

Use Limits in Wilderness: Assumptions and Gaps in Knowledge

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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.

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

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 Krumpke 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, Krumpke 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

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 Krumpal 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; Hendee and others 1990; Lucas and Krumpke 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 acres 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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