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SUMMARY

- 1) Almost 20 years ago, the United States established a National Wilderness Preservation System which now has 257 units covering 32 million hectares in 43 states. This paper focuses on managing the quality of visitors experiences in this wilderness system.
- 2) Wilderness managers perceive several problems as common, but usually afflicting only limited portions of each area. Environmental impact is the most widely perceived problem, followed by crowding, littering and conflicts between different types of visitors.
- 3) Visitor management can be classified as direct or indirect, and applied outside or within the wilderness. Direct management includes regulation, and indirect management includes provision of information and modification of the setting and access. Most visitor management actions, whatever their intent, affect both visitor experiences and environmental impacts, with intricate inter-relations and often with undesired side effects. Visitor management techniques vary in effectiveness and visitor acceptability. One technique is reducing use through rationing (15% of all areas). Party size is limited in half of all areas and length of stay in about 30%. About half of all areas try to redistribute use, both with regulations and information, with highly variable effectiveness, and sometimes at a high cost in visitor experience quality. General use dispersion is a common objective, but can be counterproductive. Changing visitor behaviour is an important type of management; some is regulatory but most depends on education. Education efforts relate primarily to ecological impacts rather than experience quality. Facilities, other than trails, are a minor part of management in wilderness.
- 4) There is more agreement among wilderness managers about problems than solutions. Management is sometimes inconsistent and even contradictory. Problems are often dealt with in isolation, without recognition of side effects. Little is known about major causal processes, including how ecological impact conditions affect visitors' experiences, a particularly critical gap in linking managing social and ecological aspects of recreation. Lack of monitoring and evaluation impairs learning from experience. Research programmes are small. Wilderness visitor management has grown in the first 20 years of the wilderness system, but it is still in a searching, early developmental phase.

INTRODUCTION

This paper focuses on managing the quality of visitors experiences in the US wilderness system and how this relates to ecological impacts caused by recreational use. David Cole's paper will concentrate on impact management. Of necessity the two papers overlap somewhat. Wilderness managers in the US are also concerned with "exceptions", the mining, grazing, water control, and similar activities permitted in some areas, and with general ecological processes, particularly the natural role of fire. I have assumed that these sets of problems are outside the scope of this conference and have not included discussions of them.

For background, I describe the American wilderness system and present manager and visitor perceptions of recreational experience problems. The body of my paper describes and analyses major visitor management techniques, and I will conclude with suggesting some ways visitor management may be strengthened. Although the American wilderness is rather different than conditions found in Britain or in most of Europe, many of the problems are similar, and considering wilderness recreation management techniques may be useful.

THE WILDERNESS SYSTEM

"Wilderness" is not a word used with a great deal of consistency and precision. In one usage, it refers to more or less undeveloped, uninhabited, roadless land, without regard to ownership, management objectives, or planned uses. As the "more or less" suggests, this usage involves a vague, loose definition of wild country. But, in the United States, as in some other countries (Hendee et al. 1978, chapter 2), there is another, legal definition of wilderness that conveys more precision.

The US Congress created the National Wilderness Preservation System, primarily in the West, by passing the Wilderness Act in 1964. The system was extended, with slight modifications, to the eastern part of the country in 1973, and, with other modifications, to Alaska in 1980. This legislation built on and endorsed earlier, less formal efforts at protecting wilderness by the Park Service and Forest Service. The Forest Service had established "Primitive Areas" on its own initiative as early as 1924. Protection of natural conditions was an explicit objective of National Parks, but without either explicit direction or designation of tracts to be managed specifically for wilderness.

Objectives of the system

The 1964 Wilderness Act culminated 8 years of debate in Congress. Its basic objective was "to assure that an increasing population, accompanied by expanding mechanisation, does not occupy and modify all areas within the United States..." One Forest Service film on wilderness is entitled "Islands in Time", suggesting that the intention of the Wilderness Act was that the flow of modern, technological society should roll around and past some remnants of wild country that still remain in the early 20th century, permitting natural changes to occur for all time.

Wilderness was defined in the Act in terms of area conditions, ecological processes, and special opportunities for visitor experiences. The area conditions specified were "land retaining its primeval character.... affected primarily by the forces of nature, with the imprint of mans work substantially unnoticeable,"

and usually over 2000 hectares (5000 acres) in extent. Smaller areas were acceptable if preservation was practical, an exception applied mainly to islands. The ecological (and geological) process required was the free play of natural forces affecting "the earth and its community of life." The special experience described was "outstanding opportunities for solitude or a primitive and unconfined type of recreation." Managers were directed to provide for recreational and scientific use in perpetuity while preserving the wilderness character embodied in the definitions above. The wilderness Act stressed preservation of natural conditions over recreation more than earlier agency-initiated wilderness.

Extent of the system

Since 1964, Congress has added areas from the pool of still undeveloped land, some based on recommendations from studies by the land managing agencies that were required by the Wilderness Act, and some responding directly to suggestions by interested parties. In 1983 there are 264 Wilderness units, with 32 million hectares (80 million acres) in 43 of the 50 states (Table 1). Alaska has only 43 units, but over 43% of the total wilderness area. This is 15% of the land in Alaska. For the rest of the United States, wilderness constitutes slightly over 1% of the total land area. Further growth of the system, at a slower rate, seems probable, and continuing controversy surrounding wilderness classification decisions is certain.

Diversity within the system

The units in the Wilderness System are diverse in the extreme in almost every significant feature. Size varies enormously around the average of about 125,000 hectares (310,000 acres), from a 1-hectare (3-acre) island to 3,500,000 hectares (8,700,000 acres) in Wrangell-St. Elias National Park, Alaska. Landforms, climate, and plant and animal communities vary widely. Representation of ecosystem diversity is an important goal of the wilderness system, especially for scientific purposes, but less than half of the 241 types identified in a classification developed by the Forest Service are represented (Davis, 1980). High mountain landscapes are the most common, but there are deserts, arctic tundra, semitropical wetland, and other types of areas in the system. The system consists overwhelmingly of areas that so far have presented limited economic development potential.

Four different federal land management agencies administer units in the wilderness system. Diversity is increased by differing legal direction and varying wilderness philosophy among these four agencies (Fish & Bury, 1981; Bury & Fish, 1980; Washburne & Cole, 1983).

TABLE 1. The US National Wilderness Preservation System as of July 1983. *As some wilderness units are managed by two agencies, the total number is less than the figures for each agency.

Managing agency	No. of units	Thousands of	
		Acres	Hectares
Forest Service	164	25,253	10,224
National Park Service	36	35,343	14,309
Fish and Wildlife Service	65	19,330	7,826
Bureau of Land Management	4	12	5
TOTAL	264*	79,938	32,364

TABLE 2. Use composition, U.S. National Wilderness Preservation System

Managing agency and location	Average proportion of parties that are day-users	Average length of stay for camping parties	Average proportion of parties using horses	Average proportion of parties using guides of outfitters	Average proportion of parties that are hunters
	Percent	Days	Percent	Percent	Percent
AGENCY					
Forest Service	37	2.5	15	8	17
National Park Service	62	3.2	3	5	0
Fish and Wildlife Service ^a	83	2.8	1	1	20
Bureau of Land Management	44	3.2	20	11	22
REGION					
Northeast	63	2.2	0	0	24
Midwest	71	2.5	1	1	27
Southeast	75	2.3	3	3	14
Rocky Mountain	45	3.0	18	5	20
Pacific	35	3.2	8	5	11
Alaska and Hawaii	37	4.9	3	4	31
ALL UNITS	47	3.0	11	7	17

^aIncludes only refuges with more than 500 visitor-days of use per year.

Recreational use of the system

Recreational use of wilderness varies greatly in both type and amount. A few Wildlife Refuges are closed to all recreational use; some areas are very lightly visited, by only hundreds or a few thousand people a year, while others are visited by hundreds of thousands of people annually. Visitor-days to the whole system (12-hour visitor-days) total about 15 million per year. Use intensity, measured in visitor-days per unit area, averages 0.2 per hectare (0.5 per acre) outside Alaska (where use is very light), but shows more than a 500:1 range from the most to the least intensely used areas. National Forests are generally the most intensely used, followed by National Park areas.

With a few local exceptions (especially in Alaska where airplane and motorboat use is permitted), mechanized recreation is prohibited. Hiking, horseback riding, paddled canoes and rowed rafts are the usual modes of travel, but the proportion of each type varies widely among areas. For example, 99% of visitors to the Desolation Wilderness in California hiked, but 65% of visitors to the Bob Marshall Wilderness in Montana used horses (Lucas, 1980). About one-tenth of all wilderness visitors use horses (Table 2), almost all in the West. Activities vary widely. Big game hunting is common in some areas and absent in others, with 17% of all wilderness visitors hunting (Table 2), although it is not permitted in National Parks, with some exceptions, mainly in Alaska. Lengths of stay range from short, one-day visits by about half of all visitors, to lengthy camping trips (Table 2). Stays tend to be shorter in the East than in the West (Washburne & Cole, 1983), partly because wilderness areas in the East are small, and length of stay is correlated with area size (Lucas, 1980).

Wilderness recreation needs to be viewed as part of a broad range of varied types of outdoor recreation. It is characterized by natural settings, few facilities, relatively light use, and considerable challenge. This places it in the primitive and semi-primitive, nonmotorized classes at one end of the recreational opportunity spectrum (ROS), as the recreation planning approach widely used in the U.S., is called. Wilderness recreation is not superior or higher in quality than other types occurring in more developed settings. All types are important, all can be high (or low) in quality, and all should complement one another in an appropriately balanced supply.

To give more meaning to these data and observations, let me describe what a wilderness visitor finds in most places, remembering that diversity produces exceptions. A visitor to a typical wilderness finds a modest network of simple, fairly low-standard trails that are winding, sometimes steep and rough, and occasionally crossed by fallen trees. Small streams likely will have no bridges, while larger rivers often, but not always, will be bridged. Campsites generally will serve a single party, and often be separated widely. Some traditional sites will be worn from many years of use, but a few groups will camp where no one has before. Usually there are no facilities - no tables, no toilets, no developed water supply. There may be a visitor-created fireplace (sometimes several), of loose rocks. Campers choose where to pitch their tent or, in areas with dependable summer weather, where to lay out their sleeping bags. Sometimes there will be no one else camped within sight or sound; at other times there will be one or a few other groups camped in the vicinity, but occasionally there will be many other parties. While traveling on the trail, other parties will usually be met, perhaps two to five per day on the average (although a current study in the Bob Marshall Wilderness in Montana indicates an average of less than one encounter per day there).

Some of the situations described here do not conform to the objectives for wilderness - many parties camped close together, for example. These problems will be discussed in the next section.

TABLE 3. Crowding of recreation use as a perceived management problem in the U.S. National Wilderness Preservation System

Managing agency and location	Not a problem	Crowding seen as:	
		A problem: a few places	A problem: many places
Percent of areas			
AGENCY			
Forest Service	45	42	13
National Park Service	63	35	2
Fish and Wildlife Service	73	19	8
Bureau of Land Management	72	27	0
REGION			
Northeast	38	38	25
Midwest	67	33	0
Southeast	60	40	0
Rocky Mountain	56	32	12
Pacific	44	45	11
Alaska Hawaii	63	37	0
ALL AREAS	53	37	10

SOURCE: Washburne & Cole, 1983

Wilderness recreational use has grown greatly over the years. Comparable figures are available only for National Forest wilderness, but similar growth occurred in National Park wilderness. From 1946 to 1964, use increased sixfold. From 1965 to 1982, after passage of the Wilderness Act, use increased two and a half times. Some of this increase is due to addition of new areas, but most of it stems from increased intensity of use. The use of areas designated in 1964 increased at an average annual rate of over 4% (Petersen, 1981).

MANAGERS' PERCEPTIONS OF RECREATION MANAGEMENT PROBLEMS

There are two aspects to managing recreational use: first, how to keep the quality of the recreational experience high, and second, how to limit the impacts of recreational use on the natural environment. As are some other distinctions in recreation management, this one is not precise. Management actions usually affect both experience quality and environmental impacts, often one positively and the other negatively.

Some of the many problems in these categories give wilderness managers more trouble than others. In 1980, Randel Washburne and David Cole surveyed managers of 269 areas classified as wilderness or likely to be classified to gather information on perceived management problems as well as on use patterns and management practices (Washburne & Cole, 1983).

Managers of different areas tend to perceive similar problems, but they usually see these problems as localized rather than widespread. Visitor crowding was considered a problem in half of the areas, but managers of over three-fourths of these areas said it was a problem 'in a few places' rather than 'in many places' (Table 3). It was most severe in the heavily populated Northeast, where wilderness areas tend to be small and accessible, and in National Forest areas, where use is heaviest.

Conflict between different types of recreational users, such as between hikers and horsemen and between groups guided by commercial outfitters and general public visitors, was perceived as a problem in 31% of the areas, but only 2% considered such conflict 'a problem in many places.' The National Forest areas reported the most visitor conflict, partly because of heavy use, and probably partly due to relatively heterogeneous use. Littering is more commonly perceived to be a problem. Half of the areas report it is a problem 'in a few places', and 12% 'in many places'.

Managers more commonly perceive ecological impacts as a problem than crowding or conflicts, especially impacts on vegetation at campsites. However, managers who considered the wilderness they managed to have a problem with use exceeding capacity cited crowding (as the limiting factor) slightly more often than environmental impacts (Washburne & Cole, 1983).

Both the 'people problems' of crowding and conflict and the 'impact problems' need to be viewed in light of the extreme unevenness of recreational use. A few units get most of the use; about two-thirds of all use occurs on the most-used 10% of the area within the system (Washburne & Cole, 1983). Unevenness is also characteristic within individual areas; a small proportion of an area's trailheads usually accounts for most use, and usually the most-used 20% of the trail miles accounts for 60-80% of all use (Lucas, 1980). This helps explain why problems are usually perceived as localized.

VISITOR MANAGEMENT TECHNIQUES

Visitor management techniques are diverse and used in varying ways. Few are used by managers of a majority of areas, even though the problems they are attacking are similar. Techniques usually are intended to affect the amount, type, and distribution of recreational use and to change the behaviour of visitors.

Almost everything managers do to modify recreational use affects both experiences and environmental impacts. The interrelations between these two aspects are pervasive and sometimes subtle and easily overlooked. For example, at some level, the number and severity of visitor impacts must adversely affect visitor experiences, as well as impairing natural conditions. Actions that reduce impacts could thus also raise experience quality. However, many techniques for modifying use and behaviour to reduce impacts interfere with ways of enjoying the area preferred by visitors and detract from their experiences. An intricate web of multiple causation exists, and simple, single problem solutions may often have unwanted side effects that can be worse than problem that is being corrected.

General approaches to visitor management

Visitor management is often classified into direct and indirect approaches. Direct approaches seek to modify visitor use and behaviour by limiting visitors' freedom of choice; management is explicit and obvious to visitors. Indirect approaches seek to modify decision factors (Peterson & Lime, 1979), but leave final decisions to visitors; management is usually subtle and not obvious to visitors. Both of these categories can be divided further into two sub-categories. Direct management includes, first, regulation, and second, non-regulatory direction or requests - 'Do this', 'Don't do that', without the sanction of punishment for noncompliance. Indirect management includes, first, provision of information about the area's recreation opportunities, its uses, its problems, and the effects of certain visitor actions and, second, design of the setting, access, and travel routes. Some management actions consisting of persuasion and suggestion could be classified as bridging the division between direct, non-regulatory and indirect, informational.

There is a common belief that it is desirable to make most contacts with visitors for management purposes outside the wilderness, before entry. This is done via personal contacts at ranger station offices, with brochures, by signboards at entrances, and sometimes by placing an information specialist at busy trailheads. However, much visitor management occurs inside wilderness, also. Most areas have wilderness rangers who patrol the backcountry, with public educational contacts as a major duty, stressing techniques visitors can use to minimize their impacts.

Use limitation

One fairly common direct, regulatory type of visitor management is use rationing. About 15% of all wilderness areas ration use (Washburne & Cole, 1983). Usually only camper use (overnight use) is limited while day use is uncontrolled. In some areas, only river floater use is rationed, probably because the narrow river corridor concentrates use and sets a relatively fixed capacity, and demand is high. Rationing is much more common in National Park wilderness than in that managed by other agencies; 40% of National Park areas ration use compared to 9% of National Forest areas (Washburne & Cole, 1983).

Research has shown fairly good acceptance of use rationing, even by those persons who are unable to obtain a permit to visit the area Stankey, 1979; Fazio & Gilbert, 1974). This suggests minor negative impacts on experience quality, although the subject has not been studied directly. Research indicates that by reducing crowding, especially in camping areas, the quality of visitor

experiences should go up (Stankey, 1973), although fewer people would receive the benefits of these experiences.

Limited permits are allotted in a variety of ways to those who wish to visit an area. The most common, in order, are advance reservations (also called 'request') usually by mail or in person, and sometimes by telephone; first-come, first-served (or 'queuing') for permits made available on a daily basis; and lotteries (used almost entirely for river floating). Pricing and merit systems are rare. Because of differences in their characteristics, several systems are often used in combination (Stankey & Baden, 1977). The most common combination is advanced reservation and first-come, first-served. Some proportion of permits can be reserved by people who need or want to plan in advance, and the remainder, including no-shows after some hour, are available on the day of entry to accommodate those who cannot or do not plan ahead.

Length of stay is limited for the entire wilderness in about 30% of the areas (Washburne & Cole, 1983). The median limit is 14 days. Stays at any one campsite are limited in about 17% of the areas, also for a median of 14 days. Reasonable campsite limits enhance experience quality by preventing monopolization of prime campsites, but areawide limits seem questionable in most places (Hendee *et al.*, 1978) except perhaps where use is rationed, in which case limits on length of stay might help distribute opportunities equitably. So few parties stay very long that preventing long stays will not reduce use appreciably, while the opportunity for an occasional long, grand adventure is lost.

Party size is limited in about half of all wilderness areas, particularly National Forest wilderness (Washburne & Cole, 1983). Limits tend to be high; 25 is the most common number, and 15 the median. These limits also do little to reduce use. However, they might reduce the environmental impacts that seem probable from groups so large that they would tend to expand campsites, although the question is virtually unstudied. Limits on party size do increase visitor experience quality by eliminating contacts with large parties for people in the typical small parties. Research shows a strong aversion to meeting large parties (Stankey, 1973) and visitor support for size limits. Size limits probably need to be lower, perhaps 10 or less, in most places to maximise these experience benefits, although any specific number is inherently arbitrary.

Use redistribution

Managers of about half of all areas report attempting some redistribution of recreational use within the wilderness area, and about one-fourth attempt to redistribute some use to other areas, often outside wilderness (Washburne & Cole, 1983). Less effort is made to shift the timing of use, which is usually concentrated in summer, sometimes with sharp, weekend peaks. Areal redistribution depends partly on indirect management, usually supplying information to people in an effort to influence their location choices, and partly on direct management in the form of rationing, which usually allocates entry permits by access point and by day, thus modifying areal and temporal distributions.

Over 40% of the areas that do not ration use require visitors to obtain permits, which provides an opportunity (unfortunately, often not well used for managers to contact visitors and provide information (Washburne & Cole, 1983). Research has shown that use redistribution can result from information dispersal, but that the timing of communication and its content and form are all critical for success (Lime & Lucas, 1977; Lucas, 1981; Roggenbuck & Berrier, 1981; Krump & Brown, 1982). Redistribution achieved with different techniques has ranged from almost none to substantial.

Use redistribution objectives

Managers must establish clear objectives to guide sound use redistribution programs, but most efforts to redistribute are informal, with vague objectives and no real plan. At least three types of objectives seem possible, each with different implications. First, managers may want to reduce the concentration of use in general by shifting some visitors from heavily to lightly used areas, although it is not always obvious that this is desirable. Second, managers may wish to shift use in site-specific ways to reduce use in particularly fragile or overused areas and shift some of it to specific places better able to sustain it. Third, they may wish to help individual visitors choose particular areas to visit that better match the visitors' desires. This last approach could result in no substantial aggregate redistribution of use if the people moving from area A to B were roughly equal to those moving from B to A. However, this type of individual redistribution could raise the quality of visitor experiences by creating a better match of visitors' desires and area conditions.

An effort to disperse recreational use more evenly by encouraging some people to visit lightly used places instead of the very popular, heavily used spots, provides an example of multiple causation and side effects. Dispersal can reduce the feeling of crowding at the popular spots, and, if many of the visitors to these spots value an experience with fewer other visitors, experience quality in these areas would go up, thus achieving one goal. However, solitude will be harder to find in the previously lightly used areas, and the visitors to these areas may place a particularly high value on solitude, resulting in lower experience quality. Ecological impacts will be reduced little, if at all, in the popular areas, as David Cole explains in another paper in this publication, and new impacts will occur in the formerly lightly used areas.

Redistributing camping

Managers redistribute camping use by a variety of techniques, usually of a direct, regulatory nature (Washburne & Cole, 1983). Camping is limited to designated sites in 14% of the areas, almost all in National Parks, usually to control environmental impacts, but probably with negative effects on visitor experiences. About 30% of the areas permit free choice of campsites except in certain prohibited areas. The most common prohibition, especially in National Forest areas, is camping within a specified distance of lakes and streams - most often about 60 meters (200 feet).

The objectives served by this common regulation are many and often unclear, in my opinion (Lucas, 1982). Most of the objectives relate to reducing environmental impacts, on the assumption sites closer to water are more fragile, and minimizing potential water pollution. Other objectives, at least in some areas, concern experience quality in two ways. First, if people camp farther back from lakes, their campsites may be less conspicuous and, if so, other visitors will feel less crowded. Second, by camping farther back, the attraction area near the shoreline remains essentially public space that all visitors can walk through and enjoy, without feeling like trespassers.

I doubt whether the experience benefits (which do not exist unless another party is present at the same time) exceed the negative effects on visitors' experiences caused by blocking use of favourite sites and limiting freedom of choice. In a study now in progress, I found that 53% of the visitors to three National Forest wilderness areas in Montana believed a 60 meter (200-foot) no camping zone was undesirable (none of the areas studied have such a regulation).

The prohibition on camping near water presents another example of the complex web of social and ecological effects connected to a single managerial

action. Most, or in some areas almost all, existing campsites are closer than 60 meters to water. The sites have developed as a result of years of free choices by campers, and reflect visitors' ideas of desirability. Campsite locations also are commonly concentrated close to water because in many mountainous areas level ground is rare elsewhere, as well as because of the convenience of a water supply close by.

The 60-meter setback regulation eliminates legal camping at some locations where level land is unavailable except close to water, and elsewhere the regulations requires the use of sites that many visitors consider second class. Some people violate the regulation. At least some of these violators have their experience diminished by feelings of guilt or fear of detection and punishment, even though some violate the regulation out of necessity as darkness or bad weather forces parties to camp where they are. People legally camped, perhaps with some resulting loss of enjoyment, may resent others illegally camped nearby on more attractive sites, but not being required to move because enforcement is bound to be hit-or-miss in vast areas. Camping 60 meters back may do little to make campers less conspicuous in subalpine lake basins with few trees. Encouraging people to select sites screened from view by terrain and scattered stands of trees would probably achieve seclusion better than a lakeshore no camping zone.

If visitor compliance with the regulation effectively eliminates use, vegetation on some of the old, traditional sites will recover slowly (Cole & Ranz, 1983). Recovery of vegetation was probably the main objective of the regulation. Because many of these sites are in the foreground viewing area of the main attraction, visitor experiences could benefit both from the absence of campers and vegetation recovery. Meanwhile, however, new campsites beyond the 60-meter limit will develop where terrain permits, creating impacts where none existed before (Cole, 1982a). Campsites farther from water generally are no more durable than those close to it, so the total area impacted probably will grow (Cole, 1982b). Use may become more concentrated at those destinations that have some level places back from water because of displacement from locations without such legal sites, with resulting adverse ecological and social effects. Management actions more closely related to specific problems and to area conditions seem preferable.

Fixed itineraries

In a few areas, mostly National Parks (for example, Glacier and Yellowstone) and on some rivers, managers control wilderness camping distribution very closely by issuing permits valid only for specific campsites on specific dates - in effect, a fixed itinerary. This rather extreme, direct, regulatory visitor management, which is very efficient and administratively convenient, would seem to reduce the quality of visitor experiences through the loss of freedom and spontaneity. The security of a campsite reservation is an advantage for visitors. Studies in areas without fixed itineraries show them to be unacceptable to most visitors (Stankey, 1973, Lucas, 1980). Almost 80% of the visitors to three National Forest wilderness areas in Montana contacted in a study now in progress said fixed itineraries were undesirable. Visitors to areas using fixed itineraries have not been studied, but self-selection would make the results of such research suspect; the people who found such tight control unacceptable would tend to go elsewhere.

Indirect redistribution

Indirect approaches to redistributing use by designing the setting are not common. Use could be reduced by closing the last part of an access road, thus making the trail longer, although this has rarely been done deliberately. The opposite effect could be achieved by extending a road. Usually road extensions are for other reasons, with altered access an unplanned side effect.

Trail construction, upgrading, or reduced maintenance usually seems to be done in response to other pressures, rather than consciously as a redistribution technique.

Trail system design has a powerful potential not only for redistributing use, but also for improving the quality of visitor experiences. In most areas, few visitors travel off trails (Lucas, 1980). Trail design and location control much of the visitor's experience - the level of challenge, the scenic vistas experienced, the level of visual variety and contrast, and opportunities to observe and learn about various natural communities and processes. I know of no trails in wilderness designed specifically to try to enhance experiences. Most U.S. trails were built over 50 years ago, before wilderness designation, primarily as an administrative transportation system, especially for fire control, and for travel with horses. Few trails have been built in recent years, and most of these have been planned more as routes to attractions rather than to provide experiences themselves.

Changing visitor behaviour

A great deal of visitor impact, both to the environment and to other visitors' experiences, is caused more by how visitors behave than by how many there are. Most damage is caused by the few unskilled, uninformed, careless groups rather than the many typical parties.

Deliberate, malicious behaviour, which is extremely rare in wilderness, must be dealt with through law enforcement. But uninformed, unskilled, and some careless behaviour should be dealt with mainly by education. Wilderness visitors tend to be highly educated, most with university educations and often with graduate study, as well as strongly committed to wilderness (Lucas, 1980). This provides a fertile ground for education. Explanations can and should be rather complete. Rather than simple 'do's' and 'don'ts', managers are likely to have more success by explaining a problem, and making clear how visitor behaviour in different situations can exacerbate or reduce undesirable effects (the issue, however, is unstudied).

Most education aimed at changing visitor behaviour deals with reducing environmental impacts through 'minimum impact' or 'no trace' camping education campaigns. Much less deals with behaviour related directly to visitor experience quality. Some efforts, unevaluated so far, have tried to encourage a social norm of quiet, unobtrusive behaviour. Visitors to some areas have been urged to choose tents, jackets, and packs with dull colours, to choose secluded, screened campsites, and to be careful to avoid alarming horses when hikers and horse users meet.

Littering is a special problem, more related to visitor experience quality than to the environment. Campaigns for a number of years encouraging visitors to 'Pack it in, pack it out' (take back out everything they bring into the backcountry) and general anti-littering educational efforts have borne fruit. It is my distinct impression (again no evaluations exist) that litter in wilderness is much less common than 20 years ago, despite increased use. A study of experimental efforts to enlist cooperation of visitors in cleaning up litter reported good success (Muth & Clark, 1978).

Some areas prohibit campfires (15%) and others discourage them (18%); a few places permit fires only in designated places (8%) (Washburne & Cole, 1983). Campfires are the cause of many serious impacts on vegetation, both from the fire itself and from wood gathering, on soils, and on visitor experiences because of the conspicuous evidence of other, previous visitors that ashes and blackened rocks present (Cole & Dalle-Molle, 1982). Managers of some areas try to teach visitors to handle fires so little or no trace remains. In a few areas fire rings are left at often-used campsites, with no-trace fire techniques encouraged at less-used sites. This seems like an attractive compromise, because a campfire is a powerful tradition and contributes much to experience quality for many people.

Facilities

The letter and spirit of the Wilderness Act, and the basic wilderness concept would seem to leave little room for many facilities beyond simple trail systems. In fact, facilities are provided in only a small proportion of areas (Washburne & Cole, 1983). Alaska is an exception; cabins for visitor use are provided in National Forest wilderness. Restraint in providing facilities seems consistent with what is known about wilderness visitor preferences; visitors are not clamoring for facilities that managers refuse to provide. For example, more visitors felt outhouses (pit toilets) were undesirable than desirable, constructed fireplaces were considered undesirable by a majority, and rustic picnic tables were strongly rejected (Lucas, 1980).

DISCUSSION AND CONCLUSIONS

It appears that wilderness managers agree more on the problems they face than on the solutions. Management techniques often appear to be inconsistent and even contradictory among areas and among wilderness agencies. The inconsistency in wilderness visitor management is confusing to the public and makes the visitor education task difficult.

Some of the variation in management techniques may be justified because of differences in conditions among areas, especially in environmental fragility, use intensity, and type of use. However, I believe most of the inconsistency reflects a lack of knowledge of both environmental impact processes and the behaviour, motivations, and preferences of recreational visitors. A conceptual framework to integrate the social and ecological aspects of recreation management is lacking, and this results in attempts to deal with perceived problems in isolation, often with unanticipated, and frequently unrecognized, undesirable side effects.

A major shortcoming of particular relevance to the Recreation Ecology Research Group is the lack of knowledge of how visitor impacts on the environment affect visitor experiences. It is well known now, I think, that any recreational use will have environmental effects, and usually even light use has substantial effects (Cole, 1982b). Thus, the critical question for managers is how much of what type of impact is acceptable. Acceptability depends, in part, on the perceptions and reactions of the visitors. This has barely been studied (Lucas, 1979), and several studies show the managers often are mistaken in their opinions about visitor attitudes and preferences (Hendee & Harris, 1970). It seems possible that managers may take actions to try to reduce impacts that most visitors view as acceptable or even desirable, such as some vegetation loss at a campsite, that may be unavoidable in any case.

Management diversity could provide a testing ground for management techniques, but this is not happening to any substantial degree, for several reasons. First, there is little objective monitoring of environmental impacts, recreational use patterns, or key aspects of visitor behaviour. Second, there is rarely systematic evaluation of the results of management actions. For example, if a new regulation prohibiting camping within 60 meters of lakes and streams is adopted, to what extent do campers comply, how much do off-limits campsites recover, how many new campsites develop and with what sorts of impact, how do visitors feel about the regulation, how is the quality of their experience affected? Evaluation must be structured and objective to be useful; an intuitive feeling that something is working, usually by persons who proposed or supported that action, is too unreliable. Wilderness research programs are far too small to substitute for monitoring and evaluation by managers. Third, managerial experience is seldom communicated well. Managers learn too little from one another about what works under certain conditions and what does not. High turnover in management personnel compounds the problem.

There also may be somewhat of a problem with fads in wilderness management. Particular management actions seem to become popular, and spread without much careful analysis of problems, their possible causes and alternative management actions. The weak state of monitoring and evaluation provides little opportunity for self-correction of these fads. In particular, I believe that direct, regulatory approaches are sometimes used excessively where nonregulatory and indirect techniques might be more appropriate (Lucas, 1982, 1983).

In summary, we are still in a searching, early developmental phase in managing recreational visitors in American wilderness. We need better systems for identifying problems needing managerial action, more innovative potential solutions, a better approach to evaluating alternative solutions and more effective ways of monitoring the consequence of actions taken on both the social and the ecological system.

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