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# Managing Recreation in Wilderness: Special Areas and Specialized Research

David N. Cole[1]


## Abstract

About one-fifth of Forest Service administered lands consist of congressionally-designated wilderness. Recreation management on these lands is unique, stressing high levels of protection for both the land and visitor experiences, as well as minimal development and regimentation. Management is challenged by both the difficulty of this task and minimal investment of resources. Research has made significant contributions to wilderness recreation management. It has developed frameworks for planning and working through management issues. It has informed the development of management objectives, provided protocols for monitoring, and identified cost-effective management techniques. Progress would most likely have been much slower if the Forest Service had not devoted a small portion of its research program exclusively to wilderness management.


## Introduction

The Forest Service is responsible for managing recreation in different types of special areas and situations. Some of these special areas are congressionally designated, for example, as national monuments or wild and scenic rivers. Other areas are administratively designated as geological areas, botanical areas, and so on. The Forest Service also is responsible for managing heritage resources and for contributing to better care of forests in urban areas.

Wilderness areas are the most abundant of these special areas. More than 400 congressionally-designated wilderness areas are located on the national forests. Wilderness areas are located in every region and on virtually every national forest. They cover about 35 million acres, which constitutes about 18% of all Forest Service lands. Wilderness management, consequently, is a significant responsibility for many Forest Service managers, and recreation management is a substantial portion of the wilderness management job.

## Wilderness Recreation Management Is Unique

Wilderness anchors one end of the recreational opportunity spectrum (Driver et al. 1987). That end is characterized by natural, primitive, largely undisturbed conditions, as opposed to urban, developed, highly altered conditions. Access is generally difficult and there are few comforts and conveniences. There are outstanding opportunities for solitude. As with most Forest Service recreation management, objectives stress protection of the natural environment. Recreation use is managed such that it does not excessively disturb plants, animals, soil, or water. Objectives also stress the protection of opportunities for visitor experiences. What is unique in wilderness is the extreme degree of protection that is desired. Impacts on both biophysical

[1] Aldo Leopold Wilderness Research Institute, Rocky Mountain Research Station, Forest Service, U.S. Department of Agriculture, P.O. Box 8089, Missoula, MT 59807. Email: dcole@fs.fed.us

resources and the visitor experience are to be minimal. Moreover, wilderness management objectives also stress lack of development and regimentation.

Managing recreation is unusually difficult in wilderness. By definition, wilderness areas are remote and access is difficult. Travel is by foot or on horseback, and many wildernesses are large, requiring days or even weeks to traverse. Standards for protection are stringent and many potentially effective management strategies, such as facility development and regimentation, are considered to be inappropriate or a last resort. Finally, financial and personnel resources allocated to wilderness are minimal. Although 18% of Forest Service lands are designated as wilderness, only about 1% of the Forest Service budget is allocated to wilderness management. Only about 0.5% of the Forest Service research budget goes to wilderness research.

## Progress in Wilderness Recreation Research

Substantial progress has been made in developing scientific knowledge that can contribute to improved recreation management in wilderness. A major contribution of research has been development of frameworks for wilderness planning and management. The Limits of Acceptable Change process, developed by Forest Service research in the early 1980s (McCool and Cole 1997, Stankey et al. 1985) has been highly influential. It clarifies the three primary tasks of management: (1) establishing management objectives, (2) monitoring conditions in relation to objectives, and (3) identifying effective strategies for maintaining or restoring conditions (where conditions are out of compliance with objectives). In this paper, I will use these three tasks to organize a highly selective overview of what we have learned and prominent additional information needs. I will also divide the material among the two primary protective goals of management: minimizing biophysical impacts and providing quality visitor experiences.

## Developing Good Management Objectives

Recreation researchers have conducted numerous studies of both wilderness visitors and the impacts those visitors cause. This work provides a strong foundation for developing management objectives. It provides the basic descriptive information needed to inform the decisions that managers must make. We know a lot about wilderness visitors—who they are and where they come from. We know much about why they come, what they do, their evaluations of their experience, and their opinions about management options—both those currently in place and alternatives that might be implemented. Much of this research is nicely summarized in several sources (Hendee and Dawson 2002, Roggenbuck and Lucas 1987, Manning 1999). A recent compilation of baseline recreation studies contains a wilderness-by-wilderness list of all the individual studies of wilderness visitors that have been conducted (Cole and Wright 2003).

One consistent finding of these studies is that most visitors are highly satisfied with their experience, regardless of the character of that experience. Trip quality ratings are typically just as high for trips where many other people are encountered as they are for trips where few other people are encountered (Hendee and Dawson 2002, Manning 1999). Moreover, little research has been conducted that is capable of describing in much detail what people actually experience and the dimensionality of their experiences during a wilderness visit. Consequently, managers can feel good about the fact that their visitors positively evaluate management, but they cannot be certain that visitors are obtaining the kinds of experiences that are most appropriate in wilderness. Recent research is attempting to address this knowledge gap, often using qualitative techniques and a focus on individual visitors. This approach differs from (and complements) the quantitative, survey-based approach that characterized earlier research (Borrie and Birzell 2001) and that is still productively going on.

The impacts of recreation use in wilderness also have been widely studied. Most of the focus has been on trails and campsites where we have learned much about the extreme degree of alteration to vegetation and soil that occurs on highly-used sites. Ecosystems that are repetitively used for recreation experience intense alteration compositionally, structurally, and functionally. We have learned that small quantities of use can cause substantial impacts in short periods of time. This knowledge is critically important to developing management objectives that are attainable rather than unreasonably idealistic. Much of this work is nicely synthesized in several sources (Buckley 2004, Hammitt and Cole 1998, Hendee and Dawson 2002).

As with basic visitor research, there are some substantial knowledge gaps regarding recreation impacts. Basic descriptive knowledge about biophysical impacts is particularly inadequate regarding (1) impacts to soil biological attributes and (2) impacts on animal populations. Although we know that soils are often compacted and deprived of organic inputs when subjected to recreation use, we know too little about how such changes affect soil biology and disrupt the functioning of soil processes (Zabinski et al. 2002). Most notably, we do not understand how those disrupted processes can be reestablished if recreation use is removed. Consequently, attempts to restore disturbed sites are often unsuccessful. Hundreds of studies of recreation impacts on animals have been conducted. But most studies document short-term changes to individuals. Little is known about longer term effects and effects on populations of animals (Knight and Gutzwiller 1995). This makes it difficult to determine the seriousness of these impacts.

While descriptive knowledge informs the development of objectives, setting objectives is fundamentally a prescriptive process. It requires decisions about the way things ought to be—about how much impact is acceptable and about the types of experiences that ought to be available. These decisions are based more on values than on facts, an arena where science is not at its most powerful. However, wilderness recreation managers, uncomfortable with making subjective decisions about objectives, increasingly seek a scientific basis for such decisions. Some scientists argue that their research (for example, the normative research of Shelby et al. 1996) can provide an empirical foundation for prescriptive decisions. Others disagree (Stewart and Cole 2003), arguing that progress in setting good management objectives is limited more by the willingness to make hard decisions than by lack of information.

## Monitoring

Once objectives are established, it is important to monitor conditions to assess trends and determine if objectives have been met. The fundamental descriptive studies mentioned above provide the basis for many useful monitoring protocols. Varied techniques are available for collecting different types of information on visitors and their recreational visits (Watson et al. 2000) and new innovations are constantly being developed (Cessford and Muhar 2004). Similarly, efficient and effective protocols have been developed for monitoring the conditions of trails and campsites (Cole 1989, Marion and Leung 2001). Not surprisingly, effective protocols are less developed for those phenomena still not very well described. Where objectives have been established for impacts on animal populations or for visitor experiences, effective protocols are still needed.

Computer simulation models of recreation use have substantial potential as monitoring tools. In wilderness, managers are often concerned with levels of interaction between visitors in the interior of large wilderness areas. Attempting to assess levels of interaction across a large wilderness at various times is prohibitively expensive. However, building on wilderness simulation work begun in the 1970s (Schechter and Lucas 1978, van Wagtendonk 2003), new computer software is being applied to this task. This

approach may make it possible to monitor hard-to-measure parameters (such as encounters between groups in the interior of a wilderness) based on easy-to-collect data such as number of people entering at trailheads (Cole and Daniels 2004). These models also have potential for other purposes. For example, the spatially and temporally explicit nature of the data could be very helpful for assessing human-wildlife interactions, which are most problematic at specific times and places. They also can be used predictively to identify management actions that are likely to be effective.

## Identifying Effective Management Strategies

Progress in identifying effective management strategies has advanced in at least two ways. First, research has identified and described the functional relationships between various characteristics of use, environment, and management that largely determine the resulting impact. For example, substantial work has identified a curvilinear relationship between amount of use and most biophysical impact (Hammitt and Cole 1998). At low levels of use, even small differences in amount of use can result in substantial differences in amount of impact. Conversely, at high levels of use, even large differences in amount of use typically result in minor differences in impact. This finding has profound implications for management, especially regarding the effectiveness of dispersing or concentrating use at varied spatial scales. Other research shows that two different vegetation types growing next to each other can vary in durability by more than an order of magnitude (Cole and Monz 2002). If visitors could be taught the difference between durable and fragile vegetation—and if they were able to find durable routes—use levels could be increased many times without any increase in impact.

Many of the same factors—use, location, management—influence the nature and magnitude of impact on visitor experiences. Substantial research suggests that, in wilderness, evaluations of experience quality declines as the number of other visitors encountered increases. The magnitude of decline in quality is not that great, however; seeing lots of other people is seldom enough to make a good trip a bad one (Stewart and Cole 2001). Many studies suggest that who is encountered and where can have more of an effect on experience than number of encounters (Manning 1999). Observing visitors behaving in ways that are considered inappropriate can be particularly troublesome. In contrast, encountering visitors perceived to be just like oneself may be enjoyable.

A second way in which research has contributed to the development of effective management strategies is by experimenting with management techniques or evaluating the success of management programs. Many examples of this type of research exist. For example, Roggenbuck and Berrier (1981) showed that information and education could reduce congestion at a popular camping destination. Marion and Farrell (2002) documented the success of a confinement strategy in minimizing campsite impacts in the Isle Royale Wilderness. Spildie et al. (2000) showed how packstock damage in a high elevation lake basin could be reduced through a program of education, behavioral restriction, designated sites, and restoration.

Although much has been learned about the strategic options for managing wilderness recreation, there is much more to learn about the details. For example, we know that education is a critical management tool, but how can visitors be persuaded to adopt recommended practices? When using bulletin boards as the primary communication medium, Cole (1998) showed that visitor attention to messages could be doubled simply by asking visitors to read the messages. Harding et al. (2000) provide a good overview of many factors that management might manipulate in an attempt to influence human behavior. Use limits are often implemented with little knowledge about their

effectiveness, efficiency, or equity consequences (McCool 2001).

## Conclusion

In conclusion, despite a rather meager investment, research has contributed substantially to improved management of wilderness recreation. Much of the progress that has been made is because much of this research has been conducted by scientists who specialize in wilderness research. Wilderness specialists have unique knowledge of wilderness issues and the implications of their research. They know better how to frame problems and interpret results. Research is more efficiently focused and can be more cumulative. This suggests that there is value in continuing to structure at least a small portion of Forest Service research around special areas and situations for which the Forest Service is responsible. This is particularly true for wilderness management which constitutes such a large portion of Forest Service responsibility.

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