# WILDERNESS RECREATON IN THE UNITED STATES-

## *Trends in Use, Users, and Impacts*

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Abstract: Recreation use of the National Wilderness Preservation System (NWPS) has increased sixfold since passage of The Wilderness Act in 1964. Use is currently increasing in most designated wilderness areas. However, the wilderness visitors of today, the trips they take, and their management preferences are not very different from those of a decade or two ago. Some of the impacts of recreation use are stable, while others are worsening. Impacts to a maintained wilderness trail system were found to be relatively stable over an 11-year period. Conditions on longestablished campsites only deteriorated slightly over 5- to 11-year periods; However, aggregate campsite impact has increased greatly due to dramatic increases in the number of campsites (53 to 123% increases in the wilderness areas studied). These findings suggest that problems with wilderness recreation are pronounced and increasing. More investment by management and commitment to dealing with problems is needed to meet wilderness recreation management goals.

IT HAS BEEN MORE THAN 30YEARS SINCE creation of the NWPS in the United States. That system, originally comprising 54 wilderness areas and 9 million acres, has changed substantially. Both the number of wilderness areas and acreage of wilderness have increased more than elevenfold. The diversity of areas designated as wilderness has also increased. The largest -wilderness, Wrangell-Saint Elias in Alaska, is almost as large as the entire original wilderness system. The smallest wilderness, Oregon Islands, at 5 acres, is ***more*** than 1,000 times ***smaller*** than the smallest wilderness initially included in the NWPS.Wilderness is no longer so highly concentrated in the West and in the high mountains. Designated wilderness is found in all but six states and contains about 60% of the basic ecosystem types found in the United States (Davis 1989).

Although these changes in the size and extent of the wilderness system can be readily described, relatively little information is available about change in the use, users, and condition of designated wilderness areas. Recreation use, in particular, has been a prominent use in many wilderness areas for more than half a century. We need a better understanding about trends in recreation use, recreation users, and the physical impacts they cause. This information would allow managers to grapple more effectively with current management issues and plan for the future.

Over the past seven years a coordinated series of studies has been conducted, designed to increase understanding of wilderness recreation trendswilderness recreation use data was analyzed over a period from 1965 through 1994 (Cole 1996). Utilizing case studies in four wilderness areas and a national park, trends in campsite conditions (Cole and Hall 1992; Cole 1993) and trail conditions (Cole 1991) were assessed over periods of 5 to 16 years. Finally, using case studies from three wilderness areas, trends in wilderness visitor characteristics over periods of 12 to 22 years (Cole et al. 1995) were assessed.

Together these studies provide the most complete picture to date of recreation trends in wilderness since creation of the NWPS. The purpose of this article is to review and integrate the findings of these studies.

## Trends in Amount of Wilderness Use

Visitor-use data available from the four agencies that manage wilderness (U.S. Forest Service [USFS], National Park Service [NPS],U.S.Fish andwildlife Service [USFS],and Bureau of Land Management [BLM]), vary in quality, units of measure, and length and frequency of record. Using data from a variety of sources, as well as conversion factors defined in Cole (1996), estimates suggest that recreation use of wilderness has increased about sixfold since passage of the Wilderness Act, from about 3 million recreation visitor-days (RVDs) in 1965 to about 17 million RVDs in 1994 (see Table 1). Most of this increase in use is the result of additional acreage of wilderness being designated. Recreation use of the original 54 wilderness areas increased 86% between 1965 and 1994 (from about 3 million RVDs to about 5.5 million RVDs). The remaining 11.5 million RVDs of wilderness use in 1994 come from wilderness areas designated since 1964.

The questions of most relevance to wilderness managers are whether recreation use of individual wilderness areas has increased in the past and is likely to increase in the future. The answer to both questions appears to be “yes." Visitor-use data clearly indicate that (1) use increased almost everywhere during the 1960s and early 1970s. (2) use has been increasing substantially during the 1990s in most wilderness areas, and (3) virtually without exception, use of individual wilderness areas is greater now than it was in 1964. In many wilderness areas, however, use levels were stable or declining during the late 1970s and 1980s (Lucas 1989).

These trends are most clear when presented for the 54

USFS wildernesses designated in 1964 and the 58 NPS wilderness areas and major parks likely to be designated wilderness (see Table 1). In these 112 "core" areas, annual increases in use typically exceeded 10% in the 1960s and early 1970s. In the NPS areas, annual increases in use have exceeded 10% during the 1990s as well. Throughout the rest of the NWPS, use has been increasing during the 1990s but more slowly than in the national parks. The anomaly is the period of stable or declining use of the 112 core areas during the late 1970s and 198Os, originally reported by Lucas (1989). Was this a widespread trend? Did it occur in the hundreds of other wilderness areas designated since 1964? And should we expect similar cycles of declining use in the future?

None of these questions can be answered definitively. However, it appears that relatively few individual wilderness areas experienced substantial declines in use-even during the late 1970s and 1980s. Over 80% of the decline in use between 1976 and 1989 in the 112 core areas occurred in just five extremely popular national parks: Yosemite, Sequoia-Kings Canyon, Olympic, Great Smoky Mountains, and Shenandoah. Many core areas did not experience declining use during this period For the entire NWPS, only 11% of wilderness areas experienced peak use prior to the 1980s.

Overall, these data suggest that recreation use of wilderness has increased greatly since 1964 and that use of many wilderness areas has accelerated during the 1990s. Use trends vary dramatically from area to area. Certain wilderness areas, particularly some of the most heavily used wilderness areas, experience pronounced cycles of growth and decline in recreation use, while slow and steady growth appears characteristic of the vast majority of areas.

**Table 1: Recreational use of the USFS wilderness and primitive areas in human-days (prior to 1965) and of the NWPS in RVDs (since 1965).**

| Year | Recreation Use Thousands | Average Annual Change Percent |
|---|---|---|
| 1946 | 406 | - |
| 1955 | 1,175 | 12.5 |
| 1964 | 2,872 | 10.4 |
| 1965 | 2,952 | - |
| 1972 | 5,246 | 8.6 |
| 1979 | 8,843 | 7.8 |
| 1989 | 14,801 | 5.4 |
| 1994 | 16,988 | 2.8 |

## Trends in Wilderness Visitors and Visits

Early surveys of wilderness visitors to the Boundary Waters Canoe Area Wilderness, Minnesota; the Shining Rock Wilderness, North Carolina; and the DesolationWilderness, California, were replicated in 1990 and 199 . The details and results of these studies are described in Cole and others (1995) and summarized by Cook and Borrie (1995) in an earlier article on trends published in this journal. Prior to this work, the only detailed longitudinal study of wilderness visitors was conducted by Lucas (1985) in the Bob Marshall Wilderness, Montana.

The principal finding of these studies is that most variables have not changed dramatically over time, and for most of those variables that have changed, trends are not consistent among different wilderness areas. Only 5 of 63 variables changed substantially and consistently across areas. Three of these strong consistent trends are sociodemographic variables. The typical wilderness visitor of today is older (35 to 40) and more highly educated (40 to 50% with some graduate study) than the typical visitor of the past. The proportion of female visitors also increased to 20 to 34% in 1990.The proportion of visitors who had visited wilderness areas other than the one they were currently visiting also increased, and visitor assessments of the severity of litter problems declined.

Much speculation about wilderness visitor trends has focused on characteristics of the wilderness visit, such as length of stay and group size (e.g., Roggenbuck and Watson 1988), but no wilderness visit characteristics changed substantially and consistently. However, there is some evidence of subtle changes: more solo visitors and fewer organized groups, slightly smaller groups, and shorter stays. Trend studies will be needed in more areas if we are to decide whether these are real, consistent trends. Nevertheless, studies suggest that these changes-even if they are real-are not dramatic. In contrast to Lucas's (1985) optimistic conclusions based on his study in the Bob Marshall Wilderness, we found no evidence that the impact potential of users has de-

**Table 2: Changes in mean conditions on campsites in Eagle Cap Wilderness, Bob Marshall Wilderness, and Grand Canyon National Park.**

| | Eagle Cap | | Bob Marshall | | Grand Canyon | |
|---|---|---|---|---|---|---|
| | 1979 | 1990 | 1981 | 1990 | 1984 | 1989 |
| Campsite Area ($ft^2$) | 2077 | 2217 | 2831 | 3391 | 549 | 538 |
| Damaged Trees (#) | 11 | 10 | 18 | 17 | - | - |
| Vegetation Cover (%) | 15 | 19 | 33 | 42 | 1 | 7 |
| Mineral Soil Cover (%) | 33 | 44 | 14 | 11 | 94 | 84 |

The condition of highly impacted, long-established campsites typically changes little over time. (Photo by Leopold Institute.)

clined or that use has shifted from more consumptive activities to more contemplative activities.

Visitor evaluations of wilderness conditions and their management preferences have been highly stable over time. The vast majority of visitors are extremely satisfied with their wilderness visits and rate trip quality as very good. There is no clear evidence that today's wilderness visitor is any more or less tolerant of encounters with other groups than their predecessors.

Of the management preferences that were assessed, the clearest trend was a decline in purist attitudes regarding trails. Support for high-standard trails, for building bridges over creeks (where bridges are needed only to keep feet from getting wet), and for administrative use of chain saws to clear trails increased, while support for low-standard trails and leaving a few trees blown down across the trail decreased.

Trends in attitudes about the desirability of actions that enhance the naturalness of wilderness ecosystems varied among ecosystem attributes. In visitor surveys conducted in the late 1960s and early 197Os, both lightning fires and a natural fishery (no stocking and no tampering with barren lakes) were considered undesirable by two- to three-times as many people as considered them desirable. By 1990, the vast majority of visitors still considered a natural fishery to be undesirable while a majority supported natural fire. This suggests that visitors may only support the goal of preserving natural conditions if it does not disrupt their preferred activities.

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Overall, these studies indicate that the wilderness visitors oftoday, the trips they take, and their management preferences are not much different from those of a decade or two ago. This suggests that if managers can understand their visitors and develop effective recreation management strategies, this knowledge and these programs can be used for substantial periods of time. Unfortunately, wilderness visitor studies have been conducted in only a small proportion of wilderness areas (Roggenbuck and Lucas 1987), and recreation management programs are more likely to be reactive than proactive or interactive (Cole 1990).

## Trends in the Condition of Wilderness Trails

Even if visitor characteristics remain relatively unchanged, if visitors are coming in greater numbers, we might expect their ecological impacts to increase. It is also possible that impact levels could increase or decrease as a result of changes in per capita impact, changes in use distribution, the cumulative effects of use over time, or changes in management.

The condition of three trail systems in the Selway-Bitterroot Wilderness, Montana, were assessed in 1978 and again in 1989 to determine change (Cole 1991). Mean cross-sectional area of the trails (an indicator of erosion) did not change significantly over this period. Individual trail locations changed, and some eroded while others experienced deposition, but there was no net change. This corroborates the finding of the only other study of change to a trail system, a study conducted in Guadalupe Mountains National Park, Texas (Fish et al. 1981).

Although impact levels on the trail system as a whole did not change, many trail segments deteriorated markedly. This suggests that managers should focus on specific problem segments rather than on trails or trail systems. Of the factors that determine the probability that a trail will deteriorate, there is abundant evidence that use characteristics are least important (Helgath 1975; Summer 1986).

The factors that most influence trail conditions are trail location and design.

The principal solutions to trail problems involve increasing the trail's capacity to withstand use (through improved design and engineering) or changing the location of the trail to one that is more capable of withstanding use (see Lang and Marion 1996 for review). Both ofthese are common practices. This suggests that wilderness managers know how to manage trails, they just lack the finds and other resources to deal with the many trail problems that exist.

## Trends in the Condition of Wilderness Campsites

Levels of campsite impact can change as a result of either changes in the condition of established sites or changes in the number and distribution ofsites. To evaluate the first of these components of change, a sample of established campsites was studied in the Eagle Cap Wilderness, Oregon (over an 1 l-year period), the Bob Marshall Wilderness, Montana (9-year period), and Grand Canyon National Park, Arizona (5-year period). To evaluate the second component of change, inventories of all campsites within portions of the Lee MetcalfWilderness, Montana (over a 16-year period), the Eagle Cap Wilderness, Oregon (15-year period), and the Selway-Bitterroot Wilderness. Montana (12-year period), were conducted.

In the assessment of individual campsites, we found tremendous variation in amount of change. both between and within campsites (Colt and Hall 1992). Certain campsites improved while others deteriorated and others were relatively unchanged. In many cases. one type of impact increased on an individual site, while another type of impact decreased on the same site. Overall, the mean response was one of slight deterioration (see Table 2).

This finding suggests that there is little reason to be overly optimistic or pessimistic about the future condition oflong-established campsites. Continued use of these sites may cause some additional damage, but the amount of additional deterioration is likely to be low in comparison to the deterioration that has already occurred. On the other hand, there is little evidence that human attempts to mitigate campsite impact have been very effective.

Among the primary causes of increasing impact problems are visitation in visitation to remote places and increases in site-pioneering behavior. (Photo by Leopold Institute.)

Changes in the number of campsites were much more pronounced and suggest the need for management action. In three studied wilderness areas the number of campsites increased markedly: 53% in the Selway-Bitterroot, 84% in the Lee Metcalf, and 123% in the Eagle Cap (Cole 1993). If these areas are typical ofwilderness, they suggest that camp site impact has increased greatly over the past decade or two, primarily from the creation of new campsites rather than the deterioration of existing sites.

Many factors may have contributed to the dramatic proliferation of campsite impact. However, I believe that proliferation is primarily a result of (1) an increase in site-pioneering behavior by visitors, in many cases with the encouragement of managers, and (2) management programs that do little to attempt to decrease the number of campsites. Management programs explicitly encourage site-pioneering when they promote use dispersal; they implicitly encourage site-pioneering with many low-impact camping suggestions. They are passive when they do little to encourage use of existing sites and do not attempt to naturalize campsites that are in the early stages of development.

## Conclusions and Implications

Given the substantial changes that have occurred in the NWPS, it is somewhat surprising that there have not been more profound changes in the nature and amount of recreation use and its impact on the wilderness environment. Nevertheless, although wilderness visitors themselves are little changed, amount of use continues to increase. There is every reason to think that use intensity will continue to increase in most wilderness areas in the future.The population of the United States continues to grow, as does the migration ofpeople to the portions of the United States with the most wilderness. The nature of recreation management problems is unlikely to change greatly in the short-term, but in the absence of more effective management strategies or the allocation of more resources to existing management programs, the severity of traditional problems is likely to continue to increase.

Of the problems I assessed, campsite proliferation is the one that has intensified the most. Trail impacts are probably not as severe as they might be because substantial sums of money

are regularly spent on trail maintenance. Similarly, wilderness rangers often give considerable attention to contacting visitors and cleaning up after them on established campsites. While these management efforts need to be continued, more attention needs to be directed toward the problem of campsite proliferation

The primary tools for combating proliferation are site designation, site restoration, visitor education and, in some places, use limitation. In popular places, management needs (1) to discourage campers from developing new sites, either by allowing camping only on designated sites or by encouraging use of established sites, and 2) to rehabilitate "excess" campsites and sites that have never been heavily impacted. In heavily used wilderness areas, use limits will increase the likelihood that these efforts will succeed, because fewer. campsites will be needed. In remote portions of wilderness, management needs to encourage campers to "leave no trace" (Hampton and Cole 1995) (see also article by Swain in this issue of *IJW)* and to use sites that have not been used before. Here as well, use limits may increase the likelihood of success, because individual sites will be less frequently used. Again, restoration of all sites in these places must be a key component of the management program.

Crowding problems are also likely to intensify if use of wilderness continues to increase and visitors' tolerance of encounters remains stable. Because attempts to disperse use more widely-one of the proposed solutions to crowding (Hendee et al. 1990)-aggravate impact proliferation problems, the alternative of use limitation may be implemented in more wilderness areas in the future.

Two shortcomings of wilderness management are highlighted in the results of these studies. First is the lack of good baseline and monitoring data. Reliable use data, the most fundamental piece of information needed by managers, is only collected in a small proportion of wilderness areas. The slow and steady growth in use reported by most wilderness areas may simply reflect the fact that most managers are guessing how much use their areas receive. Even fewer areas have reliable data on visitor characteristics and resource impacts.

Second, wilderness managers have been too reluctant to attack problems directly, with use restrictions if necessary. Two oft-cited wilderness management principles, that indirect management techniques are best and that use limits should be a last resort, have become so entrenched in the wilderness community that they have paralyzed many management programs (Cole 1995). Once unacceptable management, problems are identified, they should be attacked using techniques capable ofsucceeding in the short term, before the situation gets any worse.

Wilderness recreation problems are pronounced; they have increased over the past three decades and are likely to intensify, so wilderness managers must become more proactive in the future. More resources need to be expended on collection ofbaseline and monitoring data. Managers need to be more willing to enact restrictive management programs if unacceptable conditions are widespread. And finally, to avoid the proliferation of problems, management strategies need to be developed at the scale of entire wilderness areas (or larger) so that attempts to solve one problem in one place do not cause other problems in other places. IJW

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