



United States
Department
of Agriculture

Forest Service

Intermountain
Research Station

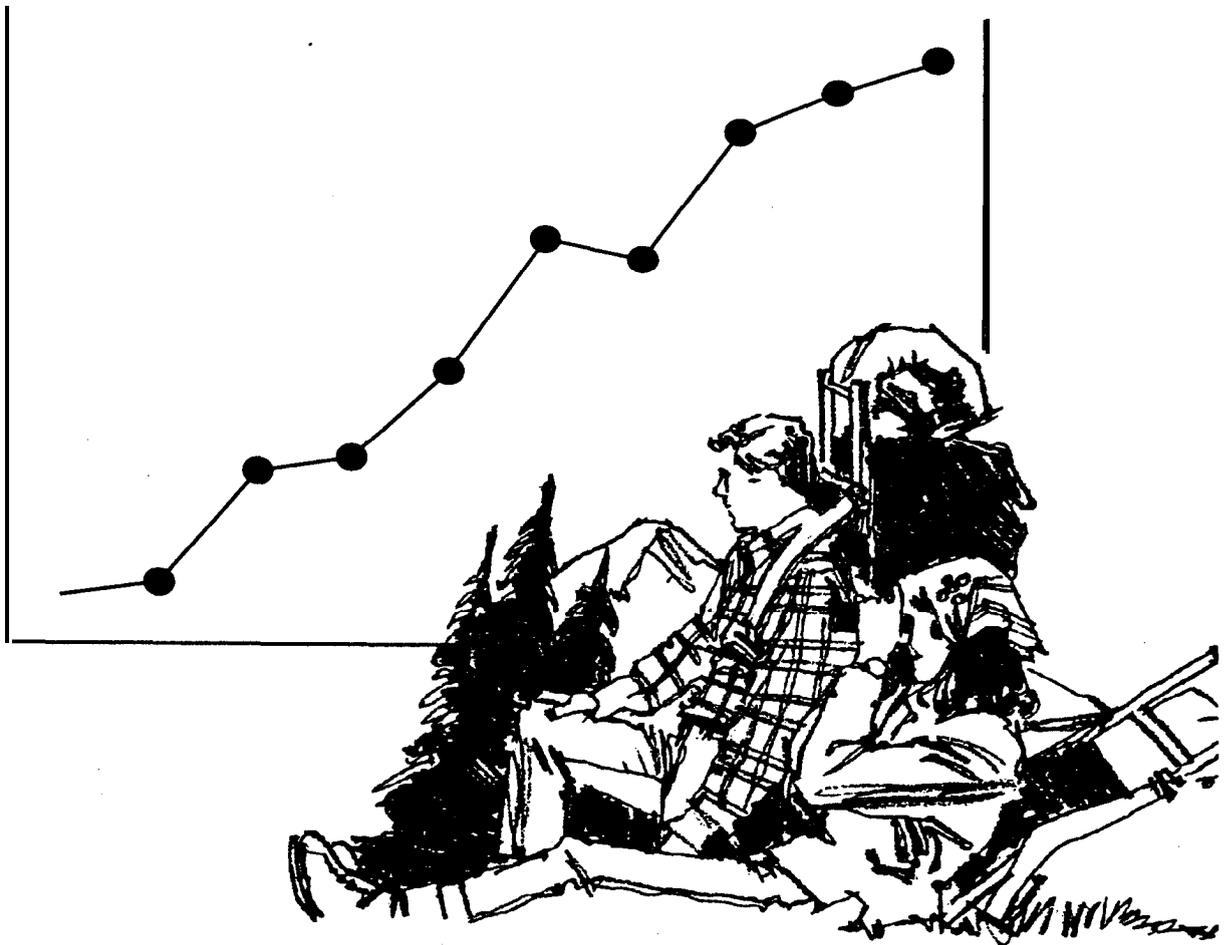
Research Paper
INT-RP-488

April 1996



Wilderness Recreation Use Trends, 1965 Through 1994

David N. Cole



The Author

David N. Cole is a Research Biologist for the Aldo Leopold Wilderness Research Institute, Missoula, MT. Dr. Cole received his B.A. degree in geography from the University of California, Berkeley, in 1972. He received his Ph.D. degree, also in geography, from the University of Oregon in 1977. He has written numerous papers on wilderness, particularly concerning the management of recreation use.

Research Summary

Recreation use of the National Wilderness Preservation System has steadily increased since passage of the Wilderness Act in 1964. People are recreating in designated wilderness more than ever. Although the size of the National Wilderness Preservation System has greatly increased since 1964, many wildernesses are also used more heavily than ever. At least one-half of all designated wildernesses experienced their highest levels of use during the 1990's. Moreover, use increased during the early 1990's in virtually every wilderness, even those that experienced higher levels of visitation in the late 1970's or 1980's. Recent growth is particularly pronounced in National Park Service units where double-digit growth rates are comparable to those of several decades ago. This conclusion is different from reports in the late 1980's that determined that wilderness use was stable or declining. The fact that use continues to increase has critical implications for wilderness management and for land-allocation decisions.

Acknowledgments

Special thanks to Ed Kleiman for developing many of the spreadsheets used for this analysis. Also, thanks to Bob Lucas for his extensive work compiling and analyzing visitor-use data. Hans Zaglauer and Dave Spildie helped collect data from the Fish and Wildlife Service and from the Bureau of Land Management. Troy Hall, Dave Parsons, and Bill Stewart provided helpful review comments.

Contents

	Page
Introduction-----	1
Units of Measure-----	1
Trend Indicators -----	2
Wilderness Use Data Sources -----	2
Overall Use of the National Wilderness Preservation System -----	3
Wilderness Recreation Use Intensity -----	4
Use Per Acre of the National Wilderness Preservation System -----	4
Use of "Core" Wilderness -----	5
Year of Peak Use -----	6
Use of Individual National Park Service Areas -----	7
Discussion and Conclusions -----	9
Implications -----	9
References -----	10

Wilderness Recreation Use Trends, 1965 through 1994

David N. Cole

Introduction

More than 30 years have passed since the Wilderness Act created the National Wilderness Preservation System, originally consisting of 54 Forest Service wildernesses and just over 9 million acres. Most of these original wildernesses were noted primarily for their outstanding recreational opportunities and were in the mountains of the Western United States.

Today, the National Wilderness Preservation System contains 630 areas, is managed by four Federal agencies, and is more than 103 million acres. Wildernesses are in all parts of the United States. Many were added more for the natural ecosystems they protect than for recreational opportunities.

Recreation remains one of the primary beneficial uses of wilderness, however, and is among the more pressing management challenges. Consequently, managers of many wildernesses make periodic estimates of the amount of recreation use. Information about trends in wilderness recreation use, based on these estimates, is important to wilderness managers and policymakers who are involved in land-allocation decisions.

Research on wilderness-use trends conducted in the early 1970's reported continuous and rapid increases in visitor use. Noting a 15-fold increase in use between the late 1940's (when wildernesses were administratively rather than Congressionally designated) and 1972, Lucas (1974, p. 5) wrote that people are visiting "more and more" and "no leveling off is in sight yet," that "recreation use is the root of the growing management challenge," and that "the challenge grows more difficult all the time." Petersen (1981) reported that this trend continued through the 1970's, at least on the National Forest wildernesses she studied, with most of the increase in use accounted for by increases in use intensity rather than growth in the size of the National Wilderness Preservation System.

By the late 1980's, however, Lucas and several co-workers (Lucas 1989; Lucas and McCool 1988; Lucas and Stankey 1989; Roggenbuck and Watson 1989) reported a different trend. Although recreation use of the National Wilderness Preservation System was still increasing, they concluded that "wilderness use

has stabilized or is declining" (Roggenbuck and Watson 1989, p. 354) because "much of the apparent growth is accounted for by the rapid expansion in the number of [wilderness] units" (Lucas 1989, p. 54).

Three lines of reasoning, based on visitor-use data available through 1986, were used to arrive at this conclusion:

1. Annual growth rates in total use of all designated wilderness decreased from double-digit increases prior to the mid-1960's to a 1-percent increase in the early 1980's (Lucas and Stankey 1989).

2. Wilderness use declined on a per-acre basis between 1975 and 1986 (Roggenbuck and Watson 1989).

3. Use decreased during the early 1980's, both in the original Forest Service wildernesses (the "core system" of areas established in 1964 by the Wilderness Act) and in National Park Service backcountry. Most of these areas experienced their peak year of use prior to 1980 (Lucas and Stankey 1989).

The conclusion that wilderness use had stabilized or was declining led these authors to recommend some dramatic changes in wilderness management, suggesting that it might be possible to reduce regulations and promote additional use of wilderness. They also suggested that because wilderness use has stabilized or declined, demand for recreation use is no longer a legitimate justification for designating more wilderness (Lucas and McCool 1988; Lucas and Stankey 1989; Roggenbuck and Watson 1989). This argument has subsequently been advanced in testimony challenging the desirability of additional wilderness designation.

Because of the potential for conclusions about trends in recreation use of wilderness to effect dramatic change in wilderness management strategies and to influence wilderness-allocation decisions, it seemed worthwhile to reassess trends in recreation use with the benefit of an additional 10 years of data.

Units of Measure

The primary units we used to measure the amount of use (recreation visitor-days and overnight stays) incorporate an estimate of length of stay. A "recreation visitor-day," the standard unit used by the

Forest Service since 1965, is defined as one person being present for 12 hours. Where this unit is used, both day-use and overnight use are accounted for. An "overnight stay," the standard unit used by the National Park Service, is defined as one person spending one night within an area. Where this unit is used, only overnight use is accounted for.

These units are generally considered the most useful measures of how intensively wildernesses are used because they account for variation in length of stay (Lucas 1990). "Visits" (the entry of one person, regardless of length of stay) are sometimes used as a unit of measure but their interpretation is ambiguous. Visits are a more appropriate indicator of use frequency than use intensity. If one were interested in the proportion of society that uses wilderness, number of visitors might be a better measure.

Trend Indicators

Visitor-use data can be analyzed in various ways to provide at least two types of useful trend information. The first type of information concerns trends in total use of the National Wilderness Preservation System. Are people using designated wilderness more or less than in the past? How much benefit, in terms of recreation use, is provided by the wilderness system? Has the demand for wilderness recreation use expanded along with the expansion of the National Wilderness Preservation System? Answers are easily found with available data

Of more widespread interest is information on trends in the intensity of wilderness use (amount of use per unit area). Are individual wildernesses more or less heavily used than in the past? This has been called the "underlying trend" of wilderness use (Lucas 1989; Petersen 1981). Such information is useful in generalizing about how visitor-use intensity has changed in recent years, in projecting demand for wilderness recreation, and in predicting recreation pressure on wilderness in the future. The constant expansion of the National Wilderness Preservation System, the short record of visitor-use data for many wildernesses, and concerns about the accuracy of use data contribute to the challenge of identifying a definite trend in use intensity that is applicable to the entire wilderness system.

Wilderness Use Data Sources

Of the four agencies (Forest Service, National Park Service, Fish and Wildlife Service, and Bureau of Land Management) that manage wilderness, the Forest Service has the most complete and the longest record of wilderness use. Data of varying quality

are available for virtually every individual wilderness for every year since wilderness designation. Areas that were wilderness or primitive areas when the Wilderness Act was passed have use records that go back to 1946, although units of measure were changed in 1965. Since 1965, the unit of measure has been the recreation visitor-day. These use estimates were compiled by the Forest Service, Washington Office until 1986. I collected data for the years since 1986 from each region. Most of these estimates are based on observation and "best guesses." In a survey of all wildernesses, conducted in 1989, only 13 percent of Forest Service wildernesses had use estimates that were "based on systematic counts (permits or counters)" (McClaran and Cole 1993).

Data available from the National Park Service are less complete and cover a shorter period of time. Estimates are available since 1971, regardless of when the park was designated as wilderness, in a report issued by the Socio-Economic Studies Division of the National Park Service. Data are not available for only wilderness, but data for backcountry provides a reasonable estimate of wilderness use.

A more serious problem is that the unit of measure used by the National Park Service is the overnight stay, a unit that only includes overnight use. For most analyses there was no need to convert overnight stays to recreation visitor-days. To quantify trends in overall use of the National Wilderness Preservation System, however, conversion was necessary. Overnight stays were multiplied by 2.5 to obtain an estimate of overnight use in recreation visitor-days. Day-use was accounted for by adding 26 percent of the overnight-use estimate.

These conversion factors were derived from data from a recent survey of National Park Service backcountry managers (Marion and others 1993) who reported that the most common length of stay is two nights. Since a two-night stay (two overnight stays) is equivalent to about five recreation visitor-days (three days and two nights), the 2.5 expansion factor was considered the most appropriate. Managers also estimated that 64 percent of backcountry visitors are day-users. Because the mean length of stay is five times as long (two nights) for the overnight visitor, this means that about 26 percent of backcountry use (adjusted to account for length of stay) is day-use.

Despite the lack of data on day-use, National Park Service overnight-use data should be much more accurate than the data provided by the Forest Service. In 1989, 47 percent of the estimates were based on systematic counts (McClaran and Cole 1993) that were often based on permits required for overnight stays.

Use data for the Fish and Wildlife Service and the Bureau of Land Management areas have never been routinely collected. Data were available, however, for

three points in time. In 1979, Washburne and Cole (1983) sent questionnaires to managers of all wildernesses asking, among other things, for an estimate of recreation use. McClaran and Cole (1993) conducted a similar survey of all wildernesses with substantial recreation use in 1989. Finally, by mail-back questionnaires or phone calls, use estimates were obtained in 1994 for all wildernesses managed by these two agencies. In a few cases, data had to be converted to recreation visitor-days.

These data for Fish and Wildlife Service and Bureau of Land Management areas are probably the least accurate. The proportion of areas with systematic counts was 15 percent for the Fish and Wildlife Service and 13 percent for the Bureau of Land Management (McClaran and Cole 1993). However, these wildernesses received such a small proportion of total wilderness recreation use that even highly inaccurate use figures are likely to have little effect on overall use trends.

Although the accuracy of these data are a concern, the implications of use trends are important, and as Lucas and McCool (1988) note, these data are “the only game in town.” Evidence of trends is most reliable when several years are considered and when numerous areas are aggregated. The best data for analyzing trends in individual wildernesses are from National Park Service areas, many of which require permits. These trends are only applicable to overnight use, however, and it may be unfair to assume that trends in National Park Service areas are applicable to areas managed by the other three agencies.

Overall Use of the National Wilderness Preservation System

Recreation use of the National Wilderness Preservation System increased almost sixfold between 1965

and 1994 when recreation use approached 17 million recreation visitor-days (table 1). The average annual increase in use over this period was 6.3 percent, and growth was remarkably constant.

For Forest Service and National Park Service wildernesses (fig. 1), a linear relationship between recreational use and year is highly significant (r^2 of 0.98 and 0.99, respectively). Because growth has been constant (linear) rather than exponential, growth rates (average annual change) have been declining for as long as use records have been kept (table 1). Declining growth rates do not imply declining use or lack of growth, as Lucas and Stankey (1989) suggested. The appropriate indicator of declining use is a negative growth rate, not a declining growth rate. For example, growth rates were declining even during the late 1960's and early 1970's, a period characterized by many as one of explosive growth in wilderness recreation (Lucas and Stankey 1989).

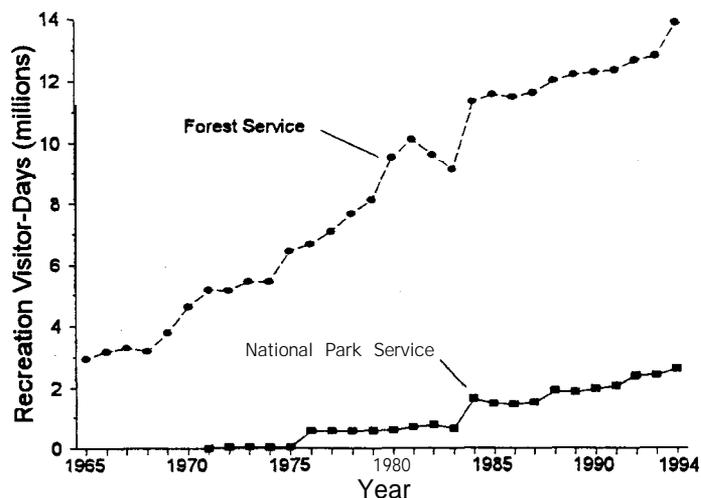


Figure 1-Total recreation use of Forest Service and National Park Service wildernesses.

Table I-Recreation use of the Forest Service wilderness and primitive areas in man-days (prior to 1965) and of the National Wilderness Preservation System in recreation visitor-days (since 1965).

Year	Forest Service man-days	National Wilderness Preservation System visitor-days	Average annual change
		Thousands	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

Wilderness Recreation Use Intensity

While recreation use in the National Wilderness Preservation System has clearly increased continuously since passage of the Wilderness Act, the size of the system has also increased. These parallel increases in visitor use and system size make trends in use intensity (amount of use in a given area) less clear.

Although trends in use intensity vary from wilderness to wilderness, most research has focused on identifying an "underlying trend" that could be applied to the entire National Wilderness Preservation System. Roggenbuck and Watson (1989) analyzed changes in use on a per-acre basis for the entire National Wilderness Preservation System and for all Forest Service wildernesses. Lucas and his coworkers (Lucas and McCool 1988; Lucas and Stankey 1989) analyzed changes in use on a subset of wildernesses and National Parks for which use data are available since at least 1971. They also identified the year of peak use for these areas. Despite drawbacks to these approaches, analyses were extended through 1994.

Use Per Acre of the National Wilderness Preservation System

Over the same period that the National Wilderness Preservation System experienced a sixfold increase in recreation use, it experienced an eightfold increase in acreage. During the 1960's and 1970's, visitor use increased more rapidly than acreage. Use intensity of the entire system increased from 0.32 recreation visitor-days per acre in 1965 to 0.40 visitor-days per acre in 1979 (fig. 2). After 1979, use per acre declined to 0.16 recreation visitor-days per acre in 1989 and to 0.18 recreation visitor-days per acre in 1994.

While these data show a decline in recreation use per acre of the entire National Wilderness Preservation System since 1979, visitor-use has not necessarily declined in any of these wildernesses. In 1980, 56 million acres of wilderness were designated in Alaska, doubling the size of the National Wilderness Preservation System overnight. But recreation use of these lands is minimal (0.02 recreation visitor-days per acre in 1994), so the designation resulted in an instantaneous 50 percent reduction in use intensity, without any change in use of previously designated wilderness. In fact, the entire decline in use intensity since 1979 can be accounted for by the addition of Alaska wildernesses. In 1994, the recreation use intensity, excluding Alaska, was as high as it has ever been—about 0.4 recreation visitor-days per acre (fig. 3).

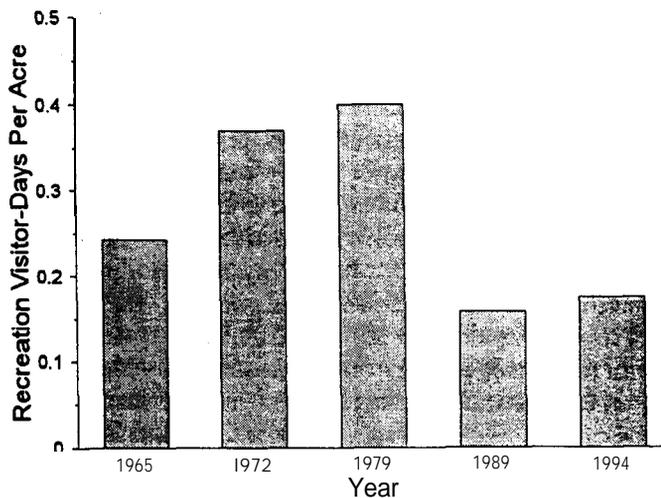


Figure 2—Use intensity (recreation visitor-days per acre) of the National Wilderness Preservation System.

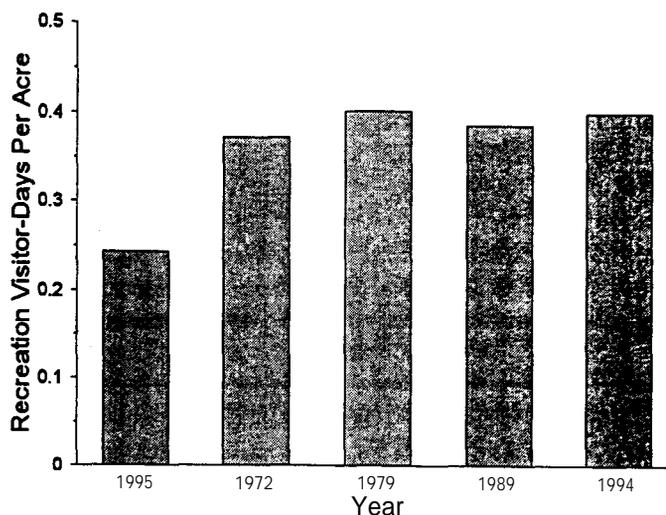


Figure 3—Use intensity of the National Wilderness Preservation System, excluding Alaska.

Although use per acre provides a simple descriptor of systemwide use intensity, it is a poor indicator of trends for established wildernesses. In the context of an enlarging wilderness system, the stable use-per-acre figures for the National Wilderness Preservation System outside of Alaska (fig. 3) may indicate stable visitation levels for most individual wildernesses. Alternatively, visitation to established wilderness could be increasing greatly, with these increases offset by the designation of new wildernesses with lower use intensities (as was the case with Alaska). Visitation could also be decreasing if

new wildernesses had higher use intensities. Many of the recent additions to the National Wilderness Preservation System are noted more for the natural ecosystems they protect than for the recreation use they receive. Therefore, stable use-per-acre figures are most likely to suggest increasing visitation to established wilderness.

Use of "Core" Wilderness

Lucas and his coauthors (Lucas and McCool 1988; Lucas and Stankey 1989) avoided the confounding effect of a changing land base by studying use trends on a "core" group of long-established National Park Service and Forest Service areas. The most accurate visitor-use statistics are those for overnight use of National Park Service areas because permits are frequently required for overnight travel in the backcountry. Lucas' late-1980's analysis was extended by compiling overnight stays for every year from 1971 to 1994 for the 44 Park Service wildernesses and for the 14 major National Parks likely to be designated wilderness. This is a subset of all parks that report backcountry overnight stays; it excludes places such as Lake Mead and Glen Canyon, where backcountry use is mostly motorized. Therefore, results differ somewhat from those reported in Lucas' work.

Overnight stays in National Park Service areas increased about 75 percent between 1971 and 1976 (table 2). Between 1976 and 1989, overnight backcountry use of these areas declined 33 percent, the trend reported by Lucas in the late 1980's. In 1989, overnight use was lower than at any time since 1971.

Since the time of Lucas' studies, however, recreation use of these areas has increased greatly. Since 1989, backcountry use has increased 65 percent and

has set new highs every year since 1992. The average annual growth rate since 1990 has been 11.4 percent per year, virtually the same rate of increase that occurred in the early 1970's. The magnitude of these recent increases in National Park Service backcountry use are probably even greater than these data suggest because day-use is not accounted for. Limited data suggests that day-use has increased as a proportion of total wilderness use in recent years (Cole and others 1995).

In the 54 original Forest Service wildernesses, visitation trends have been similar, but shifts over time have been less pronounced (table 2). Use increased rapidly from 1965 to 1971 and more slowly since then. The only period of declining use was from 1981 to 1987, the period noted by Lucas and his coauthors. In 1994, use levels were higher than they had ever been in the past-86 percent higher than they were in 1965 and 3 percent higher than they were in 1981.

For the 112 long-established National Park Service and Forest Service areas combined (fig. 4), growth has been the overall use trend since 1971. Two periods of rapid growth are separated by a decade and a half of stable to declining visitation. The first period of rapid growth ended by the mid-1970's. Use intensities in National Park Service areas peaked earlier than they did in Forest Service areas. The 1980's saw declining use intensities, particularly in National Park Service areas. The 1990's, however, show rapid increasing use. In 1994, use was much greater than it had ever been.

While use trends for these 112 areas are clear, may we assume that these trends are applicable to the entire National Wilderness Preservation System? Extrapolating from one subset of areas to all areas

Table 2-Overnight stays in National Park Service wildernesses and other major parks¹ and recreation Visitor-days in Forest Service wildernesses designated in 1964.

Year	National Park Service		Forest Service	
	Overnight stays	Average annual change	Recreation visitor-days	Average annual change
	<i>Thousands</i>	<i>Percent</i>	<i>Thousands</i>	<i>Percent</i>
1965	-	-	2,952	-
1971	778	-	4,520	7.4
1976	1,350	11.6	4,671	0.7
1981	1,145	-3.2	5,328	2.7
1987	958	-2.9	4,890	-1.4
1989	900	-3.1	5,141	2.5
1994	1,488	10.6	5,504	1.4

¹Nonwilderness National Parks are Arches, Big Bend, Bryce Canyon, Canyonlands, Capital Reef, Crater Lake, Glacier, Grand Canyon, Grand Teton, Great Smoky Mountains, Rocky Mountain, Voyageurs, Yellowstone, and Zion.

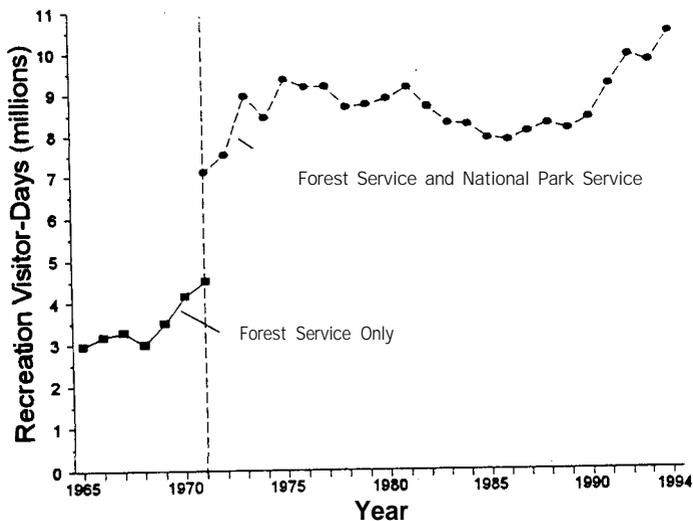


Figure 4-Recreation use in (1) the 54 original Forest Service wildernesses only and (2) both these wildernesses and 58 National Park Service wildernesses and major parks.

is always dangerous, particularly when the subset of areas is not a random sample. The National Park Service and Forest Service areas in the preceding analysis are limited to the longest established wildernesses in the entire system, and include most of the best known and most heavily used wildernesses.

The increase in use that occurred prior to the mid-1970's in the 112-area sample should be applicable to the entire National Wilderness Preservation System because the sample includes most of the wildernesses that had been designated by 1975. The increase in use that occurred during the 1990's in these areas also appears to have occurred throughout the system, although the magnitude of increase was less pronounced. Recreation use increased 14 percent between 1989 and 1994 in the approximately 400 other wildernesses (excluding the 112 "core" areas) that had been designated by 1989.

Determining an "underlying trend" for the National Wilderness Preservation System for the 1980's is more difficult. Visitor-use of the 112 "core" areas declined 8 percent between 1980 and 1989; however, use increased during the 1980's in many of the wildernesses that were designated during the 1980's. For example, visitor-use of the 74 Forest Service and National Park Service areas designated in 1980 increased 12 percent between 1980 and 1989. There are at least two possible explanations for opposing trends in the 112 long-established wildernesses and parks and in the more recently established areas.

First, by the 1970's many of the long-established wildernesses and parks were heavily used. Consequently, during the 1970's managers in many of these areas initiated highly regulatory programs, including limits on use. Little clear empirical evidence of a substantial effect exists, but it has been suggested that both crowded conditions and heavy-handed regulation can cause recreationists to be displaced from one area to another (Manning 1986). Conceivably, use was simply displaced during the late 1970's and during the 1980's from heavily used and regulated wildernesses to the more recently designated wildernesses that now compose the majority of the National Wilderness Preservation System.

Second, a common assumption is that recreation use increases after an area is designated as wilderness. Empirical support of this designation effect exists, although not in every case (Petersen 1981). Any designation effect would also have contributed to the tendency for wildernesses that were designated during the 1980's to have increases in use during the 1980's. Regardless of the reason, much of the National Wilderness Preservation System experienced increased use during the 1980's (following their designation as wilderness) at the same time that use of the 112 long-established areas was stable or was declining.

Year of Peak Use

Analysis of use trends for individual wildernesses avoids the problem of a nonrepresentative sample of wildernesses, but other problems surface. The problem of inaccurate data becomes more acute, and most wildernesses only have use data for the period following their designation as wilderness.

Extending one of Lucas' analyses, I identified the year of peak use for each individual National Park Service and Forest Service wilderness (table 3). In 47 percent of these areas, peak visitor use has occurred since 1990. In 42 percent of these areas, the year of peak use came in the 1980's. Only 11 percent of areas had their year of peak use prior to 1980. The only group of areas for which a substantial majority experienced peak use prior to the 1990's was the "core" group of original Forest Service areas.

Interpretation of these data is complicated by the lack of visitor-use data from earlier periods for more recently designated Forest Service wildernesses. However, 94 percent of the wildernesses with peak use in the 1990's were designated prior to the 1990's. The likelihood of at least a subtle designation effect suggests that most of these wildernesses were more lightly used prior to designation, the period for which use statistics are unavailable.

Table 3 -Year of peak recreation use for all National Park Service and Forest Service wildernesses and for the original Forest Service wildernesses designated by the Wilderness Act¹.

Period	All National Park Service and Forest Service areas <i>n=441</i>	National Park Service areas <i>n=42</i>	Forest Service areas <i>n=397</i>	Original Forest Service areas <i>n=54</i>
	-----Percent-----			
1965-1969	0	0	0	0
1970-1974	3	8	3	11
1975-1979	8	18	6	21
1980-1984	14	22	12	30
1985-1989	26	6	29	14
1990-1994	50	46	50	23

¹Use data go back to 1965 for original Forest Service areas, to 1971 for most National Park Service areas, and to the year following designation for most other Forest Service areas.

Because the vast majority of wildernesses are managed by the National Park Service and the Forest Service, it appears that at least one-half of all wildernesses currently receive more use than they ever have in the past. Moreover, virtually all wildernesses are experiencing growth in visitation during the 1990's, even those that experienced declining use levels sometime prior to the 1990's.

Use of Individual National Park Service Areas

Much of the difficulty in identifying an "underlying trend" in wilderness-use intensity stems from pronounced variation in use trends between individual areas. This variation can be most reliably assessed for 39 National Park Service areas (either wilderness or likely wilderness) that received at least 1,000 overnight stays in 1994. All these areas experienced increasing use during the early 1970's and are experiencing increasing use during the early 1990's. They differ in whether they experienced a period of decreasing use in the late 1970's and 1980's and in the magnitude of that decrease and the subsequent increase in use.

Of these areas, 62 percent experienced a substantial decline in overnight recreation use in the late 1970's and 1980's. Some parks, such as Shenandoah and Yosemite, experienced declines in use of more than 50 percent, and subsequent increases in use have been relatively low (fig. 5). In 23 percent of the 39 National Park Service areas, current use is increasing; but use is still less than 75 percent of use in the year of peak use. All of these areas have use limits that may be constraining the current rate of increase in visitor use. Moreover, increases in use of these parks may be underestimated because day-use is not included.

In another 23 percent of the National Park Service areas, either the magnitude of decline was less pronounced or subsequent increases have been more substantial. In these areas, which include Great Smoky Mountains and Rocky Mountain National Parks (fig. 6), current use is between 75 and 100 percent of peak use. In another 15 percent of areas, including Glacier and Grand Teton National Parks (fig. 7), declines were less pronounced or recent increases in use have been so substantial that visitation is currently higher than it has ever been.

The remaining 38 percent of these areas never experienced a substantial decline in use. Use has increased constantly in 23 percent of the 39 areas. Most of these areas are in the desert-Parks such as Canyonlands and Joshua Tree (fig. 8)-or in

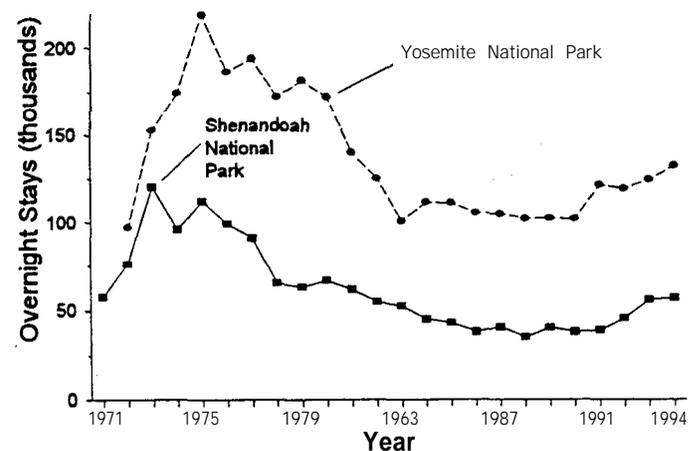


Figure 5 -Backcountry use in Shenandoah and Yosemite National Parks-two parks that have experienced substantial declines in visitation.

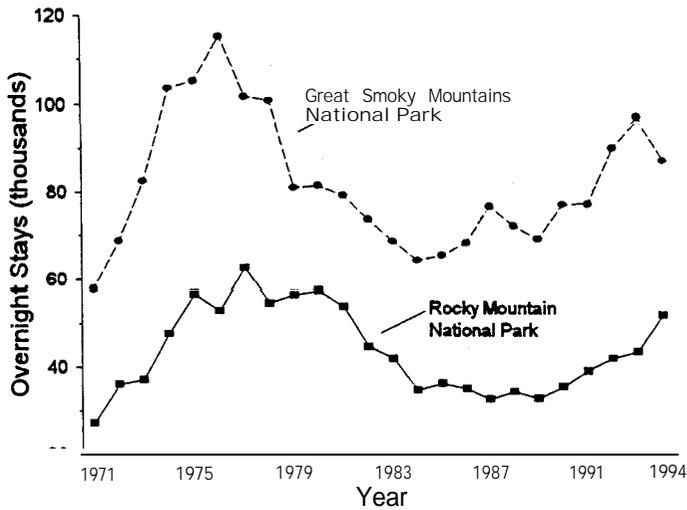


Figure 6 -Backcountry use in Great Smoky Mountains and Rocky Mountain National Parks-two parks that have experienced substantial recent increases in visitation following substantial declines.



Figure 8 -Backcountry use in Canyonlands and Joshua Tree National Parks-two parks that have experienced constant growth in visitation.

Alaska. The final 15 percent of areas, including Big Bend and Isle Boyale National Parks (fig. 9), have experienced steady growth except for a period of stable use during the 1980's.

The National Park Service areas that still receive substantially less use (less than 75 percent) than they did a decade or two ago (Shenandoah, Yosemite, Crater Lake, Haleakala, Hawaii Volcanoes, Lassen Volcanic, Olympic, Pt. Reyes, and Sequoia-Kings

Canyon) are not randomly distributed. Except for the Hawaiian parks, they are within a half-day drive of large urban areas and include the four parks with the most backcountry use in the 1970's (Sequoia-Kings Canyon, Yosemite, Olympic, and Shenandoah National Parks). These well-known, accessible parks absorbed an inordinate proportion of the increase in use that occurred in the late 1960's and early 1970's when backpacking became a fad for urban residents

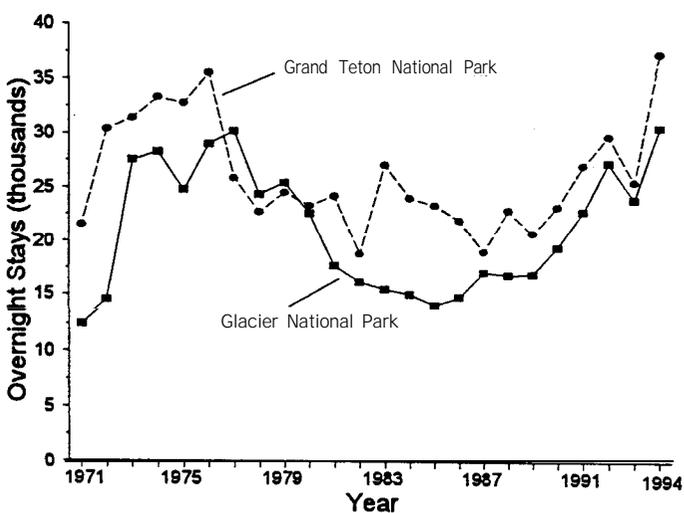


Figure 7 -Backcountry use in Glacier and Grand Teton National Parks-two parks that currently are more heavily used than ever, despite an earlier period of declining use.

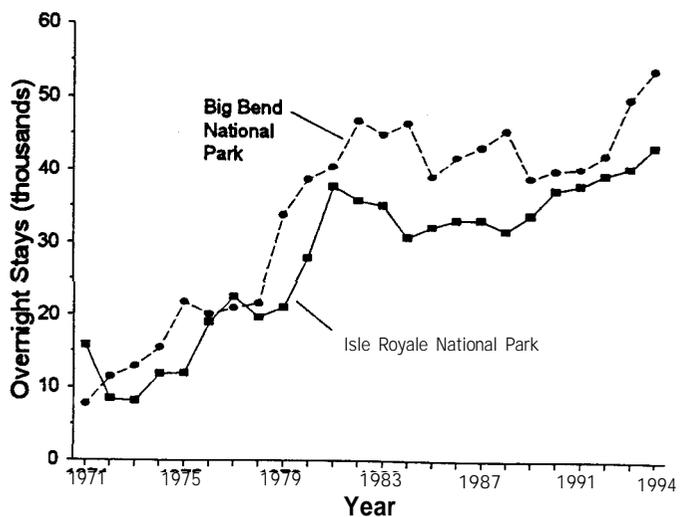


Figure 9 -Backcountry use in Big Bend and Isle Royale National Parks-two parks that have experienced constant growth in visitation, except for a period of stable visitation in the past.

and for college students. In subsequent years, use plummeted in these parks, perhaps because the **backpacking** fad was so pronounced in these parks or because those who continued to backpack, after the fad abated, tended to travel to more distant, less heavily used, and less regulated wildernesses.

The critical point is that most of the reported **decline** in use in the late 1970's and 1980's occurred in only a few parks and wildernesses. The most **pronounced** declines in use occurred in National Park Service areas, and 75 percent of the decline in use of National Park Service backcountry between 1976 and 1989 occurred in just five parks: Sequoia-Kings Canyon, Yosemite, Olympic, Shenandoah, and Great Smoky Mountains. Most parks and wildernesses did not experience a decline in use during this period.

Discussion and Conclusions

Recreation use of wilderness is increasing. Total use of the National Wilderness Preservation System has increased steadily since passage of the **Wilderness Act** in 1964. People are recreating in designated wilderness more than ever. At least one-half of all wildernesses are used more heavily than ever. Most other wildernesses are experiencing growth in visitation, even if they experienced a period of declining use sometime in the past.

This conclusion differs from that of earlier reports that wilderness recreation use is stable or declining (Lucas 1989; Lucas and McCool1988; Lucas and **Stankey** 1989; Roggenbuck and Watson 1989). One reason for this change is that use trends reversed in the sample of wildernesses and parks that were **analyzed** in earlier studies. Now we can see that the period of declining use, for those wildernesses and parks that experienced declining use, ended in the late 1980's just as the reports were being written that wilderness use was declining. Use of these **areas** began increasing again almost as soon as the apparent decline was identified.

Another possible reason for the change in **conclusions** is that these earlier reports may have been too liberal in their extrapolation of available data. They noted that the total use of the National Wilderness Preservation System was increasing, but they paid more attention to declining growth rates (Lucas and **Stankey** 1989), even though declining positive growth rates are indicative of increasing use rather than decreasing use.

The reliance of earlier reports (Roggenbuck and Watson 1989) on changes in use per acre as an indicator of trends for established wilderness is also flawed. As the land base of the National Wilderness

Preservation System increases, changes in use **intensity** on long-established wildernesses are obscured by the addition of wildernesses with different use intensities. Over the past 15 years, much of the **acreage** added to the National Wilderness Preservation System (Alaska lands and areas noted more for their natural ecosystems than their recreational **opportunities**) is more lightly used than the original wildernesses. Consequently, use intensity of established wilderness might have increased during the 1980's even though use per acre was decreasing.

Finally, reliance on trends in long-established "core" Forest Service wildernesses and National Park **Service** areas as an indicator of underlying trends on all wilderness lands can be misleading. This approach publicized the fact that some of the most heavily used and best known parks and wildernesses were **experiencing** a decline in use. However, use of many newly designated wildernesses was increasing during the **same period** when use was declining in the "core" wildernesses that were analyzed.

Earlier reports concluded that wilderness use was generally declining. With the benefit of an additional 10 years of data, it now appears that the decline was limited to a brief period and to a subset of wildernesses. The prominent trend has been one of **increasing** use. In some areas, increases have been slow and steady; in other areas, particularly in many National Parks, periods of explosive growth have been separated by a period of pronounced decline.

Lucas and his coworkers (Lucas and McCool1988; Lucas and **Stankey** 1989) advanced a number of possible explanations for declining participation in wilderness recreation. Some of these explanatory factors (such as changing demographics and **changing** interests) can also result in visitation increases, however. For example, the dramatic recent increase in use of Joshua Tree National Park (fig. 8) is largely the result of an increase in the popularity of rock climbing.

The unexplained phenomenon is why some wildernesses experience dramatic cycles of growth and decline in visitation while others do not. Many areas that have experienced dramatic cycles are popular, well-known National Parks close to urban areas. Perhaps wildernesses that are highly accessible, **heavily** used, and nationally known are more **affected** by factors that influence participation rates than wildernesses without these characteristics.

Implications

Recreation use of the entire National Wilderness Preservation System and most wildernesses continues to increase. The individual and societal benefits

that accrue from recreational use of the National Wilderness Preservation System continue to increase as the size of the system increases (assuming no reduction in benefits are associated with increased use). Demand for wilderness experiences will likely continue to increase. Consequently, avoidance of problems associated with increased future use (crowding and associated resource damage) continues to be a valid reason for designating additional wilderness.

Managers and policymakers should note that recreation use is increasing in most wildernesses and that some of the increases, particularly those in National Parks, are quite pronounced. In most areas, current problems caused by recreation use are likely to intensify. I agree with Lucas and Stankey (1989) and Roggenbuck and Watson (1989) that managers should focus more of their efforts on increasing the quality of wilderness experiences. However, I feel that the suggestion that managers can "shift their focus [away] from responding to the negative impacts of great quantities of visitors" (Roggenbuck and Watson 1989, p. 355) is dangerous and premature.

Conclusions in studies about use trends have differed over time, suggesting the danger of attempting to predict the future. The variation in use trends among individual areas (figs. 5 through 9) adds to the difficulty of predicting trends for a specific area. But because knowledge of changing visitation patterns is critical to effective wilderness management, the only solution is to develop accurate estimates of wilderness use. More resources are needed to accomplish this. Particular attention should be given to estimating day-use of wilderness. It is widely assumed that day-use of wilderness is increasing more rapidly than overnight use; however, this assumption has not been rigorously tested. More attention also should be given to management of day-use—the particular problems that day-users cause and the particular recreation opportunities they seek.

References

- Cole, David N.; Watson, Alan E.; Roggenbuck, Joseph W. 1995. Trends in wilderness visitors and visits: Boundary Waters Canoe Area, Shining Rock, and Desolation. Res. Pan. INT-RP-483. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station. 38 p.
- Lucas, Robert C. 1974. Forest Service wilderness research in the Rockies: what we've learned so far. *Western Wildlands*. 1(2): 5-12.
- Lucas, Robert C. 1989. A look at wilderness use and users in transition. *Natural Resources Journal*. 29: 41-55.
- Lucas, Robert C. 1990. Wilderness use and users: trends and projections. In: Hendee, John C.; Stankey, George H.; Lucas, Robert C. *Wilderness management*. Golden, CO: North American Press: 355-396.
- Lucas, Robert C.; McCool, Stephen F. 1988. Trends in wilderness recreational use: causes and implications. *Western Wildlands*. 14(3): 15-20.
- Lucas, Robert C.; Stankey, George H. 1989. Shifting trends in wilderness recreational use. In: Watson, Alan E., comp. *Outdoor recreation benchmark 1988: proceedings of the national outdoor recreation forum; 1988 January 13-14; Tampa, FL*. Gen. Tech. Rep. SE-52. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station: 357-367.
- Manning, Robert E. 1986. *Studies in outdoor recreation: a review and synthesis of the social science literature in outdoor recreation*. Corvallis, OR: Oregon State University Press. 166 p.
- Marion, Jeffrey L.; Roggenbuck, Joseph W.; Manning, Robert E. 1993. Problems and practices in backcountry recreation management: a survey of National Park Service managers. *Natural Resour. Rep. NPS/NRVT/NRR-93/12*. Denver, CO: U.S. Department of Agriculture, National Park Service, Natural Resources Publication Office. 64 p.
- McClaran, Mitchel P.; Cole, David N. 1993. Packstock in wilderness: use, impacts, monitoring, and management. Gen. Tech. Rep. INT-301. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station. 33 p.
- Petersen, Margaret E. 1981. Trends in recreational use of National Forest wilderness. Res. Note INT-319. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station. 3 p.
- Roggenbuck, Joseph W.; Watson, Alan E. 1989. Wilderness recreation use: the current situation. In: Watson, Alan E., comp. *Outdoor recreation benchmark 1988: proceedings of the national outdoor recreation forum; 1988 January 13-14; Tampa, FL*. Gen. Tech. Rep. SE-52. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station: 346-356.
- Washburne, Randel F.; Cole, David N. 1963. Problems and practices in wilderness: a survey of managers. Res. Pap. INT-304. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station. 56 p.