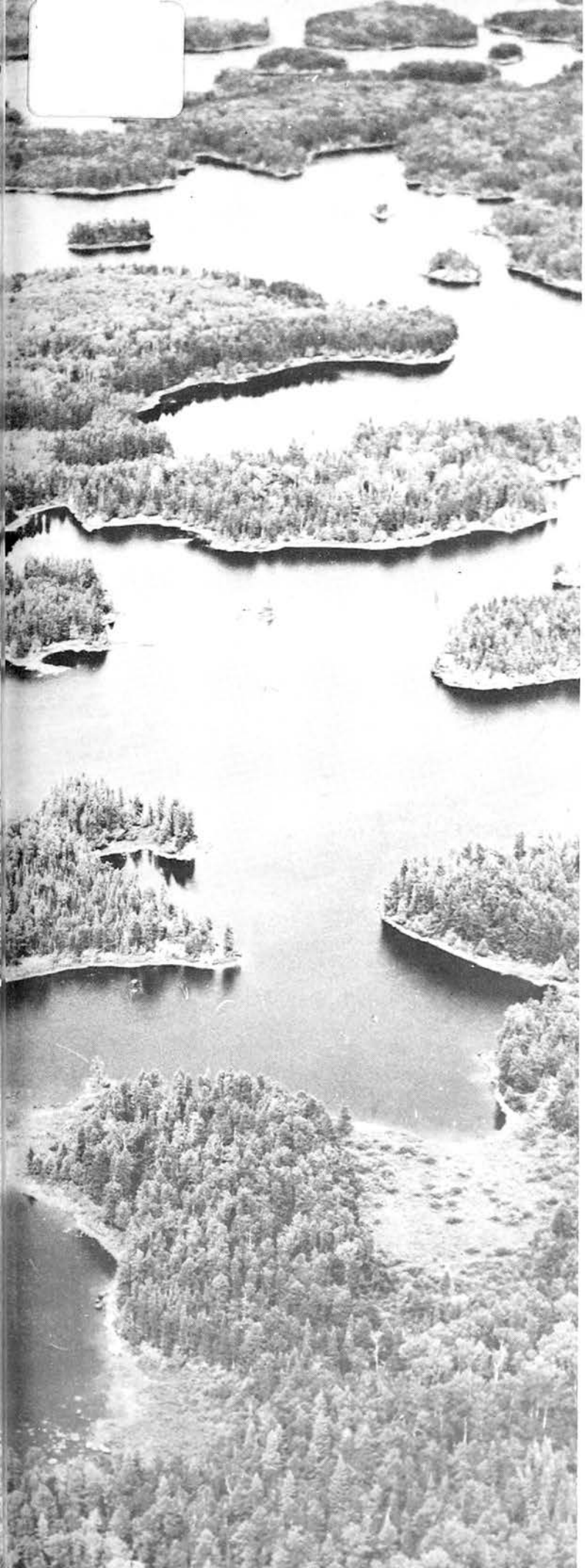

VISITOR PERCEPTION OF WILDERNESS RECREATION CARRYING CAPACITY

George H. Stankey

USDA Forest Service
Research Paper INT-142, 1973

INTERMOUNTAIN FOREST &
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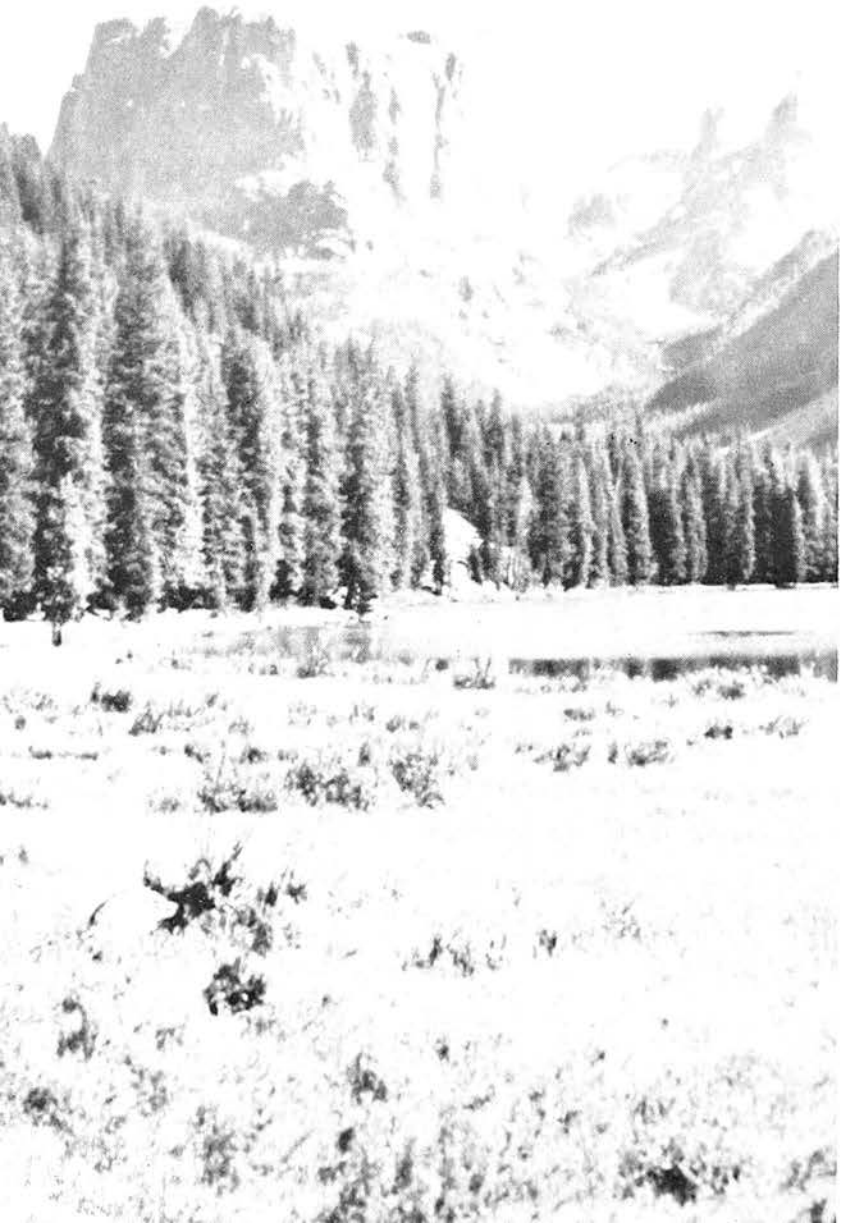

MAJOR FINDINGS

Visitor Attitudes About Use

- MOST WILDERNESS VISITORS CONSIDER LOW INTENSITIES OF USE, INVOLVING ONLY A FEW ENCOUNTERS, AS AN IMPORTANT DIMENSION OF THE WILDERNESS EXPERIENCE.

- THERE IS NOT A UNIVERSAL REJECTION OF PEOPLE. RATHER, MOST VISITORS INDICATED THAT PARTICULAR CHARACTERISTICS OF THE GROUPS THEY ENCOUNTERED, SUCH AS SIZE, METHOD OF TRAVEL, OR BEHAVIOR, WERE MORE IMPORTANT DETERMINANTS OF SOCIAL IMPACT THAN THEIR MERE PRESENCE.

- THE APPEAL OF WHAT WE MIGHT LABEL AS "SOLITUDE" IS A BROAD, GENERIC ONE. HOWEVER, INDIVIDUAL DIFFERENCES IN AREAS (e.g., TYPE OF RECREATIONAL USE, LEVEL OF USE, ETC.) ARE REFLECTED IN THE VARYING DEGREES TO WHICH SOLITUDE IS CONSIDERED DESIRABLE.

- DEFINITE NORMS EXIST REGARDING APPROPRIATE METHODS OF WILDERNESS TRAVEL. IN THE WESTERN AREAS, ALTHOUGH CONFLICTS DO EXIST, HIKING AND HORSEBACK TRAVEL ARE GENERALLY CONSIDERED APPROPRIATE BY USERS AND THIS COINCIDES WITH MANAGEMENT GUIDELINES. HOWEVER, IN THE BWCA, SERIOUS CONFLICTS EXIST BETWEEN CANOEISTS AND MOTORBOATERS: WHAT IS APPROPRIATE IN TERMS OF THE WILDERNESS ACT IS NOT APPROPRIATE IN THE VALUE STRUCTURE OF MANY USERS.

- CONFLICTS BETWEEN GROUPS ARE OFTEN ENHANCED BY THE LACK OF A SHARED VALUE SYSTEM.

- GENERALLY, HIKERS AND CANOEISTS SHOWED A PREFERENCE FOR ENCOUNTERS WITH OTHER HIKERS AND CANOEISTS AND INDICATED THEY PREFERRED NOT TO MEET HORSEBACK PARTIES OR MOTORBOATERS. HORSEBACK RIDERS AND MOTORBOATERS, ON THE OTHER HAND, WERE LESS DISCRIMINATING ABOUT ENCOUNTERS. THEY GENERALLY INDICATED EITHER A PREFERENCE FOR, OR "DON'T CARE" RESPONSE TO, OTHER TRAVEL METHODS.

- THERE IS AN INVERSE RELATIONSHIP BETWEEN THE DEGREE OF EXPOSURE TO OTHER METHODS OF TRAVEL AND THE EXTENT TO WHICH THESE OTHER GROUPS ADVERSELY AFFECT VISITOR SATISFACTION.

- THE PERCEIVED IMPACT OF A GROUP (BOTH IN AN ECOLOGICAL AND SOCIOLOGICAL SENSE) IS A MAJOR DETERMINANT IN HOW VISITORS DEFINE THE APPROPRIATENESS OF THAT GROUP. A SINGLE PARTY OF 30 PEOPLE WAS SEEN AS MORE OF AN INTRUSION ON THE WILDERNESS EXPERIENCE THAN TEN GROUPS OF THREE PEOPLE EACH.

(con. on inside back cover)

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VISITOR PERCEPTION OF WILDERNESS RECREATION CARRYING CAPACITY

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CONTENTS

ABSTRACT

Nearly 500 visitors to four wildernesses--The Bob Marshall in Montana, the Bridger in Wyoming, the High Uintas in Utah, and the Boundary Waters Canoe Area (BWCA) in Minnesota--completed a questionnaire designed to obtain data on four parameters of use that could potentially affect capacity standards: (1) Level of use encountered; (2) type of use encountered; (3) location of encounters; and (4) effects of depreciative behavior (littering).

Previous studies have indicated that a diversity of attitudes exists among wilderness users. This diversity makes it difficult for managers to interpret and incorporate visitor desires in decisionmaking because such attitudes may be inconsistent with other constraints the manager must consider.

One portion of the questionnaire was designed to obtain a measure of the extent to which the respondent's personal concept of wilderness coincided with that given by the Wilderness Act. Fourteen aspects of wilderness, defined in the Act, were presented. Those persons whose concepts most closely coincided with that of the Wilderness Act were labeled as "strong purists." It was reasoned that the attitudes of those labeled as "strong purists" are of particular relevance to management in decisions regarding appropriate use levels, use control techniques, and physical improvements of wilderness.

The amount of use a visitor encounters on a wilderness trip clearly influences his satisfaction. Solitude is expected by most persons. Most visitors rejected the idea that meeting other parties was an enjoyable experience. Although there was a generally wide ascription to the norm of few or no encounters, many noted that certain characteristics of the encountered groups affected their satisfaction more than did the encounter per se.

One characteristic cited, for example, was method of travel. In the western areas, conflicts do exist between hikers and horseback parties. Hikers tended to be "purists." The conflict was largely one-sided; horseback groups did not strongly object to hikers. Hikers, however, indicated conflicts with parties traveling with stock. In the BWCA, 85 percent of the canoeists were purists, who strongly resented parties using outboard motors.

Large parties had an adverse impact on visitor satisfaction. Two-thirds of those sampled indicated that encountering a large party reduced the sense of being in a wilderness. Given a choice of meeting one large party during the day or no one else, or of meeting from one to 10 small parties, visitors consistently favored the small parties.

Most preferred encounters on trails as opposed to encounters near campsites. There were indications that (a) people normally expect encounters near the periphery of the wilderness and (b) this expectation seemingly modifies the adverse impact of such encounters. Most preferred campsites that provided solitude.

Two-thirds of those sampled were more disturbed by seeing litter than by seeing too many people. This suggests that certain widely-held value systems exist with regard to wilderness and also introduces the possibility of a hierarchy of stimuli having varying degrees of impact on visitor satisfaction.

No one type of use control technique was favored by a majority of visitors. A mail reservation system, involving a limited number of permits, was the most acceptable. Strong purists tended to be somewhat more favorable to the concept of use controls.

Indirect controls (i.e., modification of wilderness infrastructure, manipulation of access) were more favored than direct controls. Horseback riders were more opposed than hikers to the elimination of trails. Both canoeists and motorboaters favored leaving portages rough; however, motorboaters opposed blocking off access roads to wildernesses.

Sixty percent of the canoeists in the BWCA favored limits on party size; 64 percent of those using outboard motors opposed such limits. Visitors to the three western areas were generally in favor of controlling party size. Strong purists favored limiting party size to a somewhat greater degree than did others.

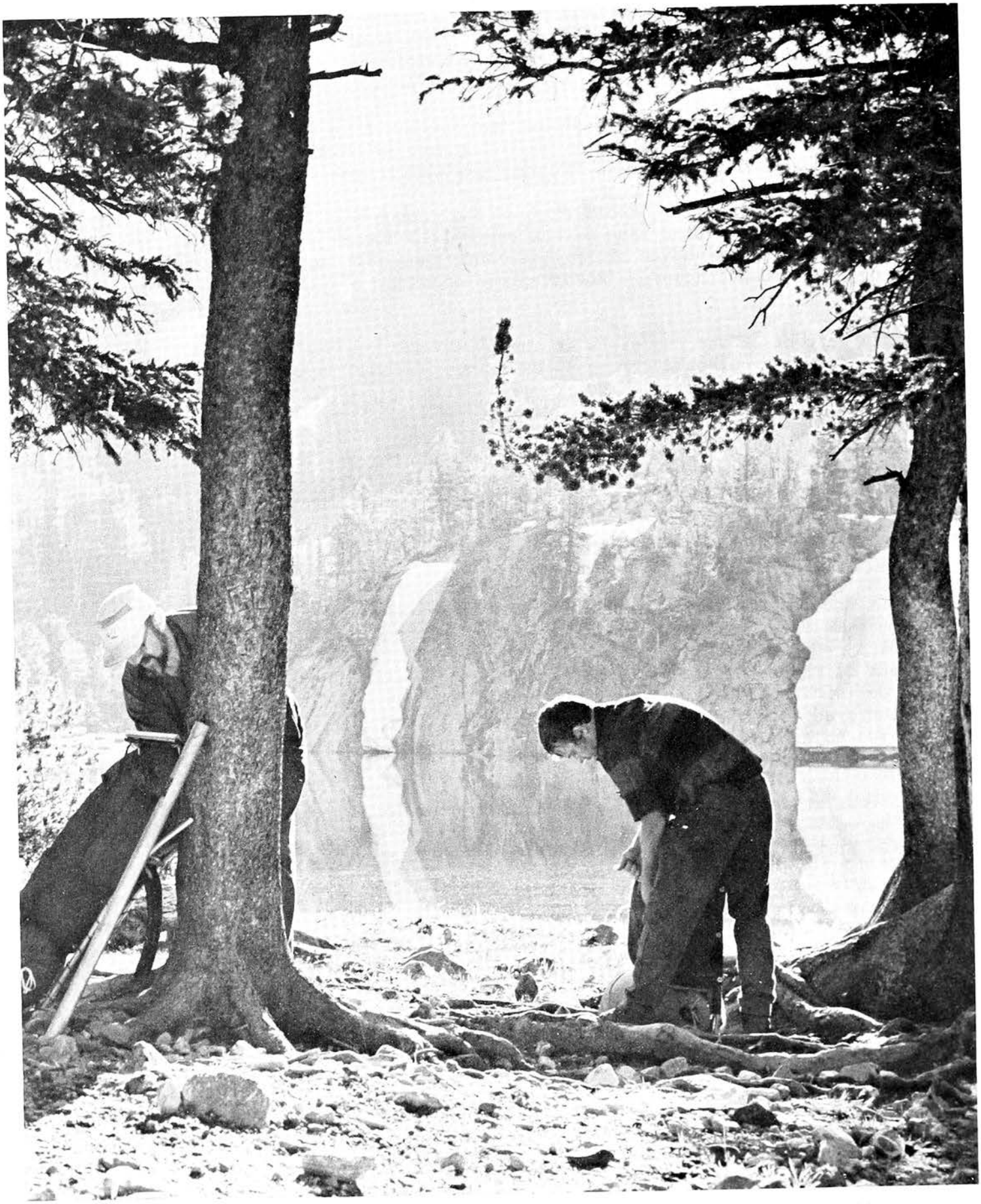
Certain managerial actions designed to protect the resource or provide a more even distribution of use could offset potentially adverse impacts on the wilderness environment. However, most of these actions were opposed by visitors. Physical modification appears to be an unacceptable method of enhancing carrying capacity. Provision of more maps and brochures, and use of wilderness rangers were well accepted methods of influencing wilderness use.

About one out of four visitors felt the wilderness they visited was crowded. Strong purists showed even more sensitivity: about one-third felt the area was crowded. In the BWCA, 40 percent of the canoeists complained of crowding compared to less than 20 percent of the motorboaters. This difference appears related, in part, to the broader definition canoeists gave "crowding," which included both the level and type of use encountered. In the Bridger, about one-third of those complaining of crowding took some action to avoid it. A similar percentage of strong purists tried to avoid the crowding they found.

All four wildernesses had areas defined as crowded. These areas generally were related to well-developed exterior access, scenic attractions, and good fishing opportunities. Visitor definitions of crowding included references to litter, excessive levels of use, and damage associated with livestock grazing.

Several broad types of action are suggested that might increase visitor satisfaction: (1) Limit on party size; (2) better control and cleanup of litter; (3) availability of information and educational materials to inform visitors of other recreational opportunities; (4) a ban on motor craft in the BWCA; (5) a more critical examination of the extent and quality of exterior access to the wilderness; (6) fish and game regulations to control the temporal distribution of use and, to some extent, the type of use; (7) encouragement of "off-season" use; (8) zoning to eliminate conflicts between use types and to protect the resource during critical periods; (9) closure of damaged campsites; and (10) a greater effort to inform the public about the objectives of the National Wilderness Preservation System.

A prototype model to simulate wilderness travel and provide probabilistic measures of encounters is introduced. Although such a model will not make decisions regarding rationing, it will provide administrators with estimates of the consequences of alternative courses of action regarding use control.



Most visitors prefer camping spots near a lake. Estimates of an area's ability to provide a satisfactory wilderness experience may be limited by overnight camping locations on lakes that provide visitors with solitude.

BACKGROUND

This study explores the complex issue of wilderness recreation carrying capacity. Resource managers today find themselves facing difficult decisions regarding the numbers and kinds of use wildernesses can support while meeting the preservation objectives of the Wilderness Act. Decisions that lack a factual basis can lead to irreversible damage to the resource as well as fail to give a quality experience to the visitor. Furthermore, increasing use of the courts by groups dissatisfied with public land management practices stresses the need for decisions based upon the best scientific data available.

Carrying Capacity Concept

Carrying capacity is a fundamental concept in resource management. Traditionally, its primary use has been associated with activities such as range management. Basically, it is the concept that various environmental resistance factors set limits beyond which no major increases in the dependent population can occur (Odum 1959).

The term has some intuitive appeal to recreation management; it has become, in fact, a common, if not agreed upon, part of the recreation management terminology (Chubb and Ashton 1969). Of course, recreational impacts on the physical-biological features of a site are analogous in many ways to the impact of grazing on the range resource. However, in the context of outdoor recreation, we are not only interested in the response of the biological parameters of the site, but also in how the recreational experience changes. When we consider the recreational experience and its relationship to the carrying capacity concept we can again conceive of an output subject to change under increasing use pressure.

The underlying fact of *change* is basic to a grasp of the carrying capacity concept. Any use results in change; for example, we know that fairly low levels of use can lead to marked changes in the biological regime (Frissell and Duncan 1965). The social quality of a recreational experience also is subject to swift and substantial changes in the face of increasing use. The fundamental question in studying carrying capacity is "How much change do we allow?" To answer that question, we must first specify what it is we are attempting to provide; i.e., the management objectives must be clearly defined.

Traditional models of carrying capacity have been founded on two major assumptions. First, it has been assumed that increasing use resulted in a declining quality of output, whether measured in terms of the recreational experience or environmental quality. However, evidence suggests this assumption is false. For example, studies of the biological impact of recreationists on sites have revealed that vegetational changes at recreation sites vary in complex ways that do not correspond with the simple linear model of change expected. LaPage (1967) found that some measure of recreation use other than simple use intensity was required to explain camping impact on vegetation. Vegetation in selected California National Forest campgrounds showed an overall improvement

over a 5-year period (Magill 1970). This improvement was attributed to "adjustment" to recreational use.

Similarly, we find that user definitions of quality do not subscribe to any simple linear relationship between use and satisfaction. To the contrary, for some opportunities, visitor satisfaction is enhanced by increasing use (Wagar 1964). As was the case with ecological change, simple use intensities do not appear to be a sufficient predictor of the recreationist's definition of satisfaction. Method of travel is one use parameter that appears to be more critical for many than the level of use encountered (Lucas 1964).

A second major conceptual basis of traditional capacity models has been a belief in the existence of a determinable figure that represented the "capacity" of recreation land (Wagar 1968). This belief in some inherent quality of land to withstand use has had several unproductive results. It has led to a focus of attention on the biological and physical impacts of recreation, often ignoring the social consequences of increasing use pressures. Moreover, the belief in a single capacity has constrained our thinking and imagination in how to deal with overuse problems. Too often we have not adequately considered the potentially fruitful role of a measure such as capital investment to increase an area's recreational capacity. Perhaps most significantly, the belief in a discrete measure of recreation capacity has led to considerable expenditure of resources and energy in pursuit of that value. Because of the simplistic nature of the traditional model of capacity, we have failed to consider some of the complex but fundamental issues in order to resolve the growing disparity between wilderness demand and supply. To accomplish this, a new model of carrying capacity should be considered.

Limits of Acceptable Change

An alternative model of carrying capacity calls for the establishment of limits in the change that may occur in the ecological and social qualities of a recreational opportunity (Frissell and Stankey 1972). This model recognizes the inevitability of change and relates the process of change to various considerations that will assist managers in defining the "limits of acceptable change." As suggested earlier, the management objectives for the area will be a major influence on such a decision. The model as it applies to wilderness is outlined in figure 1.

Although varied sources can lead to changes in the wilderness environment, our attention focuses on those related to recreation use. Moreover, we will address ourselves only to the issues concerning change in the wilderness experience or what we might refer to as the "social side of carrying capacity," although the wilderness resource consists of two interlinking dimensions (wilderness ecology and the wilderness experience).

The need to define "limits of acceptable change" (LAC) for wildernesses stems from the explicit directive of the Wilderness Act that calls for "the preservation of their wilderness character" [Public Law 88-577]. Increasing demand, coupled with limited opportunities for expansion of the supply sector (outside extraordinary levels of capital expenditure), has created conditions in many areas that make the "preservation of wilderness character" extremely difficult. For example, recreational visits to USDA Forest Service Wildernesses and Primitive Areas increased 14-fold between 1946 and 1970; in this same period, designated wilderness acreage increased only about 3 percent. Although estimates indicate substantial growth in the demand sector, the supply of wilderness is distinctly limited. The recent Roadless Area Review conducted by the Forest Service indicated about 55 million acres of *de facto* wilderness acreage existed in the National Forests. An earlier estimate suggested the wilderness system might reach about 47 million acres, or about 2.5 percent of the conterminous United States (Stankey 1971). Thus, the prospect of added acreage to increase use capability is only a shortrun solution for the wilderness system. One should also recognize that adding acres does little to increase capacity in a net sense because present *de facto* areas already sustain considerable use.

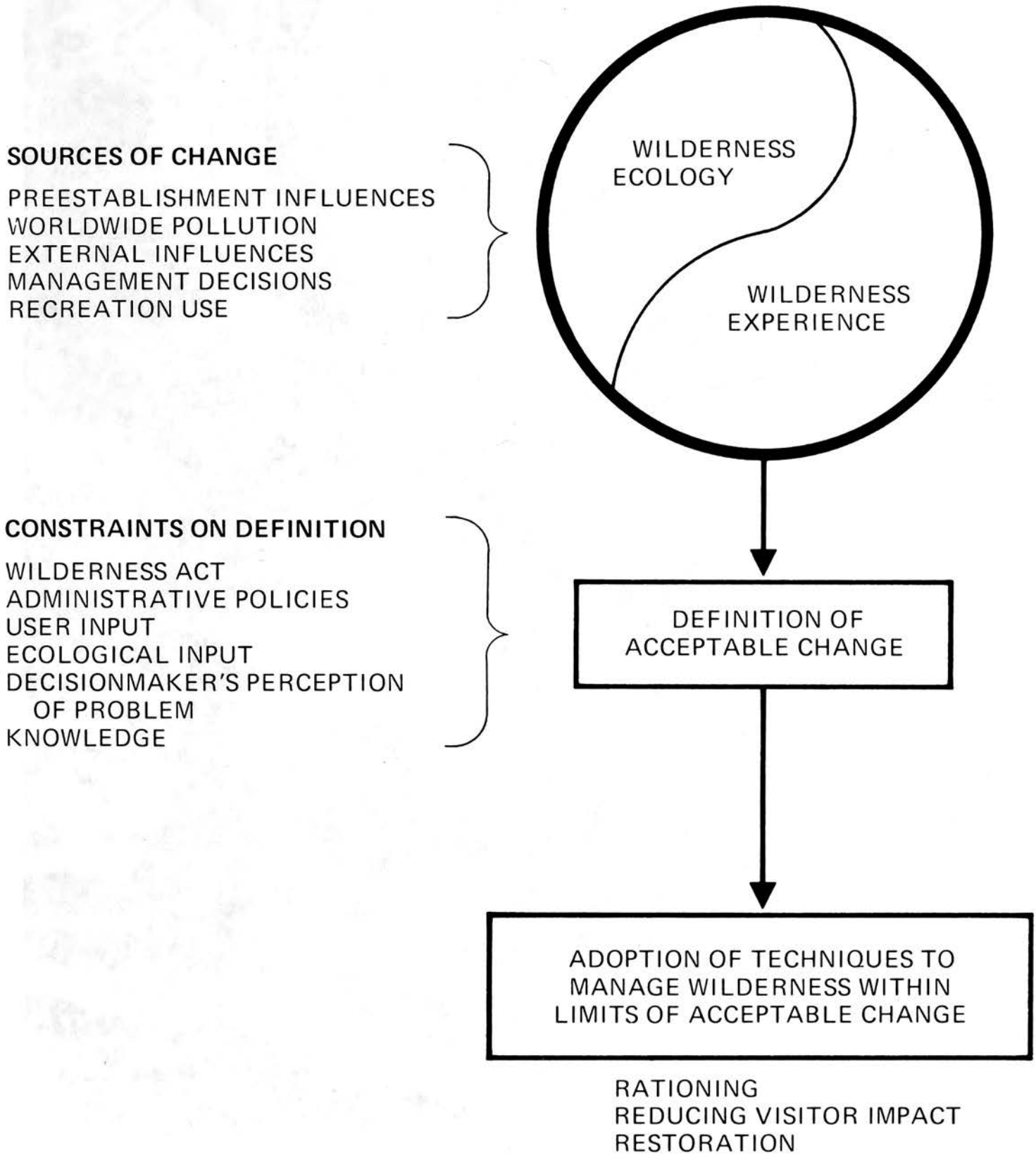
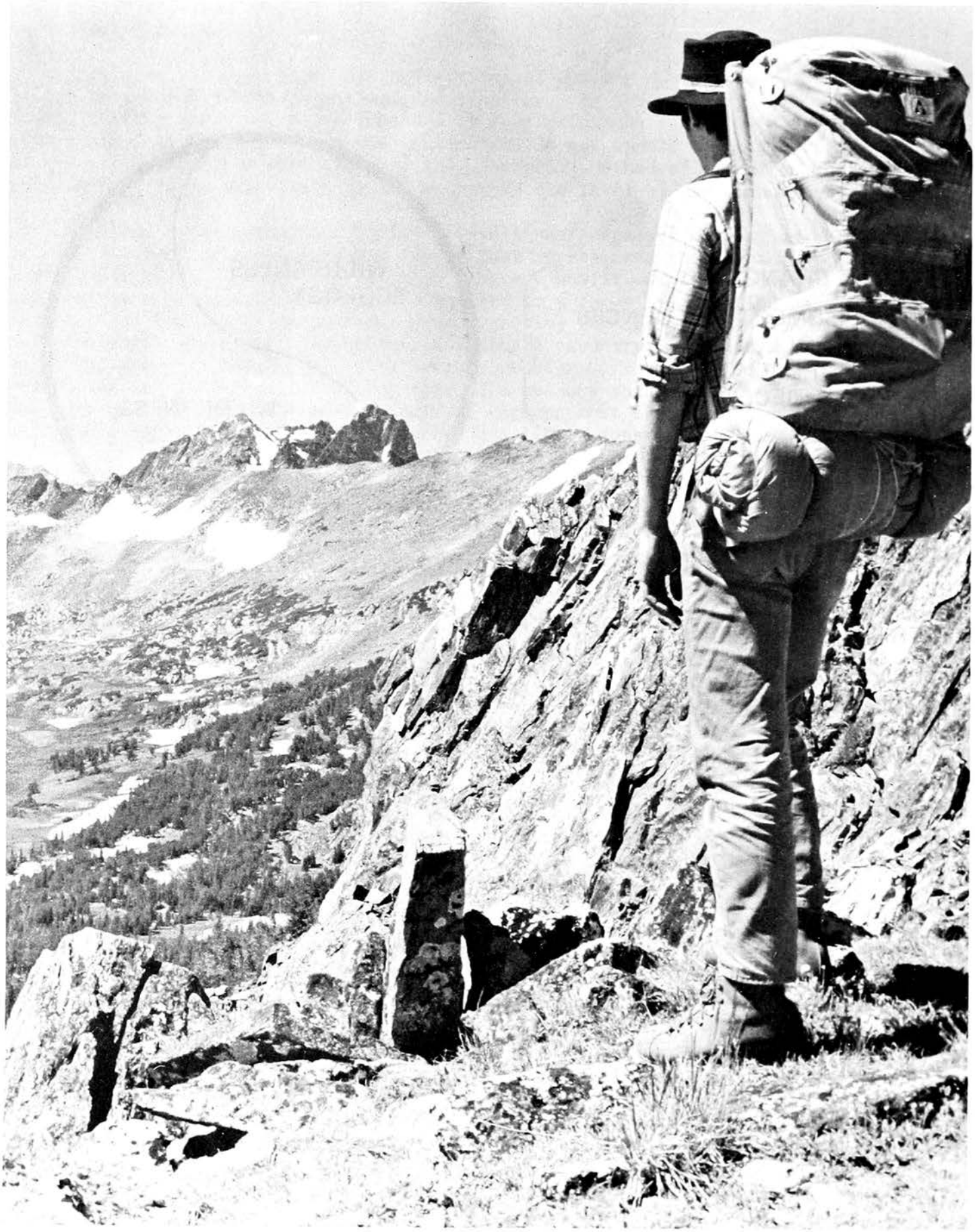


Figure 1.--Model of carrying capacity as it applies to Wilderness.



Solitude and the opportunity for a primitive and unconfined kind of recreation are keystones to wilderness recreation.

Providing the type of recreational opportunity described by the Wilderness Act ("Outstanding opportunities for solitude or a primitive and unconfined type of recreation") will be increasingly difficult in the face of the pressures described above. The institution of rationing or of other management measures to offset congestion externalities is a certainty. When considering these measures, however, we are immediately beset by confounding questions as how to measure subjective attributes such as solitude, crowding, and quality.

As a hypothetical concept, we could describe a "pristine wilderness experience" as one offering complete solitude in a completely natural environment, where the visitor will witness no artifact of civilization. Of course, we know present Wilderness does not provide such an opportunity; different areas provide varying degrees of departure from this construct. However, at what point does departure from this construct lead to excessive change in the experience offered the visitor?

Visitor perception of wilderness quality could be influenced by three broad factors: (1) Recreation use-related influences; (2) environment-related influences; and (3) management-related influences. Our interest here focuses on the first category (use-related influences), which we can break down into four principal problem areas: (1) Level of use; (2) type of use; (3) spatial-temporal variations in use; and (4) depreciative behavior. By probing user definitions of carrying capacity, we can focus attention on some of the fundamental research issues to be considered in defining the limits of acceptable change.

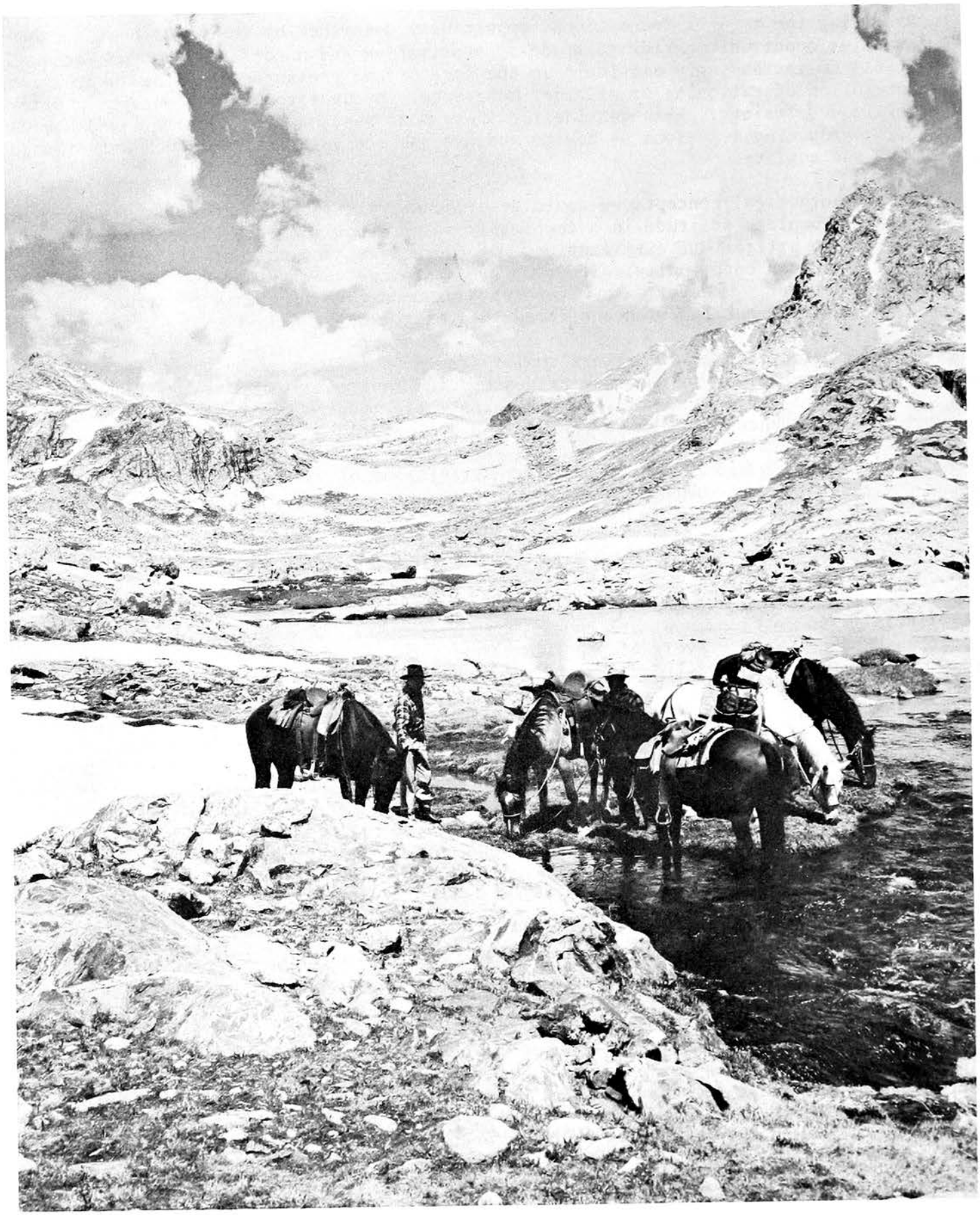
Sociological Aspects: Conceptual Issues

The amount of use encountered represents an obvious source of impact on visitors, but little is understood about its specific effects. Are there thresholds of sensitivity toward other users, levels of use that, when exceeded, result in an appreciable loss of quality for the visitor? What is the source of impact for the visitor; is it the mere presence of others or perhaps more subtle influences that are somewhat independent of use levels? To what extent is the absence of meeting other users considered to be an important component of the wilderness experience? To what extent do encounters provide intergroup social interaction that enhance the visitor's experience? What is the nature of the differences (if any) between intergroup and intragroup social exchange?

A second parameter of interest is the type of use encountered. An obvious variable is method of travel. What is the nature of the conflicts (if any) that exist between different travel methods? Again, are there thresholds of sensitivity toward other kinds of groups? In what way do conflicts relate to the predominant method of travel in an area? Does continued exposure to other travel methods generate increased tolerance toward them? To what extent does the type of group one is traveling with influence his perception of other groups?

Encounters vary not only in number and kind, but also in space and time. How does the location of an encounter vary in its impact on visitor satisfaction? Does the user develop some sort of "mental map" of the wilderness which recognizes that certain kinds or levels of use are appropriate in some zones and not in others? In what way do encounters on the trail vary in their impact on satisfaction from encounters while camped? Do visitors recognize "trade-offs" between encounters spread evenly throughout some time period and those that are bunched together, leaving substantial periods free of any encounters?

Finally, what role does behavior play in the social carrying capacity system? Are there accepted social norms that govern behavior in wilderness and to what extent do violations of these norms affect other users? How are these norms communicated? And, how do violations of established norms relate to other dimensions of social carrying capacity in terms of effects on visitor satisfaction?



Much of the Bridger Wilderness shows evidence of intense glacial action. Numerous lakes dot the area. The thin soils support only limited vegetation and stock use can have severe ecological impact.

PROCEDURES AND STUDY STRATEGY

The principal objective of our study was to provide some insight into wilderness visitor attitudes toward the use parameters of amount, type, distribution, and behavior. We also sought to probe visitor attitudes toward not only the concept of use rationing, but toward some specific rationing techniques. Finally, we attempted to measure the relationship between actual recreation use encountered and the respondent's perception of capacity. The study was conducted during the summer of 1969.

Four Areas Studied

Four areas were selected for study: 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 (fig. 2).

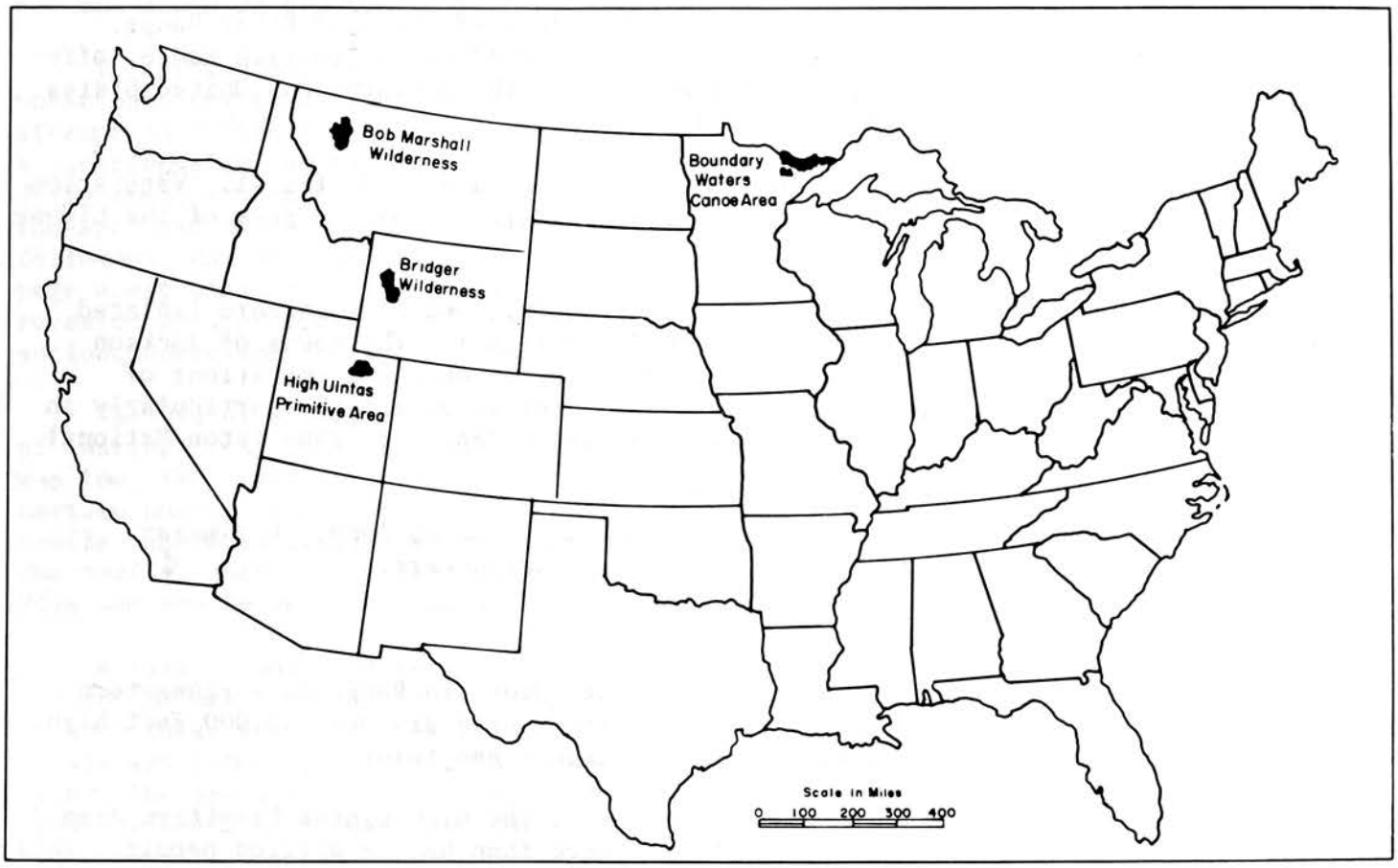


Figure 2.--Four study areas were selected providing a broad backdrop of environmental and use characteristics against which to study carrying capacity.

The Bob Marshall Wilderness

The Bob Marshall Wilderness lies astride the Continental Divide in western Montana on the Flathead and Lewis & Clark National Forests. It encompasses 950,000 acres; it is the largest of the three western study areas, and was designated a Wilderness in 1940. Elevations range from 4,000 to over 9,000 feet along the Continental Divide, which runs north-south through the middle of this wilderness. There is not a large number of lakes, but several river systems flow through this wilderness, including the Flathead system, composed of the South Fork, Middle Fork, Spotted Bear, and White Rivers, which drains the western part of this wilderness. Areas along the South Fork are open and parklike. Some areas adjacent to the North and South Forks of the Sun River, on the eastern side of the wilderness, also are open and parklike.

Over 66,000 visitor-days were recorded during 1969 in this wilderness. Estimates indicate that most travel was by horseback and that nearly 60 percent of this use occurred during the fall.

The Bob Marshall Wilderness is relatively remote from any major population center. However, it is within a 2-hour drive of western Montana's main urban areas: Missoula (50,000), Great Falls (60,000), Helena (22,000), and Kalispell (11,000).

The Bridger Wilderness

The landscape of the Bridger Wilderness is striking and dramatic; extensive glacial action has left its mark. Over 1,300 lakes dot the area. The only major river is the Green River, which drains the northwest end of this wilderness. Along the crest of the Wind River Mountain Range, the Continental Divide forms the north and east boundaries of this 383,300-acre wilderness.

Several permanent glaciers are found along the crest of the Wind River Range. These glaciers, coupled with the rugged terrain of the Wind River Mountain Range, offer some of the best rock and ice climbing opportunities in the conterminous United States. Many of the peaks range between 11,000 and 13,000 feet.

The intense glacial scouring has left much of the area devoid of soil. Vegetation is sparse in many areas; soils are unstable under even limited use in some of the higher basins, especially during early summer.

The Bridger Wilderness is located in western Wyoming, and is even more isolated from any major center of population than is the Bob Marshall. The towns of Jackson (1,000), Lander (4,000), and Rock Springs (10,000) are the only concentrations of population nearby. However, tourist travel in this area is very high--particularly in the summer--primarily because of the proximity of Yellowstone and Grand Teton National Parks, which are 2 hours' driving time northwest.

Over 111,000 visitor-days were recorded in the area during 1969. Estimates indicate that about three-fourths of this use was by backpackers.

The High Uintas Primitive Area

The High Uintas Primitive Area lies on the Uinta Mountain Range in northeastern Utah. Several peaks within this 237,177-acre Primitive Area are over 13,000 feet high. Extensive alpine glaciation has created numerous cirques and tarns.

Unlike the Bob Marshall and Bridger Wildernesses, the High Uintas Primitive Area lies only 50 miles east of a population center of more than half a million people. This includes Salt Lake City, which is the largest of the network of cities between Logan and Provo. The western boundary of the Primitive Area lies only a short distance from State Highway 189, a major route of travel to Salt Lake City.

Over 100,000 visitor-days were recorded in the Primitive Area during 1969; this use was evenly divided between foot and horse traffic. A considerable amount of it was day use.

The Boundary Waters Canoe Area

The Boundary Waters Canoe Area (BWCA) presents a wilderness environment that is very dissimilar to the three western areas. Lakes are a major feature of the landscape, occupying 16 percent of this area's 1,029,257 acres. Local relief within the area is low (500 feet is about the maximum); however, numerous rock outcrops provide scenic variation.

The BWCA lies within relatively easy driving distance of St. Paul-Minneapolis and Chicago. Access directly into the BWCA is extensive; in fact, visitors can drive close to the boundary along much of the area. Users may enter at 70 locations; however, eight of these locations account for nearly 80 percent of the total use.

This area is the only formally designated wilderness in the Midwest; thus, alternate wilderness opportunities are almost nonexistent in this region. Because of this, use pressures on the BWCA are intense.

Recreational use of the BWCA totaled nearly 800,000 visitor-days in 1969, more than any other unit of the National Wilderness Preservation System. A mandatory free-use permit has been in effect since 1965.

Collection of Data

Fieldworkers contacted exiting parties at the trail heads; all persons 15 years old and above were asked to participate. Less than 1 percent refused to cooperate.

To eliminate potential interviewer bias, the visitors were asked to complete the questionnaires themselves. Field personnel were instructed that they should only attempt to obtain the names and addresses of persons who appeared to be "in a hurry." A questionnaire was then mailed to each of these persons. No statistically significant difference existed in responses obtained from those who completed the questionnaires on the spot and those who were mailed questionnaires. A 78-percent return, using two followups, was obtained from the total of 248 questionnaires that were mailed. A one-page questionnaire mailed to those persons failing to complete the more lengthy form revealed no significant difference between respondents and nonrespondents on selected socioeconomic and attitudinal variables.

The use of wilderness trails varies greatly. Therefore, to eliminate the problem of wasting field time on trails where the probability of encountering an exiting party was low, the trail heads were stratified on the basis of probability of encountering a certain number of exiting parties each day. Two categories were defined: *high use trails*, where an average of at least two parties per day could be expected; and *low use trails*, where an average of from one to two parties per day could be expected. *High use trails* were sampled at twice the intensity of *low use trails*.

Actually, only 493 persons were contacted: 362 observations on *high use trails*; 131 on *low use trails*. Kish (1967) noted that sampling rates can differ between strata if such rates are uniform within strata, provided that the *simple* sums of the stratum totals are properly weighted to compensate for unequal sampling fractions. In this study, the sampling ratio between strata was 2:1. Therefore, observations obtained from *low use trails* were duplicated; this resulted in an adjusted sample size of 624.

Construction of the Questionnaire

The questionnaire was designed to provide (a) a description of the party; (b) information regarding previous outdoor recreation and wilderness experiences; (c) attitudes and perceptions toward various parameters of wilderness recreation use; (d) attitudes toward possible management alternatives regarding wilderness carrying capacity; and (e) a socioeconomic description of the respondent. Data from (c) and (d) form the focus of this paper.

Two sets of attitude statements were developed.

First, 18 items were constructed that focused on (a) attitudes toward encountering various *levels* of use in the wilderness, (b) attitudes toward various *forms* of use in the wilderness, and (c) attitudes toward various wilderness management policies. A five-point scale was provided for each item, ranging from "strongly agree," to "strongly disagree."

Second, 14 items were constructed as follows to meet the need for a unit of analysis that would recognize the wide range of individual involvement, concern, and knowledge about wilderness among the respondents:

1. Absence of manmade features, except trails
2. Lakes behind small manmade dams
3. Gravel roads
4. Private cabins
5. Stocking the area with kinds of game animals that were not native to the area
6. Developed campsites with plank tables, cement fireplaces with metal grates, and outhouses
7. Lots of camping equipment to make camping easy and comfortable
8. Stocking the area with kinds of fish that were not native to the area
9. No motorized travel by visitors
10. Forests, flowers, and wildlife much the same as before the pioneers
11. Solitude (not seeing many other people except those in your own party)
12. Covers a large area (at least 25 square miles)
13. Remote from towns or cities
14. Little evidence of other visitors before you

Ten of the items concerned three basic dimensions the Wilderness Act defines as integral elements of wilderness: (1) Natural ecosystem; (2) a minimum level of human influence; and (3) primitiveness of the recreational opportunity. The remaining four items related to (a) solitude; (b) little evidence of other visitors, (c) remoteness of wilderness from urban areas, and (d) size of wilderness.

Lucas (1964) used method of travel as an approximate surrogate of the respondents' attitudes about wilderness. The Wildland Research Center (1962, p. 135) utilized prior wilderness experience as "a rough and admittedly partial measure of commitment." Both of these efforts were aimed at differentiating wilderness users in a manner that would enable the land manager to translate user values and preferences into actual management decisions, consistent with ecological and policy constraints.

In another study, an attitude scale was developed to differentiate wilderness users on the basis of the underlying values that govern their attitudes toward wilderness (Hendee and others 1968). The scale consisted of 30 short statements relating to features, activities, and benefits ascribed to wilderness and identifying values that persons having a strong wilderness-purist set of values might hold more intensely than those having a less demanding concept of wilderness. This scale was focused on how users perceived certain features, activities, and benefits of wilderness.[1] The scale developed for use in our study was focused on wilderness as defined by the Wilderness Act. The difference between the two scales is important. Both scales provide operational definitions, but it is difficult to state whether they relate to the same construct.

Respondents replied to the items listed on page 10 on the basis of the item's desirability *in the context of wilderness*. A five-point affective scale, ranging from "very undesirable" to "very desirable," was provided for answering. These responses were accorded values from one to five and a total score was computed for each individual. The possible range of scores was between 70 and 14. Scoring was arranged so that a person who held strong "purist" ideas (i.e., consistent with wilderness as defined by the Wilderness Act) would score high while the person with less intense opinions would score low.

Our scale enabled us to array respondents along a continuum on which polar types were represented on one end by those whose concept of wilderness meshed closely with that prescribed by law and on the other end by those whose definition of wilderness differed markedly from that of the Wilderness Act. This made it possible to evaluate responses to the various questions according to the extent to which the respondent concurred with the objectives laid down by the Act.

Because of this multitude of value systems that exists among wilderness users, any definition of "acceptable change" poses a principal methodological problem. Several studies have shown that a gradient of preferences for environmental experiences exists among wilderness visitors ranging from those for whom natural environment and solitude are essential qualities to those who have little interest in such attributes. If we try to decide what users consider "acceptable" without weighing this diversity of opinion, we can expect that our findings will probably suggest a fairly broad latitude in definition. Thus, a major purpose of this purism scale is to provide a mechanism that accommodates the wide range of user definitions of wilderness so that a more sophisticated analysis of the data can be made.

The respondents were classified into groups on the basis of their overall "purism" score (table 1). Four groups were established: *Strong purists*, persons who scored between 60 and 70 on the scale; *moderate purists*, persons who scored between 50 and 59; *neutralists*, persons who scored from 40 to 49; and *nonpurists*, persons who scored less than 40 points.

The boundaries of these four groups are arbitrary to a considerable degree. For example, in classifying visitors as "*strong purists*," the intent was to group persons who demonstrated a consistently high level of agreement with the Wilderness Act's definition of wilderness. "*Neutralists*" tended to be clustered around the midpoint of the scale. Any classification scheme is arbitrary and variations in the establishment of boundaries will affect results. However, as noted previously, these groupings are intended only to provide a framework for recognizing this gradient in our analysis.

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[1]The reader is urged to review Hendee's "Wilderness users in the Pacific Northwest--their characteristics, values, and management preferences," U.S. For. Serv. Res. Pap. PNW-61, 1968, esp. p. 24-27.

Table 1.--*Number of respondents for each study are grouped using purism scale*[1]

Study area	Strong purists	Moderate purists	Neutralists	Nonpurists	Total
BWCA	[1]41(20)	100(49)	52(25)	13(6)	206
Bob Marshall	63(53)	47(39)	8(7)	2(1)	120
Bridger	96(67)	33(23)	14(10)	1(<0.5)	144
High Uintas	48(31)	76(49)	28(18)	2(1)	154
Total[2]	248(40)	256(41)	102(16)	18(3)	624

[1]Percentage value, based on total number of respondents from the area, is shown in parentheses.

[2]Percentage value, based on total number of respondents from *all* four areas, is shown in parentheses.

For the student of social science methodology, there is a second problem which perhaps is more significant. The attitude scale we used to derive the purist groups is a multidimensional scale; that is, it taps several distinct attitude domains. For example, it asks about solitude, ecological integrity, and vastness. These are separate domains: any individual responding to them might hold varying attitudes as he moves from one domain to another; e.g., he might fully agree that ecological integrity is very desirable in the wilderness, but that the distance from towns or cities is irrelevant. However, the scores a person obtained on the items in our scale were added together; this served as an index of his "purism." This can only be done legitimately if one assumes the scale is unidimensional; i.e., it measures only a single domain. However, there is little reason to believe "purism" is unidimensional,[2] as our example shows.

Our "purism" scale can be characterized as an intuitive one. It taps a multidimensional domain and labels this domain "purism" because it seeks to measure the extent to which the individual's definition of wilderness conforms to that of the Wilderness Act, *which is also multidimensional*. Properly, the scale should have been subjected to factor analysis. From this, a true unidimensional scale could have been derived. However, this process would have destroyed the intuitive foundation that underlaid the construction of the scale. The Wilderness Act provides a legal definition of wilderness; it is this definition that governs the direction of management decisionmaking. In effect, the Act defines "the rules of the game." Certainly, if public demand so warrants, the Act may be changed. However, until such occurs, the Act must be considered as the principal source of decision criteria under which wilderness managers operate. Thus, purism, as used in this paper, is an institutionalized idea, not some intrinsic environmental quality or homogeneous sociological domain.

Interpreting Attitude Data

This study focused on attitudes. There are many definitions for "attitudes," but a common theme to most is that attitudes reflect a person's disposition toward some person, object, or thing. If we know someone's feeling about something, we assume his behavior toward it will be consistent with his expressed attitude. This

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[2]For an excellent discussion on the problem of measuring purism on a unidimensional scale, see Thomas A. Heberlein, "Some relationships between theoretical and applied issues in attitude research: the case of wilderness," paper presented to the Annu. Meet. of the Rural Sociological Society, August 1971, Denver, Colorado.

is not necessarily true in life. Therefore, attitudes are useful but imperfect predictors of behavior. Public attitude about litter is a good example; almost everyone is against it, but littering continues.

Nevertheless, determination of visitor attitudes toward wilderness management is an important part of the input for managers. If these attitudes oppose some policy, then institution of that policy would probably cause a decline in aggregate visitor satisfaction. Moreover, management decisions that are contrary to expressed attitudes might result in a gradual shift in clientele, as persons whose values cannot be adequately satisfied under those decisions are "displaced" by others who find the changing character of opportunity more nearly suited to their taste. As mentioned previously, the wilderness manager might feel that an established policy leaves him no option other than to undertake the action, but an understanding of possible user reaction could greatly facilitate its implementation.

Although attitudes are imperfect predictors of actual behavior and sometimes change rather rapidly, they are also characterized by a *consistency* in the manner of expression. Attitudes are not characterized by random, totally unpredictable fluctuations. When such randomness appears, it is often the result of a respondent's interpretation or perception of some object or item rather than any intentional arbitrariness. Designing research to avoid this problem is a complex task, but results of carefully designed survey research can provide administrators with important insight on the goals and objectives of wilderness visitors.

Statistical Tests Used in This Study

Two statistical tests were applied to the data. The measure of association between the purism score and response to various questionnaire statements (ordinal measurements only) was gamma. Gamma measures the proportional reduction in error (PRE) possible in predicting rank order variation in response to the statements from knowledge of an individual's purism score over the potential errors that might be derived if these were random predictions. It ranges in value from -1.0 to +1.0 (Goodman and Kruskal 1954; Costner 1965).

The clustering of respondents near the upper end of the scale (very few nonpurists) precluded the possibility of obtaining any high gamma statistics because of the few low scores to balance the analysis. However, as Hendee and others (1968, p. 72) observed:

> ....for practical interpretation (in a relative sense) the statements receiving gamma values near the upper end of the distribution...can be considered as strongly associated with wilderness-purist concepts as expressed in the...scores.

The second statistical test utilized was chi-square. Chi-square is used to determine whether actual (observed) frequency distribution between independent sample groups is significantly different from that expected, given the total number in the studied categories and sample groups (Burch and Wenger 1967). A significant difference was defined as one that would have occurred from chance no more than 5 percent of the time (0.05 level of significance). A significant chi-square value is designated by an asterisk in the tables.

The sample population was expanded by 26 percent due to the differential sampling intensity (see p. 9). This process also caused chi-square values to appear somewhat higher than if they had been calculated on the raw, unadjusted sample. To eliminate this possible overstatement of significance, chi-square values shown in this report represent those values derived before expansion of the original sample population. However, the figures in the tables represent the expanded sample.

FACTORS IN CARRYING CAPACITY PERCEPTION

Impact of Encounters

We were concerned with determining whether visitors expected to find solitude in wilderness so we sought to grasp how encounters affected the perception of carrying capacity.

Respondents were asked the degree they agreed or disagreed with the following statement: *"It is reasonable to expect that one should be able to visit a wilderness area and see few, if any, people."*

In the western areas, 77 percent of the respondents were in agreement with this statement; in the BWCA, 67 percent agreed. However, a closer examination of responses from the BWCA revealed that paddling canoeists tended to agree with this statement more than those using outboard motors, as reflected in the following tabulation:

	Paddling canoeists (119)[3] *(Percent)*	*Motor canoeists (22) (Percent)*	*Motor-boaters (60) (Percent)*
Strongly disagree	2	9	15
Disagree	4	23	13
Neutral	21	5	13
Agree	55	45	48
Strongly agree	18	18	10

The higher agreement expressed by the paddling canoeists could logically be attributed to: (1) As canoeists penetrate deeper into the area than those using motor-propelled craft (Lucas 1964), the probability of encountering others declines; (2) moreover, 28 percent of the paddling canoeists were classified as strong purists compared to 14 percent of the motor canoeists and 6 percent of the motorboaters.

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[3]Total number of respondents shown in parentheses.

Table 2.--*Purist attitudes (in percent) toward meeting other parties on the trail*

Purist group	Number of respondents	Bother a lot	Bother a little	Enjoy it	Does not matter
		Percent			
Strong purists	248	20	40	10	30
Moderate purists	254	13	33	23	31
Neutralists	102	4	30	30	34
Nonpurists	20	0	20	20	60
Total	624	14	35	19	32

Chi square 36.42*, 9 df
Gamma = -0.21

Inasmuch as the purism scale used in this study was constructed using the Wilderness Act as a normative framework in which wilderness could be defined, we feel it was reasonable that one should expect to see few, if any, people in a wilderness. This reasoning is substantiated when comparing the response to this statement by "purists" category: 87 percent of the strong purists agreed, compared to only 71 percent of moderate purists, and 59 percent of the neutralists.

Encounters with other parties can occur at two locations. (1) While en route from one destination to another, or (2) at the campsite. We expected that attitudes toward meeting other people would vary according to whether the respondent was on the trail or in camp. Persons were asked to indicate their reaction to encountering other parties on the trail. Only about one out of five persons (19 percent) indicated they enjoyed it; one-third (32 percent) replied that it "did not matter." However, in the BWCA alone, 29 percent responded they enjoyed the encounters; in the three western areas, only 14 percent so indicated.

The reaction to encounters varied considerably among the four purist groups (table 2). Only about one out of 10 strong purists enjoyed meeting people on the trail. The gamma statistic of -0.21 indicates an inverse relationship between purist score and the degree to which one enjoys encounters. However, there was some variation among the area studies in the responses. In the Bridger and the Bob Marshall, strong purists were less inclined to accept encounters on the trail as a part of their wilderness trip than were strong purists in the BWCA and the High Uintas. Whereas about one out of five strong purists in the BWCA and High Uintas (21 and 17 percent, respectively) indicated they enjoyed trail encounters, only one out of 20 in the Bridger and Bob Marshall so responded.

The trail is, of course, a focal point of movement. While one is on the trail, travel is the normal activity and the expectation that one will meet others in transit might temper adverse reactions. However, while in camp, attitudes toward other parties might be different. Thus, visitors were asked the extent to which they agreed with the following statement: *"Meeting other people around the campfire at night should be part of any wilderness trip."*

The pattern of responses to this statement was quite similar to that of the trail encounter question. Only one out of five persons (21 percent) agreed that meeting other people around the campfire was important to the experience and about one-third (34 percent) were neutral. Respondents from the BWCA again tended to be more in

Table 3.--*Response (in percent) to "It's most enjoyable when you don't meet anyone in the wilderness," by study area*

Study area	Number of respondents	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
				Percent		
BWCA	203	10	23	20	24	23
Bob Marshall	120	2	12	22	32	32
Bridger	144	2	13	19	26	40
High Uintas	154	5	16	28	25	27
Total	621	5	17	22	26	30

Chi square 39.40*, 12 df

agreement than those in the three western areas (28 percent as opposed to 17 percent). However, only 10 percent of the strong purists were in agreement. The association between purist score and the level of agreement showed a somewhat stronger inverse relationship (gamma = -0.39).

Respondents also were asked the degree to which they accepted or rejected this statement: *"It's most enjoyable when you don't meet anyone in the wilderness."*

About two-thirds of the visitors to the Bob Marshall and Bridger Wildernesses expressed agreement (table 3), as compared to the similarity in responses (about one-half) in the BWCA and the High Uintas. Strong purists tended to respond to this statement in a more positive fashion than did the total sample. Nearly eight out of 10 (76 percent) agreed with the statement.

To determine the effect on satisfaction of the presence of others, respondents were asked to evaluate this statement: *"You should see at least one group a day in the wilderness to get the most enjoyment out of your trip."*

Only about 25 percent of the total visitors sampled for the four areas expressed agreement. However, there were some differences among the study areas. A greater percentage of the respondents in the Bob Marshall and Bridger (58 percent in each) showed a negative reaction to this statement than those in the BWCA or the High Uintas (30 and 47 percent, respectively). In the BWCA, motorboaters had the highest level of agreement (45 percent), which substantiated Lucas' (1964) earlier conclusions that motorboaters were less oriented to the wilderness resource and probably consider encounters as adding to the enjoyment of their trip.

The pattern of responses between study areas is further clarified in examining the answers of the strong purists. Only 13 percent of the strong purists agreed with the statement, while 26 percent of the moderate purists concurred.

CONFLICTS BETWEEN TYPES OF USE

Method of Travel

The type of use one encounters on a wilderness trip is generally varied. Some persons are hiking, others are on horseback. If conflicts do exist between the different travel methods, then the management goal of maximizing visitor satisfaction is hampered. Visitors were asked to respond to this statement: *"Both backpacking and horseback travel are entirely appropriate ways to travel in wilderness areas."*[4]

Backpackers were less inclined to agree with the statement than were horseback riders. They objected to some conditions that result from horseback use: muddied trails, being forced off trails when meeting parties on horses, and manure on trails.

In the West, most respondents agreed with the statement: In the Bridger, 74 percent; in the High Uintas, 80 percent; and in the Bob Marshall, 92 percent. In the Bridger, foot travel predominates, whereas in the latter two areas, horseback travel predominates.[5]

In the BWCA, the conflict between paddling canoeists and those using motor-propelled craft demonstrated by Lucas (1964) and others (Gordon Lusty Survey Research Ltd. 1968) was substantiated (table 4).

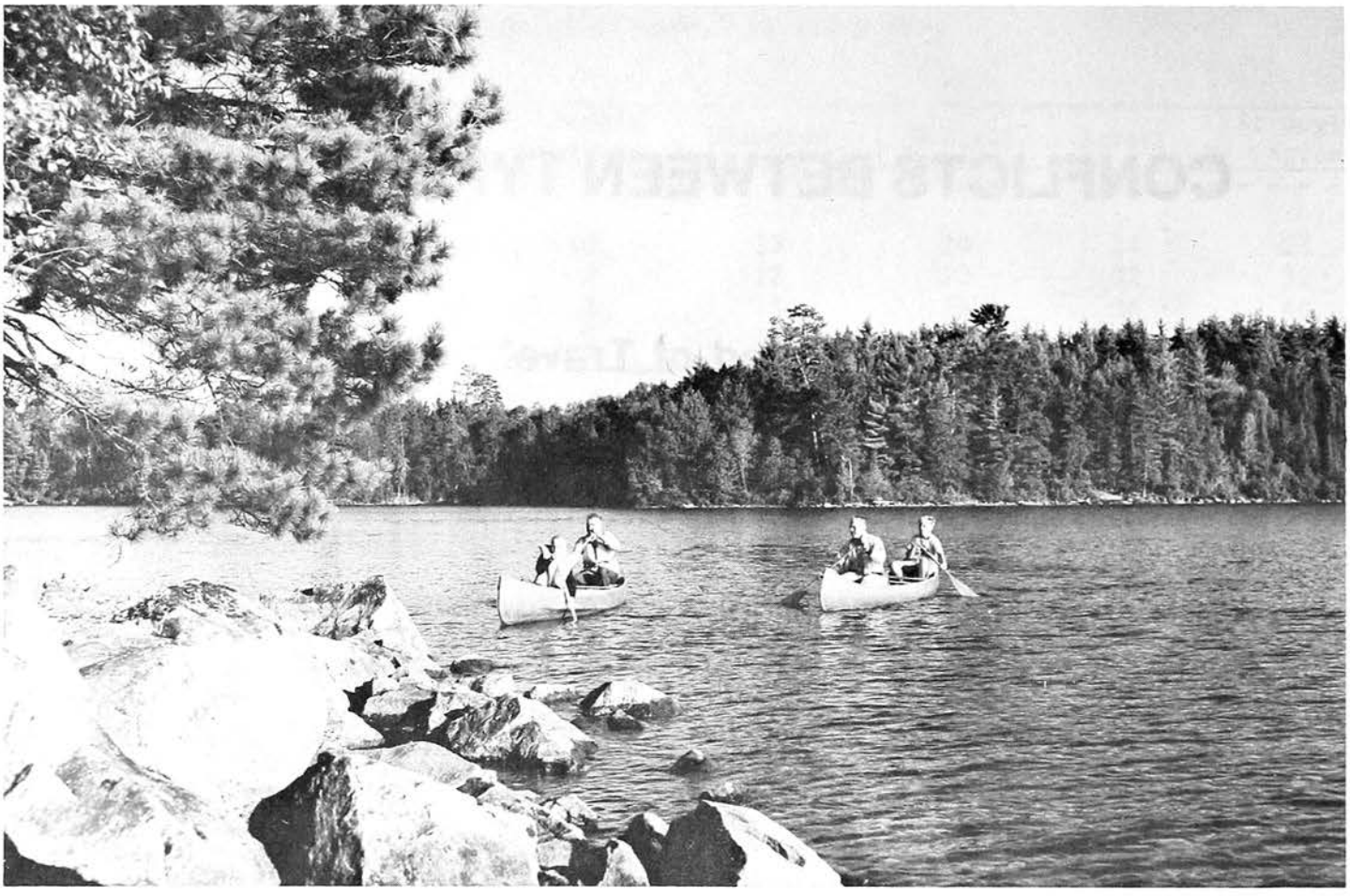
Table 4.--*Perception of appropriateness of manual and motor travel by paddling canoeists, motor canoeists, and motorboaters*

Method of travel	Number of respondents	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
			Percent			
Paddling canoe	119	19	33	22	22	4
Motor canoe	20	15	10	5	35	35
Motorboat	60	0	7	18	47	28
Total	199	13	23	19	31	14

Chi square 44.34*, 8 df

[4]On the BWCA form, "paddling" was substituted for backpacking, and "using an outboard motor" for horseback travel.

[5]In this sample, hikers comprised 85 percent of the Bridger sample. Horseback riders comprised 65 percent of the sample in the Bob Marshall, and 51 percent were in the High Uintas.



Only about one-fourth of the canoeists sampled agreed that both canoeing and motorboating were appropriate ways to travel in wilderness. Canoeists almost unanimously viewed motorboats as an indication use was beyond capacity.

Only about one out of four paddling canoeists agreed that *both* paddling and using an outboard motor were appropriate means of wilderness travel. The strong negative reaction to the statement probably can be attributed almost entirely to the reference to outboard motors. The perceived norm regarding appropriate means of wilderness travel held by the paddling canoeists excludes mechanized travel. However, motor canoeists and motorboaters look upon their own mode of travel as being in keeping with their perception of the wilderness environment.[6] Moreover, they tend to perceive other wilderness groups as similar to themselves; this might explain the source of at least part of the conflict between these user groups. If motor users extrapolate their attitudes and norms about the wilderness environment to those traveling in nonmechanized craft, their behavior in regard to other travelers might be influenced by their perception of a shared value system, even though no such shared system exists in fact.

Visitors were asked to indicate their personal preference for the different modes of travel they might encounter. Sixty-nine percent of all visitors in the BWCA indicated a preference for seeing paddling canoeists (table 5). Only 15 percent indicated a preference for motor canoeists and 6 percent for motorboats, even though these two groups comprised 42 percent of the sample.

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[6]Under the terms of the Wilderness Act, "Prohibition of Certain Uses," Section 5, the use of motor-propelled craft is permitted as a protection of preexisting rights. At the time of this study, over half of the water acreage of the area was open to motorized craft.

Table 5.--*Expressed preferences (in percent) for seeing other methods of travel in the BWCA, by respondents' methods of travel*

Method of travel	Paddling canoeists			Motor canoeists			Motorboaters		
	Prefer to meet	Prefer not to meet	Don't care	Prefer to meet	Prefer not to meet	Don't care	Prefer to meet	Prefer not to meet	Don't care
Paddling canoeist	85	3	12	5	35	60	1	81	18
Motor canoeist	41	4	55	50	0	50	9	55	36
Motorboater	51	2	47	20	2	78	14	16	70
	Chi square 27.61*			Chi square 44.06*			Chi square 55.46*		

Table 6.--*Expressed preferences (in percent) for seeing other methods of travel in the western study areas*

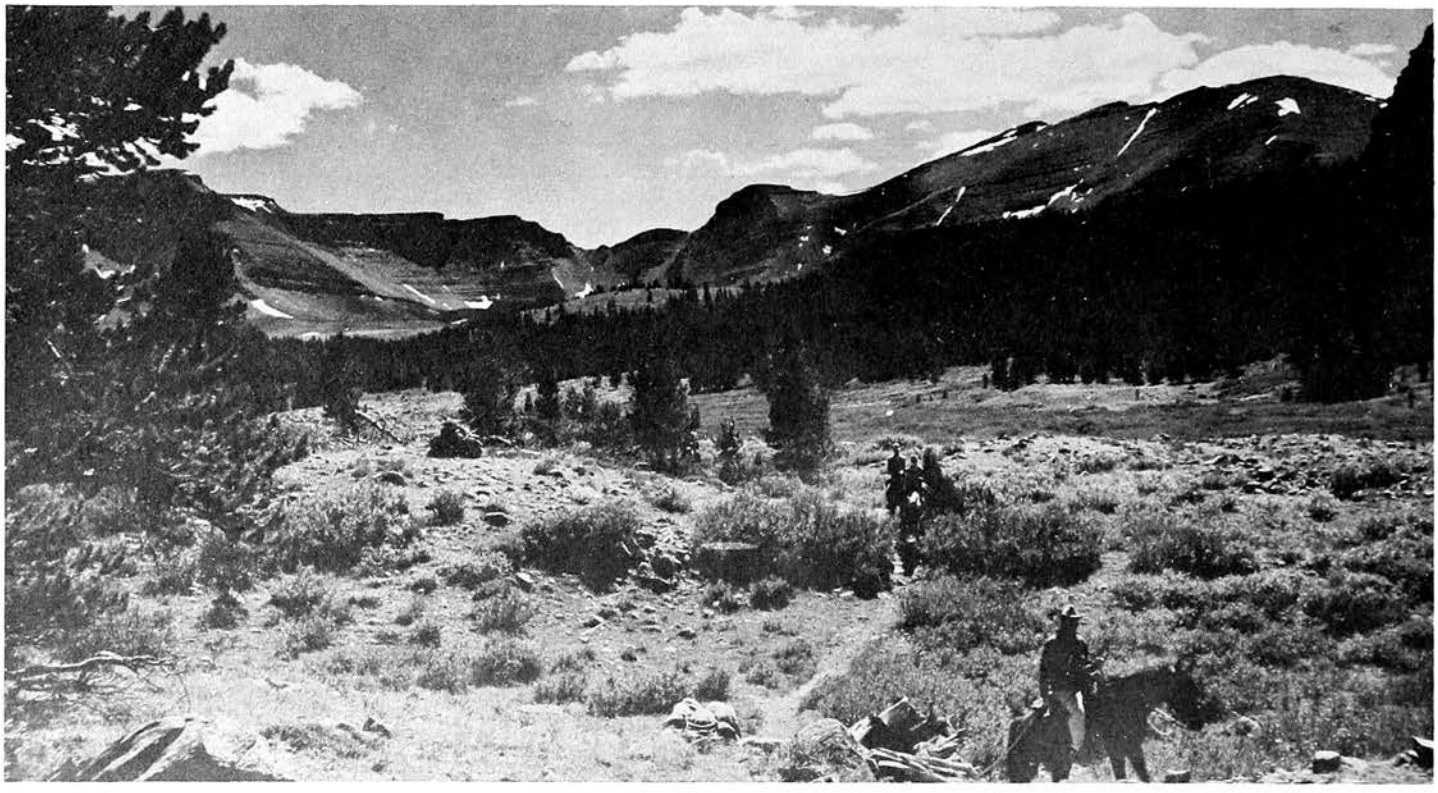
Area	Backpackers			Horseback riders			Hikers with stock		
	Prefer to meet	Prefer not to meet	Don't care	Prefer to meet	Prefer not to meet	Don't care	Prefer to meet	Prefer not to meet	Don't care
Bob Marshall	44	14	42	37	21	42	16	14	70
Bridger	78	4	18	15	59	26	10	28	62
High Uintas	51	8	41	35	25	40	15	29	56
	Chi square 30.35*			Chi square .54			Chi square 10.02*		

The overall favorable attitude toward paddling canoeists is clearly recognizable. Paddling canoeists have strong antipathy toward motorboaters, but over 75 percent of the motorboaters preferred seeing canoeists to seeing other motorboaters.

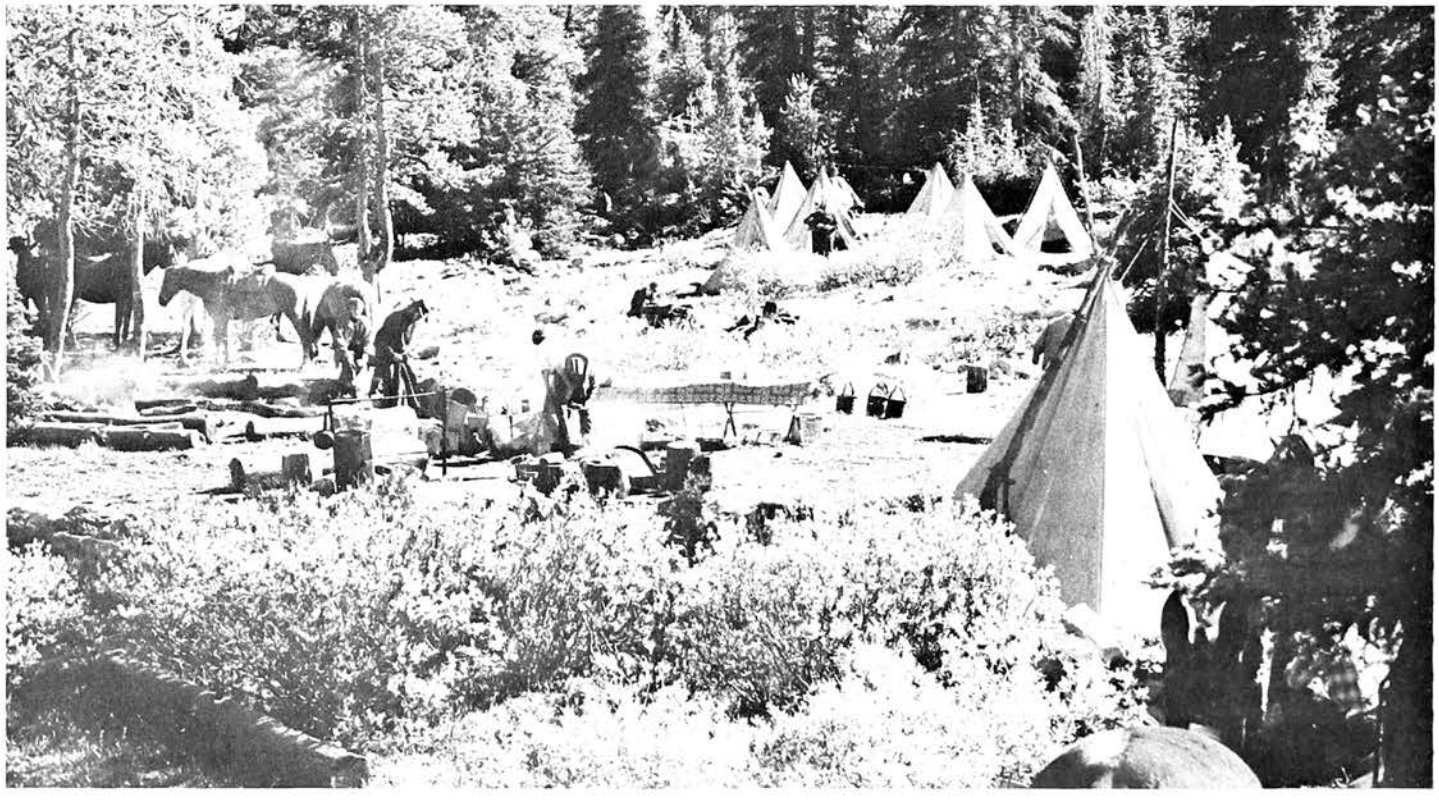
The general "don't care" attitude of a large proportion of the motorboaters probably is a reflection of their less critical attitude about appropriate uses of the wilderness; it indicates their greater interest in the area as an activity setting rather than an experience source. When asked if there was one single activity for which they used the BWCA, 40 percent of the motorboaters answered "yes," compared to only 25 percent of the paddling canoeists and 14 percent of motor canoeists.[7]

In the western areas, preferences for different methods of travel appeared linked to the method of travel that was characteristic of each area (table 6). Nearly half of those persons hiking indicated they preferred not to meet horse parties; however, when asked about meeting other hikers, 38 percent said they preferred not to meet them either. On the other hand, persons on horseback were less concerned about encounters with hikers: 62 percent indicated it didn't matter; only 12 percent said they preferred not to meet hikers. Only 5 percent of those on horseback indicated they preferred not to meet other riders. Thus, conflict between use types appears largely one-sided. Horses do present hikers with certain problems that probably reduce their enjoyment.

[7]Thirty-seven percent of the motorboaters answering "yes" indicated fishing as the principal attraction; 24 percent of the paddling canoeists did so.



Nearly one-half of those persons hiking indicated they preferred not to meet horse parties. Much of the opposition, however, may be associated with large parties traveling by stock.



Large parties have an especially significant impact on visitor satisfaction. Not only do many visitors consider such groups inappropriate in wilderness, but there is also concern about their impact on sensitive wilderness ecosystems.

Effects of Large Parties

Past research efforts (e.g., Wildland Research Center 1962) have suggested that large parties might have severe impacts on user satisfaction. Such an effect could result in any or all of: (1) Perception by other users that such groups are inappropriate in a wilderness; (2) recognition of the ecological damage caused by such parties; and (3) extent to which such groups contribute to feelings of crowding.

To determine how large groups affected the satisfaction of other users, visitors were asked to respond to the following statement: *"Seeing a large party (a dozen or more people from a club, and so forth) reduces the feeling that you're out in the wilderness."*[8]

Two-thirds of the respondents concurred with the statement, but there was some variation among the areas: 80 percent in the Bridger; 68 percent in the Bob Marshall; 54 percent in the BWCA; and 69 percent in the High Uintas. Both the Bob Marshall and the High Uintas receive more outfitters than does the Bridger. There seems to be a relationship between the degree of exposure to such groups and tolerance for them. In the Bridger, where much of the travel is in small groups, a norm supporting a small group as appropriate seems widely held; in the other areas, where large parties are more common, norms have apparently shifted to a more tolerant position. Also, persons traveling with large groups probably tend to be more tolerant of similar groups (Jubenville 1971; Merriam and Ammons 1968). Method of travel had no effect on response.

This does not necessarily mean that individual user attitudes toward large parties have changed. Rather it may reflect a change in the clientele. Persons who object to large parties may have moved from those areas experiencing increases in this type of use to areas where use still meets their criterion of appropriateness. In a sense, they have been "displaced." As they leave, a new clientele replaces them, drawn perhaps because of the very changes that lead the original group to move. Conflicts in values can gradually lead to substantial changes of clientele--this process needs to be distinguished from changes in individual attitudes (Clark and others 1971).

The more "purist" users were, the more likely they were to express agreement with the statement (gamma equaled 0.33). About 80 percent of the strong purists considered encounters with large parties as detrimental to their enjoyment.

Sonnenfeld (1966) suggested that man might adapt to various conditions of stress by either heightening or reducing his sensitivity. The response to the "large party" statement tends to support this hypothesis. This would indicate that any effort at formulating a measure of carrying capacity for wilderness might only be valid for a particular area or at a particular point in time.

This conclusion is mitigated when the norms of purists are examined: this suggests that they are less adaptable. It appears that certain values are shared over space; the extent to which they are shared over time awaits data from which trends might be examined. It is perhaps revealing that when we examine the percentage of persons classified as purists in the four areas, there is a rough inverse relationship between amount of use and percentage of purists. Many of the purists formerly using areas like the BWCA may now be found in Canada or other remote areas. Those who still utilize the area may do so because of limited opportunity to go elsewhere, strong personal feelings about the area, or by adopting a pattern of behavior that allows them to avoid problems of congestion (e.g., "off-season" visits, careful selection of itinerary, and so forth).

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[8]The fact that groups were referred to as "large" or as from a club might have biased response. The major concern in the design of this section of the questionnaire was to present the respondent with a clear and specific stimulus. However, to the extent to which this was accomplished, we might have obtained a somewhat higher level of opposition than a more ambiguous and undefined approach would have obtained.

Table 7.--*User preference (in percent) for a single large party (30 or more persons) or a variable number of small parties (about 3 persons)*

Area	One large party	One small party	Don't care	One large party	Five small parties	Don't care	One large party	Ten small parties	Don't care
BWCA	7	70	23	15	60	26	19	48	33
Bob Marshall	4	79	17	24	47	28	36	33	31
Bridger	4	88	8	16	68	16	23	56	21
High Uintas	3	73	24	14	57	29	25	43	32
Average	5	77	18	17	58	25	24	46	30
	Chi square 17.07*			Chi square 12.08			Chi square 17.41*		

One other examination was made of user preference for the size of parties encountered while traveling. Visitors were presented with the following hypothetical situations and asked to indicate their preference for one alternative in each situation:

(1) Seeing one large party (30 or more persons) during the day and no one else, or one small party a day (3 persons) and no one else;

(2) Seeing one large party a day and no one else, or five small parties a day and no one else; and

(3) Seeing one large party a day and no one else, or 10 small parties a day and no one else.

The majority of visitors expressed a preference for a single, small party rather than one large party, and although the percentage favoring five and ten small parties declined, it still remained greater than that expressed for a single large party (table 7). This indicates that a large party has an extraordinarily detrimental effect upon user satisfaction and suggests that respondents might perceive the large party as something more than the simple sum of people in the group; i.e., wilderness visitation in a large group represents a behavior outside the accepted norm.

Large parties generally travel by horse in the western areas; thirty people in such a party would normally have an additional 15 to 30 pack animals accompanying them. Thus, the actual party size might be as large as 60, which would have substantial esthetic and ecological impacts.

USE AND SATISFACTION

To arrive at a measure of how level of use and type of use are related, visitors were asked to indicate how they felt about encountering an increasingly larger number of other parties. Specifically, they were asked to evaluate the question as to their feelings about different methods of travel they might normally encounter. Responses regarding these encounters were made along a five-point scale, ranging from "very pleasant" to "very unpleasant." In this manner, for example, it would be possible to estimate the effect of an increasing number of encounters with backpackers on the visitor's satisfaction.

Analysis of Data

"Satisfaction curves" were computed for each study area regarding various travel methods a visitor might encounter.[9] The curves were constructed by determining the percentage of respondents in each study area who indicated a "very pleasant" or "pleasant" response to the various encounter situations.

Our general hypothesis that satisfaction declines as use increases was substantiated (figs. 3 and 4). However, certain variations in the slope of the curves are noteworthy. In the BWCA, the method of travel encountered yielded a broadly disparate set of curves (fig. 3). Notice the upswing in the percentage of persons that cited seeing up to two paddling canoeist parties a day as a satisfactory experience. It declines quickly, however, for encounters with persons traveling in motor canoes and motorboats.

The curves obtained for the three western areas combined are shown in figure 4. Note the basic similarity between these curves and those obtained for the BWCA; this suggests that norms regarding use encounters are shared by visitors to all four areas. The unique conditions of individual areas affect the rate and extent of the decline in visitor satisfaction as use increases. Moreover, the perception of carrying capacity for an area is a function of several parameters of which amount of use encountered is only one (fig. 1). Respondents were not fully satisfied even when confronted with situations free of encounters (figs. 3, 4). Therefore, it is obvious that other characteristics (e.g., the physical setting) influence this perception of carrying capacity; we probably never will be able to account for all the variables that influence this perception.

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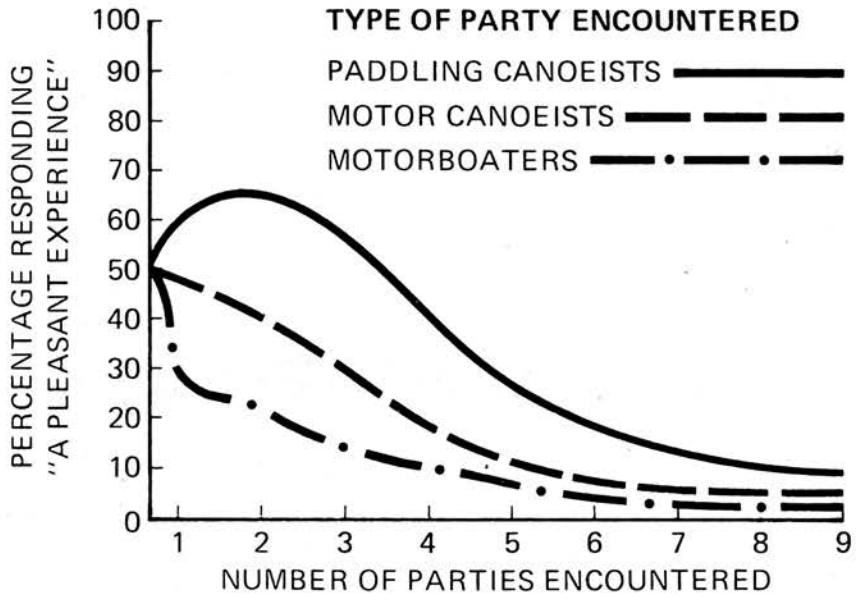
[9] No curve was computed for hikers with stock because of the small sample size of this group.

Figure 3.--Boundary Waters Canoe Area satisfaction curves.



Characteristics of the individual areas resulted in variations in responses to increasing use. In the Bob Marshall and the High Uintas, these responses varied only slightly between hikers and horsemen. However, in the Bridger, we received more than 30 percent less "pleasant" responses to an encounter with only one horse party than to an encounter with a hiking party.

The curves based upon the responses from only the strong purists in the BWCA are depicted in figure 5 and from the three western areas combined in figure 6. When these two figures are compared with figures 3 and 4, which are based upon the responses of all users, certain consistencies are obvious: Specifically, (1) satisfaction declines with use; and (2) degree of satisfaction is affected by the type of use. However, differences in the degree of satisfaction indicate how the strong purist differs in his attitude toward use compared to the "average" visitor.

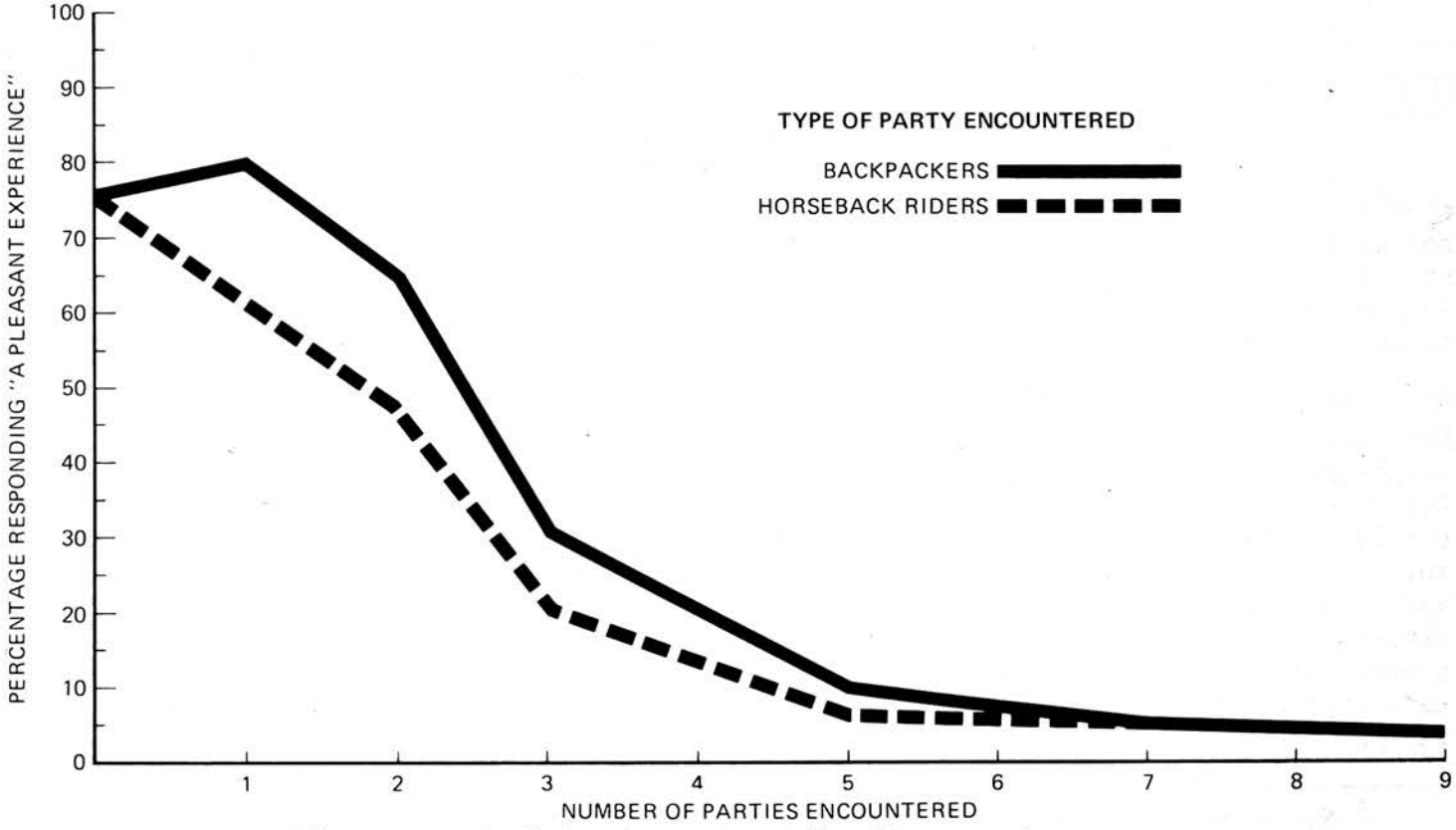


Figure 4.--Satisfaction curves for three western areas.

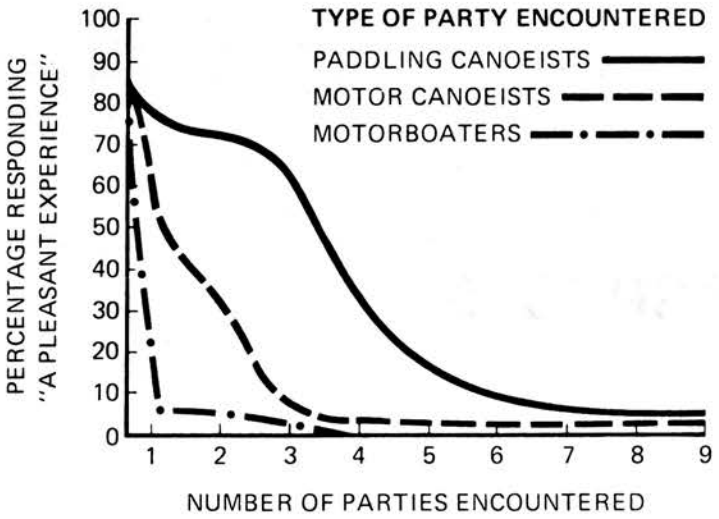


Figure 5.--Boundary Waters Canoe Area strong purist satisfaction curves.

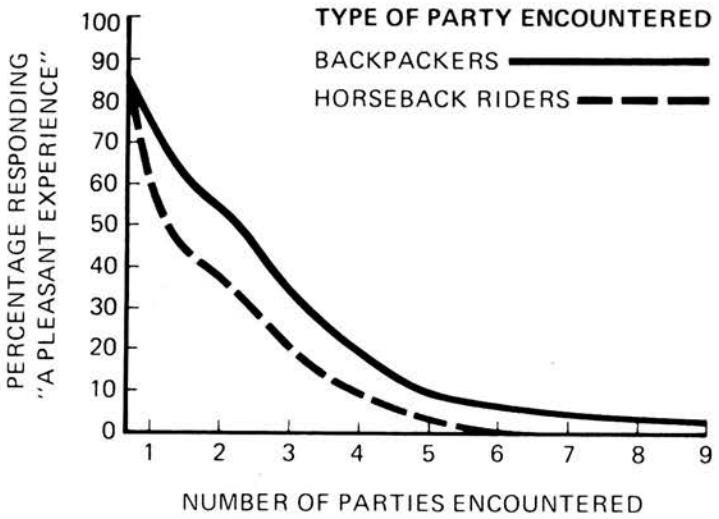


Figure 6.--Western study area strong purist satisfaction curves.

Initially, these curves reveal the degree to which solitude (seeing no other parties) is an important and differentiating criterion for the strong purists. In all four areas, just over 80 percent of this group preferred a situation free of encounters.

In addition, it is obvious that satisfaction of strong purists consistently declines with *any type* of encounter. There is no upswing in the curve with the first or second encounter as shown in figures 3 or 4; this further confirms our conclusions as to the importance of solitude.[10] However, a majority of purists indicate that over two encounters per day would adversely affect their experience. The latter does not apply to strong purists in terms of their reactions to motorboats. Only 7 percent of the strong purists did not feel that their experience would be adversely affected by one meeting with a motorboat. A similar, but less intense reaction, was obtained from encounters with motor canoes.

Individual area differences will always have to be weighed when prescribing guidelines for carrying capacity. However, individual standards should not be set for each area. Our data indicates that wilderness visitors, particularly the strong purists, ascribe to a remarkably consistent set of standards regarding appropriate intensities of use. Decisions to allow increases in use because of local pressures might lead to a loss in aggregate social benefit as the satisfaction lost exceeds that gained because of the increased number of visitors.

[10]The nature of these curves confirms the relationship of use and solitude hypothesized by Wagar (1964).

SPATIAL ASPECTS

The trail head represents a point where entering and exiting parties are focused. Thus, the probability of encountering others is higher than "deeper" in the wilderness. Most visitors are aware of this and expect such encounters in this peripheral area. We hypothesized this expectation would desensitize to some extent possible adverse reactions visitors might experience if these encounters occurred "deep" inside the area, particularly near the campsite. To test this, visitors were asked which of the following they would prefer:

"Seeing a lot of people within the first few miles or so from the road and no one else the rest of the trip or several other parties in the area where I expect to camp and no one else."

More than two-thirds of the total sample indicated a preference for encounters at the periphery of the area rather than in an interior location near camp (table 8). Thus, it appears that users mentally zone wilderness, identifying at least one peripheral region and a core region. Within these zones, expectation of other encounters and the consequent behavior and attitudes toward such meetings differ sharply. This does not suggest visitors *necessarily* enjoy or welcome meetings on the trail. It does indicate most wilderness users, given the option, prefer seeing others while in transit from one point to another, rather than while in camp.

Table 8.--*Expressed preference (in percent) for encounters on wilderness periphery or in interior locations*

Area	No. of respondents	Encounters on periphery	Encounters in interior	Don't care
		Percent		
BWCA	203	59	14	27
Bob Marshall	118	65	8	27
Bridger	143	76	7	17
High Uintas	152	74	3	23
Total	616	68	9	23

Chi square 17.41*, 6 df

Respondents were asked the extent to which they agreed with the following statement: *"When staying out overnight in the wilderness it is most enjoyable not to be near anyone else."*

There was broad and uniform concurrence with the statement; overall, 75 percent indicated agreement. Purism of wilderness perception was positively associated with agreement with the statement (gamma equaled 0.43).

To obtain an indication of how the respondent felt he would react if others set up camp nearby, a situation was described where, after setting up camp in an isolated spot, two or three other parties arrived on the scene.

Visitor reactions to this situation varied sharply. About 30 percent of the total sampled indicated they would keep their camp where it was; either they did not care if other parties camped in the same area or they would enjoy the companionship provided by these persons. However, 65 percent responded that such a situation would result in a loss of quality for them. Reactions by some indicated they would stay at the same campsite, but would experience a loss in enjoyment; others stated they would leave the area and set up camp elsewhere.

Two out of three strong purists in the BWCA and the High Uintas indicated either a loss of enjoyment, a shortened visit, or a search for a new camp as their reaction, as compared to four out of five strong purists in the Bridger and Bob Marshall. This was about the same pattern found for the total sample. As expected, purism was positively related to an expression reflecting a loss in quality (gamma equaled 0.34).

User attitudes about others in the same camping area were examined further. Visitors were presented a situation that required them to evaluate how "camping at a place where several other parties are camped" would affect their enjoyment (table 9).

In table 9, it is noteworthy that (a) only 3 percent enjoyed camping near others; and (b) the pattern of response is quite uniform over the study areas. This small variation in attitudes toward other campers suggests that a commonly understood and accepted norm of wilderness behavior exists. This uniformity also applied to the strong purists; about 90 percent of them in all four areas indicated they would be annoyed to some degree by other parties camping near them.

Burch and Wenger (1967) also found an aversion among wilderness visitors to camping near others; two-thirds of their sample indicated a preference for a campsite "far away" from others.

Table 9.--*Visitor reaction (in percent) to camping near several other parties*

Area	No. of respondents	Bother a lot	Bother a little	Enjoy it	Doesn't matter
		Percent			
BWCA	206	39	40	6	15
Bob Marshall	120	41	43	2	14
Bridger	142	41	44	2	13
High Uintas	153	44	43	2	11
Total	621	41	42	3	14

Chi square 7.85, 9 df

To determine what constituted a desirable campsite, respondents were asked to indicate their preference for one of the following: *(1) A place out of sight and hearing of others; (2) a place some distance away from others, but where one might be able to see or hear other parties camped; and (3) a place near others.*

Clear differences appeared between the BWCA and the western areas in the response to this questionnaire. Visitors to the BWCA expressed a more ambivalent response to the three options; they split almost evenly on the first two types offered (table 10). Persons traveling with motor-propelled craft tended to prefer camp locations near others. In the West, about two-thirds of the respondents favored locations out of sight and hearing of others: backpackers were slightly more so inclined but no statistically significant differences were detected between methods of travel.

Strong purists in the Bridger and in the Bob Marshall expressed a clear preference for sites providing complete solitude. Eighty-four percent of the strong purists favored this type of site compared to 55 percent of the total sample for the four areas. Although a smaller percentage of the strong purists in the BWCA and in the High Uintas preferred this type of camping location (69 and 75 percent, respectively), they still were decidedly more inclined than the total sample to prefer such a site. The association between purist score and preference for a location out of sight and hearing was relatively strong (gamma = 0.52). None of the strong purists indicated a preference for a site near others. Moreover, less than 20 percent of the strong purists desired a location where others would be some distance away, but still within sight or hearing.

Apparently, the opportunity to be apart from others is an important characteristic of the camping site. It might represent the strong purist's concept of the relationship of man-to-man and man-to-nature in the wilderness. Within the zone around the camp, the primary interaction involves the visitor's group and the physical environment; socialization with persons other than one's own party members is unwanted and probably discouraged. The opportunity to develop close intragroup ties might represent an important dimension of the wilderness experience, particularly when so much of our day-to-day life is characterized by anonymity and impersonalness (Hendee and others 1968).

Table 10.--*Preference (in percent) for camp location*

Region	No. of respondents	Out of sight and hearing	Some distance from others	A place near others	Don't care
		Percent			
BWCA	201	42	37	7	14
West	420	65	27	1	7
Total Average	621	54	32	4	10

Chi square 31.33, 3 df

DEPRECIATIVE BEHAVIOR[11]

By the very nature of the wilderness environment, where the works and evidence of man are generally minimal, the depreciative actions of users are more noticeable.

Respondents were asked to respond to two aspects of littering: (1) *Their attitudes toward finding litter per se; and* (2) *which disturbed them the most--littering or too many persons.*

Persons were asked to indicate their reactions to finding litter along the trails and at campsites. The response was clearly and unequivocally negative. Ninety-nine percent indicated it annoyed them, either a lot or a little.

The response to this item obviously was predictable. However, the item was purposely used to establish the extent to which litter was a source of dissatisfaction.

The overwhelming negative reaction to littering was obtained in a situation where it alone was judged. To test how users felt about litter as opposed to encountering too much use, respondents were asked the extent to which they agreed or disagreed with the following statement: *"Seeing too many people in the wilderness is more disturbing than finding a littered campsite."*

Two-thirds of the sample felt a littered campsite represented a more disturbing situation than meeting too many people. Inasmuch as the statement referred to a "littered campsite," this level of disagreement might have been somewhat intensified because the camp location is important to the user; then littering would represent an especially irritating source of dissatisfaction at this location.

Strong purists did not differ significantly from the total sample in their level of disagreement with the statement. The statement presented a difficult choice for the strong purist, but the similar response of this group to the total sample's response further reinforces the idea that with regard to wilderness certain widely accepted value systems exist. This pattern in the responses introduces the possibility of a hierarchy of stimuli having varying degrees of impact upon user satisfaction; specifically, the results suggest the effects of depreciative behavior (in this case, littering) might override those associated with seeing too many people. Whether this occurs with other dimensions of carrying capacity is conjecture at this point, but efforts should be directed toward investigating this possibility. The presence of such a hierarchy has obvious and important implications in terms of the establishment of management priorities, particularly during periods of limited financial and manpower resources.

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[11]Depreciative behavior, as used here, describes behavior that might violate institutional restrictions, accepted social norms, or both.

VISITOR ATTITUDES TOWARD USE RATIONING

When one considers the increasing use of the limited wilderness acreage and the obligations imposed by the Wilderness Act, it is apparent that some form of rationing will eventually need to be adopted. To many, the idea of regulation seems incompatible with the idea of wilderness. However, the consequences that could occur if controls are not adopted seem similarly unpalatable.

We solicited the attitudes of visitors to a series of techniques that could be utilized by managers to regulate use. These techniques can be grouped into two broad categories: (1) Those that enable the manager to directly ration use; and (2) those that might reduce use by placing greater demands on the potential visitor.

Direct Rationing Techniques

Respondents were asked how they would feel about the use of the five control techniques listed in table 11. No one technique was favored by a majority. However, important differences did exist among the total responses to the individual technique, the responses obtained from each study area, and the responses obtained from strong purists.

Table 11.--*Visitor reaction (percentage of total sample) to use control techniques*

Control technique	Strongly favor	Favor	Neutral	Oppose	Strongly oppose
1. Issue limited number of permits on a first come, first served basis	8	20	18	29	25
2. Issue limited number of permits on a lottery basis	4	14	20	33	29
3. Issue limited number of permits through a mail reservation system	15	28	18	19	20
4. Issue permits that assign where people can visit and camp	2	6	11	35	46
5. Charge an entrance fee	6	17	20	22	35

Visitors strongly rejected assignment of travel and camp itineraries. Approximately 20 percent were neutral in their reaction to the other four control techniques; thus we assumed they might be receptive to the use of such techniques. The ability to directly regulate and manipulate the visitor's trip might have some appeal to wilderness managers, but its regimenting nature and its virtual elimination of the individual's freedom to capture the spirit of spontaneous and unplanned travel apparently make it highly unpalatable to visitors. In many ways, it is the antithesis of the type of experience wilderness is intended to provide.

The mail reservation technique was considered the most acceptable technique of control; six out of 10 were either in favor of it or were neutral. The first-come, first-served technique ranked second; 46 percent of the sample were either in favor of it or were neutral. The greater acceptance of a mail reservation technique seems linked to the relationship between the residence of the visitors and the study area sampled. As an example, 52 percent of the visitors to the Bridger favored a mail reservation technique and only 29 percent supported the first-come, first-served technique. In the Bob Marshall, the order of ranking of these two techniques was the same as in the Bridger, but there was less support for the mail reservation technique (41 percent) and greater support for the first-come, first-served technique (35 percent). The Bob Marshall serves a fairly large local population, however, whereas the Bridger use population is primarily nonlocal. It seems reasonable local residents would tend to favor a technique that requires an individual to report personally to obtain a permit than one where his geographical advantage would be offset by having to apply by mail.

The lottery technique would eliminate many of the advantages and disadvantages associated with an individual's location relative to the particular wilderness he desired to visit. It is, as Hardin (1969, p. 23) notes, "eminently 'fair'."

However, visitor acceptance of a lottery was low; only 18 percent of the total sample favored it. This figure was depressed by its low level of acceptance in the BWCA where only 9 percent supported it. For the three western areas as a whole, 23 percent favored such a technique.

Apparently, most persons are reluctant to leave to chance the opportunity for a wilderness visit. The visitor prefers to retain some control over the outcome, either by personally obtaining a permit or by early mailing of an application. These opportunities are lost in a lottery.

We made no effort to determine what effect the amount of the fee would have on use if the entrance fee technique was adopted. Rather, we were concerned only with user attitudes about the concept of charging for what traditionally had been free.

Only about one out of five persons favored the entrance fee technique. There was a direct relationship between the acceptance of the fee technique and the percentage of each study area's sample having incomes of $10,000 or more. However, it is probable that factors other than income are involved. Visitors to the Bridger and Bob Marshall areas, for example, consistently showed greater acceptance of all control measures than did visitors to the BWCA and High Uintas.

The pattern of responses from strong purists in each study area tended to be similar to that of the sample, but generally were more pronounced. However, there were some sharp differences between strong purists among the different areas.

Strong purists in the High Uintas were significantly more inclined to accept a first-come, first-served permit system than those in other areas. Situated only 50 miles from Salt Lake City, the area is probably considered by many local visitors, including the strong purists, as "personal property" and a use system that compliments their close location is perceived as more desirable.

Nearly one-third of the strong purists in the Bob Marshall and one-fourth of those in the Bridger favored the lottery technique. This response might reflect a particularly strong level of commitment to wilderness preservation. A number of persons have indicated in personal discussions with me that they would be willing to limit their visits to the wilderness to once every 5 years if it could ensure a high quality visit. The high level of acceptance of a lottery in the Bob Marshall and the Bridger might reflect such thinking.

As was found for the overall sample, strong purists tended to support the mail reservation system most strongly. They vigorously rejected the concept of assignment of itineraries. This suggests that spontaneity and freedom of choice are very important elements of the wilderness trip and not diminished in importance by a person's general attitude toward wilderness. It might also reflect the more common concern about increasing government control over the individual.

Strong purists had mixed feelings about an entrance fee. Although about 45 percent of the total sample's strong purists opposed the imposition of such a fee, the percentage favoring it ranged from 23 percent in the BWCA to 53 percent in the Bridger.

Ordinarily, strong purists adopt a somewhat more positive attitude toward use regulation than do other users. This is a particularly relevant factor for wilderness managers to consider. The strong purists understand that certain aspects of wilderness are being threatened by overuse.

Regulation offers a means of protecting those aspects. However, land managers have consistently overestimated user resistance to controls (Hendee and Harris 1970; Clark, Hendee, and Campbell 1971). Apparently, the converse may be true where important user values are threatened by uncontrolled use; support for regulation can be stronger among users than among managers.[12]

Indirect Rationing Techniques

It might be possible to reduce the total level of use by adopting techniques that would place greater demands upon the visitor's skills or physical stamina. Two potential techniques based on this approach were investigated: (1) Reducing the number of trails and signs (within the area) so that only those persons willing to make the effort could visit the area; and (2) blocking off the last few miles of the access roads so the trail to the wilderness would be longer.

Reduction of Signs and Trails

The reduction or elimination of trail maintenance or elimination of signs, bridges, and other facilities could be considered functional restrictions. No direct restriction would be placed on who or how many might enter. The success of such restrictions is based upon the assumption that total use would be reduced if users were confronted with more primitive conditions of travel where convenience or personal safety became possible considerations. Such success would be contingent upon user awareness of these conditions; this factor was not explored in this study.

Visitor reaction tended to be distinctly more favorable to indirect than to direct restrictions (table 12). About half the visitors to all the study areas either reacted favorably or were neutral to such "restrictions."

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[12]Forest Service Region 5 (California) adopted a mandatory wilderness registration system in 1971. Preliminary indications suggest a high level of visitor acceptance of the system, despite the concern by many administrators that it would be strongly opposed.

Table 12.--*Visitor reaction (in percent) to reducing number of signs and trails*

Area	No. of respondents	Strongly favor	Favor	Neutral	Oppose	Strongly oppose
				Percent		
BWCA	205	24	23	16	20	17
Bob Marshall	114	11	18	19	40	12
Bridger	143	24	24	21	22	9
High Uintas	153	14	21	19	30	16
Total	615					
Average		19	22	18	27	14

Chi square 23.45*, 12 df

Visitors to the Bob Marshall and the High Uintas were least favorable in their response; this might be attributed to the large percentage of horseback riders in these two areas. Trails are more necessary for horseback riders than for hikers. The elimination of trails would close off, in effect, certain areas to horses (for example, where one has to cross a talus slope) and would greatly increase the possibility of injuries to the horses. Therefore, it is understandable why in the total sample only about 25 percent of the horseback riders favored this approach.

On the BWCA questionnaire, this statement read as follows: *"Leave portages rough so that only those persons willing to make the effort could visit the area."*

Surprisingly, persons using outboard motors and paddling canoeists favored such an action to the same degree. It had been hypothesized that those traveling by outboard motor would reject this more subtle control technique because they generally were opposed to any form of control. Furthermore, it would be rather difficult to transport motorized craft across a portage.

Except for those in the Bob Marshall, the strong purists were somewhat more favorable toward reducing the number of trails and signs (gamma equaled -0.23): the more purist the respondent, the more he favored reduction of trails and signs. Only 41 percent in the Bob Marshall favored this action whereas 55 percent in each of the other areas were in favor.

The basically receptive attitude of strong purists toward this form of control was somewhat predictable. It permits such persons to avoid approval of additional restrictions, yet it would tend to alleviate the problem of overuse. Moreover, it promotes a management direction probably similar to the strong purists' own concept of an area where facilities are minimal and where opportunities for cross-country travel are enhanced.

Manipulation of Access

Another method suggested to restrict use involved making the wilderness more remote by blocking off the access road at some point so the hike to the wilderness boundary would be longer. In the BWCA, this would also involve a portage to start the trip.

About 40 percent of the visitors in the three western areas rejected this concept; in the BWCA, 60 percent were opposed. Motorboaters in particular objected to such an action; only 6 percent favored the measure and 14 percent were neutral.

Zoning

Separating incompatible uses in the wilderness has been cited in other studies as a method to provide users with more enjoyable experience (Wildland Research Center 1962; Lucas 1964; Carhart 1961). Even though zoning in the three study areas would apparently have limited value in terms of user esthetics, there may be important ecological reasons for the zoning. For example, areas of particularly fragile soils might have to be zoned against horse use. In the BWCA, on the other hand, zoning areas to exclude outboard motors would contribute greatly to providing a high quality wilderness experience for canoeists.

User attitudes toward zoning were divided clearly between the study areas (table 13). In the BWCA, six out of 10 visitors agreed with the concept of separating travel methods; in the four western areas, only 25 percent agreed.

Apparently, the pattern of response to zoning reflects current administrative practices in zoned areas of the BWCA, where motor-propelled craft are excluded. Handout recreation maps and pamphlets are available to keep visitors informed of these zoned areas.

The responses of strong purists closely followed that of the total sample. In the BWCA, 79 percent favored setting aside areas for the exclusive use of paddling canoeists. Such an attitude reflects the concern of canoeists for the provision of an area that more nearly coincides with their perception of wilderness than does the present legislatively defined BWCA.

Strong purists in the western areas were basically opposed to zoning. About 55 percent of this group in each area disagreed with the statement. However, about one-quarter favored zoning; again it seems the somewhat ambivalent stance of this group reflects their concern for the protection of the resource and their rejection of authoritarian sanctions and controls.

There is no comparable form of zoning in the three western areas. Therefore, the unfamiliarity of visitors in the three western areas to zoning probably contributed somewhat to their negative reactions. Moreover, most of the people apparently cannot perceive the need for such zoning.

Table 13.--*Visitor reaction (in percent) to zoning on basis of method of travel*

Area	No. of respondents	Strongly favor	Favor	Neutral	Oppose	Strongly oppose
		Percent				
BWCA	203	13	14	13	32	29
Bob Marshall	120	20	43	23	13	2
Bridger	144	19	31	15	22	13
High Uintas	154	21	36	18	18	7
Total	621					
Average		18	29	17	22	15

Chi square 79.80*, 12 df

Limit on Party Size

Our study indicated that wilderness users consider encounters with large parties as having an adverse effect on their wilderness experience.

In response to the question, "*Do you feel there should be a limit to the size of parties visiting the BWCA*?" visitors split almost evenly: 49 percent opposed such a limit and 51 percent were favorably or neutrally disposed. However, nearly 62 percent of the paddling canoeists supported such a limit; 64 percent of those using motor-propelled craft opposed it.

Visitors in the three western areas were asked to specify whether they would support a limit on party size and, if so, whether they would prefer such a limit on (a) all parties, (b) horse parties only, or (c) backpackers only. About 70 percent of the Bridger users favored a limit on party size, of which nearly two-thirds favored placing such a limit on all parties. In the Bob Marshall and High Uintas, 30 and 40 percent of the users, respectively, favored restrictions on the size of horse parties. The latter probably can be attributed to the larger percentage of horse parties visiting these two areas.

There was virtually complete rejection of controls of party size for backpackers. Most visitors probably see little benefit associated with such a restriction.

A limit on party size would principally affect the horse party; backpacking groups tend to be small, averaging three to four persons. Thus the responses of backpackers to the proposed party size limit might have been based, in part, on how such regulations would control the size of horse parties. Our analysis of the responses of these two groups provides limited support for this idea; backpackers showed slightly more support for a fairly restrictive size limit (12 people) than did horseback visitors (62 as opposed to 55 percent).[14]

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[14] This is significant at the 0.05 level, but there is little substantive difference.

VISITOR ATTITUDES TOWARD MANAGERIAL ACTIONS

Respondents were presented with 12 managerial actions (table 14) that could be undertaken to offset potentially adverse visitor impacts.

Table 14.--*Visitor response to suggested managerial actions, by study area and strong purists*

Managerial actions	Percentage favoring adoption					Gamma[a]
	BWCA (N=206)	Bob Marshall (N=120)	Bridger (N=144)	High Uintas (N=154)	Strong purists (N=248)	
More high quality trails (portages)	37	35	31	35	26	0.31
Signs indicating place to camp[b]	--	52	30	26	31	.41
Portages to lakes presently undeveloped[c]	73	--	--	--	74	.09
More maps and pamphlets	60	52	60	55	54	.05
More campsites	46	22	16	15	17	.39
Wilderness rangers	70	58	68	67	63	.03
Hitching racks[b]	--	26	4	16	10	.46
Small docks at portage landings[c]	24	--	--	--	5	.54
Corrals[b]	--	25	4	11	8	.43
Canoe rests[c]	51	--	--	--	43	.18
Simple pit toilets	63	43	22	25	28	.31
Wooden bridges across large rivers[b]	--	67	65	62	57	.14

[a]Gamma reflects the degree to which endorsement of the item is related to purist attitudes.

[b]Listed only on questionnaires used in the three western wildernesses.

[c]Listed on BWCA questionnaire only.

More High Quality Trails

Recreational use of most wildernesses is poorly distributed in space. If a more even distribution could be achieved, it might be possible to reduce problems of crowding and other conflicts by providing high standard trails which possibly would attract persons to areas receiving little use.

However, the pattern of response suggests such trails are not regarded as appropriate by most visitors, particularly by strong purists. Generally, user attitudes toward upgrading trails are negative: the presence of such trails appears to represent an inappropriate modification to many. Moreover, some visitors might feel that attempting to redistribute use through high standard trails will result in increased use pressures rather than a more equitable distribution.

Response to providing more high quality trails was evenly mixed among those favoring, those rejecting, and those neutral to such an action. However, the more purist users were, the more likely they were to reject such trails. Purists in the Bob Marshall were slightly more inclined to accept high quality trails than purists in the other three areas; this probably can be attributed to the greater amount of horse travel on the Bob Marshall than in the other three areas.

In the BWCA, only about one-third of the paddling canoeists favored more high quality portages; nearly half of those traveling with outboard motors were in favor. Canoeists probably consider such developments inappropriate in wilderness; furthermore, it would facilitate the greater use of many lakes presently reached only by rough portages.

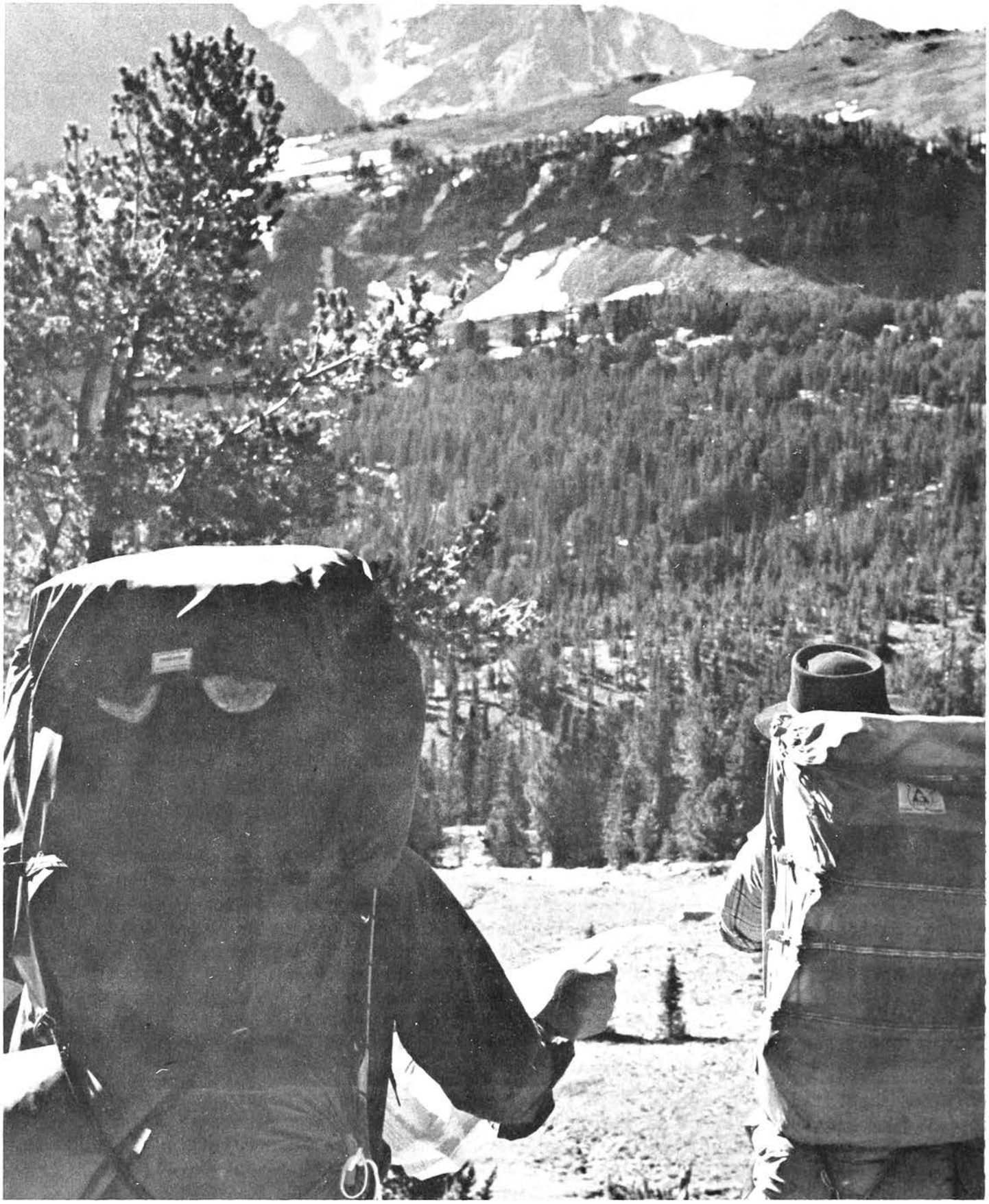
BWCA visitors were asked their reaction to providing portages to lakes previously lacking such access. About three out of four were in favor. However, paddling canoeists tended to be significantly less so inclined ($p>0.05$); again, it appears they perceive such an action more as promoting the wider distribution of motor craft rather than providing themselves with additional wilderness opportunities.

Signs Indicating Places to Camp

The present pattern of wilderness campsite use is probably influenced considerably by information provided on handout recreation maps of the wilderness area and by the user's past experience; this has concentrated use in only a few areas. Most wildernesses, however, have numerous locations where a small party could set up a tent to enjoy solitude. Often such locations are close to the trail, but factors such as topography prevent the visitor from easily locating such spots. One method of spreading camping use might involve the placement of signs indicating site locations.

The suggested provision of directional signs to campsite locations was not well accepted by visitors, except in the Bob Marshall, where 52 percent responded favorably. There is some basis for horseback riders desiring this kind of information. Visitors traveling by horse are probably less willing than backpackers to chance leaving a trail in search of a nearby camping location.

The general negative reaction to such signs was probably based on the feeling that signs indicate the presence of man; they eliminate the sense of exploration and discovery one might otherwise enjoy.



The provision of high quality maps could do much to enhance the wilderness experience. Information about out-of-the-way camping spots, horse feed, drinking water, and attractions could be shown. Moreover, the availability of such maps would greatly reduce the need for signs.

Maps and Information Pamphlets

An alternative to signs would be to provide maps and pamphlets about attractions, trail quality, campsites, fishing quality, and so forth. Basic interpretative data also could be provided regarding the historical, biological, and geological features of the area. Such printed materials eliminate the obtrusiveness of signs but would require at least some mapreading skills.

Although there was basic agreement to the suggestion of providing printed material, visitor response was not especially favorable. In the total sample, about six out of ten responded favorably; the response among strong purists was slightly less.

This pattern of response suggests that wilderness users do not feel a decided need for printed materials. The author did receive considerable unsolicited criticism of standard Forest Service maps (experience has shown that many such maps are inaccurate, only partially cover trail systems, and are out-of-date). Moreover, it is probable that some visitors fear the availability of better maps will increase total use rather than redistribute use.

More Campsites

Only about 20 percent of the visitors in the three western areas favored the provision of more campsites. Some expressed confusion, because campsites in wilderness are not developed to the degree they are in an auto campground. Often, wilderness campsites are wherever the visitor decides to spend the night. Nevertheless, certain locations have become recognized as campsites, either through administrative actions or through habitual use.

This suggestion was included because an inventory of potential campsite locations based on such criteria as terrain, water supply, and so forth, might be used by managers to redistribute use. However, visitors in the three western areas apparently do not feel the need for such action. Nevertheless, it appears the number of available campsites providing solitude may be a critical "bottleneck" in establishing the esthetic carrying capacity; as such, an inventory of these locations would prove invaluable to the development of management capacity programs. Nearly half of the BWCA visitors favored more campsites probably because they do not have the flexibility that users in the western areas have in finding campsites. As a result of the heavy use on the BWCA, most of the more desirable camping areas are occupied; yet many visitors are probably still hopeful there are other potentially desirable sites.

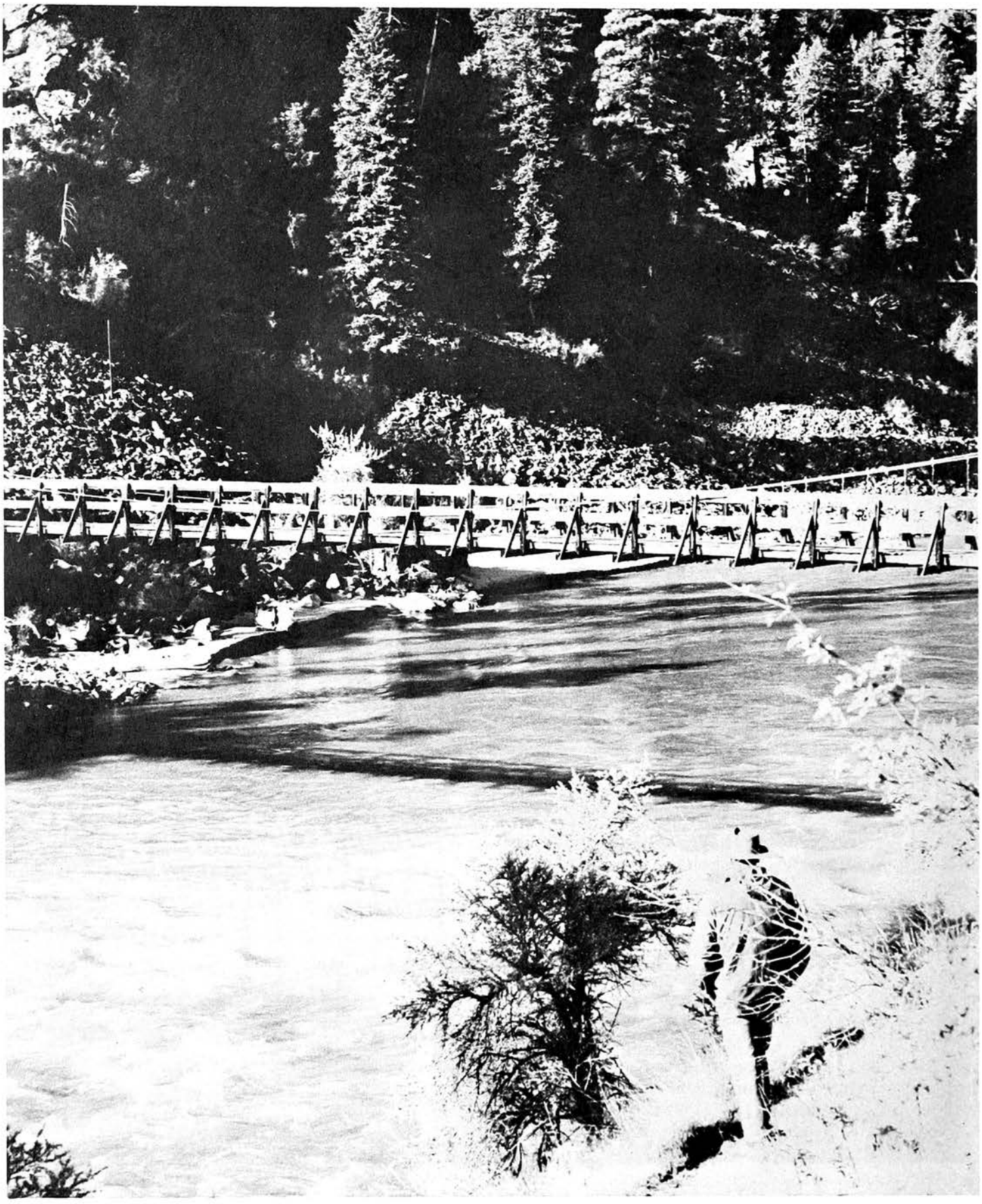
Wilderness Rangers

Forest Service Wilderness Rangers are on duty on a seasonal basis on all four study areas. On the Bob Marshall, 58 percent of the respondents favored their presence; on the other study areas, approximately two-thirds were in favor. There was no appreciable difference between the response of strong purists and that of the total sample.

Litter cleanup and visitor contact by the rangers probably account largely for their acceptance. None of the visitors indicated they felt rangers were present to "check up" on them.

Hitching Racks and Corrals

Visitors to the three western areas were asked the degree to which they favored the provision of hitching racks and corrals. Half of the respondents opposed both; about one-fifth favored them. Even in the Bob Marshall, only about 25 percent were in favor. Method of travel had little influence on response to this proposal.



About two out of three persons surveyed favored bridges across wide rivers. Purists tended to be less favorable, however.

Hitching racks and corrals could help to prevent much of the vegetation loss, muddying, and soil damage found around many campsites as well as to keep such sites free of manure. They would also help to reduce tree damage caused by tethering. However, damage to the environment might become more noticeable if stock was concentrated into relatively small areas. Many persons traveling by horse or with packstock hobble their animals; temporary rope corrals probably would serve as well as permanent structures. Such facilities probably would not be effective in motivating horse parties to use one area rather than another.

Docks at Portage Landings and Canoe Rests

In the BWCA, docks and canoe rests might be considered functional equivalents to hitching racks and corrals in the three western areas. Overall reaction was somewhat mixed; mode of travel did not affect the response. Paddling canoeists were more favorable toward canoe rests, but not significantly so, even though such rests are not used by most motorboaters. Docks were viewed as not being particularly necessary.

Pit Toilets

Despite all other considerations, it might become necessary to restrict use if sanitation problems develop in an area. Human health is not the only reason. Barton (1969) pointed out that the release of nutrients and pollutants associated with increasing recreational use in the BWCA can result in aquatic growth that has adverse effects on esthetics as well as on health.

Visitor response to the provision of pit toilets varied fairly substantially between the BWCA and the western areas; it varied to a lesser degree among the three western areas. This response was expected because sanitation problems are more serious in the BWCA where soil cover is limited and there is more danger of polluting the only source of drinking water because most campsites are on lakeshores. Current management policy in the BWCA recognizes these problems and simple latrines are already being provided. In the western areas, disposal of human waste generally is more easily accommodated. At the time of this study, toilets were still to be found on the Bob Marshall, which might explain the greater level of approval for such facilities in this area. Current Forest Service policy permits the construction of toilets in cases where sanitation is a problem.

Wood Bridges

Nearly two out of three persons favored erection of wood bridges across wide rivers. The basis for this response probably varied among individuals, but the element of safety probably influenced the responses. Such bridges also have potential as a management technique to use in redistributing use. In certain areas, a bridge across a river that cannot be safely forded could provide access into remote areas. Strong purists tend to be less favorable to bridges. This is to be expected because bridges obviously represent the invasion of man and are in direct contradiction to their philosophy that is rooted in virgin landscapes.

In view of existing legislative constraints, as well as of the basically negative attitudes of visitors (especially those of strong purists) toward any physical modifications except bridges, one could only conclude that structural modification of landscapes will not appreciably enhance carrying capacity. Claims by administrators that such developments are necessary because visitors "want this" or "demand that" appear unfounded. Such statements may stem more from administrators' misperception of user desires than from an accurate assessment of users' needs and desires (Hendee and Harris 1970; Clark, Hendee, and Campbell 1971).

RECREATION USE IN RELATION TO CAPACITY

Given an opportunity to respond to questions on the basis of "What should be," wilderness visitors tend to reject excessive numbers of people, certain types of use, encounters at certain locations, and evidence of littering. Do they, in fact, react in the same way under actual conditions? To determine this, some of the specific aspects of the respondent's visit were investigated.

User Perception of Crowding

When asked whether the areas they had visited seemed "crowded," about three out of four replied "No." However, 24 percent indicated they encountered "crowding;" specifically, they felt the character of use encountered did not provide a high quality wilderness experience, an implicit management goal of the Wilderness Act.

However, response to this question varied greatly among study areas and the users. Visitors to the Bridger were most critical; 33 percent felt crowding was a problem. In the BWCA (which had the highest use of the four areas), 28 percent of the visitors felt crowding was a problem; in the Bob Marshall (which had the least use of the four areas), only about 11 percent expressed concern over crowding.

Nearly 40 percent of the canoeists complained of crowding; less than 20 percent of those using outboard motors did. This pattern of response can be attributed not only to the canoeists' greater sensitivity to use levels, but also appears to be related to their greater intolerance for outboard motors.

In the West, backpackers tended to complain of crowding to a greater degree than horseback riders; about one in four complained as opposed to about one in six horseback riders. Apparently--as was the case in the BWCA--backpackers' definition of crowding is influenced not only by the level of use encountered, but also by the type of use encountered. Horseback riders appear to define crowding more in terms of amount of use encountered and do not display the adverse reactions toward other types of users as backpackers do.

Paddling canoeists and backpackers were disproportionately represented among the strong purists, and as a consequence, it follows they would be more critical in their evaluation of crowding. This was evident when purist scores were examined as the independent variable. Strong purists perceived crowding to be more of a problem than the other purist groups (36 percent as compared to 17 percent of the moderate purists); gamma between purist score and the degree to which crowding was perceived as a problem was 0.42.

Effects of Crowding on Route of Travel and Length of Stay

Respondents who cited crowding as a problem were asked to indicate whether it had caused them to change the route or duration of their wilderness trip, or both. Separating one's self from an area perceived as crowded, either by changing the planned travel route or by actually terminating the trip early and leaving the area, was interpreted to be the strongest action open to the visitor.

Most visitors simply tolerated situations they perceived as crowded. Overall, 79 percent indicated they took no action to get away from areas of crowding. The Bridger Wilderness was one exception, where only 68 percent were content to tolerate overuse; there, one out of three persons altered their spatial behavior to offset what they considered to be a situation detrimental to their enjoyment.

In the BWCA, only about 10 percent of the persons traveling in motor craft who mentioned crowding as a problem indicated this affected their itinerary. However, nearly 20 percent of the paddling canoeists reacted to crowding by altering the route or length of the trip. This suggests that even though both canoeists and those traveling by outboard motor may perceive problems of crowding in wilderness, the effects are of less concern to the latter group and there is less motivation to try to alleviate its impact. For some of the paddling canoeists, however, crowding represents a serious intrusion upon their experience; consequently, they are more likely to take measures that will offset or eliminate the problem.

The decision to shorten one's trip probably represents a more drastic reaction than changing one's route. Although a change of route might mean the user will not have the opportunity to visit a particular area he was interested in, he may discover some equally pleasing new location. On the other hand, cutting short the length of one's visit indicates the user apparently perceives no other alternative to contend with crowding and terminates his visit.

The Areal Extent of Overuse

Visitors to each area were asked to indicate where crowding had been a problem; we were then able to map each study area showing where visitors considered that use had reached or exceeded their definition of capacity.

An index of crowding (IC) was computed, where $IC = \frac{TC}{TV}$. TC represents the total number of complaints reported by the individuals in any given area (for example, a lake basin) and TV represents the total number of visitors sampled who visited that particular area.

Using the values so computed, we constructed a series of isolines with those line values representing the percentage of individuals sampled who visited a particular area and defined it as crowded. Thus, it was possible to obtain an idea of the areal extent of crowding and its relationship to external access, attractions, and trails.

Overuse and Crowding in the BWCA

About 28 percent of the users sampled in the BWCA complained of crowding. As shown in figure 7, areas of perceived crowding were fairly limited in their areal extent: the Moose Lake area, the Fall Lake entrance, the Saganaga Lake-Sea Gull area, and the Lac La Croix area. The Lake One entry also represents a problem area, but to a lesser degree.

Moose Lake and the Fall Lake entry are the principal problem areas. These two large lakes lie on the BWCA boundary, only a few miles from Ely, Minn. Consequently,

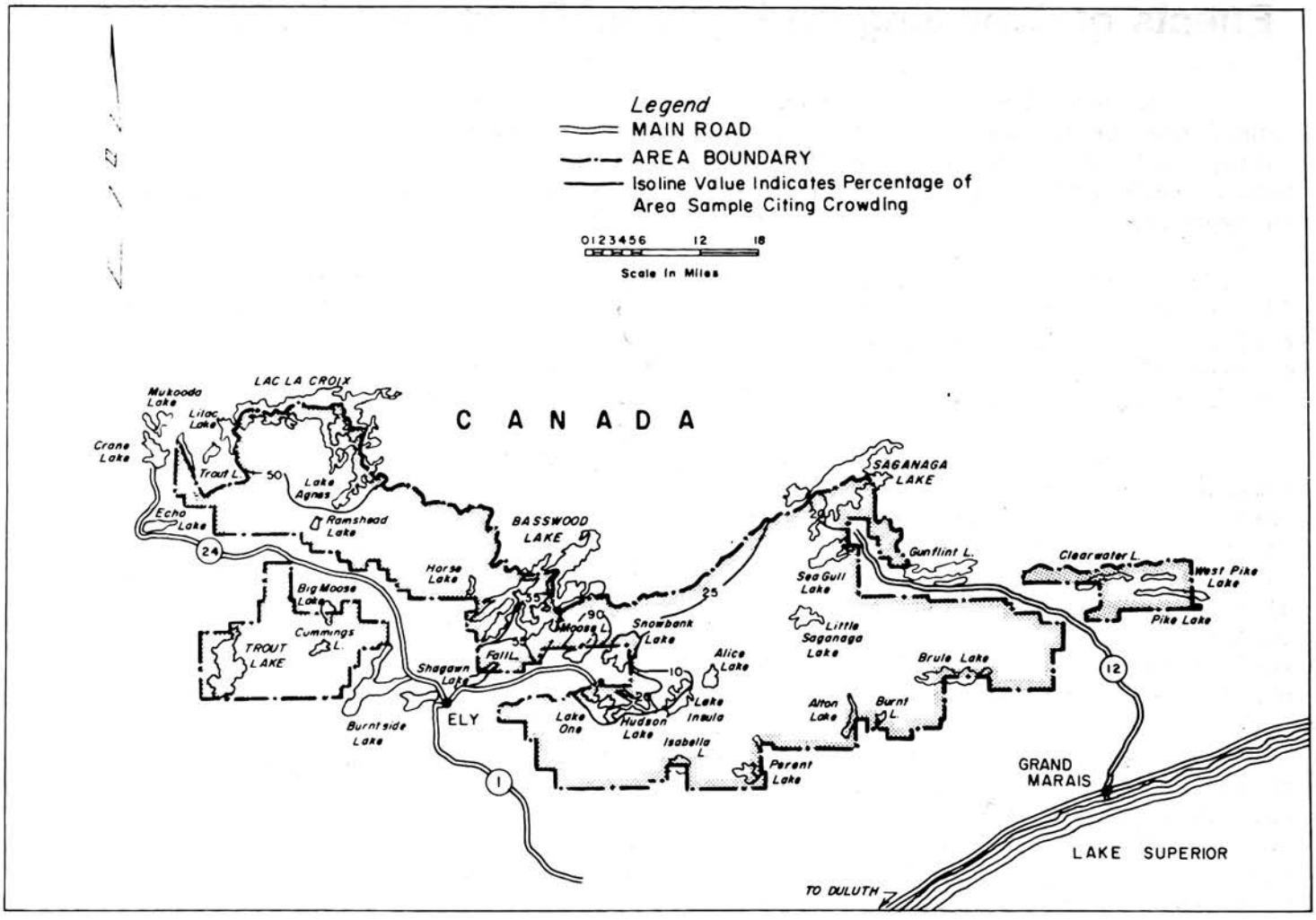


Figure 7.--Zones of crowding within the Boundary Waters Canoe Area.

concentrated use of these lakes is to be expected to some extent, but apparently it has reached such levels that many persons must endure an initial period of dissatisfaction until they have penetrated a few miles into the area, where use begins to disperse and decline.

Except for the Saganaga Lake-Sea Gull and Lac La Croix areas, crowding is concentrated immediately east of Ely. Access into this area is well developed. The Fernberg Road, extending about 20 miles east from Ely, is a paved highway and well-maintained. This will probably tend to intensify the already skewed use distribution.

Both the Saganaga Lake-Sea Gull and Lac La Croix area were classified as "transitional" (they were close to being used to capacity) by Lucas (1964) in terms of the relationship between use and capacity. The lakes in these areas serve as important links for considerable Canadian-bound traffic; as BWCA use increases, it seems reasonable that more persons will have Canada as their destination (Nelson and Hughes 1968). Thus, lakes that presently accommodate a considerable amount of this northward flow can expect future increases in numbers of visitors as well as complaints about overuse.

It was stated earlier that carrying capacity is a function of not only use levels, but type of use encountered, location of encounters, and evidence of depreciative behavior as well. In analyzing comments regarding overuse in the BWCA, a striking number of persons defined crowding in terms of the simple presence of motorboats. Other specific complaints cited littering, campsite wear and tear, and the inability to find isolated campsites.

Visitors indicated that overuse is not uniformly spread throughout the area, but rather that it tends to be focused in certain locales; among the principal locales are around portages from one lake to another. Use is normally constricted in these areas as travel patterns converge into a narrow flow through the portage. One result is that canoeists are forced into contact with the motor craft they usually try to avoid. The result is an increased level of dissatisfaction for these persons.

Overuse and Crowding in the Bob Marshall

In the Bob Marshall Wilderness, two areas were defined by visitors as crowded (fig. 8). One is along both sides of the South Fork of the Flathead River. This area has long been recognized as being overused; in 1970, Flathead National Forest officials closed several camps along the river so vegetation damaged by overuse might recover. The open, flat nature of the country, as well as the attractiveness of the river, has drawn a large number of visitors for a number of years.

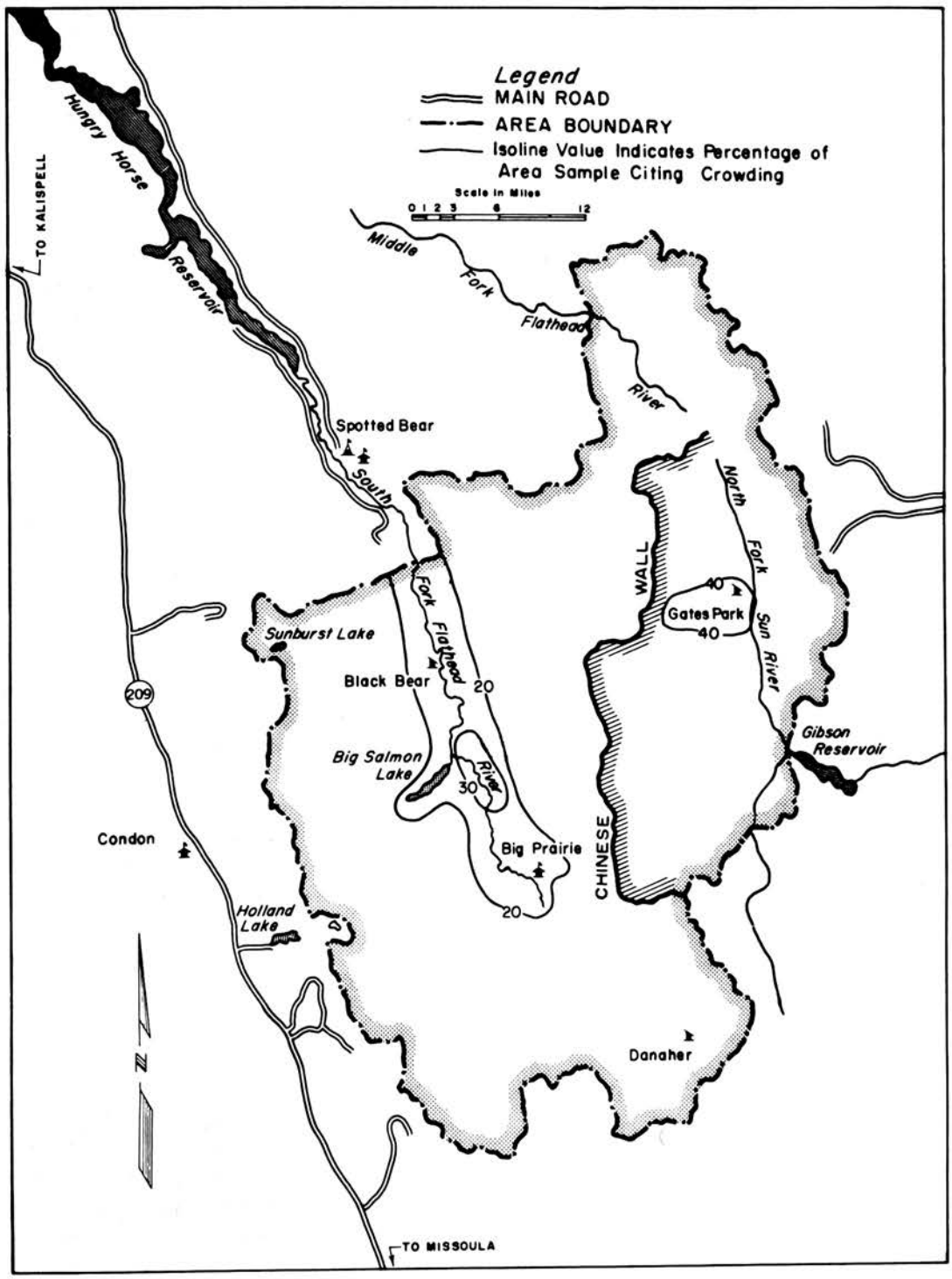


Figure 8.--Zones of crowding within the Bob Marshall Wilderness Area.

The second area was along the east side of the wilderness at Gates Park. Like the South Fork of the Flathead River, this area has sustained moderately high levels of use for some time. Access into this area is either along the North Fork of the Sun River or over Headquarters Pass from the South Fork of the Teton River.

Both of these areas are characterized by not only an apparent problem of excess use, but by a large amount of horse use and by the presence of administrative structures. A Forest Service Ranger Station and an airstrip are located at Big Prairie along the South Fork of the Flathead River. Two other airstrips are located nearby, one at Black Bear and another at Gates Park. These airstrips are restricted to emergency use only; nonetheless, they represent extremely noticeable impacts on the land.

The longitudinal boundary of the zone along the South Fork of the Flathead which was perceived as crowded is a marked departure from the pattern found in the other western areas. In most areas, lake basins form a convenient frame of reference for users' definition of the areal extent of crowding. This longitudinal aspect represents a serious barrier to the goal of managing for high-quality wilderness recreation. As noted earlier, the South Fork is a major artery of travel into the wilderness and it is clear that use levels are such that considerable penetration is necessary before many users find a desirable experience.

Use problems intensify somewhat near Big Salmon Lake and its junction with the South Fork. The attraction of a lakeside camping location and the opportunity for both stream and lake fishing probably make this an especially desirable location. However, it is paradoxical that these very qualities accelerate and accentuate the problems that gradually lower the desirability of the area (e.g., littering, campsite deterioration, too many people).

Overuse and Crowding in the Bridger

The 383,300-acre Bridger Wilderness is split nearly exactly in half by an oblong zone defined by visitors as severely overused (fig. 9). Island Lake is in the center of this zone which is reached by a well-used trail from Elkheart Park. Considerable day use enters here, destined primarily for Long Lake, about a mile from the end of the road.

Two other areas of overuse lie at opposite ends of the wilderness. The northwest end, with good fishing in the Slide Lake area, coupled with its proximity to the road end at Green River Lake, attracts heavy use. At the southeastern end, similar conditions create a problem of overuse in the Big Sandy Lake area.

Complaints of excessive trail traffic were common in the Bridger, particularly from visitors to the Big Sandy area and those traveling the trail from Elkheart Park to Island and Seneca Lakes. This may be related to encounters between those seeking a wilderness experience as opposed to those primarily interested in fishing at a mountain lake.

There is an extensive amount of grazing by sheep in the Bridger. Allotments have been established to hold numbers of sheep in line with grazing capacity, but it is apparent from our study that sheep are contributing to a serious decline in visitor satisfaction. There are at least three sources of friction: (1) The changes caused by grazing of alpine meadows and its effect upon esthetics; (2) other evidence of the sheep's presence, such as odor, manure, and dust; and (3) their competition with recreational packstock for forage. Sheep grazing is declining, however; personnel of the Bridger Forest indicate over a 50 percent reduction since 1940. Increasing costs of such grazing probably will cause this decline to continue. One visitor commented: "The sheep, of course, lent their noxious presence to an otherwise superb area."

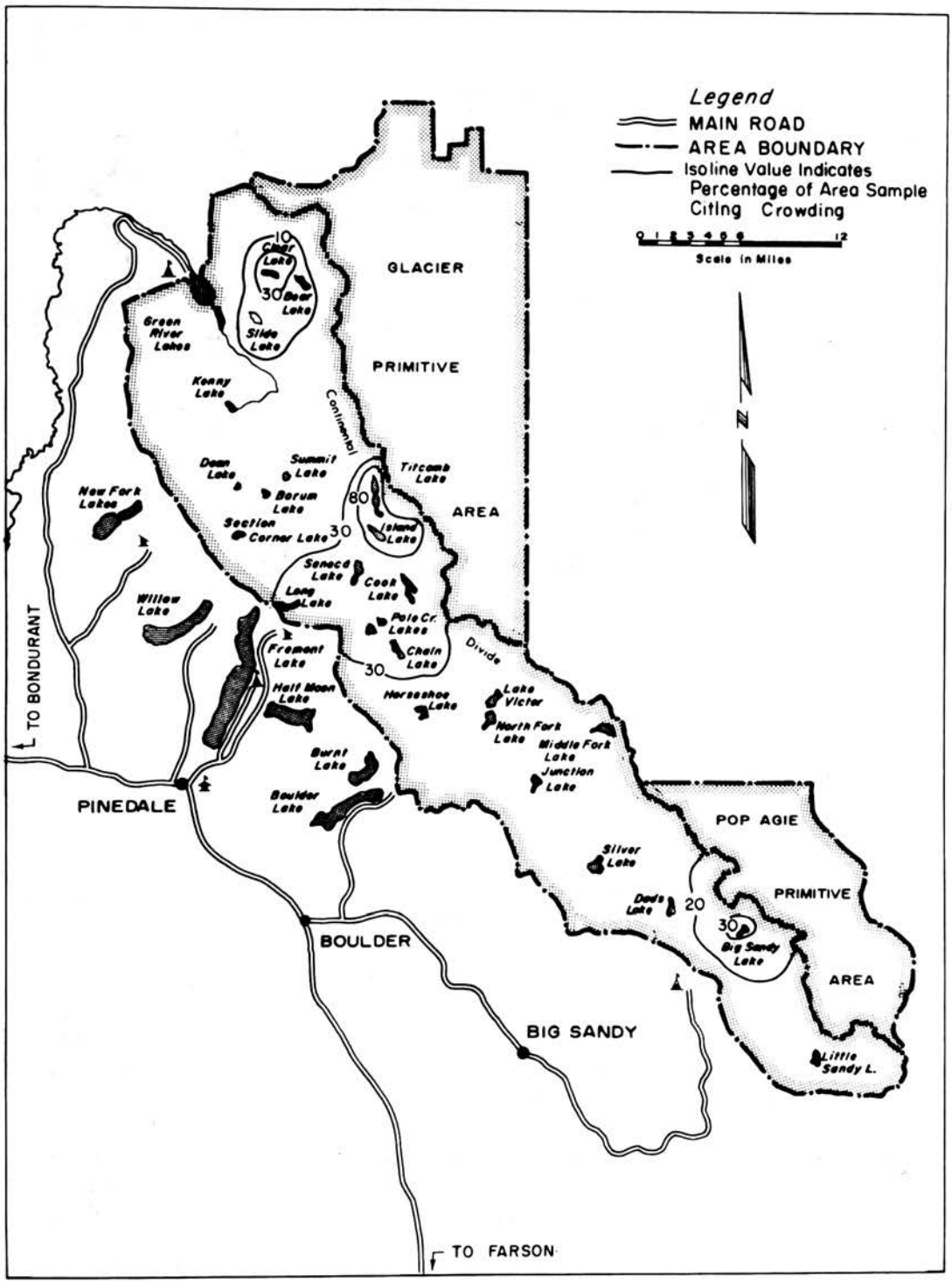


Figure 9.--Zones of crowding within the Bridger Wilderness Area.

Overuse and Crowding in the High Uintas

Visitors identified three major areas in the High Uintas as crowded (fig. 10). This crowding can be attributed to two factors: (1) Clustering of lakes; and (2) relative closeness to access points into the Primitive Area.

About ten percent of the campers in Naturalist Basin and the Brinton Meadows area perceived crowding as a problem; however, this figure rose to 40 percent in the Brown Duck area. In all three areas, these percentages were higher for individual lakes. This reflects what we had noted previously; namely, that the tolerance was low for other users locating near a visitor's campsite. In these areas, most of the visitors indicated they had selected lake areas for overnight campsites.

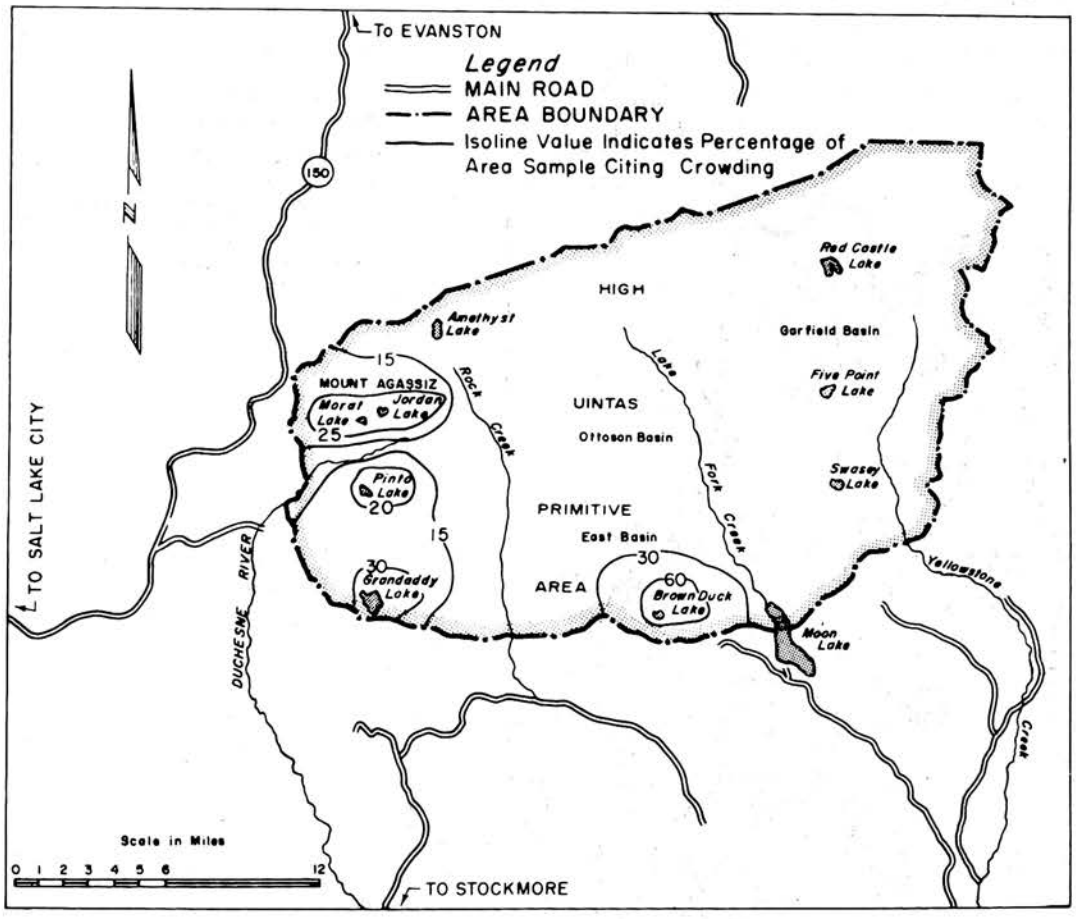


Figure 10.--Zones of crowding within the High Uintas Primitive Area.

Several persons commented that the first few miles of the access trails were crowded, particularly along the Highline trail, but "this was to be expected." This type of response suggests that a person may experience some undesirable element in his immediate environment, but is willing to tolerate it because of the particular setting. It also concurs with one earlier conclusion that users zone wilderness into a "peripheral" area and a "core" area. Expectation of encounters with others is higher in a peripheral area; consequently, visitors appear more willing to accept encounters in such an area than in a core area.

A substantial proportion of the High Uintas does not receive the level or type of use visitors consider as crowded. As suggested earlier, wilderness use is highly skewed in its spatial distribution. The three areas of crowding are all adjacent to the Primitive Area boundary; in the case of Naturalist Basin, a major State highway lies within a few miles of the area. This poor internal distribution of use is a result, in part, of the pattern of development that has taken place outside the Primitive Area boundary. Also, all three areas possess a number of lakes that provide good fishing opportunities coupled with nearness to the road end. The chance for good fishing in an environment still largely unmodified by man makes it especially attractive to outdoorsmen. The level of concern for overuse, however, suggests the very characteristics that make the area attractive may be simultaneously fostering a condition of reduced quality.

MANAGING FOR CARRYING CAPACITY

How to manage wilderness within its carrying capacity has become one of the central issues confronting administrators today (Dana 1957; Clawson and Knetsch 1963). The National Park Service has initiated a limited program of rationing and visitor limitation in three National Parks (Taylor 1972) and the Forest Service has moved to restrict growing use in some southern California wildernesses. The motivation for these seemingly radical actions has been a concern that increasing use threatens the environmental and esthetic qualities of wilderness.

Rationing "across the boards," however, fails to distinguish the disproportionate impact some uses have compared to others on the environmental and esthetic qualities of wilderness. Although it is democratic, it can mislead administrators into thinking that because action has been taken, the problem is being solved. In making the decision to ration use, our concern should be on reducing the impacts of use on wilderness rather than simply restricting use. Hendee,[15] in an unpublished lecture, has described the issue as one of rationing the "environmental expense" of use. Under this concept, one attempts to rank the relative impact of various uses on the wilderness and make decisions regarding rationing or control according to this ranking.

The concept of "rationing environmental expense" fits closely with the concept of "limits of acceptable change." Both draw our attention to specifying sensitive indicators of overuse and provide a rationale for making rationing decisions that avoids arbitrary administrative judgments.

With these concepts in mind, a variety of administrative actions have been defined that would help offset current sources of visitor dissatisfaction. These actions are based upon the data reported herein. The basic objective of each action would be to lessen the "environmental costs" associated with various situations.

Party Size Limitations

The severe impact of large parties on visitor satisfaction and the adverse effect of such on both managers' and users' objectives warrants restrictions on the number of

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[15]John C. Hendee. Principles of wilderness management. Unpublished lecture given to conservation groups and University classes.

Poor handling of stock not only can result in damage to vegetation and soils, but can also result in deteriorated sites that have little esthetic appeal.

persons and stock. A party size limit of no more than 25 persons appears to be about the largest group possible consistent with protection of the quality of the experience for others such a party might encounter.

Stock numbers also must be controlled. Limiting packstock to about one animal per guest seems desirable. The adoption of some of the new, light camping gear would facilitate this. Initially, this might cost the outfitter more, but his long term costs would probably be reduced because (a) fewer packstock would be needed, thus, fewer wranglers would be required; and (b) greater durability of the newer equipment such as nylon tents.

Commercial outfitters operating on National Forest lands are presently regulated by special-use permits in terms of itineraries and number of stock. Such a system provides a convenient framework for wilderness managers to further offset the adverse effects of large parties.

The growing interest in mandatory wilderness registration provides an opportunity to adopt measures designed to minimize the adverse effects of large parties. For example, managers could suggest that itineraries be scheduled to prevent overlap with other large parties. It might be advisable to keep these parties separated by at least one day's travel.

Control of Littering

The presence of litter is a major source of dissatisfaction to all wilderness visitors. There are probably a number of control actions worth consideration. Certainly, the cleanup of residual litter, coupled with a continuing program of cleanup, is important. There should also be improvement in the legal mechanisms to enforce antilitter regulations.

In 1971, the use of noncombustible materials in the BWCA was banned. Tentative reports suggest the program has been highly successful and well received by users. A similar action might be adopted elsewhere; it could do much to halt continuing litter accumulations.

Forest Service regulations regarding litter disposal need to be communicated more effectively. Preliminary results of a survey of wilderness users in the Northern Rocky Mountains indicated that 30 percent thought burying was the proper procedure for disposal of noncombustible trash.

Beyond these measures, concern needs to be directed toward a modification of visitor behavior. Regulations and legal sanctions against littering will probably never be completely satisfactory in contending with the problem. Additional research should be encouraged toward the understanding of how such depreciative behavior could be altered. For example, recent studies in a special interest hiking area and in a dispersed car camping location demonstrate that provision of incentives can yield substantial reductions in litter levels (Clark, Hendee, and Burgess 1972).

Provide Wilderness Users a Greater Basis for Choice

Apparently, present visitors have little information concerning alternative opportunities and attractions that affect their use of wildernesses. Many probably tend to follow familiar routes or routes that are already mapped.

Additional sources of information might be one method of changing use patterns. Information on special attractions, fishing opportunities, scenic hikes, out-of-the-way campsites, available horsefeed, and so forth, could be made available to the users through improved maps and/or guidebooks, or the use of other media such as television, radio, or newspapers.

Publications could have two important functions: (1) They could serve as an important management tool, particularly if it can be demonstrated that patterns of use can be influenced by making this information available to the wilderness visitor; (2) such publications could represent an important means of enhancing the visitor's satisfaction and understanding of the wilderness. The total quality of the experience could be enhanced by providing data concerning the area's diversity as well as information concerning the biological and geological nature of the environment. However, excessive description should be avoided in the writing of such publications so that the visitor would not lose his sense of adventure and discovery. Moreover, there is the potential problem of additional information leading to increased use--in a sense, a counterproductive result of efforts to lessen use impacts. However, this possibility should not serve as the criterion for making a decision whether or not to provide such materials. Rather, if providing people with more complete information leads to use in excess of an area's capacity, then a rational system of regulation rather than the suppression of information should be instituted.

In our study, nearly 20 percent of the visitors were found to be either "neutralists" or "nonpurists;" these persons were probably seeking an experience that could be satisfied in areas managed for a primitive kind of recreation rather than as wilderness. Thus, attention must be turned to developing positive management programs to provide such opportunities as well as techniques to disseminate information regarding these areas to the pertinent audience.

Eliminate Motor Craft in the BWCA

Despite provisions of the Wilderness Act that permit continued use of motor craft, use must be restricted in the BWCA if "outstanding opportunities for solitude" in a

Access roads leading to the wilderness have a major influence on the use within the area. Road construction programs in areas adjacent to wilderness should consider that the last few miles of driving could be a prelude, a slowing down from the conventional.

primitive environment are to be provided. Lucas (1964) noted that elimination of motor craft beyond the second lake from the boundary would greatly increase capacity and his observation, made 10 years ago, seems even more pertinent today.

McCool and Merriam (1970) suggest that restriction of motor craft might not be as vigorously opposed as previously thought. They found between 25 and 35 percent of those persons currently traveling by motor craft would prefer traveling by paddling canoe.

It is paradoxical that the objective of providing a unique opportunity for primitive canoeing and camping is compromised by the presence of motorboats in an area designated as a "Canoe Area." The continued presence of motor craft will only result in an earlier need for restrictions on the number of visitors permitted in the BWCA.

Examine Existing Access to Wilderness Boundaries

Although not specifically investigated, the problems of development adjacent to wilderness aggravated many wilderness management problems. We have tended to regard the wilderness boundary as an effective barrier to potentially adverse impacts resulting from management decisions on surrounding lands outside--particularly in terms of roads developed adjacent to these boundaries. Too often the areal impacts of such roads on wilderness have been underestimated or not considered at all.

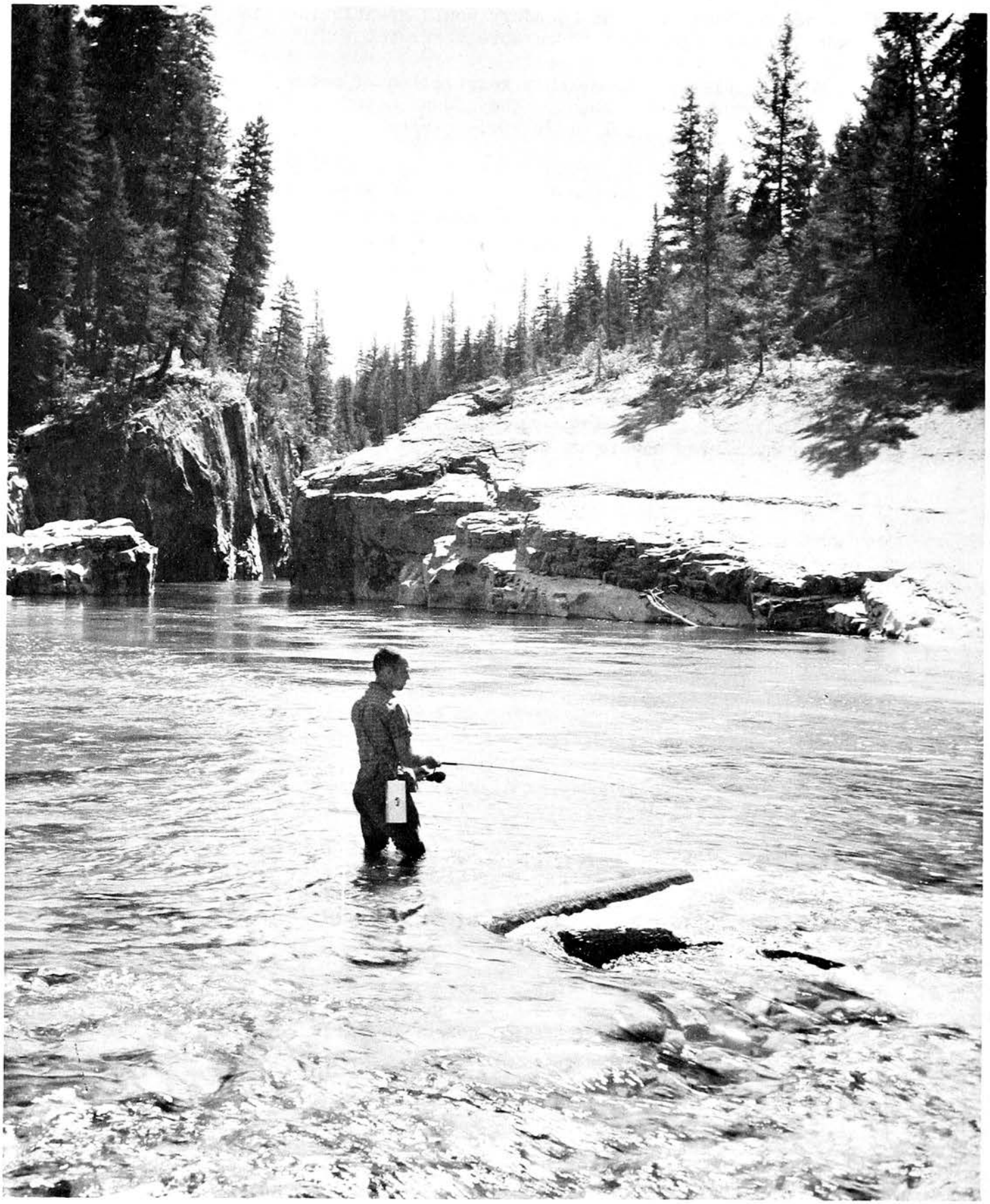
In the past, part of this problem stemmed from the lack of definitive policy guidelines regarding wilderness. Management decisions regarding road construction near wilderness areas were often guided by principles more applicable to intensive recreation developments where access for a large number of persons is a prime consideration. However, management objectives for wilderness call for the provision of a special type of opportunity that is difficult if not impossible to achieve under heavy use. The improvement of the Fernberg Road in the BWCA is an example. Records indicate that recreational use was high on lakes adjacent to the road, particularly Fall Lake and Moose Lake. Forest Service officials generally recognized that use was excessive; yet, access was improved to accommodate this heavy traffic. The improvement will only make it easier for additional traffic to move into the area and the use problems on Fall Lake and Moose Lake will be further aggravated.

The following three actions appear available to managers seeking to offset the heavy use conditions that can develop along a wilderness boundary:

1. Transportation plans could eliminate the practice of extending road ends up to the wilderness boundary. Where roads are presently adjacent to the boundary, serious consideration could be given to blocking off the last few miles. If it proves necessary for roads to be built into this area (for example, to harvest timber) these roads could be closed to the public.

2. Where possible, trails branching off from main access routes could be developed to promote a more rapid dispersion of use and consequently, a lowered probability of encountering others. In some areas, this might not be possible because of terrain features.

3. Means of achieving more equitable distribution of use at access points should be investigated, fully recognizing that moving use from one area to another may only relocate the problem rather than eliminate it. However, the highly skewed nature of visitor concentration at access points certainly warrants an effort to effect some redistribution. Such a result could be obtained by developing or improving access to areas presently not utilized. This could include the development of overnight facilities at trail heads or facilities designed especially for horse parties (corrals, stock unloading ramps, and so forth). Another option is to provide better information to visitors regarding alternative access, which could be done using maps or signs. However, such redistribution at access points will have an impact upon levels and patterns of use within wilderness areas.



Fishing is an important aspect of wilderness recreational use. However, much of the fishing that occurs is not wilderness-dependent; that is, its availability is not dependent on the area being wilderness. As a result, conflicts arise between persons seeking just good fishing and persons seeking a wilderness experience.

The issue of achieving more even use distributions in wilderness is a complex one. In some wildernesses, small areas experience severe overuse while the bulk of the remainder is virtually unutilized. Efforts to redistribute use in such areas could provide more users with a more satisfactory wilderness experience by reducing congestion and conflict at local areas. However, there is a trade-off involved in that redistributing use means (1) the ecological effects of use become more widely distributed and (2) areas once trailless now become developed and the opportunity they provided for solitude altered. The decision to attempt to achieve a more even use distribution must recognize this trade-off and will require sensitive judgment on the part of administrators.

Elimination of Structures

All structures that are not necessary for the administration of the area as *wilderness* should be removed at the earliest possible time. The Wilderness Act provides specific guidelines on buildings; our findings suggest strong purists, as well as most other visitors, largely agree with these guidelines. For example, criticism from respondents in our study indicate that excessive campsite developments represent a source of dissatisfaction.

Establish Fish and Game Restrictions

Unquestionably, fishing is an important aspect of wilderness recreational use. The opportunity to fish in a natural setting with usually good success is a powerful appeal to many--particularly when the stream or lake is close to the wilderness boundary. However, this has unfortunate consequences; specifically, it not only increases trail traffic, but it also increases chances that deterioration of the natural surroundings will be accelerated.

Moreover, much of the fishing that takes place in wilderness is not a *wilderness-dependent* type of activity. That is, people fish the lake or stream because of the probability of success and it is only incidental that this location happens to be in wilderness. The fishing would continue even if the area were not a wilderness (assuming roads were not developed). Thus, we find wilderness, a scarce and nonreproducible resource capable of providing a unique and nonsubstitutable kind of recreational experience, often being used as a base for activities, such as fishing, that can be provided relatively easily in other settings. The cost of this situation is growing conflicts between fishermen and wilderness buffs and a potential hastening of the day when restrictions on use will be required.

Much day-use probably could be eliminated by modifications of creel limits. Many States presently have a "10-fish-a-day" or "20-in-possession" limit. Under the terms of the Wilderness Act, fish and game regulations remain under the jurisdiction of the States. State and Federal agencies could cooperate in adjusting creel limits to permit the taking of fish only for food on the wilderness trip itself. Such would discourage use of the wilderness by the day-visitor interested only in fishing, yet still permit fishing as an important aspect of the wilderness trip. Enforcement poses problems, but should not be viewed as insurmountable. Creel limits could be reduced within wildernesses.

Apparently, the hunting situation is quite different. There is probably less of the casual, one day type of use that characterizes fishing. Additionally, big game seasons normally occur in the fall when weather is worsening and the intensities of use in many areas probably do not approach those of the spring and summer fishing period. Fishing use is concentrated along stream and lakeshores, while hunting use is probably more widely dispersed.

Encourage "Off-Season" Use

Overuse and crowding show considerable periodicity. In most of the western wildernesses, a disproportionate amount of the total use occurs during the month of August.

Redistributing use into periods where use levels are presently low would involve an information and education program designed to inform visitors of the advantages of "off-season" travel--e.g., solitude, fall coloring, wildflowers, and wildlife migration. Such information could be disseminated through brochures, personal contact, or various conservation organizations (Brandborg 1963).

A second method would involve working through State fish and game associations. Some temporal redistribution could be gained by manipulating the opening and closing of various seasons. This would be particularly true of hunters. Fall use in some areas could be entirely eliminated by delaying the opening of the big game seasons. Conversely, an early opening would increase the level and duration of use in an area. Staggering seasons might result in a more even distribution of use.

There would also be opportunities to shift use spatially. Where unacceptable resource damage might accompany extended use in some areas, early closing or even total closure to fishing or hunting could be utilized to protect the resource. This would be particularly important where spring or fall rains aggravate potential soil erosion or other physical conditions.

As discussed earlier, any management alternations might lead to increased use, rather than to a better spatial or temporal distribution. Encouraging off-season use might simply result in more use. Any such efforts should recognize this potentiality and provisions made to cope with it.

Zoning[16]

Zoning could alleviate resource damage and enhance visitor satisfaction. Opportunities to both spatially and temporally redistribute use would be possible.

Certain areas in many of the wildernesses are subject to considerable resource damage from horses in the early part of the season. As snows melt and spring and early summer rains occur, the chances of excessive resource damage to saturated soils are greatly increased. These areas could be zoned against horses, perhaps for the entire season, or for periods when chances of damage are greatest.

In some areas, or at certain times, there may be sufficient reason to restrict all use. We can apply the "limits of acceptable change" concept discussed earlier to describe such a situation. Research in the BWCA (Ream 1968) has disclosed that presence of visitors on islands is a major factor in nest abandonment by loons (*Gavia immer*). Even low intensities of use by canoeists apparently affect nesting success. Thus, if we judge that preservation of the loon is the major consideration (that is, we say we do not want nesting success to decline at all as a result of recreational use), we have defined the "LAC" and the capacity would be judged as "no use." In this situation, the critical period of nesting is between mid-May and mid-June and no use would be permitted in loon nesting areas. After this time, other criteria, perhaps social considerations, would affect the capacity issue.

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[16]FSM 2320 notes: "Parts of any wilderness may be designated as management units if they are recognized as having distinctive management situations and needing individual management direction and related coordinating requirements to ensure that the basic objective of maintaining an enduring resource of wilderness is achieved." This differential application of management within wilderness is herein referred to as "zoning."

Tethering stock to trees has lead to considerable soil loss and the destruction of vegetation. Severely disturbed sites such as this are especially distracting to visitors. Natural restoration of such damage may take a long time.

Closure of Damaged Campsites

Prohibiting use of sites damaged from overuse is an important action in light of the Wilderness Act as well as in terms of its effect upon the wilderness experience. Such has been done in the Bob Marshall; examples could be cited where similar actions should be initiated in other wildernesses.

In some cases, restoration activities might be warranted. Sites where vegetation has been severely disturbed might not recover for a substantial time under natural conditions. Carefully regulated applications of fertilizer, for example, could return the site to its natural condition in a short time. The benefit to be gained from accelerating recovery of the resource would need to be weighed against any potential adverse results.

Campsite closures will need to be complemented by an effort to provide visitors with information regarding which sites are closed as well as alternative camping locations. The institution of mandatory wilderness permits would provide a convenient opportunity for contact with users in order to provide this information (Hendee and Lucas 1973).

Communicate Objectives of Wilderness System

Perhaps one of the most significant actions that could be undertaken by administrators to increase capacity is to attempt to promote better public understanding of the objectives of the National Wilderness Preservation System. The manner in which the

preservation objectives mesh with overall resource planning should be shown--particularly, the concept that wilderness represents one type of opportunity along a continuum of environments having varying degrees of human influence. Failure to do so could lead to a growing disparity between public perception of the purposes of wilderness and management objectives and intent.

More effort could be directed at communicating norms of wilderness behavior. I have referred to the many complaints made concerning behavior regarded as inappropriate in the wilderness environment. The difference in behavior should be viewed as reflections of differing tastes, objectives, and motivations rather than as purposeful malicious acts. Thus, rather than expending public funds on programs of questionable efficacy to change people's behavior to conform with values resource managers deem desirable, we should strive to provide opportunities to fulfill these diverse tastes. Through such an effort, one would hope to achieve a distribution of users among the various opportunities that most nearly satisfied their personal motivations and objectives. By achieving such a distribution, one would expect to see the conflicts produced by frictions between varying value systems reduced; e.g., providing alternative opportunities for wilderness canoeists and motorboaters. However, such a program raises other important management implications: (1) It will necessitate positive management efforts to provide the necessary range of diversity; and (2) it will require an aggressive, imaginative effort to provide knowledge of this diversity to potential users. Both of these implications, to date, however, have received little attention.

Restricting the Number of Users

Both the ecological integrity of wilderness and the unique type of recreational opportunity such areas provide are threatened by increasing use pressures. In particular, the recreational experience offered by wilderness is especially sensitive to congestion and related problems such as intergroup conflicts. Beyond what most people would consider fairly low densities of use, the opportunities for solitude are greatly constrained. But formidable questions confront use when we seek to specify such levels or when we attempt to describe the optimal "mix" of uses.

Considerable interest has arisen in developing computer simulation models that would permit managers to forecast when use will exceed an area's carrying capacity. However, as we discussed earlier, there is no single carrying capacity and the most sophisticated forms of analysis will not yield decisions regarding the "right" amount of use that should be permitted. Computer simulation *can* provide managers with a measure of the probable consequences of alternative actions and can describe expected interactions between important variables. But the decision as to the "goodness" or "badness" of the consequences must be a human judgment, based on objectives for the area in question. A current cooperative research effort between the Wilderness Management Research project at Missoula and Resources for the Future, Inc., Washington, D.C., is attempting to develop a model that combines a travel-behavior simulator with data from survey research regarding visitor response to varying levels and types of use (Fisher and Krutilla 1972).

It is perhaps useful to describe some of the underlying assumptions and premises of the model. As was demonstrated in the earlier section on "Use and Satisfaction," there is evidence that the quality of the wilderness experience is diminished as a result of congestion. This diminution of quality shows varying sensitivity under different conditions; e.g., quality declines quickly in the presence of motorboats. Typically, however, increasing intensity of use (and therefore, increased probabilities of encountering others), is associated with declining judgments of satisfaction.[17]

The probability of encountering others in a wilderness trip is a function of several variables: (1) Amount of use; (2) length of use season; (3) temporal distribution

[17]"Encounters" are not the only way satisfaction is lost on a wilderness trip. However, they do provide us with relatively easily quantifiable measure of a cost of congestion.

of use; (4) method of travel; (5) distribution of use at trail heads; (6) trail system; (7) topography and vegetation, which affect intergroup visibility; and so forth. In the present cooperative investigation, interest has focused on how probabilities of encounter among backpackers and horseback riders are influenced by changing use levels on an existing trail system. This involves the development of a travel-behavior simulator which generates probabilistic distributions of use under varying use levels on the existing trails. Thus, for example, we might discover that under existing use levels, the probability of encountering more than two parties per day is only 1 in 10; when we simulate a 50 percent increase in use, this probability rises to 7 in 10.

As we suggested above, we have data that clearly show that increasing intensities of use result in declining judgments of satisfaction. In the study reported herein, satisfaction was measured only at the *ordinal* level; we are able to say that so many people experienced less enjoyment about meeting an increased level of use, but we cannot say that *aggregate* satisfaction declined by, say, 50 percent when the level of use encountered doubled. In order to make this kind of statement, our measure of satisfaction would need to be at the *interval* level; the distance between any two judgments of satisfaction would need to be known.

If we were able to obtain aggregate measures of satisfaction we would then be able to estimate the trade-offs involved in the decision to allow use to increase. Is the added satisfaction (utility) gained by allowing additional visitors to enter the system offset by the loss in satisfaction experienced by other visitors because the additional use results in a significant increase in the probability of encounters? That is to say, if we allow use to increase by some margin, does the gain in satisfaction (utility) experienced by the newcomers offset the loss in satisfaction by current users that results from the increased congestion?

Some severe methodological problems confront us in regard to the development of this model. Obtaining realistic interval measures of satisfaction is one. A technique currently being utilized is to request visitors to define how a "100 percent" satisfactory experience might be characterized and to relate this judgment to specific hypothetical situations (e.g., a 3-day trip where you encountered 15 backpacking parties). From this, judgments that a situation would provide, for example, a "50 percent of full satisfaction" experience are obtained.

The situation is further confounded because multiple satisfactions are derived from the wilderness experience and the basis on which judgments of degree of satisfaction are made thus shifts from individual to individual. Basically, it is the problem of interpersonal utility. For some persons, the dimensions of solitude are the most critical to their satisfaction. For others, it might variously be the challenge of primitive camping, observing the pristine environment, or the development of close intragroup bonds. Satisfactions derived from these various sources are not necessarily related or additive. However, we are currently treating satisfaction as a unidimensional concept because of our inability to distinguish how these dimensions vary among users.

It is important to understand that the model outlined above, or any other model for that matter, will not make difficult rationing decisions nor will it provide the standards for which we manage wilderness. These are the responsibility of the wilderness administrator and the exercise of these responsibilities calls for a mixture of seasoned judgment, sensitivity, and awareness of existing information on the part of administrators. Certainly, the availability of improved data and sophisticated techniques for predicting consequences of alternative actions will upgrade the quality of decision-making by reducing uncertainty. For example, the model we describe would yield a probabilistic description of what trade-offs are involved with alternative courses of action, before it is necessary to make a decision that might have irreversible implications. However, we will always face situations where decisions must be made, but when little or no "hard" data exist. In these situations, the role of the perceptive, sensitive wilderness administrator will be crucial. In particular, his ability to monitor, evaluate, and revise, as necessary, management programs will be the major way in which operational guidelines designed to preserve wilderness quality will evolve.

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Provo, Utah (in cooperation with Brigham Young University)
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PHOTOS

Outer cover: The Boundary Waters Canoe Area in northern Minnesota is the only large water-oriented unit of the National Wilderness Preservation System. It is also the only designated wilderness in the midwest.

Inner front cover: Squaretop Mountain, standing above Green River Lakes, greets visitors entering from the northwest end of the Bridger Wilderness.

Inner back cover: The Chinese Wall in the Bob Marshall Wilderness is a major scenic attraction.

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STANKEY, GEORGE H.

1973. Visitor perception of wilderness recreation carrying capacity. USDA For. Serv. Res. Pap. INT-142, 61 p., illus. (Intermountain Forest & Range Exp. Station, Ogden, Utah 84401.)

Presents results of a study of wilderness users in the Bob Marshall, Bridger, High Uintas, and the Boundary Waters Canoe Area (BWCA) to determine their perception of, and reaction to, problems such as crowding, littering, and conflicts between user groups, and to management actions to alleviate such problems. Definitions of crowding included references to conflicts with other users, excessive levels of use, and to inability to find isolated campsites. Suggested management actions include (1) limit party size; (2) restrict motors in the BWCA; (3) encourage "off-season" use; and (4) zoning.

OXFORD: 907.1:907.2. KEYWORDS: wilderness values, recreation, visitor perception, carrying capacity.

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OXFORD: 907.1:907.2. KEYWORDS: wilderness values, recreation, visitor perception, carrying capacity.

- SOURCES OF VISITOR DISSATISFACTION MIGHT BE OFFSET BY VISITORS EITHER HEIGHTENING OR REDUCING SENSITIVITY. THIS SUGGESTS THAT EFFORTS TO FORMULATE A MEASURE OF CARRYING CAPACITY MIGHT BE VALID ONLY AT ONE POINT IN SPACE OR TIME. NEVERTHELESS, WHEN THOSE PERSONS DESCRIBED AS STRONG PURISTS ARE CONSIDERED, IT IS CLEAR THAT CERTAIN NORMS AND VALUES ARE SHARED OVER THE FOUR AREAS STUDIED.

- A CHANGING CLIENTELE MIGHT BE RESPONSIBLE FOR APPARENT CHANGES IN ATTITUDES ABOUT CAPACITY. AS THE CHARACTER OF AN AREA CHANGES, EITHER BECAUSE OF SHIFTS IN USE OR BECAUSE OF MANAGERIAL PROGRAMS, PERSONS ESPECIALLY SENSITIVE TO THESE CHANGES MIGHT "DROP OUT"; USE DOES NOT DECLINE, HOWEVER, AS OTHER PERSONS, DRAWN TO THE AREA PERHAPS BECAUSE OF THE VERY CHANGES THAT LEAD THE FORMER USERS TO LEAVE, ENTER THE AREA. THIS PROCESS OF "DISPLACEMENT" HAS NOT BEEN CLEARLY DOCUMENTED, BUT IT HAS SIGNIFICANT IMPLICATIONS FOR THE ESTABLISHMENT OF CAPACITY GUIDELINES.

- MOST VISITORS INDICATE THE QUALITY OF THE WILDERNESS VISIT BEGINS TO DIMINISH BEYOND ABOUT TWO ENCOUNTERS PER DAY. THE MAJOR EXCEPTION TO THIS INVOLVES ENCOUNTERS WITH MOTOR CRAFT IN THE BWCA. IN THIS CASE, MOST VISITORS INDICATE ONE ENCOUNTER IS EXCESSIVE.

- THERE IS A BASIC SIMILARITY AMONG THE FOUR AREAS REGARDING USE ENCOUNTERS AND THEIR EFFECT ON SATISFACTION. THIS SUGGESTS THAT DESPITE DIFFERENCES IN AREA CHARACTERISTICS, AND TYPE AND AMOUNT OF RECREATIONAL USE, SOME SHARED NORMS EXIST REGARDING USE ENCOUNTERS.

- USERS MENTALLY ZONE WILDERNESS AT A MACRO-SCALE, RECOGNIZING AT LEAST ONE "PERIPHERAL" AREA (PORTAL ZONE) AND A "CORE" REGION (DESTINATION ZONE). ATTITUDES ABOUT MEETING OTHER GROUPS DIFFER BETWEEN THESE ZONES, WITH EXPECTATION APPARENTLY TEMPERING ADVERSE REACTIONS IN THE PORTAL ZONE.

- SOLITUDE AND FREEDOM FROM INTERGROUP CONTACTS AT THE CAMPSITE IS AN IMPORTANT DIMENSION OF THE WILDERNESS EXPERIENCE. IN FACT, THE ABILITY OF AN AREA TO PROVIDE OPPORTUNITIES FOR CAMPSITE SOLITUDE MIGHT REPRESENT AN IMPORTANT "BOTTLENECK" ON THE AREA'S SOCIAL CARRYING CAPACITY.

- THE CAMPSITE APPEARS TO OFFER THE VISITOR AN OPPORTUNITY TO STRENGTHEN INTRA-GROUP BONDS IN A MANNER DIFFICULT TO ACHIEVE IN AN INCREASINGLY DEPERSONALIZED WORLD.

- EVIDENCE OF VISITOR MISUSE, SUCH AS LITTER, REPRESENTS A MAJOR SOURCE OF VISITOR DISSATISFACTION. IT APPEARS THAT CERTAIN WELL-ESTABLISHED NORMS REGARDING APPROPRIATE WILDERNESS BEHAVIOR EXIST AND THAT VIOLATION OF THESE NORMS HAS AN ESPECIALLY SEVERE IMPACT ON THE QUALITY OF THE EXPERIENCE FOR OTHER VISITORS.

(con. on back cover)

Visitor Attitudes About Use Regulation

- NO RATIONING TECHNIQUE WAS FAVORED BY A MAJORITY OF USERS. HOWEVER, THERE WERE CLEAR DIFFERENCES IN THE LEVEL OF ACCEPTABILITY AMONG VARIOUS TECHNIQUES, WITH A MAIL RESERVATION SYSTEM THE MOST ACCEPTABLE, AND ASSIGNING TRIP ROUTES, THE LEAST.

- APPROXIMATELY 20 PERCENT OF THE RESPONDENTS WERE NEUTRAL ON THE ISSUE OF RATIONING. A SENSITIVE, INTELLIGENT APPROACH TO INFORMING USERS OF THE NEED FOR RATIONING SHOULD BE PUT FORTH TO GAIN THE SUPPORT OF THIS UNCOMMITTED GROUP.

- INDIRECT RATIONING TECHNIQUES, INVOLVING MEASURES SUCH AS MINIMAL TRAIL AND SIGN SYSTEMS, REPRESENT MORE ACCEPTABLE METHODS OF USE CONTROL THAN PERMITS OR FEES.

- MANAGERIAL ACTIONS THAT INVOLVE DIRECT OR "HEAVY HANDED" MODIFICATIONS OF WILDERNESS ARE REJECTED BY MOST VISITORS. THOSE ACTIONS THAT INFLUENCE USE IN A MORE SUBTLE, DISCRETE FASHION, SUCH AS MAPS, ARE SEEN AS MORE FAVORABLE.

- THE BELIEF THAT WILDERNESS VISITORS ARE PARTICULARLY CONVENIENCE-ORIENTED STEMS FROM A MISPERCEPTION OF USER DESIRES RATHER THAN FROM AN ACCURATE ASSESSMENT OF THE USER'S PREFERENCE.

The Relationship of Recreation Use to Capacity

- FOR MOST VISITORS, CROWDING DOES NOT REPRESENT A PROBLEM. HOWEVER, ABOUT ONE OUT OF FOUR PERSONS SAMPLED DID CITE CROWDING AS A PROBLEM; OVER ONE-THIRD OF THE STRONG PURISTS SO RESPONDED.

- ALL FOUR STUDY AREAS HAD LOCATIONS DEFINED BY VISITORS AS CROWDED. GENERALLY, THESE ZONES OF CROWDING WERE RELATED TO WELL-DEVELOPED ACCESS AND THE PRESENCE OF ATTRACTIONS, SUCH AS FISHING.

- VISITOR DEFINITIONS OF CROWDING INCLUDED NOT ONLY EXCESSIVE USE LEVELS, BUT CONFLICTS WITH OTHER GROUPS (PADDLING CANOE AND MOTORBOAT CONFLICTS, FOR EXAMPLE), THE INABILITY TO FIND ISOLATED CAMPSITES, AND LITTER AND BEAT-UP CAMPSITES.

- THERE IS EVIDENCE TO SUGGEST THAT VISITORS ESTABLISH PERSONAL HIERARCHIES IN EVALUATING ONE DIMENSION OF CARRYING CAPACITY WITH ANOTHER. FOR EXAMPLE, THE PRESENCE OF LITTER APPEARS TO REPRESENT A MORE SERIOUS SOURCE OF DISSATISFACTION THAN DOES ENCOUNTERING EXCESSIVE USE. GIVEN THE CONSTRAINTS ON BUDGET AND MANPOWER WILDERNESS MANAGEMENT AGENCIES WILL GENERALLY BE CONFRONTED WITH, THIS HIERARCHY HAS IMPORTANT IMPLICATIONS FOR THE ESTABLISHMENT OF MANAGEMENT PRIORITIES.