

Information about Wilderness Visitors and Recreation Impacts

Is It Adequate?

BY DAVID N. COLE AND VITA WRIGHT

Introduction

The Wilderness Act of 1964 (P.L. 88-577) established a National Wilderness Preservation System (NWPS) to be administered “for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as wilderness.” To provide for the use and enjoyment of these areas while preserving their wilderness character, it is important to study and monitor wilderness recreation visitors and the impacts they have. Some people state that The Wilderness Act mandates that recreation impacts not be allowed to increase following wilderness designation (Worf 2001). Ideally, baseline conditions should be inventoried at the time each area is designated as wilderness and added to the NWPS, and then periodically monitored in the future to assess trends in conditions and the efficacy of existing recreation management programs. Such data will become increasingly valuable to future attempts to evaluate trends in the wilderness character of each area in the NWPS.

Although baseline recreation conditions have been inventoried in many wildernesses, data are lacking for many others. Moreover, the distribution of wildernesses with baseline recreation data is not equitable across the nation or the four agencies that manage wilderness. In order to assess the extent of baseline recreation data for the NWPS and to document the data that do exist, we conducted a survey of all wildernesses in the NWPS, asking about the availability of three types of data: (1) campsite impact data, (2) trail impact data, and (3) information about visitor characteristics.

Methods

The process of compiling this information began in January 1999 with a letter and one-page questionnaire sent to admin-



Article co-authors David N. Cole and Vita Wright.

istrators of each of the 625 wildernesses in the NWPS (and three additional wildernesses designated in 1999). The questionnaire asked whether any recreation baseline data of the three types we were interested in had ever been collected in any of the wildernesses managed by that office, either by the management agency or by someone else (such as an academic institution). If respondents stated that no data of any of the three types had ever been collected, we accepted that response.

We conducted phone interviews with all the administrators who either responded that they had data or who did not respond to our questionnaire. In each interview we began by establishing whether the data met our criteria for inclusion. Sometimes, data were collected in such a nonsystematic manner that we decided not to include them. However, for this criterion we erred on the side of inclusion and simply noted that the sample was an opportunistic one. There were

About one-half of the 625 wildernesses in the NWPS (56 percent) had baseline recreation data of some type.

two other common reasons for excluding data. First, in many wildernesses, trails are inventoried and information is collected on the location of existing improvements (e.g., drainage devices or bridges) and segments that need maintenance or improvement. We only included trail studies if they had data on recreation impacts on trails, and relatively few wildernesses have such data. Second, many wildernesses have systematically collected data on amount of recreation use but have no baseline data on visitor characteristics. Data on amount of wilderness recreation use prior to 1995 are compiled in Cole (1996). For purposes of this article, however, we only included wilderness visitor studies if they had data on more than amount of use. Our criteria for campsite data were less stringent than for trail and visitor data. We included wilderness campsite studies even if the only data collected were campsite locations. Virtually all wildernesses have maps of trail locations in their official trail system.

In addition to interviewing agency managers, we searched for data that had been published in outlets such as journals, proceedings, theses, and reports. For this purpose, we conducted extensive literature searches and ultimately located over 300 publications that contained baseline data about wilderness campsite impacts, wilderness trail impacts, or wilderness visitors.

For each type of baseline data, we collected information about when the studies were conducted and how and where the data are stored. We asked

questions about the survey sample. Sometimes data were collected across the entire wilderness; in other cases, data are only applicable to a portion of the wilderness or to a specific situation (such as visitors to heavily used trailheads or campsites that are highly impacted). We also asked questions about the type of data that were collected (for example, photopoints, conditions classes, or detailed measures). This detailed information should be helpful both to characterize the types of studies that have been conducted across the NWPS as well as provide the specifics of a particular study in a wilderness of interest.

Baseline Recreation Data for Wilderness

About one-half of the 625 wildernesses in the NWPS (56 percent) had baseline recreation data of some type (see Table 1). The availability of baseline data varied substantially among the agencies that manage wilderness. Most Forest Service (77 percent) and National Park

Service (66 percent) wildernesses had data; few Bureau of Land Management (17 percent) and Fish and Wildlife Service (10 percent) wildernesses had data. Variation among regions of the country was less pronounced. The Southwest (Arizona, Nevada, New Mexico, and Utah) was the only region in which a majority of wildernesses had no data. The region with the largest proportion of wildernesses with data was the Rocky Mountains (Colorado, Idaho, Montana, and Wyoming).

Campsite data were the most frequently collected type of baseline recreation data. Based on our criteria, about one-half of the wildernesses in the NWPS (51 percent) had baseline campsite data (see Table 1). About one-quarter of wildernesses (24 percent) had visitor data and only 9 percent had trail condition data. Forest Service wildernesses were more likely than National Park Service wildernesses to have campsite data, whereas National Park Service wildernesses were more likely to have visitor and trail condition data. Wildernesses in the Southwest were least likely to have campsite data. Wildernesses in the Southwest, Pacific states, and Alaska were least likely to have visitor data, and wildernesses in the central and north-east states and Hawaii were least likely to have trail data.

Table 1—Number (%) of Wildernesses with Any Baseline Recreation Data, Campsite Data, Trail Data, or Visitor Data.
(Values are for each agency and for all wildernesses.)

Agency	Type of Data			
	Any	Camp	Trail	Visitor
Bureau of Land Management	23 (17%)	21 (16%)	3 (2%)	8 (6%)
Fish and Wildlife Service	7 (10%)	4 (6%)	1 (1%)	4 (6%)
Forest Service	308 (77%)	291 (73%)	46 (12%)	122 (31%)
National Park Service	29 (66%)	22 (50%)	9 (20%)	20 (45%)
All wildernesses	349 (56%)	321 (51%)	56 (9%)	148 (24%)

Note: Because some wildernesses are managed by multiple agencies, the sum of the wildernesses managed by each agency exceeds the total number of wildernesses.

Wildernesses that were designated long ago were somewhat more likely to have baseline data. For example, of the 54 wildernesses designated in 1964 (all managed by the Forest Service), 92 percent had campsite impact data, 22 percent had trail impact data, and 48 percent had visitor data.

Wilderness Campsite Data

In 2000, although one-half of the 628 wildernesses in the NWPS had some type of baseline data on campsite conditions, just over one-third (37 percent) had data for all the campsites in the wilderness (see Table 2). Another 5 percent had data for a sample of campsites considered to be representative of all campsites in the wilderness. A wide variety of campsite monitoring techniques is available (Cole 1989); the easiest technique is simply to map the location of sites. In 31 of the wildernesses with campsite data, location was the only information collected (see Table 2). Another 12 wildernesses also had established photopoints at campsites. In 12 wildernesses, condition class ratings had been assigned to campsites, but no site measurements had been taken. In 150 wildernesses, multiple impact parameters had been

evaluated, but evaluations consisted of either categorical ratings or quick measures. Finally, 116 wildernesses had detailed measures of multiple impact parameters, the most precise and expensive data.

The earliest campsite data were collected in the early 1960s on samples of campsites in the Mt. Rainier and Glacier Peak Wildernesses (Thornburgh 1962)

and the Boundary Waters Canoe Area (Frissell 1963). The first surveys of campsites across entire wildernesses were conducted in the early 1970s in the Yosemite and Olympic Wildernesses. In 44 wildernesses (7 percent of the NWPS), some baseline campsite data had been collected prior to 1980 (see Figure 1). By 1990, baseline campsite data had been collected in 136 wildernesses (21 percent of the NWPS) and had increased to 321 wildernesses (50 percent of the NWPS) by 2000.

Wilderness Trail Data

Most wildernesses had data on the extent of their official trail system, and many periodically monitor the loca-



Figure 1—Location of wilderness campsite studies (Cole and Wright 2003).

tion of places that require some sort of improvement such as a water bar or bridge. However, only about 9 percent of wildernesses had baseline assessments of the trail-system condition such as condition class or measures of trail depth and erosion. Twenty-six wildernesses (4 percent) had baseline data for all official trails in the entire wilderness, and another eight wildernesses (1.3 percent) had data for a sample representative of all official trails (see Table 3). Seventeen wildernesses (2.7 percent) had data for social trails that develop informally as a result of user traffic.

Trail condition data can be collected using either a census or sampling-based approach (Leung and Marion 2000). In 14 of the wildernesses with trail information, photopoints were all that was available (see Table 3). In another 15 wildernesses, condition class ratings were assigned to trails, but no measures were taken. In the remaining wildernesses with trail data, measures of trail condition were taken. In 22 wildernesses, measures of the spatial extent of impact (e.g., the number of occurrences of erosion or the length of trail with muddiness problems) had been taken. Measures of the severity of impact (e.g., trail depth) had been taken in 24 wildernesses.

Table 2—Number (%) of Wildernesses with Baseline Campsite Data of Various Types.

Sample Type	
All campsites in the entire wilderness	234 (37%)
All campsites in a portion of but not the entire wilderness	22 (4%)
Only a sample of sites representative of the entire wilderness	32 (5%)
Only a sample of a particular type of campsite	29 (5%)
Only an opportunistic sample of campsites	9 (1%)
Data Characteristics	
Detailed measures	116 (18%)
Categorical ratings or quick measures but not detailed measures	150 (24%)
Condition class ratings but no individual impact parameters	12 (2%)
Photopoints but no quantitative data	12 (2%)
Only locations of campsites	31 (5%)

Table 3—Number (%) of Wildernesses with Baseline Trail Data of Various Types.

Sample Type	
All official trails in the entire wilderness	26 (4%)
All official trails in a portion but not the entire wilderness	5 (1%)
Only a sample of trails representative of all trails	8 (1%)
Only a sample of a particular type of trail	14 (2%)
Only an opportunistic sample of trails	4 (1%)
Data collected on social (user-built) trails	17 (3%)
Data Characteristics	
Data on impact severity	24 (4%)
Data on spatial extent of impact	22 (4%)
Condition class ratings but not any measures	15 (2%)
Photopoints but no quantitative data	14 (2%)

The earliest reported data on trail condition were photopoints taken in the 1960s on problem trail segments in the North Absaroka and Washakie Wildernesses. The earliest measures of trail condition were collected in the early 1970s on selected trail segments in the Lee Metcalf (Dale 1973) and Selway-Bitterroot (Helgath 1974) Wildernesses. The first survey of trails across an entire wilderness was also conducted in the early 1970s in the Yosemite Wilderness. In 11 wildernesses (1.8 percent of the NWPS), some baseline trail data had been collected prior to 1980 (see Figure 2). By 1990, baseline trail data had been col-

lected in 23 wildernesses (3.7 percent of the NWPS); this increased to 56 wildernesses (9 percent of the NWPS) by 2000.

Wilderness Visitor Characteristics Data

Although about one-quarter of the 628 wildernesses in the NWPS in 2000 had some type of baseline data on visitor characteristics, only 17 percent (107 wildernesses) had data representative of the entire wilderness (see Table 4). Another 3 percent had data for all the visitors in a portion of the wilderness. In most of the wildernesses with baseline visitor data, only main season visitors were included in studies.

Information on off-season users was available for 47 wildernesses. In most visitor studies, all of the common modes of travel that occur in that wilderness were included. Hikers, visitors traveling with pack stock, and water-based users were included in studies conducted in 135, 95, and 14 wildernesses, respectively. Occasionally, visitor stud-

ies focus on either day visitors or, more commonly, overnight visitors. Consequently, overnight users were included in studies in 130 wildernesses, and day visitors were included in studies in 125 wildernesses.

Many of these visitor studies have been conducted by academic institutions rather than management agencies. Results of such studies are often carefully analyzed and reported, and written reports are available for 373 (93 percent) of visitor studies. However, the original data often are not carefully archived. With only a few exceptions, the data from these studies have not been stored in electronic format nor copies filed at a management agency facility.

The earliest data on wilderness visitors were collected in the late 1950s in the Boundary Waters Canoe Area Wilderness (Taves et al. 1960). In 1960, data were collected in the Bob Marshall, John Muir, and Gila Wildernesses (Wildland Research Center 1962). In 42 wildernesses (7 percent of the NWPS), some baseline data on wilderness visitors had been collected prior to 1980 (see Figure 3). By 1990, baseline campsite data had been collected in 59 wildernesses (10 percent of the NWPS), and this increased to 148 wildernesses (24 percent of the NWPS) by 2000.

Conclusion

About one-half of the wildernesses in the NWPS have no baseline data of any type regarding recreational visitors and their impacts. In these wildernesses, management programs are being implemented with minimal understanding of current conditions and trends and without the data necessary to evaluate the success of management. The protection of something as valuable and vulnerable as wilderness character is unlikely under these circumstances.



Figure 2—Location of wilderness trail studies (Cole and Wright 2003).

The paucity of baseline recreation data also indicates the high value that should be attached to whatever baseline data do exist. These data represent all the information we will ever have regarding recreational conditions in the NWPS in the twentieth century. Although some of the data have been carefully archived, most are stored on paper files in ranger stations where they are vulnerable to loss. Data collected by professors and graduate students, stored in electronic files and reported in theses and papers, is also being lost. Every effort should be made to ensure that these data and whatever documentation is necessary to facilitate their replication and interpretation are archived in such a manner that they will be preserved in perpetuity. We hope that this survey will (1) help managers of wildernesses without such data better meet their monitoring responsibilities and (2) facilitate future studies that seek to replicate early studies in order to gain insight into trends across the NWPS. Extensive information on available data for each wilderness in the NWPS can be found in Cole and Wright (2003) and in a searchable database located on the Internet (<http://leopold.wilderness.net/links.htm>). 

Acknowledgments

Keith Vanderwielen, Nicole Miller, and Dave Spildie assisted in various aspects of this study.

REFERENCES

Cole, D. N. 1989. *Wilderness Campsite Monitoring Methods: A Sourcebook*. General Technical Report INT-259. Ogden, Utah: USDA Forest Service, Intermountain Research Station.

———. 1996. *Wilderness Recreation Use Trends, 1965 through 1994*. Research Station, Research Paper INT-RP-488. Ogden, Utah: USDA Forest Service, Intermountain.

Cole, D. N., and V. Wright. 2003. *Wilderness Visitors and Recreation Impacts: Baseline Data Available for Twentieth Century Conditions*. General Technical Report RMRS-GTR-117. Ogden, Utah: USDA Forest

Service, Rocky Mountain Research Station.

Dale, D. R. 1973. Effects of trail-use under forests in the Madison Range, Montana. Master's thesis, Montana State University, Bozeman, Mont.

Frissell, S. S., Jr. 1963. Recreational use of campsites in the Quetico-Superior Canoe Country. Master's thesis, University of Minnesota, St. Paul.

Helgath, S. F. 1974. Selway-Bitterroot Wilderness trail deterioration study. Master's thesis, Washington State University, Pullman.

Leung, Y., and J. L. Marion. 2000. Recreation impact and management in wilderness: A state-of-knowledge review. In D. N. Cole, S. F. McCool, W. T. Borrie, and J. O'Loughlin, comps. *Wilderness Science in a Time of Change Conference, Vol. 5: Wilderness Ecosystems, Threats and Management* (23-48). Ogden, Utah: USDA Forest Service, Rocky Mountain Research Station, Proceedings RMRS-P-15-VOL-5.

Taves, M., W. Hathaway, and G. Bultena. 1960. *Canoe Country Vacationers*. Miscellaneous Report 39. St. Paul: University of Minnesota, Agricultural Experiment Station.

Thornburgh, D. A. 1962. An ecological study of the effect of man's recreational use at two sub-alpine sites in western Washington. Master's thesis, University of California, Berkeley.

Wildland Research Center, University of Califor-



Figure 3—Location of wilderness visitor studies (Cole and Wright 2003).

nia. 1962. *Wilderness and Recreation—A Report on Resources, Values and Problems*. Review Commission Study Report 3. Washington, D.C.: Outdoor Recreation Resources.

Worf, B. 2001. The new Forest Service wilderness recreation strategy spells doom for the National Wilderness Preservation System. *IJW*, 7 (1): 15-17.

DAVID N. COLE is a research biologist with the Aldo Leopold Wilderness Research Institute, Rocky Mountain Research Station, Forest Service, P.O. Box 8089, Missoula, MT 59807, USA. Telephone: 406-542-4199. E-mail: dcole@fs.fed.us.

VITA WRIGHT is research application program leader with the Leopold Institute. Telephone: 406-542-4194. E-mail: vwright@fs.fed.us.

Table 4—Number (%) of Wildernesses with Baseline Visitor Characteristic Data of Various Types.

Sample Type

Visitors to the entire wilderness	107	(17%)
Visitors to a portion but not the entire wilderness	18	(3%)
Only an opportunistic sample of visitors	23	(4%)

Data Characteristics

Main season visitors included	139	(22%)
Off-season visitors included	47	(7%)
Hikers included	135	(21%)
Stock users included	95	(15%)
Water-based users included	14	(2%)
Day visitors included	125	(20%)
Overnight visitors included	130	(21%)