

THE ROLE OF ENVIRONMENTAL PERCEPTION

IN WILDERNESS MANAGEMENT

UNPUBLISHED MANUSCRIPT

George H. Stankey and Robert C. Lucas

Wilderness Management Research Unit

USDA Forest Service

Missoula, Montana 59807

INTRODUCTION

“Wilderness” probably conveys a wide and variable meaning as any environmental term. People apply it to a wide range **of** landscapes, from the vast, unmodified reaches of interior Alaska to lightly settled rural roadsides and even to scraps **of** undeveloped urban land. Tuan (1974) goes so far as to write, “true wilderness exists only in the great sprawling cities .” Persons reading or hearing the term filter it through their own value system and in each person it evokes varying images. Wilderness also often carries connotations of approval or disapproval, as in expressions such as ‘a wilderness wonderland” or “wilderness paradise,” or, at the other extreme, “a wilderness wasteland” **or** “a howling wilderness.” ,

This variability in meaning and evaluation reflects the contentious history of wilderness in modern western society. There has always been some ambivalence concerning wilderness, even in the Bible, but earlier perceptions were predominantly negative (Tuan 1974). Wilderness was abundant and technology limited. Wilderness was difficult, dangerous and a barrier to settlement and development. Religious beliefs sanctioned **conquering** the wilderness, and esthetic ideals glorified **tamed**, human-

dominated landscapes (Huth 1957). Largely in the 18th and 19th century, another perception of wilderness emerged. Wilderness was becoming scarcer in North America. Influenced by changing European philosophical ideas, an articulate minority including Thoreau, Marsh, and Muir began to see wilderness less as a barrier and more as a treasured heritage, a place of contemplation, inspiration, and beauty (Nash 1973).

The newer, favorable view of wilderness has not entirely replaced the older, negative attitude. The two opposing views continue to exist and still generate intense, emotional debate. The shift in perception was strong enough, however, to be mirrored in government policies. At one time these policies universally promoted development and utilization of wilderness--for example, the Homestead Act and the 1872 Mining Law. National Park legislation in the late 19th and early 20th centuries showed early signs of shifting perceptions. In 1964, after eight years of often acrimonious debate, the first Wilderness Act passed, declaring it to be the policy of Congress to secure the benefits of "an enduring resource of wilderness" for present and future generations. Eighty million **acres** in the United States are now officially classified as wilderness. under this Act.

The Wilderness Act sought to codify a definition of wilderness, but it resorted to some almost poetic language and the debates continue. The legal definition exists alongside and intertwined with the varying, individualized meanings that tend to cloud discussions. As a consequence, debates over wilderness designation versus development revolve not only on relative benefits and costs but also are fed by variable and often conflicting perceptions as to what constitutes wilderness.

An example of this variable perception of wilderness was presented in an early study by Lucas (1964) of the Boundary Waters Canoe Area Wilderness of northern Minnesota. There, different types of visitors tended to hold very different perceptions of "where the wilderness began" and the setting characteristics necessary for perception of places as wilderness. Paddling canoeists had a demanding definition of wilderness and perceived an area smaller than the official boundaries as wilderness. Roads were almost never in their perceived wilderness. Heavy recreational use resulted in loss of wilderness perception for most paddlers. The type of use encountered was even more important than the amount; users with outboard motors created a strong negative effect on paddlers' perception of wilderness.

The visitors using motorboats, in contrast, had less demanding standards than paddlers. (Motors are an anomaly in the Boundary Waters; generally, mechanized travel is banned in wilderness.) Roads were accepted by most motorboaters in their wilderness, after the last town. Gravel roads, after the pavement ended, were almost always acceptable. The motorboaters' wilderness was larger than the area's official boundaries. Heavy recreational use was tolerated by motor users and they made no distinction among the types of use they encountered.

Although neither the paddlers' nor the motorboaters' perceived wildernesses conformed well to the official area, not surprisingly the Forest Service managers' perceived wilderness did. As a result, some actions taken by managers outside the boundaries, such as road improvements, conflicted with some visitors' perceived wilderness. Over the years,

from the 1920's on, the managers' perception of appropriate conditions has evolved and become more demanding, shifting towards a more negative view of logging, motorized recreation and excessive use.

It is apparent that an environmental perception perspective is useful in dealing with problems related to both wilderness classification and management, Managers have legal obligations that are tied to official wilderness boundaries, but the choice of specific actions to meet those obligations and decisions about other, related actions outside wilderness can be more effective if they are made with knowledge of public perceptions of wilderness. However, the incorporation of the implications of such a perspective into organizational policies has not been substantial. Nevertheless, there are a number of wilderness issues for which an environmental perception approach is not only desirable but necessary to promote effective decisions. Three important issues will be discussed: perceptions of appropriate wilderness use and management, perceptions of recreational crowding and conflict, and perceptions of the environmental impacts resulting from recreational use.

PERCEPTION OF APPROPRIATE USE **AND** MANAGEMENT

As the preceding discussion suggests, wilderness is a shifting image, varying over time and among individuals. The variable perception of wilderness held by administrators, recreationists, and those for whom wilderness provides a livelihood (e.g., ranchers, miners) means that decisions about the use of such areas are inherently conflict-laden. Each **group** holds a conception of the purpose, value, and appropriate use

of such areas which might or might not be shared by others. In the absence of formal rules and guidelines regarding the definition and role of wilderness, it is easy to see how conflicting uses and practices become established and, indeed, it was this lack of consensus as to what constitutes appropriate wilderness use and management that lent impetus to efforts to establish a national wilderness system (e.g., see the discussion in ORRRC, 1962, pages 16-39).

Passage of the Wilderness Act in 1964 resulted in establishment of a formal codification of a concept that, until that time, had had only a general, and often romanticized, definition. Establishment of a wilderness law imposed a legalistic, technocratic definition upon a personal, even religious (Graber 1976) concept, thereby setting the stage for a conflict between managers and recreationists.

As has been found in other resource management sectors, the conflict in perception between managers and users is accentuated by differences in training, education, and behavioral norms. Those charged with management of wilderness are typically foresters, with an educational tradition favoring utilitarian and commodity values. Hart (1968), for example, has pointed to the selective dropout among college natural resource students who find the lack of educational emphasis on non-commodity values in curricula dissatisfying; a process that can lead to a cadre of professionals biased in favor of traditional, commodity philosophies.

The institutionalization of wilderness also has made it the subject of planning processes that demand a quantitative, rational approach to management. While many recreationists are intensely interested in wilderness planning and management and are motivated to participate in

the planning process (e.g., over 50,000 people participated in the recent **Roadless** Area Review and Evaluation held by the Forest Service), many also find it difficult to express their needs, concerns, and feelings about wilderness in a manner that can be accommodated in established organizational methodologies. Managers may be motivated to develop **plans** to meet organizational goals, legislative mandates, and procedural requirements; users may participate in the planning process to protect features or values of individual concern.

Hendee and Harris (1970) have pointed to basic differences between managers and recreationists in their perception of the wilderness setting. For many managers, wilderness is a place of work, responsibility, and problems to be resolved. For recreationists, on the other hand, it is a place of play, respite, and relaxation. The resulting images of wilderness that emerge from these different perceptions can lead to wide differences of opinion with regard to questions concerning appropriate use, development, and management.

Like National Parks, wildernesses are managed according to two objectives:- **the** provision of low-density primitive recreation opportunities, and the maintenance of substantially naturally operating ecosystems. There is a tension, or even an inconsistency, involved with meeting either objective fully if the other is to be accorded *some* attention. Resolution of this conflict involves a decision on the relative emphasis for each objective. Typically, organizational policy has emphasized the environmental preservation objective and has focused management effort⁶ on limiting visitors' impacts. While such an approach can be justified on a number of grounds, the consequences for wilderness recreation use can be severe.

For example, because most wilderness managers have a background in the biological sciences, they often tend to be greatly concerned with impacts on the natural environment, labeling even small degrees of impact as "resource damage." As we shall discuss later, many visitors have neither the technical training to make these distinctions nor are they perceptually inclined to identify all such impacts as undesirable. Thus, managers might institute actions to control impacts they perceive as unacceptable and inappropriate in a wilderness while recreationists do not even perceive their presence, let alone find them as detracting to their experience. However, actions taken by managers to contend with these impacts can easily interfere with the experiences recreationists seek, experiences characterized frequently by such qualities as a change from the constraints and rules of everyday life, freedom, and spontaneity (Brown and Haas 1980). This conflict in perception results in visitors being constrained by rules and regulations for which many see little purpose or rationale. In turn, managers are perplexed by the actions of visitors they perceive as taking place in the face of obvious and serious environmental problems, reflecting a direct challenge to their management authority and responsibility. It is as though two groups occupy a large playing field simultaneously, one playing football and the other soccer.

Manager perception of recreationists' beliefs and attitudes about wilderness management can also contribute to inaccurate judgments regarding the type and level of development desired. Hendee and Harris (1970) asked wilderness managers in Oregon and Washington how they thought most users would respond to each of a series of statements concerning wilderness policy and behavior. While there was a great deal of similarity between

the responses given by the managers and those derived from a study of users, there were also some important differences. For example, managers did not credit users with having as responsive an attitude toward various behavior control measures as the users actually held. Most users expressed an awareness and acceptance of the need for control in order to protect essential wilderness qualities. Thus, the managers' perception of users' reluctance to accept control might have resulted in a lack of actions to control problems, contributing, in turn, to a perception on the part of users of a failure of managers to meet their responsibility. In a study of use rationing in two southern California wildernesses, **Stankey** (1979) found that not only was use rationing supported by users (including those who failed to get a permit), but users expressed concern with the delay on the part of managers in implementing such controls. Managers, on the other hand, were greatly concerned with anticipated user resistance to such an action.

The **Hendee** and Harris study (1970) also found that managers overestimated visitor support for developments, such as corrals, fireplaces, and outhouses. This might stem both from the selective perception by managers of vocal support for such facilities on the part of a minority of users, and also from the managers' view that facilities represent a way of localizing and minimizing resource impact.

Somewhat contrary to the above results, managers also overestimated the prevalence of a "purist" philosophy among users. There was more acceptance among users of management activities seemingly inconsistent with wilderness conditions than presumed by managers. Again, this probably stems from the managers' selective perception of opinion brought

about by their contact with wilderness advocacy groups. These forcefully expressed opinions are likely generalized to other visitors, even though most studies indicate that only 20-30 percent of visitors belong to any conservation or outdoor recreation organization (Lucas 1980).

Managers and recreationists perceive wilderness in different ways; moreover, they also perceive one another differently. The collective result of this differential perception often is conflict. Presumptions about attitudes, needs, and behavior derived from partial or selective perception can lead to the establishment of programs that do not address significant problems or that focus on inappropriate concerns. An accurate appraisal of how these respective groups view one another and the wilderness setting could do much to promote more effective management of the resource which they both clearly value.

PERCEPTION OF RECREATIONAL CROWDING AND CONFLICT

The quality of solitude--the absence of many others--typifies wilderness perhaps better than any other aspect. In both popular literature as well as the law, it is a major focus of concern. The absence of solitude; typically described as crowding, is conversely seen as a major management concern; in a recent census of wilderness managers around the country, nearly half reported that crowding was a problem in at least a portion of the areas under their jurisdiction (Washburne and Cole 1983).

Studies of wilderness users reveal that the general domain of escape or solitude is important. Hendee et al. (1968) found that the general theme of escapism emerged as a moderately important factor among wilderness users in the Pacific Northwest. They concluded that many of the elements of escapism were implicitly embodied in other factors which

ranked higher (e.g., spartanism) and "that the escape from civilization theme underlies many aspects of wilderness appeal but, by itself, is overshadowed." **Stankey** (1973) reported that nearly 80 percent of respondents in three western wildernesses agreed that it was reasonable to expect to visit a wilderness and see few, if any people. Lucas found that solitude/crowding was the most common reason for expressions of satisfaction or dissatisfaction in most wildernesses he surveyed (Lucas 1980).

While the literature clearly documents the generalized appeal of, and support for, solitude, the question as to what specific use levels are appropriate has plagued researchers and managers alike. The effort to identify some measure of "how much is too much" has largely been addressed through a variety of studies under the broad rubric of carrying capacity. This literature has, as its basic objective, the identification of what use levels can be accommodated before unacceptable impacts occur on both wilderness environments and experiences. However, while such research has provided important understanding about the relationship between use and impact, the objective of identifying some specific level at **which it** is possible to say "use beyond this is too much" has not been achieved.

Much of the difficulty encountered in attempting to solve the carrying capacity problem stems from failure to recognize the 'perceptual nature of the crowding phenomenon. The definition of a given objective density situation as crowded reflects a variety of antecedent and situational variables. A variety of models has been proposed to describe the process whereby density conditions are evaluated (e.g., Heberlein 1977; Shelby 1980; **Gramann** 1982). However all center

on an evaluation of an objective density state (e.g., number of other persons encountered per day) relative to some goal state. *When* conditions exceed those desired, a state of crowding exists.

Because crowding is a situational construct, it is difficult to define a given density condition as crowded in absolute terms. Even the same individual in the same setting can respond to a given density level differently at different times. At the same time, the situation is not without some order and research is beginning to identify certain regularities in how contacts are evaluated and, particularly, in terms of what kinds of contact levels are preferred in certain settings. Estimates of the normative structure surrounding contact levels will prove useful to managers attempting to establish appropriate use levels (**Stankey** 1980).

Research on carrying capacity from a "how much is too much" perspective has also been handicapped by the fact that what constitutes "too much" is not simply a matter of how many. It **also** involves questions regarding who, when, where, and what. Lucas' early work in the Boundary Waters Canoe Area (1964) vividly demonstrates this. When asked for an **estimate of** how many canoeing and motorboating groups one could meet in a day-before they felt there was too much use, canoeists indicated no motorboats, but as many as five other canoeing parties. Motorboaters had no limit on the number of canoeists and from 25 to 100 other motorboats. Similarly, **Stankey** (1973) found sharp differences in preferred levels of contact among backpackers depending upon whether the contacts were with other hikers or horse parties.

Stankey (1973) also found differences in how contacts were evaluated based upon where they occurred, with contacts on the area's periphery preferred over those in the interior, and contacts along the trail preferred over those at one's campsite.

Individual behavior also accounts for variability in how density situations are evaluated. Persons who engage in activities generally viewed as non-normative in a wilderness setting (e.g., playing radios) likely contribute to the evaluation of a given use level as crowded.

The implications associated with recognizing crowding as a perceptual phenomenon would include identifying the kinds of factors in addition to use level that contribute to crowding, providing information to users that allows them to form more accurate expectations about use conditions (Shelby et al. 1983), and considering how visitor attitudes, motives, and perceptions relate to proposed management actions. For example, proposals to redistribute use in an area must take into account the experiences sought by recreationists, the level and specificity of information they can process, and the effects on both other users and the environment stemming from such a redistribution.

Similarly, if the perception of crowding stems from conditions other than use level (e.g., type or location of encounter, evidence of misuse, such as littering), then actions such as rationing might have little effect. On the other hand, programs designed to separate conflicting uses, improve visitor behavior, and eliminate the presence of conditions judged as unacceptable in wilderness could do much to reduce perceived crowding.

PERCEPTION OF ENVIRONMENTAL CHANGE

The effects of recreational use on the environment is a concern in wilderness. One objective of wilderness, and one which the Wilderness Act emphasizes, is preservation of natural ecological conditions and processes. However, any recreational use--which is another objective in the Wilderness Act--will produce some environmental change. For example, camping inevitably causes some loss of vegetation.

As discussed earlier, the key question is, "How much change is acceptable?" A management standard of no change is unattainable, and very strict standards can only be achieved by severely restricting recreational use and heavily regulating visitors. Surveys of ecological conditions reveal that the proportion of the wilderness impacted by visitors is very small, limited in one fairly heavily used wilderness to about one half of one percent of the total area (Cole 1981). In purely physical-biological terms, these impacts are minor, less important than the common alteration of natural fire regimes by many years of fire control or widespread livestock grazing which occurs in some wildernesses. Yet, much management effort is devoted to the control of these impacts on the assumption they have a serious effect on visitors' enjoyment as well as on ecological integrity.

As discussed before, it may be that the level of concern by managers derives more from their own value systems and related perceptions than from the visitors' perceptions. It is essential that reasonable, attainable standards be set to avoid excessively limiting use and restricting visitor freedom--an important wilderness value, also. Although some types-of visitor impacts are largely unrelated to visitor perception

(for example impacts on water quality or displacement of sensitive wildlife which usually occur without visitor awareness) the types of impacts that occur to vegetation and soils at campsites and on trails are observable and visitor perceptions are one factor to consider in setting standards for acceptable conditions.

At present, however, research on perception of recreational impacts is scarce (Lucas 1979) and many questions remain unanswered. Only three studies focus directly on the topic, but several more touch on it, at least peripherally.

Most studies suggest that visitors are not very aware of impacts and that their choice of campsites and satisfaction with them are not greatly affected by impacts. In three Indiana State Parks, Knudson and Curry (1981) found a majority of campers rated ground cover vegetation as satisfactory in each area, although one campground was severely impacted. There were differences in ratings that paralleled conditions, but the differences were only moderate--with approving ratings dropping from 87 to 78 to 59 percent from the campground in excellent condition to the one managers considered a disaster area.

Hancock (1973) experimentally removed vegetation, both ground cover and screening shrubs, in 25 percent increments at five sites in a Utah National Forest campground. With the exception of the last increment involving removal of all remaining vegetation, use of the treated sites increased relative to untreated controls, and contrary to the verbal preferences expressed by the campers.

In the third study emphasizing impact perception, Shelby and Harris (1982) found that campers in the Mt. Jefferson Wilderness in Oregon did not include impact conditions among the five most commonly cited reasons for choosing a campsite. They did find that campers gave lower campsite acceptability ratings to sites with more bare ground, with an unacceptability threshold of from 700 to 1500 square feet of bare ground,

Other studies have a question or two that bear on impact perception. In the Boundary Waters Canoe Area Wilderness, reasons given by visitors for choosing a campsite did not include impact conditions, and satisfaction was little affected by site conditions (Frissell and Duncan 1965). Another study in the same area (Merriam and Smith 1974) reported that campers seldom commented on site impact conditions but often mentioned littering. They found no correlation between visitor ratings of campsite physical condition and their ratings of the severity of impacts.

Lee (1975) found less than 8 percent of the variation in visitor satisfaction in Yosemite National Park could be accounted for by expert assessments of impact conditions at their campsites. He concluded, "deterioration of the physical environment had far less effect on campers than did the presence of unnatural objects left by previous visitors."

A study of visitors to nine wildernesses in Idaho, Montana and California (Lucas 1980) showed that 70 to 80 percent of visitors rated site impact conditions as "good" or "very good" in eight of the nine areas (the area in California received such ratings from 55 percent of the visitors). However, visitor perceptions or evaluations of impact conditions were negatively correlated with overall satisfaction, accounting for 18 to 44 percent of the variation in satisfaction in the nine areas..

Ranz (1979) found that campsites considered by managers to be so impacted that they had been closed were still acceptable to a number of visitors; 16 percent of the camper groups in a part of the **Selway-Bitterroot** Wilderness in Montana camped on the closed sites, perhaps partly due to a lack of unoccupied open sites, but apparently also because the visitors did not really see anything wrong with these sites.

Overall, the results are somewhat mixed and further research is clearly needed. It seems clear that recreational impacts are not a critical, prominent factor in the perceptions of recreationists. Which types of impacts visitors are most aware of is still unclear. There are indications, however, that satisfaction is affected by impacts, and that there may be general thresholds for the severity of various types of impacts that could be useful to managers setting standards for impact conditions. Visitor perceptions lend little support to extremely strict standards, although other reasons may exist for such decisions.

Intensive education efforts to teach wilderness visitors how to minimize their impacts may also make visitors more sensitive and change their perceptions to more demanding standards. This seems possibly to have happened with littering. There now is less littering present in many recreation areas than earlier, but visitors react very **negatively** even to these reduced amounts of litter.

CONCLUSIONS

Despite an array of administrative and legislative edicts, wilderness remains fundamentally a creature of human perception (**Stankey** 1972). Consequently, its **management** must rely upon the framework of an environmental

perception approach. Such an approach provides a clearer understanding of the antecedent and situational variables that influence individual perception, thereby suggesting ways in which managers can more effectively, as well as sensitively, modify behavior in desired directions.

Although individual variation in perception makes simple, encompassing conclusions difficult, the situation ~~is~~ not one of confusion and chaos. Where efforts to control for some of the primary influences on perception have been made (e.g., the extent to which users hold "purist" ideas about wilderness; see **Stankey 1972**), certain consistent and predictable patterns do emerge. However, more work remains to be done in terms of establishing a better understanding of the variations in perception, the influences on this variability, and the extent and means of either altering these perceptions to be more consistent with established management objectives or developing alternative opportunities to meet unsatisfied public needs. Thus, both managers and the public would enjoy benefits from a greater emphasis on a perceptual approach.

The perception of environmental impacts is likely the poorest understood area presently, but it is one which could have considerable influence on management decisions. The types of impacts that are important, critical threshold levels (i.e., levels at which they become an influence on visitor satisfaction and/or their choice process), and the various trade-offs involved between different impacts are important areas where improved understanding is needed.

LITERATURE CITED

- Brown, Perry J. and **Haas**, Glenn E. 1980. Wilderness recreation experiences: the **Rawah** case, J. Leisure Res. 12: 229-241.
- Cole, David N. 1981. Vegetational changes associated with recreational use and fire suppression in the Eagle Cap Wilderness, Oregon: some **manage-ment** implications. Biol. Cons. 20: 247-270.
- Frissell, Sidney S. and Duncan, Donald P. 1965. Campsite preference and deterioration. J. Forestry 63: 256-260.
- Graber, Linda H. 1976. Wilderness as sacred space. Washington, DC: Association of American Geographers.
- Gramann**, James H. 1982. Toward a behavioral theory of crowding in outdoor recreation: an evaluation and synthesis of research. Leisure Sciences 5: 109-126.
- Hancock, "**H.**" K. 1973. Recreation preference: its relation to user behavior. J. Forestry 71: 336-337.
- Hart, George E. 1968. Natural resource education: a tender trap. J. Forestry 66: 845.
- Heberlein, Thomas A. 1977. Density, crowding, and satisfaction: sociological studies for determining carrying capacities. Pp. 67-76 in Proceedings: River Recreation Management and Research Symposium. USDA Forest Service General Tech. Rep. NC-28. St. Paul, MN.
- Hendee**, John C. and Harris, Robert W. 1970. Foresters' perception of wilderness-user attitudes and preferences, J. Forestry 68: 759-762.

- Hendee**, John C., **Catton**, William, R., Jr., **Marlow**, Larry D., and Brockman, C. Frank. 1968. Wilderness users in the Pacific Northwest--their characteristics, values, and management preferences. USDA Forest Service Research Paper PNW-61. Portland, OR.
- Huth, Hans. 1957. Nature and the American. Berkeley: University of California Press.
- Knudson, Douglas M. and Curry, Elizabeth B. 1981. Campers' perception of site deterioration and crowding. J. Forestry 79: 92-94,
- Lee, Robert G. 1975. The management of human components in the Yosemite National Park ecosystem. Final report to the Yosemite Institute, Yosemite National Park, California.
- Lucas, Robert C. 1964. Wilderness perception and use: the example of the Boundary Waters Canoe Area. Nat. Res. J. 3: 394-411.
- Lucas, Robert C. 1979. Perceptions of non-motorized recreational impacts: a review of research findings. Pp. 24-31 in Recreational Impact on Wildlands: Conference Proceedings (Ittner, Ruth, Potter, Dale R., **Agee**, James K., and Anschell, Susie, eds.). Seattle, WA: USDA Forest Service and USDI National Park Service. .
- Lucas, Robert C. 1980. Use patterns and visitor characteristics, attitudes and preferences in nine wilderness and other **roadless** areas. USDA Forest Service Research Paper INT-253. Ogden, UT.
- Merriam, L. C. and Smith, C. K. 1974. Visitor impact on newly developed campsites in the Boundary Waters Canoe Area. J. Forestry 72: **627-630**.
- Nash, Roderick. 1973. Wilderness and the American Mind. New Haven: Yale University Press.

- Outdoor Recreation Resources Review Commission. 1962. Wilderness and recreation-- a report on resources, values, and problems. Washington, DC: U.S. Government Printing Office.
- Ranz, Beth. 1979. Closing wilderness campsites: visitor use problems and ecological recovery in the Selway-Bitterroot Wilderness, Montana. Unpub. M.S. thesis, School of Forestry, Univ. of Montana.
- Shelby, Bo. 1980. Crowding models for backcountry recreation, *Land Econ.* 56: 43-55.
- Shelby, Bo and Harris, Richard. 1982. Evaluating methods for measuring visitor perceptions of ecological impacts and wilderness campsites. Final report to the Wilderness Management Research Unit, USDA Forest Service, Missoula, MT.
- Shelby, Bo, Heberlein, Thomas A., Vaske, Jerry J., and Alfano, Geraldine. 1983. Expectations, preferences, and feeling crowded in recreation activities. *Leisure Sciences* 6: 1-14.
- Stankey, George H.** 1972. A strategy for the definition and management of wilderness quality. Pp. 88-114 in *Natural Environments: Studies in Theoretical and Applied Analysis* (John V. Krutilla, ed.). Baltimore: The Johns Hopkins University Press.
- Stankey, George H.** 1973. Visitor perception of wilderness recreation carrying capacity. USDA Forest Service Research Paper INT-142. Ogden; UT.
- Stankey, George H.** 1979. Use rationing in two southern California wildernesses. *J. Forestry* 77: 347-349.
- Stankey, George H.** 1980. Wilderness carrying capacity: management and research progress in the United States. *Landscape Research* 5: 6-11.

Tuan, Yi-Fu. 1974. *Topophilia: a study of environmental perception, attitudes, and values*. Engelwood Cliffs, NJ: Prentice Hall, Inc.