (*eremos*) was the worst of all curses, and forests, deserts, open seas, and isolated islands were the *eremia* of Greek literature—dangerous and foreboding. This general revulsion of both solitude and wild nature was held by Roman, early Christian, and Medieval

writers, although a minority recognized solitude as a means of retreat from a corrupt world to find direct contact with God.

Petrarch secularized the idea of contemplative solitude, seeing it not as a means to a religious end, but as an end in itself. For Petrarch, solitude symbolized an affirmation of the individual as self-contained, intrinsically valuable apart from society. He argued that the inner world of the mind was of greater importance than a sense of community. He regarded the demands of public and familial life as activity that conflicted with solitude.

While Petrarch still recognized that God was one route to self-fulfillment, he recognized two other favorable paths: (1) self-examination and cultivation of the inner self through solitude, and (2) love and kinship. He formulates this view in the first words of *De Vita Solitaria* (trans. 1978):

I believe that a noble spirit will never find repose save in God, in whom is our end, or in himself and his private thoughts, or in some intellect united by a close sympathy with his own.

Three aspects of Petrarch's solitude distinguish him from both the Medieval perspective and the earlier classical attitude: (1) the idea that motivation could be found purely in the desires of the individual independent of external social influences, (2) the valuing of individual preference and independence above collective morality and duty to society, and (3) the absolutely secular nature of the solitude he sought (Dillon 1981). This was truly unconventional thinking for the fourteenth century. Steadfast in their view that society was the only way to personal fulfillment, Medieval writers thoroughly reject Petrarch's ideas on withdrawal from the active social life. Yet a small cult of intellectual elites repeated and perpetuated his ideas through the Elizabethan and Renaissance periods.

Metaphorically linked with solitude, wild nature in these writings is construed first negatively but eventually more positively (see Nash 1982 for more on this transformation) as that part of the world not encompassed by the dominant human culture. Varieties of this "other" generally include wild animals, dark forests, barbarians, and indeed, women (Roberts 1991). It should be pointed out that the European natural landscape was by this time largely pastoral—improved over thousands of years of agrarian activity. For the European Romantic, the result was a general resignation to the fact that even what appeared to be wild nature had largely been humanized, and the dismal proposition that the self is unavoidably socialized (Ferguson 1992).

In the New World, however, the European mind encountered what was truly vast wilderness, inspiring a radical reinterpretation of not only the wild, but the potential for the truly autonomous individual. The opportunity presented by freedom from societal constraint through voluntary isolation in wilderness has been a powerful theme in American literature. In fact Schopenhauer's statement "One is free only when one is alone" became an idea attached almost exclusively to works from or about America. Isolated from civilization, the solitary pioneers of the American wilderness assume the vitality and moral superiority of the untamed landscape surrounding them (Nash, 1982).

In North America, romanticism found philosophical expression through Transcendentalism. To the Transcendentalists, wilderness was synonymous with psychic solitude.

The passion with which they argued for wilderness can only be understood by recognizing that wilderness was in essence a metaphoric focus for a metaphysical solitude, or a spiritual state of detachment from human society in order to experience a deep connection with the natural world. (Clough 1964). While there are of course other important justifications, the fight to protect wilderness from the incremental and insidious pressures of expanding civilization can be seen at least in part as a plea for the freedom and autonomy of the individual as against the overwhelming influences of social life.

Nash (1982) and Allin (1982) have written extensively about the psychological and political transformation of the wilderness idea from a place of waste and evil to a place of beauty and goodness. Solitude underwent a similar transformation from a physical place of isolation, alienation and loneliness to psychological space in which the individual is not answerable to others. Wild nature—by definition a place that is not answerable to society—is valued both as a metaphor for the solitary mind untrammelled by society, and as a place to escape from the increasing demands of society. At the same time, wilderness is no longer simply "unimproved land" indicative of an inferior culture, but a place, maybe the only place, where one can retreat in solitude in order to achieve a true sense of self. Thus the two concepts—wilderness and solitude—become intricately linked as either in binary opposition to, or in their independence and detachment from society.

The writings of Ralph Waldo Emerson and Henry David Thoreau illustrate the symbolic meaning of solitude in relation to society and wilderness. For Emerson (1883), the essence of the American experience was resistance to the past and the formulation of a new idealism based on the private intuition of the self-reliant individual. Emerson was resolute in his protest of "externals": old systems, old thoughts, old institutions, old families. He looked instead to new confirmations and validations that might emerge from individual intuition and from nature's universal laws as interpreted by those intuitions. In his first book, entitled *Nature*, he asks "Why should we not also enjoy an original relation to the Universe?" Also, his essay *Self-Reliance* not only focuses on Americans being fiercely independent, but on the self as a fortified source of intuition and resolution.

Solitude became one of the most important sources of simile and metaphor for Emerson to extend these ideas. Believing in the "infinitude of the private man," Emerson's solitude embodied the inner world of self-reliance and ingenuity. Diverging from the elitist rhetoric of the romantics, Emerson's solitude was not for the rare individual, but the democratic privilege of each individual to seek their own potential. In a frequently reoccurring summons, he admonishes us in *Self-Reliance* to listen to "the voices which we hear in solitude," and to believe that "nothing is at last sacred but the integrity of your own mind."

Metaphor and analogy were the means by which Henry David Thoreau (1893) explored the inner worlds of the self. For Thoreau, foremost among these metaphors was the isolated individual facing the solitudes of the vast North American Wilderness. The solitude of the frontier contained the requisite elements to make it isomorphic to everyday experience. These included the positive elements of opportunity and hope on one hand, and loneliness, isolation, despair,

fear on the other. Thoreau found unique resolution for the solitude metaphor in characteristics of the individual: courage, self-reliance, survival against all odds, and the irrepressible human spirit. His conclusion to *Walden* (1893) is in essence a declaration of this frontier metaphor.

Be...the Lewis and Clark and Frobisher, of your own streams and oceans...explore your own higher latitudes...be a Columbus to whole new continents and worlds within you, opening new channels, not of trade, but of thought...there are continents and seas in the moral world, to which every man is an isthmus or an inlet, yet unexplored by him, but that it is easier to sail many thousand miles, than it is to explore the private sea, the Atlantic and Pacific Ocean of one's being alone...Explore thyself...Start now on that farthest western way.

The other unique element inherent in Thoreau's solitude is found in its social-moral dimension. It is not solipsism Thoreau seeks. In his *Solitude* treatise he writes, "I never found the companion that was so companionable as solitude." He purposely distances himself from human civilization not to be alone, but in order to develop deeper relations with the "indescribable innocence and beneficence of Nature." The relationship of humans and nature was for him the supreme union towards which we should be concerned. Through solitary experience *with* nature, Thoreau anticipates Leopold's moral extension of "community" by including the nonhuman world in his definition of society. Thus, it is not aloneness, but the forging of relationship and connectedness with something of equal or even superior moral stature that he is after. Listen to these expressions from *Solitude*.

The most sweet and tender, the most innocent and encouraging society may be found in any natural object...There can be no black melancholy to him who lives in the midst of Nature...I enjoy the friendship of the seasons...I have never felt lonesome, or in the least oppressed by a sense of solitude. I was suddenly sensible of such sweet and beneficent society in Nature, in the very pattering of the drops, and in every sound and sight around my house, an infinite and unaccountable friendliness all at one like an atmosphere sustaining me, as made the fancied advantages of human neighborhood insignificant...Every little pine needle expanded and swelled with sympathy and befriended me. I was so distinctly made aware of the presence of something kindred to me, even in scenes which we are accustomed to call wild and dreary, and also that the nearest of blood to me and humanest was not a person nor a villager, that I thought no place could ever be strange to me again.

Yet Thoreau is no antique Stoic, defiant of all humanity. He had faith in human potential though little respect for the small extent to which this potential had been realized. Thoreau does not seek solitude to disconnect the self from communication with all forces external to the self. Rather than contraction from the external world into the self, he desires a moral expansion that allows the individual to find communion with the nonhuman world. "Shall I not have intelligence with the Earth?" he asks near the end of *Solitude*. "Am I not partly leaves and vegetable mold myself?" Like Aquinas before him, Thoreau believed that the individual and society were complementary. He simply sought a broader understanding of society that included Nature. The beautiful irony of Thoreau's solitude path is that it ultimately leads to this broadened sense of belonging and community.

## Contemporary Perspectives on Solitude

What of solitude in the twenty-first century? In *Solitude: A Return to the Self* (1988), Anthony Storr draws a fascinating psychological picture of solitude and its role in the post industrial world. Never mentioning wilderness, and making only passing reference to nature, Storr argues that modern society is preoccupied with intimate personal relationships as the "touchstone of health and happiness," and that this preoccupation is a relatively new phenomenon. Earlier generations would not have rated this focus on attachment so highly. Basic concern for survival and earning a living left little time for the subtleties of human relationships. Storr builds an anthropological argument to support this point, proposing that members of modern affluent societies are insulated from disease, poverty, hunger, and other natural hazards to an extent not fathomable by former generations. Needing to be preoccupied with something, he suggests that our present day concern for, and anxiety about, human relationships has displaced the former preoccupations with the uncertainties of the natural world. In essence, the physical environment has been replaced by an abstract environment—a "virtual world" of human relationships as the realm of most pressing concern.

Storr argues that the dominant theme in psychology, sociology, and social work is the belief that intimate personal relationships are the chief source of human happiness. Conversely, those who do not develop such relationships are neurotic, immature, or in some other way abnormal. This leads to Storr's next supposition. While he does not deny the importance of social attachments in our lives, he believes the preoccupation grossly underestimates the importance of the inner mind of the individual separate from the influences of external attachment. In particular, capacity for imagination and creative achievement hold a central place in the inner world of the mind, yet are relatively independent of external social forces. While recognizing that "Intimate attachments are a hub around which a person's life evolves," he is adamant that they are "not necessarily *the* hub."

Our culture, Storr argues, is preoccupied with the capacity of the individual to make mature relationships as the criterion of emotional maturity. Conversely, we fail to consider the capacity to be alone as an equally important criterion. He suggests that the need for solitude is organic, but that the capacity to experience it positively is a learned trait that begins in infancy. Referencing the iconoclastic work of psychoanalyst Donald Winnicott, Storr contends that building of the capacity to be alone in adult life begins with the infant's experience of being "alone in the presence of the mother." It is through this environment of secure (the mother) aloneness (the infant) that Storr and Winnicott believe the individual begins to develop an authentic sense of self based on true feelings and instinctive needs. Later, the capacity to be alone in the mother's absence must be cultivated. "It is only when the child has experienced a contented, relaxed sense of being alone with, and then without, the mother," Storr writes, "that he can be sure of being able to discover what he really needs or wants, irrespective of what others may expect or try to foist upon him." Development of a "false self," that is an inauthentic

self based upon compliance with the wishes of others, may occur in the absence of such formative experience.

Storr's notion of solitude thus becomes "the capacity to be alone" for the purpose of "becoming aware of one's deepest needs, feeling, and impulses." It is also conceptually parallel to the notion of solitude as a means of self-discovery and self-realization—previously explored by the likes of Petrarch, Aquinas, Thoreau, and Emerson—although it does not appear that Storr consciously builds his theory from this intellectual base.

Phillip Koch, in his work *Solitude: A Philosophical Encounter* (1994), reiterates Storr's theme of solitude as social disengagement. He identifies three features associated with solitude: (1) physical isolation, (2) social disengagement, and (3) reflection. Thus unlike Storr, Koch explicitly recognizes the potential role of physical isolation as a catalyst for solitude. However he warns us to not place too great attention on it, arguing that while solitude may be easier to achieve in physical isolation, it is not requisite. Rather, he suggests the most promising place to look for the core experience of solitude is in the realm of social disengagement combined with contemplative reflection.

Koch goes on to identify five virtues or benefits of solitude:

1. *Freedom* from the social norms and constraints that control interpersonal life;
2. *Attunement to self* as compensation for the scattering and submersion of the self that occurs in social life;
3. *Attunement to Nature*, as opposed to our daily preoccupation with social attunement;
4. *Reflective perspective*, including introspection, recollection, and contemplative analysis; and
5. *Creativity*, or the "programmatically ordering" of the first four benefits/virtues into original expression.

Lastly, discussion of solitude in modern society should be placed in the context phenomena particularly characteristic of modern life; that of mass alienation, isolation and loneliness. Defined as a response to the absence of a particular type of relationship, loneliness results from the lack of or loss of intimate relationships and a sense of community in the individual (Bowlby 1982; Koch 1994). A vast and wide-ranging literature suggests that loneliness is an extremely common experience in contemporary society. While modernity creates the most complex and globalized social relationships between actors, it also tends paradoxically to alienate them from each other. We suggest that preoccupation with social attachment, combined with a generalized fear of alienation and loneliness, have served to effectively marginalize solitude as a legitimate form of experience in modern life. This radical mass de-emphasis on solitude has serious implications for wilderness policy and management.

## Policy and Management Implications

The 1964 Wilderness Act defines wilderness as containing "outstanding opportunities for solitude." By including this phrase, it appears that Howard Zahnizer understood that wilderness and solitude were metaphorically bound together in the American psyche as physical and mental

regions untrammelled by society. Ostensibly, the Wilderness Act counterbalances the relentless forces of "increasing population, accompanied by expanding settlement and growing mechanization" on the natural world. Yet in a deeper symbolic sense, the Wilderness Act also affirms the humanistic notion of individual will and self-determination in the face of ever greater pressure to become "socialized."

Drawing on this symbolic tradition, we have argued that solitude is *psychological detachment* from society. This detachment serves two primary functions: (1) affirmation of individual will and self-determination, and (2) cultivating the inner world of the self. As such, the wilderness solitude experience compensates for the limitations of social interaction and social institutions in the search for meaning, happiness, self-awareness, and emotional maturity.

Such a perspective has significant wilderness policy and management implications. First, we have generally assumed that a relationship existed between solitude and spatial variables such as density, encounters, and perceptions of crowding and privacy. Yet we have shown here that solitude may have little or no theoretical relationship with these variables. While managers have some control over use density, crowding, and encounters, and recognizing that management of these variables is defensible for other reasons, we probably need to look beyond such management tools in our efforts to enhance opportunities for solitude.

Secondly, while we recognize that limited encounters may help catalyze the solitude experience, there are other important factors related to social disengagement and opportunities for contemplative reflection that demand more managerial and research attention. What can we do to enhance visitor freedom, to maximize opportunities for attunement with self and nature, and to promote reflective thought and creative expression?

Thirdly, it seems that the paradox of wilderness management extends to a "paradox of solitude management." *Solitude* is a psychological condition that by definition implies freedom from social influences and constraint, yet *management* implies intervention from the very social institutions and mechanisms that solitude is supposed to be free from. Ironically, to the extent that we impose social controls on wilderness visitors, opportunities for solitude may be diminished. In our effort to provide outstanding opportunities for solitude, we may have overemphasized the impact of encounters with other visitors, while ignoring the greater threat of government control and regulation.

If we are truly interested in providing solitude benefits, we should turn our management and research gaze away from crowding and encounter norms towards our own management tendencies to impose constraints on visitor freedoms and independence. Wilderness visitors have always stood apart from the general run of American life. It is critical that we recognize and accommodate their need for independence in their personal and social lives. A management culture that resists all deviations, or even attempted deviations, from its uniformities is antithetical to solitude. It seems the great challenge we face is to find the means of respecting visitors' need for freedom and independence while protecting the ecological values of the wilderness resource.

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# Goal Interference and Social Value Differences: Understanding Wilderness Conflicts and Implications for Managing Social Density

Alan E. Watson

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**Abstract**—Wilderness conflict research has mostly followed the direction of recreation research in the U.S. An interpersonal recreation conflict model proposed in the late 1970s has guided much of the conflict research in wilderness, with emphasis on determining the amount of interpersonal conflict resulting from goal interference and how much one or more hypothesized contributors actually influence the occurrence of conflict. This approach is heavily rooted in expectancy-valence theory explanations of human recreation behavior and may contribute to an understanding of how social densities influence perceptions of conflict. The contributions of activity style, resource specificity, mode of experience and lifestyle tolerance to understanding interpersonal conflict arising from crowding largely comes in the form of understanding the role of expectations and importance attached to social density preferences. Today, however, wilderness conflict extends beyond recreation within the boundaries of wilderness, beyond interpersonal interaction, and beyond the boundaries of wilderness to competing demands for the wilderness resource. Understanding of the causes for differences in attitudes toward wilderness and the meanings various subpopulations attribute to wilderness resources will be critical to developing solutions for conflict management and managing the social mix among all demands in the future.

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In contrast with the days of early explorers, when wilderness travel was often a solitary activity, the wilderness resource is now shared by many interests, representing both recreation and nonrecreation uses. Interaction among the various user groups, often with contrasting views on wilderness values, leads to varied amounts of conflict. Much of the research on conflicts in wilderness has centered on conflicting recreational uses. There are other values of wilderness described in the U.S. Wilderness Act besides recreation, however, and these other values and uses can often conflict with recreational use and with each other. The most basic conflict in wilderness may be between the mandate to provide opportunities for all of these various human activities while maintaining the natural conditions also mandated by law and upon which some human experiences depend.

Conflict research in outdoor recreation in the U.S. has extended from early speculation about causes (Jacob and

Schreyer 1980) to many studies of extent and influences on conflict. Lucas (1964) documented the asymmetrical conflict (one-sided) between canoeists and motor boaters in the Boundary Waters Canoe Area of Minnesota before it was part of the National Wilderness Preservation System. Entry to the system did not preclude this conflict since some established motor boat routes were retained when it was designated wilderness. Research on the conflict between motorized and nonmotorized uses was extended beyond the wilderness boundaries to snowmobilers and cross country skiers by Knopp and Tyger (1973). Perhaps Stankey's (1971) early studies on visitor perceptions of crowding also contributed more to conflict research than usually acknowledged because they illustrated visitors' differential responses to the types of encounters they had in wilderness. While Stankey was focusing on the reaction to the number of people visitors saw in the wilderness, these responses were influenced by whether the people encountered were hiking or riding horses. From that time forward, most crowding research has mistakenly ignored this finding, focusing too much on density of people and not enough on the interaction between number of people, their behaviors, and their orientation toward the place, including method of transport.

Bryan (1977) described the potential for conflict between anglers of various specialization levels, demonstrating that conflict was not just between motorized and nonmotorized groups or differing forms of access in the out-of-doors. Some people sought very pristine places to fish and enjoyed the special skills accumulated while moving from very simple angling techniques to more advanced. When more specialized anglers encounter novices, we would expect conflict to occur. This conflict may arise from interference with fish catching objectives or with enjoyment of a pristine place, but it may also rest with basic differences in how members of the two types of anglers value fish and the environment.

In more recent times, a renewed interest in conflict research has accompanied an apparent growth in conflict issues. Watson and others (1991) published the first study of conflict between National Forest hikers and mountain bike riders, Baird (1994) studied conflict on the ski slopes between skiers and snowboarders, Gibbons and Ruddell (1995) studied conflict between cross country skiers and those skiers dropped off in the backcountry by helicopters, Blahna and others (1995) studied the growing conflict between llamas and horse users in the wilderness and backcountry, and Vaske and others (1995) moved to the general public in a study of conflict between hunters, those who previously hunted, and nonhunters. Watson and others (1993, 1994) refocused conceptual thinking through studies of the conflict

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between hikers and horse users by bringing some organization to the variety of measurement methods being employed. Conflict had been measured in several different ways and substantial progress had occurred over the years in measuring variables that had been hypothesized to influence conflict.

The primary purpose of this paper is to explore the extent that knowledge from recreation conflict research can help us manage recreation use density in wilderness. In this effort, however, we cannot ignore the growth of conflict research in recent years to include conflict between such different orientations to the wilderness as subsistence users and recreation visitors, commercial interests and wilderness protection, and biodiversity protection and human meanings. The focus taken here is broadly on management of social densities in order to understand how conflict research can affect the way we think about proactively managing numbers of people and types of activities in wilderness.

## Review of Past Progress

Past research on conflict in wilderness and outdoor recreation has mostly been reactive and focused on groups with obvious differences in orientations toward recreation. Some studies, for instance those investigating growing complaints by canoeists about motorboats, by skiers about snowmobiles, by skiers about heli-skiers, and by hikers about mountain bikers, involved groups with differing levels of motorized or mechanized support for travel. Downhill skiers were threatened with a nontraditional use of the ski slopes when snowboarding began to grow in popularity, as horse users felt invaded by llamas, a nontraditional method of access to wilderness in the U.S. The conflict between hikers and horse users was noted on public land in the U.S. well before our National Wilderness Preservation System was established, but has grown even as the percentage of users visiting on horse back has generally decreased (Lucas 1985). There is also concern about impacts of horses on trails and campsites, much as some hikers are concerned about the impacts of mountain bikes on trails. Safety is often a concern when llamas meet horses and mules on narrow mountain trails, and speeding bicycles have also caused some injuries and frightened people and pack stock. Jacob and Schreyer (1980) proposed that the common element in all of these recreation conflict situations is goal interference; one person or party is not able to realize the positive aspects of a visit to the outdoors because of the behavior of someone else.

This commonality is somewhat constrained by our awareness of conflict between groups who may or may not directly interact in the wilderness. A study of hunters and nonhunters (Vaske and others 1995) has suggested that conflict can be based on differences in values, represented by differences in meanings attached to a resource or differences in attitudes towards management policy to protect these meanings, held by opposing groups, encouraging us to extend our conceptual conflict model to include a more broad range of conflicts. Implications for social density exists within the study of conflict between tourism promotion and wilderness protection, or between placing high value on biodiversity restoration and personal attachment to a place. Social value differences offer us additional understanding of conflicts and the ways we might address them through wilderness policy.

## Goal Interference Conflict

Jacob and Schreyer (1980) suggested that conflict is caused by goal interference attributed to the behavior of another person. Arising from the popularity at the time of adapting expectancy-valence theory concepts to outdoor recreation issues, recreation was described as a goal oriented behavior and interference with achieving that goal would cause negative emotional response. The more value visitors place on finding naturalness while on a trip to wilderness, and the higher their expectations are that they will indeed find it at the chosen time and place of a trip, the more likely conflict will be felt if this goal is not realized. It is interpersonal conflict if the visitor can attribute this loss of goal attainment to the behavior of someone else (for example, the person who has damaged the vegetation with livestock, or violates the natural quiet of wilderness with a radio, or crosses the bow of a canoe with a motorized boat), not to the weather, car trouble, or illness. In the traditional school of cognitive psychology followed by many recreation researchers at the time, the assumption that all recreation participation is goal oriented was very natural.

Incompatibility of goals is not a requirement for conflict. While conflict may arise when wilderness travelers seeking solitude encounter those seeking challenge and risk but place no value on solitude, or when those whose relation to wilderness is for subsistence encounter those there for recreation, sometimes conflict exists among those with common goals. A local, subsistence user of the wilderness with a long history of association with a place may be skiing merely for the enjoyment of being alone in the wilderness, or enjoying being the first one to travel over newly fallen snow. Encountering a tourist with the same goal might result in conflict.

Goals can be similar or different between conflict groups, and the conflict may include groups differing in levels of impact, traditional or invading practices, and mechanical or nonmechanical methods of travel. All of these types of recreation conflict have been hypothesized to be at least partially fueled by perceived differences in four ways to describe recreation visitor groups: activity style, resource specificity, mode of experience, and tolerance of lifestyle diversity.

**Activity Style**—The concepts of activity specialization and the level of importance placed upon participation in the activity have come to represent the intensity with which visitors participate in selected activities. A backcountry skier may be extremely specialized in cross-country skiing and place substantial importance on the activity as a demonstration of a primitive skill or for maintaining cultural identity. A tourist participating in the same activity as another person and in the same place could unknowingly contribute to conflict due to differences in their activity styles. Similarly, in a remote U.S. wilderness, an angler who places high importance on tying flies and luring wild cut-throat trout to a barbless hook will likely experience conflict with spinning or bait anglers sharing the same resource.

Numbers of people present could also interfere with the specialized angler's goal, no matter what level of intensity their activity style, with conflict most likely for those who place the greatest importance on this type of angling and have the greatest expectations for accomplishment. Low

numbers of people will not necessarily create less impact on the less specialized angler, depending upon the expectations and valence attached to social density. Watson and Cronn (1994) have found that less experienced wilderness visitors have less ability to determine trends in resource and social conditions and therefore are less likely to evaluate conditions as unacceptable or declining in quality.

**Resource Specificity**—Some people are more dependent upon a particular place or resource than others or are attached in different ways. Mountain bikers at the Rattlesnake National Recreation Area in Montana reported less substitutes for the kind of biking they liked to do there than hikers reported (Watson and others 1991). They were more dependent upon the place than hikers. Hunters were believed to visit the Upland Island Wilderness in Texas mostly for the functional values it offered; they believed it was a reservoir of large deer, and therefore they exhibited relatively low place and wilderness attachment scores (Williams and others 1992). An identifiable portion of visitors to the Caney Creek Wilderness in Arkansas came for the symbolic values it represented; “wilderness” demonstrates the social values Americans place on protecting a network of wild areas across the country for this and future generations. Some residents of North Georgia frequently visited the Cohutta Wilderness not at all because it was part of a national wilderness system or for some set of functional reasons, but because it was a place that had always been available to them as a natural place, and they had attached emotional values to it many years ago. The more visits people had taken to the Cohutta Wilderness, the greater the attachment to the place.

People with a strong level of dependence, strength of attachment, or relationship with a place may feel conflict when encountering people who they perceive have weaker or different relationships with that place. Visiting a place with low numbers of people could be a functional purpose for those urban dwellers needing to escape the crowds of the freeway or community. Rural residents may see the lack of people in wilderness as symbolic of the values associated with rural lifestyle. Traditional users may find the presence of other humans threatening to hunt or fishing success. In any case, encountering social densities that extend beyond expectations for those who value the lack of people may change the experience from that of wilderness. Numbers of people can influence achievement of wilderness character for different reasons, potentially as a result of different relations with the place.

**Mode of Experience**—Originally, Jacob and Schreyer (1980) hypothesized that those more focused on the environment have more rigid definitions of acceptable aspects of their experience there and are less tolerant of the behaviors of others that change these aspects. More recently, this potential contributor to conflict has been expanded to the belief that not only strength of focus on the environment is important, but that other points of focus exist and that different points of focus between groups can contribute to conflict. Mountain bikers at the Rattlesnake National Recreation Area were found to be most focused on the activity itself, while the hikers who were feeling conflict were more focused upon their social group or the environment (Watson and others 1991). The hikers probably accurately perceived

that the bikers, while moving quickly over mountain trails, had little ability or interest in an intense focus on either the natural surroundings or the intense companionship felt by hikers during a walk there.

**Tolerance of Lifestyle Diversity**—Some earlier work suggested that people of different socio-economic groups could be in conflict partly because of differences in lifestyle preferences (Knopp and Tyger 1973). Later work by Watson and others (1993) acknowledged that these differences in lifestyle preferences could only contribute to conflict if they were perceived by the group feeling conflict. Hikers perceived many more differences in lifestyle factors between them and bikers than really existed (for example, some hikers stereotyped all bikers as university students) or than the bikers perceived, potentially a contributing factor to the asymmetry of this conflict situation. Saarinen (1998) suggests that backcountry and wilderness hikers in Finland distinguish between Finnish and non-Finnish tourists when deciding on how to greet them while hiking. Stereotypes of people who participate in a particular activity or who come from a particular place can contribute to conflict by either directly interfering with experience goals or by conflicting with goals not specifically related to the outdoor recreation experience.

A private rafter might encounter a commercially outfitted group during a trip down the Salmon River in Idaho, and that raft of people should not interfere with goals for the private floater any more than encountering another private party. However, conflict can occur if the private rafter knows or believes that commercial users are the dominant user on that river, nearly half of the commercial users have annual household incomes over \$100,000 (compared to only 12 percent of noncommercial floaters), they are novice river floaters, they have high expectations for nature but attach low value to solitude, they tend to come from distant large urban centers, and they do not have to compete in a lottery system like the private floaters to obtain a permit to float the Salmon River (Hunger and others 1999). Categorization of individuals as members of an “outgroup” is closely related to evaluations of goal interference by many people (Ramthun 1995). Stereotyping seems to lead individuals to make assumptions about the probable behavior of outgroup members, or to simply equate their presence with interference in goal attainment. Commercial floaters could represent any of several aspects of civilization that the private floater worked so hard to escape by taking a wilderness float trip.

## Social Value Conflict

While not as well represented in the recreation or wilderness literature, a more broad approach to understanding conflict necessarily entails understanding social value differences. Watson and Landres (1999) have proposed that attitudes toward wilderness are diverse and constantly changing as a result of changes in society and specific things we are doing to protect the wilderness resource. In turn, the ecological and human values (meanings) we derive from this protection and contribute to higher order personal and societal benefits are often in conflict. Sometimes this conflict is between the two types of values and sometimes within one type of value.

It is true that predator control to protect reindeer herding in Finland (Sippola 2000) or livestock grazing allocation in the U.S. may conflict with purposes of biodiversity maintenance, pitting ecological values against human meanings (Watson 2000), but differences can also exist among incompatible human values attached to the wilderness resource. Hunters can attach meanings to the trophy values associated with remote wilderness wildlife populations, or they can value the meat and by-products for their subsistence or ancestral meanings. Nonhunters can value the scenic qualities of seeing large, wild animals. These different values placed upon the wildlife resource are believed to be the primary contributors to the increasingly visible social debate over hunting and trapping in the U.S. (Vaske and others 1995).

Conflicts which do not necessarily involve onsite interaction and which can be ascribed to these value differences may be partly caused by some of the same contributing factors as in the goal interference model (particularly resource specificity and lifestyle tolerance). However, greater emphasis is placed on societal changes and specific sources of influence in understanding this type of conflict. The conflict between hunters and nonhunters (Vaske and others 1995) mostly stems from differences in social values, not interpersonal interaction. One group possesses a set of values (attitudes) that accepts killing of wildlife by humans for sport or consumption, and the other does not. They also differ in the meanings attached to wildlife, with one group placing high value on seeing wildlife and acknowledging their right to exist, while the other group attaches additional meaning to consumptive uses. This approach allows us to look at more broad conflict issues like the conflict between subsistence use and tourism promotion, not just subsistence activities and the tourist. A complex set of values exists across an array of demands on wilderness, and a goal interference approach is insufficient to understanding them or working toward solutions.

## Measurement of Conflict

There has been little agreement in the past on the topic of conflict measurement. Jacob and Schreyer (1980) offered a conceptual definition of interpersonal conflict as goal interference attributed to the behavior of another, but they did not suggest a specific way to measure that concept. In some cases, it has been recommended that more than one measure is appropriate in order to understand the effects of efforts to manage the conflict (Watson and others 1993). Watson and others (1993) differentiated between three common interpersonal conflict measures:

1. Predisposition toward conflict. Using a scale to measure position from "extremely undesirable" to "extremely desirable," the strength of a person's feelings toward the possibility of encountering a person or group of another type can be measured. It is considered cumulative in that it does not focus usually on a specific encounter, but it does also not focus very specifically on actual feelings of conflict.

2. Attraction toward outgroups. Using a nominal scale with points of "enjoyed meeting them," "didn't meet any," and "disliked meeting them," the strength of attraction can be measured for encounters with certain types of groups

during a specific trip. The lack of attraction is assumed to represent conflict.

3. Goal interference measure. A measure of conflict more adherent to the Jacob and Schreyer model requires the subject to indicate "yes" or "no" in response to being asked if the behavior of someone else interfered with their enjoyment of their wilderness trip (or trips) to the area of interest. If yes, they are asked to explain what behavior caused the interference and who exhibited that behavior.

In research by Watson and others (1993) it was found that the potential contributors offered by Jacob and Schreyer (1980) and refined by others over the years were more closely associated with predisposition toward conflict and strength of attraction toward outgroups than goal interference. Activity style, resource specificity, mode of experience, and lifestyle tolerance differences may be most closely associated with conflict through influence of expectations and importance attached to wilderness attributes, leading to predispositions toward goal interference, not conflict itself. This association has not been widely acknowledged in the conflict research literature, but may be an extremely important factor in developing approaches to managing conflict.

In an explanation of social value differences, Vaske and others (1995) advocated use of the goal interference measure to more accurately identify the groups in conflict and sources of the conflict. This measure, however, focuses too directly on behaviors in a reactive way. The need is to understand the values that are driving the conflict and contributors to changing these values. A more qualitative method of data collection may be more productive in developing this understanding. Generally, there is a need to advance methodologies that define and measure conflict at the subpopulation level. Minimally, group level measures need to be employed that acknowledges conflict often is influenced by group dynamics and cumulative attitudes and experiences of groups of people. Beyond measures of interpersonal conflict, the amount of conflict and differences in values may be better understood by approaching the conflict from a subpopulation level than an individual level. Evidence of conflict can exist in organized group position statements, articles written to be published in newspapers by identifiable interest groups, justifications for court cases, or simply a careful analysis of the meanings and attitudes placed on the wilderness resource by different interests. There seem to be those subpopulations who believe social density should not be controlled by the managing agencies. There are also organized groups who believe social density management is prescribed in the legal foundations of the wilderness system in the U.S. Conflict between these two groups should be studied at the subpopulation level, not the individual level. A simple vote to determine the outcome of this debate would not be constructive.

## Implications

There remains a need to approach feelings of conflict related to undesirable social density in a reactive manner, trying to measure how much conflict occurs and whether it is caused by some perceptions or behaviors that can be modified to reduce the conflict. These measures could serve as good indicators (Stankey and others 1985) of impact to

solitude experiences that is attributable to the behavior or presence of others.

Some conflict, however, exists because of incompatibility of user behaviors, uses or values associated with wilderness and are most likely to be addressed by temporal or spatial separation of opposing social groups. An appropriate approach to conflict management may be a proactive one that brings all interests together in order to understand conflicting values and work through compromise or recognition of decision criteria. The way we identify groups for involvement in public participation and how we define public participation may change substantially in the near future. Our dependence upon management solutions that ignore the complexity of social value differences and reactively attempt to solve conflicting demand issues through exclusion may also change (Watson and others 1997).

Conflict research suggests to us that social density should not be studied as an independent causal factor. The number of people one sees along a trail in wilderness or on a float trip on a river may have more to do with expectations and importance attached to certain types of encounters than the absolute numbers of people. Sometimes managers have established social density indicators for wilderness based only on numbers of people seen each day without distinguishing between user types (for example, horse back riders and hikers, kayakers and rafters). This practice ignores the most basic piece of information provided from early carrying capacity studies. While consistent relationships have not been found between encounters and experience quality, people have provided different responses to encountering different types of groups, in different places, behaving differently, and under different management regulations.

There is no easy way to incorporate the knowledge derived from previous conflict research into social density determinations without management decisions about objectives for social density. In the initial plan for the Salmon River inside the Frank Church-River of No Return Wilderness, a desire was stated to manage the river for a particular type of group, the intermediate-skilled river floater. This targeted "market" resulted from an analysis of opportunities in the immediate region of this river, recognizing an abundance of roadside and remote settings available for novice and beginning skill levels, as well as extremely challenging whitewater in both remote and accessible rivers of the region. Even this general decision about the type of visitor most dependent upon this river within the regional context provides guidance for science to explore and understand the types of conflict (good conflict, bad conflict, acceptable conflict?) reported between parties on the river. We don't have this type of guidance in very many places, though it could be valuable in guiding management decisions beyond those about social density. Providing opportunities for demonstrating primitive skills could intentionally vary across a system, as well as the types of encounters that are most probable, not just the number of people encountered or numbers of parties encountered.

Approaching social density from a conflict perspective suggests that we need to explore two primary aspects of visitor experiences:

1. We need to understand the orientations people have toward the place of interest. Whether it is a nonconforming

user (like jet boaters on the Salmon River inside the Frank Church-River of No Return Wilderness), a group of scientists, scouts, a wilderness therapy group, or a commercially outfitted group in the wilderness, we need to proactively study the values, meanings, expectations, and importance they attach to the place.

2. How does interacting with various numbers and types of people interact with these values, meanings, and expectations? Participatory Rural Appraisals (Medina and Rodriguez 1998) and Community-based Conservation practices (Jones and Braun 1996) are planning and management implementation methods that attempt to proactively understand the attitudes, values, and behaviors that need to be addressed in wilderness management and assure they are addressed. An approach to social density management that similarly is based on the mix of human and ecological values associated with wilderness (or a regional system of wilderness opportunities) instead of the single dimensional crowding measures commonly used today will extend our abilities to meet the full potential of wilderness to current and future generations of people.

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