

Wilderness:

Carrying Capacity and Quality

GEORGE H. STANKEY¹

SINCE 1946, RECREATIONAL USE OF WILDERNESS has increased about 10 per cent a year, a faster rate than most other forms of forest recreation and considerably beyond our population growth rate (about 2 per cent per year). Projections of future wilderness use indicate the rapid growth experienced in the past will continue, at least for some time.

While recreational use of wilderness has been rapidly spiraling upwards, designated wilderness acreage has grown only very slowly; from 13.8 million acres in 1945 to 14.3 million acres in 1969, or about 4 per cent. The amount of land remaining that is suitable for classification as wilderness is limited; the maximum size the National Wilderness Preservation System might achieve is probably between 35 and 50 million acres or less than 2 per cent of the contiguous 48 states.

The Wilderness Act of 1964 calls for "outstanding opportunities for solitude" as well as the provision of a community of life largely unaffected by man's activities. However, today's increasing use of wilderness areas and the limited extent to which the Wilderness Preservation System can be expanded will make it increasingly difficult for managers to meet these objectives.

Moreover, management constraints imposed by the Act often bar use of techniques that are seemingly the easiest or cheapest ways of insuring these goals are met. For example, roads that would facilitate the collection (clean-up) of litter in the backcountry are illegal. Similarly, the construction of corrals and other permanent campsite features designed to protect the environment are considered inappropriate.

The solution lies in deciding what wilderness use is consistent with the desired levels of resource preservation and recreational quality. In short, we must establish standards for wilderness carrying capacity and apply these standards in the context of intelligent

management policies. However, estimating wilderness carrying capacity is a complex task: many factors must be evaluated (for example, see the factors noted by David W. Lime in the 1970 winter issue of *Naturalist*).

Traditionally, the term "carrying capacity" has been used to mean the ability of a biotic community to survive under use; for example, the reaction of plants to grazing by cattle. However, there are some real difficulties in trying to apply biological carrying capacities to wilderness management. Any use of an ecosystem creates some change: thus, unless we do not allow *any* use of wilderness, we must be ready to accept a wilderness environment something less than totally natural. How much change is too much? The physical environment will not "tell" the wilderness manager how much use is "too much." Nor does it provide any clues as to how characteristics of use (other than total numbers) affect the experience of the wilderness visitor. If we permit only that amount of change capable of natural restoration within one year, some areas would need to be totally protected from any use. On other sites, where the ecosystem is more resilient and hardy, fairly large amounts of use might yield only small amounts of physical change; however, such large amounts of use may be entirely incompatible with what the wilderness visitor considers appropriate. Thus, the inevitable fact of biological change associated with any use necessitates some knowledge of how visitors define "too much change" and their attitude as to what constitutes inappropriate use. Con-

¹The author is geographer, USDA, Forest Service, Intermountain Forest and Range Experiment Station, Ogden, Utah. He is headquartered at the Forestry Sciences Laboratory at Missoula, which is maintained in cooperation with the University of Montana.

sequently, wilderness carrying capacity must be defined at least in part as the ability of an area to provide the visitor with a satisfactory wilderness experience over time.

Our Study

During the 1969 summer use season, nearly 500 visitors to four areas—the Bob Marshall Wilderness in Montana, the Bridger Wilderness in Wyoming, the High Uintas Primitive Area in Utah, and the Boundary Waters Canoe Area in Minnesota—were contacted and asked to complete a questionnaire on how they felt about four broad dimensions of wilderness carrying capacity: (1) the level of use; (2) the types of use (for example, backpackers vs. horseback groups); (3) the location of encounters with others and the timing of those encounters; and (4) the effects of inappropriate behavior, specifically littering and campsite wear and tear.

There exists a wide range of ideas as to what constitutes wilderness, even among wilderness users

To develop methods of converting trail register data into use figures, we interviewed 50% of the visitors to the Mission Mountain Primitive Area in Montana, and compared their actual use to the trail register data. The resulting estimates were quite accurate.

themselves. To handle this problem, we developed an attitude scale. This consists of 14 items, such as “solitude— not seeing many other people except those in your own party” and “absence of man-made features, except trails.” The items selected reflected the criteria set up by the Wilderness Act.

Respondents were then asked to indicate the extent to which they considered each item desirable *within the context of wilderness*. Thus, the more desirable a person thought an item was (or undesirable, in the case of an item such as “gravel roads”) the closer his concept of wilderness matched that established by the Wilderness Act. By assigning scores to the responses it was possible to arrange respondents along a continuum.

We labeled those who scored highest on the scale “purists.” These persons, we reasoned, are especially relevant for wilderness decision-making because their personal definition of what is or is not desirable in wilderness is matched by the definition that governs management actions.



This does not in any way mean we will ignore the attitudes of the other visitors. Their attitudes will prove invaluable in helping define what other types of recreational opportunities besides wilderness are needed as well as providing us with some idea as to the relative proportion these other opportunities should constitute for the Nation.

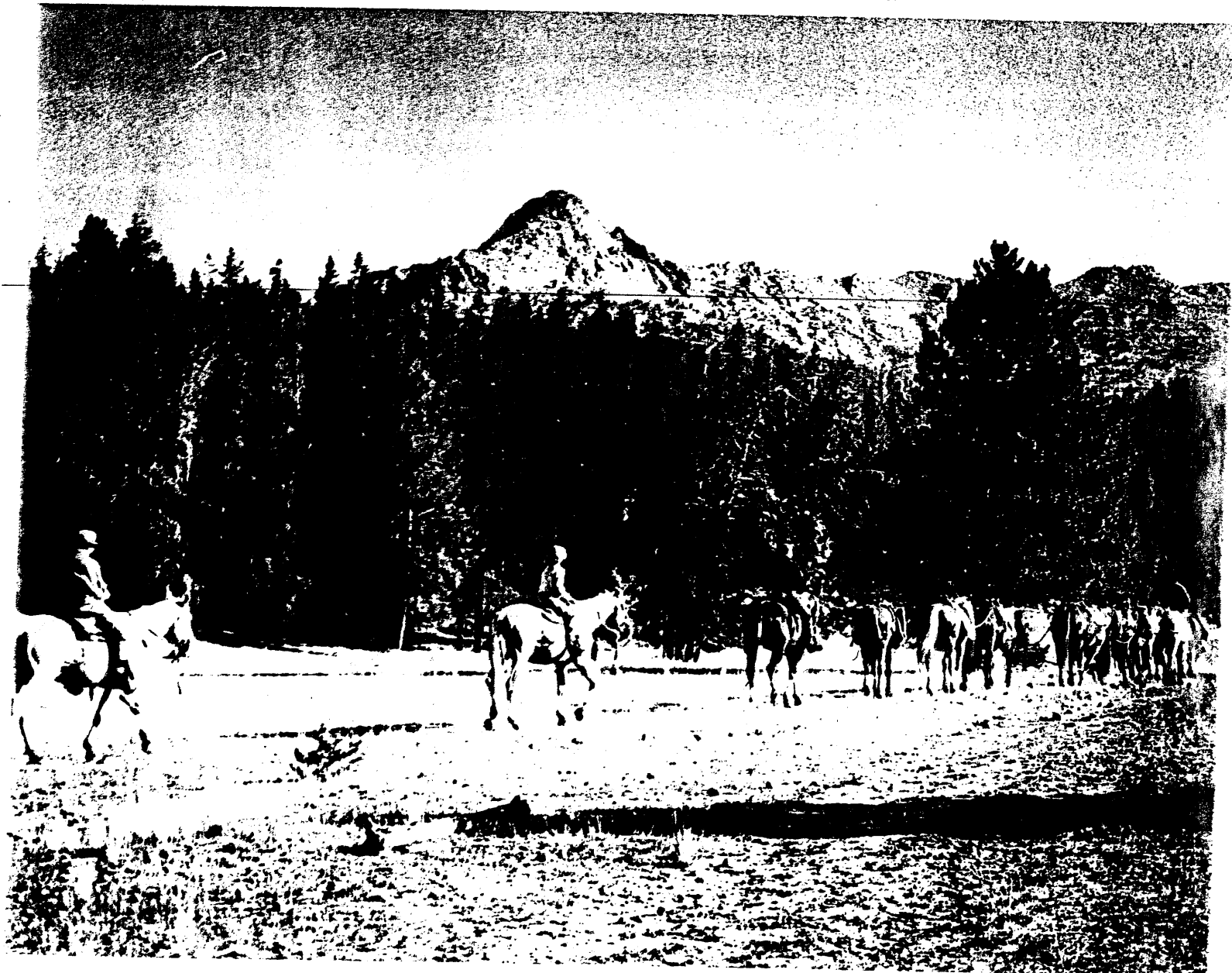
Purists comprised 40 per cent of the total sample, but this percentage ranged considerably among the four areas: 20 per cent in the Boundary Waters Canoe Area, 53 per cent in the Bob Marshall, 67 per cent in the Bridger, and 31 per cent in the High Uintas.

As anticipated, the level of use encountered was an important component of a purist's evaluation of capacity—96 per cent of the purists felt solitude was a desirable characteristic of wilderness. Moreover, purists fully expected to be able to enjoy solitude—nine out of ten indicated it was reasonable to expect

to visit wilderness and see few, if any, other people.

Respondents were asked to indicate their reaction to encountering others on the trail as well as the extent to which they agreed with the proposition "Meeting other people around the campfire at night should be part of any wilderness trip." On both of these items, only about 10 per cent of the purists overall indicated they enjoyed meeting others. There was an interesting difference among the four areas in regard to trail encounters. In the BWCA and the High Uintas, about 20 per cent of the purists enjoyed encounters while traveling; in the Bridger and Bob Marshall, only about 5 per cent did. This difference may be linked to the relative intensity of use to which one becomes accustomed: recreational use, both absolute and on a per acre basis, was higher in the former two areas than the latter two. This variation did not show up, however, in the statement regarding campsite en-


The wilderness trips sponsored by some conservation clubs have often combined the problems of large size and many horses. Changes are coming, aided by research, to reduce this impact on the wilderness resource and the wilderness experience of other visitors.



SPECIAL WILDERNESS STUDY

ALL VISITORS REGISTER
WHEN ENTERING

To protect and manage Wilderness,
we need to know more about you,
the Wilderness visitor - what you do
and what you think.

Write the name and address
of each person in your party
who is 16 or older on a card
from the box and drop it through
this slot → 

Some of you will be picked as sample
visitors and mailed a questionnaire.
so, please complete it and send it back.

THANK YOU

U.S. Forest Service Research

Wilderness visitor studies have been hampered by
problems of contacting a representative sample of
visitors. Personal interviews are hard to get in useful
numbers. Special registration stations have been used
to obtain names and addresses for mail questionnaires.
Wilderness visitors have cooperated very well. About 95
percent of hikers register and two-thirds of the horse-
men, and over 90 percent of the people sampled com-
pleted and returned a questionnaire.



A large party, such as this one in Wyoming's Bridger Wilderness, probably has a much greater impact on the soil and vegetation than small parties. The effects of camping are influenced by many things: party size, length of stay, method of travel, camping methods used, season of year, character of the site, and so on. The role of all these factors needs to be analyzed to guide policy formation.

counters. There was uniform agreement regarding the desirability of "having" one's own camp.

Respondents were asked how they would feel if they met no other parties during the day on a wilderness trip. For the overall sample, nearly 15 per cent indicated meeting no one else would bother them; only 3 per cent of the purists, however, responded similarly. Furthermore, purists strongly rejected the notion that it was necessary to see others to get the most enjoyment out of their trip: only about one in ten agreed with this idea.

Thus, in terms of this first broad dimension of capacity, it seems clear purists consider low intensities of use as an important part of the wilderness experience. This is, of course, in line with the intent of the Wilderness Act and certainly fits the traditional image of wilderness.

It is misleading, however, to speak only of numbers and ignore the type of use involved. Conflicts between different travel methods or between different sizes of groups represent important considerations for any wilderness capacity policy. In western wildernesses some conflict exists between backpackers and horseback parties. This is also true, to an even greater extent, in the BWCA between paddling canoeists and outboard motor users. Thus, we sought to determine the extent to which the different travel methods were considered appropriate in the four areas.

For the three western areas together, both hiking and horse travel were acceptable; however, there was considerable difference in the magnitude of agreement about this from one area to another. Over 90 per cent of the purists in both the Bob Marshall and High Uintas felt hiking and horseback travel were appro-

appropriate ways of traveling in the wilderness. In these areas, horseback travel is common: horseback riders comprised 65 per cent of the Bob Marshall sample and 51 per cent of the High Uintas sample. In the Bridger, however, only 80 per cent felt both were appropriate. In this area, backpacking predominates: 85 per cent of this sample are hikers. Horses do create problems for the hiker—muddy trails, manure, and so forth—thus, it is not surprising to find resentment among the foot travelers.

Over half of the purists in the BWCA, however, rejected the idea that both paddling and outboard motor travel were appropriate in the wilderness. However, 83 per cent of the purists were paddling canoeists; thus, it was not surprising many felt that use of outboard motors was inappropriate.

Purists in the BWCA were quite emphatic in their belief that a great deal of difference in the individual motivation underlying wilderness use existed between people who paddled their canoe and those who used outboard motors. In the West, a majority of purists in the Bridger and the High Uintas also perceived a similar difference between people who backpack and those who travel by horse. Thus, the notion of pitting one's self against the wilderness or of dealing with it on the basis of one's own abilities seems an important part of the total wilderness experience for the purist.

This aspect was further developed when we questioned people about the type of groups they most preferred to meet. Purists in the West preferred encountering backpackers rather than horseback groups. Although just over half of the purists were backpackers, 65 per cent preferred meeting backpackers. Persons on horseback (purists as well as others) tended to be only mildly favorable towards other



The effects of misuse, especially littering, are more disturbing to most wilderness visitors than the numbers of other visitors they meet in the wilderness.

horse parties and neutral or slightly favorable to backpackers. In the BWCA, purists demonstrated a strong preference for encountering paddling canoeists (76 per cent) and a very strong rejection for those using outboard motors (85 per cent). There is a strong clash between purists in the BWCA (who are primarily canoeists) and motorboaters. It is a one-way relationship, however; motor boaters tended to enjoy seeing canoeists. They might lend a certain amount of "voyageur" flavor to the boater's trip.

We asked visitors to tell us how they would feel about encountering progressively higher amounts of use. We specified as follows: (1) meeting only backpackers (canoeists in the BWCA); (2) horseback riders (motor boaters in the BWCA).

Although some variation in response occurred among the three western areas, response of purists to encounters for the four areas are shown in Figure 1. The slope of the curve relative to backpackers is relatively gentle, but two encounters a day is about the limit for a majority of purists. However, a majority indicated they could meet only one horse-party per day and still have a satisfactory experience.

Where in the West we found a *general* similarity between the curves, the responses of BWCA purists to these two modes of travel is distinct and emphatic as shown in Figure 2. It clearly demonstrates the profound impact motor boats have on judgments of a wilderness experience for the purists and strongly suggests such use represents a major constraint on capacity standards for the BWCA.

Several past studies have reported a strong concern among wilderness visitors about "large parties." To determine whether or not "large parties" affected a person's perception of carrying capacity we asked visitors several questions concerning the appropriateness of these groups. We arbitrarily defined "large parties" as a dozen or more people.

Most purists believed that encountering a large

party reduced their feeling that they were in the wilderness. Overall, about 80 per cent of the purists rejected large parties, ranging from 75 per cent in the BWCA to 90 per cent in the Bridger.

Visitors also were asked to express a preference for the following: (1) seeing one large party during the day *or* one small party a day; (2) seeing one large party a day *or* five small parties a day; and (3) seeing one large party a day *or* ten small parties a day.

As expected, for No. 1, purists definitely favored the one small party (88 per cent); No. 2, a majority favored the five small parties (57 per cent). Surprisingly, however, for No. 3 half preferred the 10 small parties! Ten small parties would mean an average of perhaps one encounter per hour. Given the importance of solitude to the purist, we had assumed they would "trade-off" their dislike for large parties for a greater chance to enjoy being by themselves. Less than a quarter expressed a preference for the large group, however.

Obviously, our data suggest that large parties are a particularly distressing type of encounter for the purist. Although definitive data is lacking, visitor reactions to large groups may stem from one or more of the following beliefs: (1) large parties represent an inappropriate way of using the wilderness; (2) large parties create a disproportionate amount of resource damage; and (3) large parties contribute to the problems of overuse and crowding.

We found that where one meets other groups makes a lot of difference in terms of how those encounters affect satisfaction. There are two basic locations where encounters take place; while traveling (along trail, lake, or portage) or at the campsite. When given a choice, most purists did not object to meeting others around the periphery of the wilderness. Encounters in the "interior" were considered especially disturbing, particularly if they occurred near one's own campsite.

Almost 90 per cent of the purists agreed that it was

best when no one else was near their camp. When questioned as to what they would do if others set up camp nearby, between 80 and 85 per cent of the purists in each area indicated they would experience a loss of enjoyment; many indicated they would either cut their trip short or move their camp.

The notion of a campsite isolated from others seems an important part of the wilderness experience. Perhaps it is the quality of having a location where one can interact primarily with nature undisturbed by his fellowman (which in itself may be a major underlying motivation for much wilderness use) that makes the solitude of the campsite so important.

We also focused on two aspects of human behavior that leave their mark on the wilderness experience as well as on the environment: campsite damage and littering. We expected, and found, strong concern about sites that showed evidence of overuse; soil erosion, damaged vegetation, and so forth. The concerns about damage and littering were uniform among the areas and purists did not show any more concern than did the overall sample.

We also asked visitors which bothered them more: seeing too many people or finding a littered campsite. Nearly 70 per cent of the purists were bothered more by finding litter than seeing too many people. This, of course, has considerable significance for wilderness managers inasmuch as intensifying litter clean-up represents a much less controversial action than does restricting use.

Are our wildernesses presently being used beyond their carrying capacities? To some extent, the answer is yes. Slightly more than a third of the purists indicated they felt the area they had visited was "over-used," at least in some portions. Generally, these

"zones of crowding" (as we labeled them) were related to two factors: (1) well-developed access, both in terms of roads leading to the wilderness boundary and trails within the wilderness proper, and (2) opportunities for good fishing, especially in areas that were readily accessible to the day visitor. We found such "zones of crowding" along such places as the South Fork of the Flathead River in the Bob Marshall Wilderness (an area of fairly open country along the river) and in the Island Lake-Seneca Lake complex in the Bridger Wilderness (an area possessing good fishing and very accessible to visitors).

What Is Wilderness Quality?

What exactly do we mean when we speak of managing for a "high quality wilderness experience." We do not imply that wilderness recreation represents one end of a quality continuum, and some type of mass recreation experience is at the other end. There are high and low quality wilderness recreation experiences as there are high and low quality mass recreation experiences. For wilderness experiences we judge quality against both a legal framework (the Wilderness Act) and the perception of those visitors we define as purists. Thus, a "high quality" experience would be characterized by a very few encounters with others in an environment where man's evidence was minimal. Camping locations would afford the visitor complete solitude. In the BWCA, this would also involve no encounters with outboard motors. Conversely, we could define a "low quality" wilderness experience as one involving numerous encounters, perhaps with large parties, an inability to locate an isolated camp, and where one continually encountered evidence of man's presence.

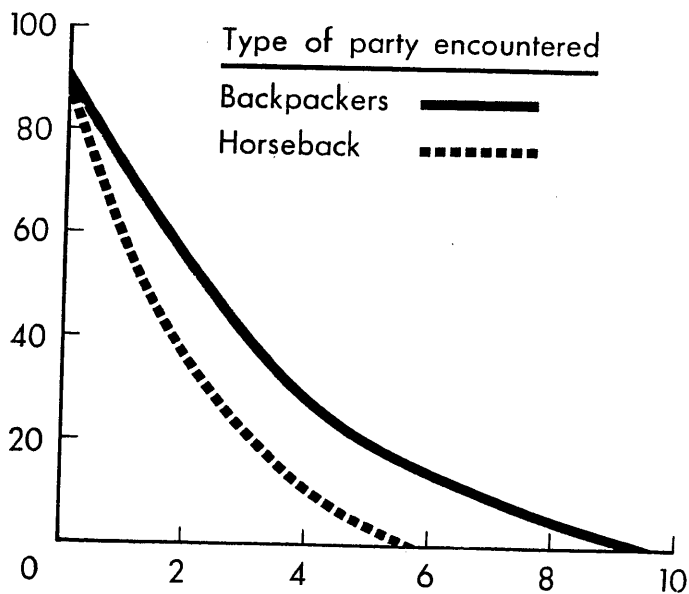


FIGURE 1—Curves showing changes in percentage of purists in three western study areas having a satisfactory wilderness experience with an increasing number of encounters.

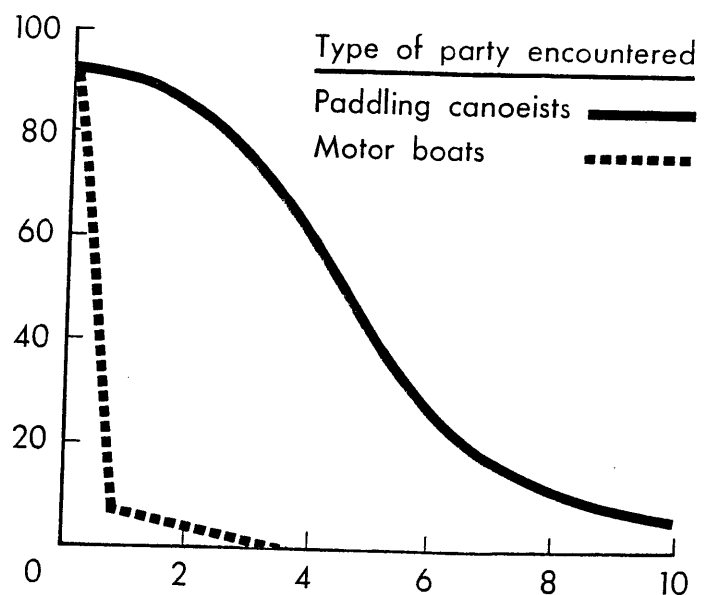


FIGURE 2—Curves showing changes in percentage of purists in the BWCA having a satisfactory wilderness experience with an increasing number of encounters.

