Recreational Carrying Capacity Reconsidered

J. Alan Wagar

ABSTRACT—Because recreation areas produce psychological experiences, acceptable levels of use depend greatly on desired qualities of experience, management patterns, and such off-site factors as alternative opportunities and visitor characteristics. Emphasis on carrying capacity may focus so much attention on physical site factors that equally important factors are overlooked, especially those concerning a balanced system of recreation opportunities.

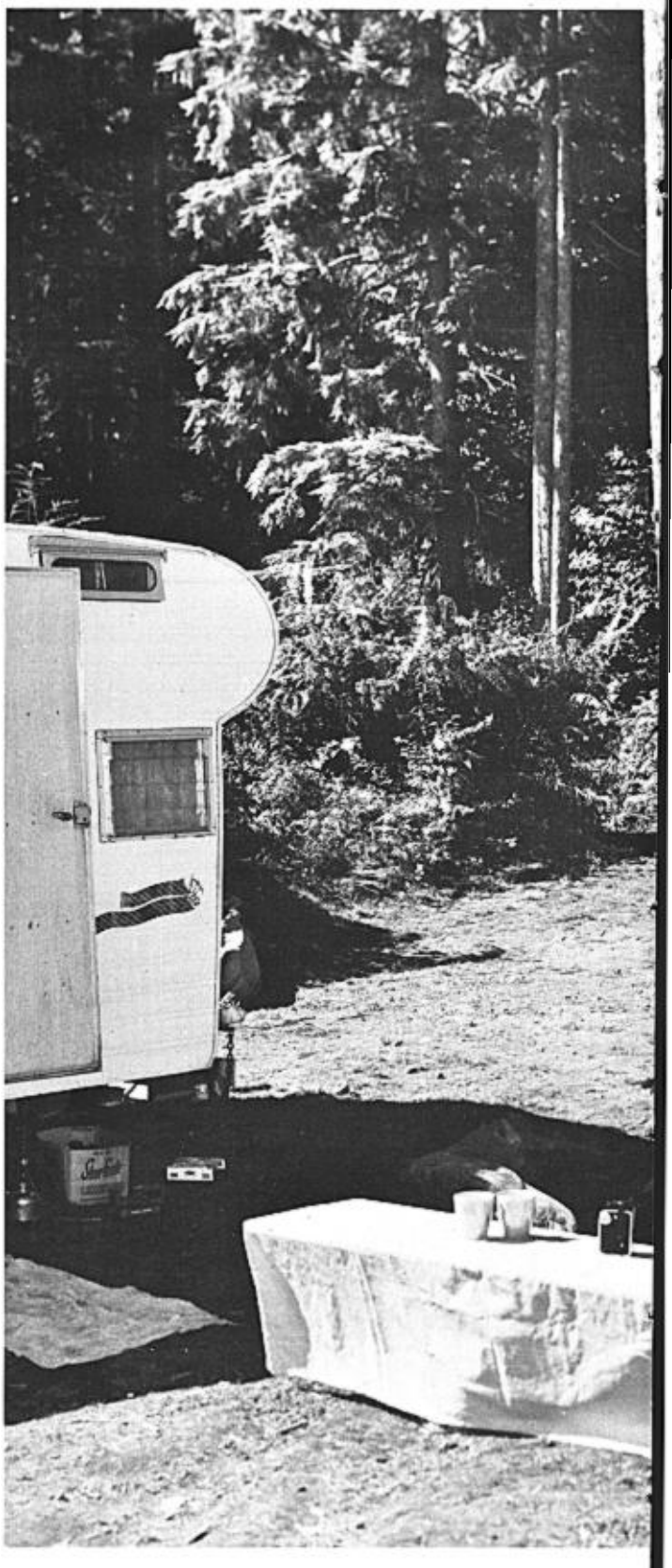
As the use of outdoor recreation areas increases, such highly regarded values as solitude and naturalness are threatened, and the quality of some experiences declines. This point was well made many years ago (*1, 9, 12, 18*) and has in recent years led to a rather extensive literature as summarized by Stankey and Lime (*14*).

In seeking a rationale for limiting use to protect high-quality recreation and unique attractions, managers of recreation resources borrowed the concept of carrying capacity from the fields of range and wildlife management. In many ways, it was a bad choice that has diverted our attention from more promising approaches to effective management of recreation lands.

Biological or physical concepts of carrying capacity have been highly useful for managing grazing and browsing species. Their numbers must be balanced with a sustained supply of suitable vegetation, which in turn depends greatly on such physical factors as soil, temperatures and precipitation. For managing recreation, however, physical concepts of carrying capacity are less useful. Outdoor recreation is primarily a psychological experience whose quality may depend as much (or more) on a person's expectations, belief systems, and prior experiences as on the physical condition of the area he visits (*15*).

To supplement physical concepts of recreational carrying capacity, increasing attention has been focused on *social* carrying capacity (*10, 11, 13*). Even when qualified as social, however, the very term capacity suggests that reasons for limiting use reside in the characteristics of a specific site and not in its contribution to human experiences. This diverts attention from the relation of each area to many others and thus away from allocations, trade-offs, alternative management practices and explicit analysis of objectives.

The term also tends to obscure an essential distinction between technical issues (involving what *can* be) and value choices (involving which of various possibilities *ought* to be). Thus every statement of recreational carrying capacity includes the assumption (often not explicitly stated) that unacceptable consequences will occur if use is permitted at a higher level. Defining what is acceptable, however, is a value choice rather than a technical issue. Although initial use may cause substantial site changes, the relationships between ad-



Camping in Mt. Baker National Forest. Robert J. DeWitz, U.S. Forest Service Photo.

ditional use intensity and site changes generally seem to be continuous curves without abrupt discontinuities (*5, 15*). Therefore, even if research can show how areas and experiences will change with various levels of use and various management practices, someone must still decide what changes are acceptable.

To maintain our focus on managerial decisions designed to achieve selected objectives, such terms as "use limits" or "use-intensity-quality relationships" seem preferable to "carrying capacity." Rather than a single capacity, each site has a whole range of potential capacities, each providing different consequences.

First Question: Why?

The starting point for examining questions of use limits is to clarify our reasons for having recreation areas. From the viewpoint of society, the objective of all resource management is to create and maintain a flow of benefits for people. This frankly man-centered objective is far broader than it may first appear because benefits embrace anything that makes a person better off. Thus they include emotional as well as material values.

Clearly, resources must be protected if we are to maintain a stream of benefits. The biological factors that determine an area's durability and capacity for self-repair are vitally important for determining how the area might best be managed and used. But we must not forget that protecting and managing resources are means, not ends.

The usual alternative given to a man-centered objective for resource management is to protect unique species, attractions, values or qualities; the argument is that unique resources have intrinsic worth and must be protected, regardless of human preferences. But both "unique" and "resource" are human concepts, the former indicating a human judgment about relative rarity, the latter expressing a judgment that a part of our environment is useful for some human purpose (*3*). It is often argued that each species or organism has a "right to live." But taken literally, this would lead to not trying to eliminate the protozoan that causes malaria—a step few of us would accept. Complete protection of unique features and species could mean curtailing all human use, thus eliminating them as resources important to people.

A man-centered view is really inescapable. Given a sufficient span of time, all current species—including man—will become extinct. And, barring total holocaust, a competely new set of species and landscapes will evolve to take their place, eventually making our current decisions of absolutely no consequence. We do not take this long view of time because we will not be here to enjoy that future environment and, in the interim, many of us will miss the things that

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have been destroyed. Both reasons bring us back to a man-centered view of resource management and protection.

Rather than base our actions on claims of absolute worth for selected attractions, it seems more productive to start with the underlying basis for our judgments of worth. Our most powerful argument for such values as wilderness, solitude, whooping cranes and redwoods is that many of us judge our lives to be enriched by their presence. We maintain diversity and uniqueness for the current and future benefits they provide for people, not to benefit the attractions themselves.

Limiting Use to Increase Benefits

If the objective of managing recreation land is to create and maintain benefits for people, then the test of use limits or other management policies will be whether they increase or decrease the levels of benefits that can be sustained. The effects of use limits are misleading, however, unless they are examined for a whole system and not just one area within it (*17*).

The total benefits contributed by one specific area would seem to equal the number of experiences it provides times the average value of an experience. Consider, for example, a forested and mountainous tract of 10,000 acres. As wilderness, it might provide a prime experience for 3,000 man-days of use each year. But developed for more intensive use, it might easily provide such experiences as picnicking, swimming, boating and Sunday driving for 300,000 man-days of use each year—100 times as many as for wilderness.

To justify wilderness in terms of human benefit, we apparently would have to assume that a man-day of wilderness use is 100 times as good as a man-day of recreation on a developed site. Conceivably, it is two or three times as good, but certainly not 100 times as good. Mass use would always appear to be more justified than severely limited use if we examine one area at a time.

Examining one area at a time may be the trap that has caused so much confusion about use limits for specific areas. One-at-a-time thinking may also explain why many managers insist that their responsibility is to resources rather than to people: letting widely cherished values be destroyed is obviously unwise, and a basis is needed for avoiding such destruction. Fortunately, our choice is not between protecting resources at all costs or accepting the lowest common denominator in our recreation.

Consider again the 10,000-acre tract. For simplicity, assume that wilderness (with severely limited use) and a highly developed recreation area (with few constraints on use) are the only two alternatives. If we already had abundant wilderness and few developed areas, the tract would contribute more to human benefit if used as a highly developed recreation area.

On the other hand, if we had ample developed areas and a shortage of wilderness, using the tract as wilderness would contribute more to total benefit. Even though the tract might, by itself, produce increased benefits under intensive recreation, a shift from wilderness would reduce the benefits provided by the total system of recreation areas. New users of the tract would be gaining little they did not already have elsewhere, but wilderness enthusiasts would be losing a scarce opportunity. We would be using a scarce resource to provide a commonplace opportunity; and for the whole system, losses would exceed gains.

Marginal Analysis—In concept, we are dealing with the economist's concepts of decreasing marginal utility and marginal analysis. Decreasing marginal utility simply means that the more we already have of some good or value, the less importance we place on each additional unit of it. A family of four, for example, would probably place great importance on its first TV set. But a family with 25 working sets probably would not care much about a 26th set.

In allocating a value such as land or money for a combination of benefits, we should be able to trade off benefits, provided that the ones received exceed those given up. (In marketplace allocations, individual judgments of value reflect marginal utilities, and Fisher and Krutilla (*4*) have shown how willingness to pay might be used to determine "optimal capacity" of wilderness.)

Consider land. Each acre added to one kind of use is less important than the previous acre. But each acre taken from some other use will be more important than the previous acre taken from that use. Eventually, the benefit created by shifting an acre into one use will exactly offset the benefit lost by taking that acre out of some other use. In economic terminology, the marginal utilities are now equal and, because no pattern of substituting land uses will increase the sum of all benefits, benefits are at their maximum.

Thus, land should be shifted from one use to another if such a shift will increase sustained benefits. However, we must not mistake immediate benefits for those that can be sustained. For example, a wilderness lake might provide 20-inch trout and other unusual benefits to the few people willing to hike 10 miles for them. If a road were built to the lake, the many fishermen arriving by automobile might, for a short time, enjoy the generous catches formerly experienced by only a few hikers. But in doing so they would be exploiting more than the current productivity of the lake, and the size of the catches would soon decline. This is like spending from a bank account faster than it accumulates interest. Building the road might simply create a commonplace car-access attraction in place of a unique hiking opportunity that some people value highly.

Zoning as a Tool for Use Limits—Unfortunately, people don't always honor each other's desires for diverse opportunities or the intent for which diverse areas were established. For example, people who don't mind crowding are quite willing to use areas where others are seeking solitude. And people who don't mind noise are quite willing to sing or shout or run their motor bikes within earshot of people who hate such noise.

To prevent all opportunities from being reduced to the lowest common denominator, and to prevent rare and unique opportunities from being converted to conditions that are already abundant, the obvious solution is to create an integrated and highly visible *system* of areas and zones. Such a system, by providing alternatives for visitors who might invade some zones with conflicting uses, can protect diversity and opportunities for diverse desires (*16*).

Intensity of use, as regulated by use limits, is one

factor in defining zones and areas within a system, but not the only one. Physical site characteristics will often affect the pattern of zoning; some areas will lend themselves to such purposes as boating or camping or wilderness or sight-seeing better than other areas. Other factors might be vegetation management techniques, site design, or regional population (*2, 7*).

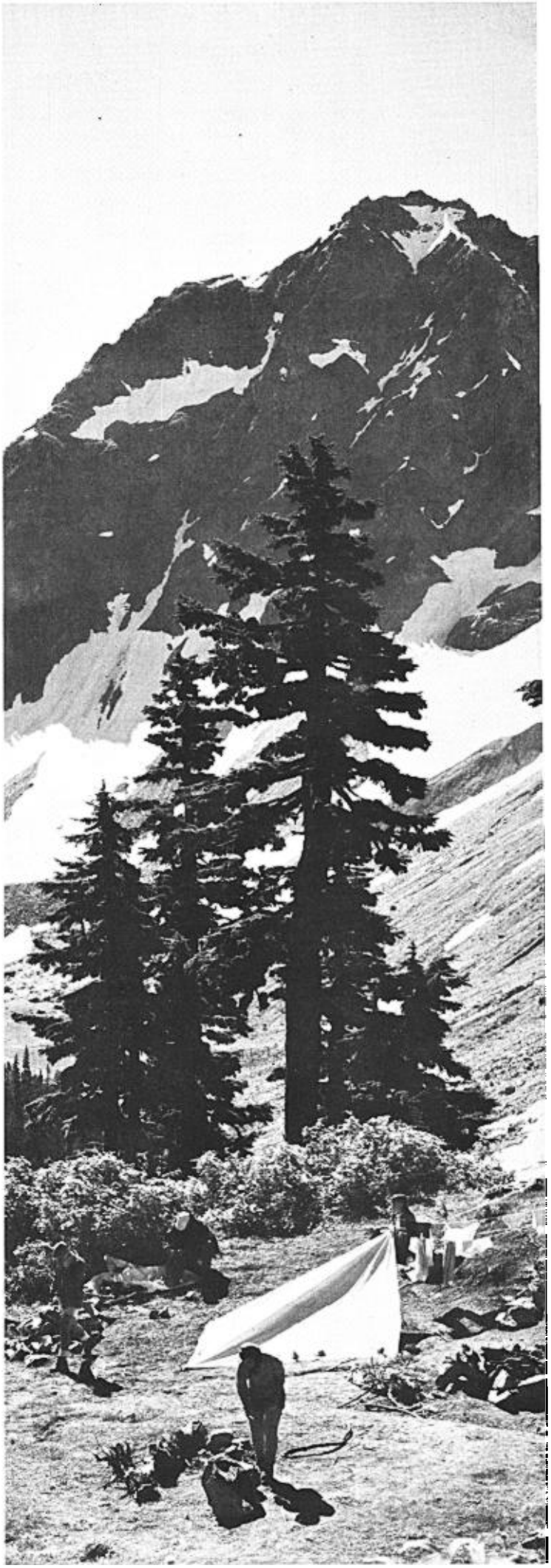
Use limits, as one criterion for zoning, are simply a mechanism for maintaining the diverse opportunities to serve diverse needs and desires. For balance in this diversity, we must examine the range of people's tastes and the relative abundance of opportunities. Often it will be more important to insure that adequate sites for a specific opportunity are included in the system than to insist that all is lost if a specific site is not designated for that opportunity (*16*).

Resources must be used efficiently whenever they become so scarce that use limits are considered. Yet, without zoning and conscious management to provide opportunities tailored to people's diverse desires, recreation resources may be used wastefully. In campgrounds designed to a single standard, for example, people are often forced to use more space than needed to fulfill their desires. Thus, after a new and attractive campground in Grand Teton National Park went largely unused because it provided no view of the Tetons, the superintendent threatened to build an asphalt "airstrip" with lines painted to designate stalls in which visitors would park their campers and trailers facing the Tetons (personal communication with Fred C. Fagergren, 1963). This would have provided many people with what they came to see without wasting resources or values they did not seek.

As another example, many people use wildernesses when their needs could be met, perhaps better, in other areas managed to withstand heavier use. To supplement established wildernesses and to protect them from excess and inappropriate use, we need managed backcountry areas which include some "hardened sites" offering such facilities and services as developed water supplies, toilets, or even provision for meals and overnight accommodations (*6, 8*). Because named areas often become "targets" before and "trophies" after they are reached, managed backcountry areas may need such names as Conner's Dome National Backcountry.

When Are Use Limits Appropriate?

For use limits to be acceptable, the sacrifice they imply (i.e., less use per visitor or visitors turned away) must be worth the benefits gained. Therefore, as means for achieving high-quality recreation and high levels of sustained benefits, use limits will be appropriate only if they are at least as effective as other means of achieving the same ends. Other costs or sacrifices that might be exchanged for high-quality recreation include (a) paying for the acquisition, development and management of recreation lands through taxes, entrance fees, or other means; (b) accepting different kinds of recreational experiences, as with irrigated plantings and paved pathways in place of unmodified natural areas; (c) spending time, money and effort to reach such quality recreation as fishing in Canada, hunting in Africa and hiking beyond crowded



Wenatchee National Forest, U.S. Forest Service Photo.

roadsides; (d) accepting less of some products and services and perhaps paying more for them because of devoting more land to recreation; and (e) accepting such regulation of conduct and movement as remaining on trails so that off-trail areas are not damaged (*15*).

Because use limits are only one of several means to quality recreation, the crucial question becomes: What management patterns—including kinds and amounts of use—will permit this recreation area to make its maximum contribution to the sustained benefit provided by the whole system of recreation areas? The question generates a host of additional, complex questions: What recreational opportunities suited to the area are in shortest supply? To what alternative opportunities and use levels are the area's physical characteristics suited? What techniques for offsetting the effects of heavy use would be appropriate? What are the legal, financial and other constraints upon the organization that administers the area? How can the management of this area be coordinated with that of other areas? How would various management strategies affect important nonrecreational values?

The complexity of such questions makes any search for an impersonal carrying capacity formula totally unrealistic. Use limits must remain a human judgment guided not only by information about visitor desires, site capabilities and alternative opportunities, but also by a sound conceptual framework.

Use limits are most likely to be appropriate at the wilderness end of the recreational spectrum where legislation—as a reflection of representative government—has defined predominant values which preclude many alternatives to limiting use. In emphasizing "natural conditions," the Wilderness Act of 1964 rules out elaborate facilities or intensive vegetation management. And in emphasizing "opportunities for solitude," the act rules out the levels of use that might be supported by such intensive management. For the short run, dispersing people in both time and space can help them use areas with minimal impact, but an area cannot endure continually growing use and still be wilderness. For wilderness, use limits are inevitable.

For nonwilderness, a much greater variety of management practices is appropriate, including the design of areas, construction of facilities, and intensive management of vegetation. Use limits may still be appropriate, however, as a means of providing solitude, good wildlife viewing, good hunting or other prime experiences. As part of a total recreation system, for example, reservations could be used to provide solitude in beautiful places for boaters or motorists.

Placing the Value Judgment

Limiting use at recreation areas is just one of several means for maintaining the variety of recreation opportunities suited to people's diverse needs and desires. Use limits are therefore to be found primarily within human purposes and judgments of quality. Although physical characteristics may define a site's initial durability, the decision to limit use rather than "let the site deteriorate," "intensify management," or even "pour more concrete" is dictated by human objectives, not ecological imperatives.

Each argument for limiting use includes—implicitly or explicitly—a judgment of what the site *ought* to be, often in terms of traditional notions of naturalness, numbers and kinds of facilities, and types of experiences provided. Nearly every site, however, *could* be used in a number of ways ranging in intensity from wilderness to high-rise condominiums. Therefore, a basis for decisions is essential.

If we accept that the objective of managing land is to create and maintain a flow of benefits for people, and if we want our actions to increase rather than decrease this flow, then we must consider each area as an element within a total system of areas and not as an isolated entity. Otherwise, we may have difficulty weighing pressures to use every area intensively because the area, by itself, could provide more benefit if used heavily rather than lightly.

Sacrificing unique opportunities to increase commonplace opportunities, while increasing the flow of benefits from specific areas, would decrease the flow of benefits from the total system. Unfortunately, visitors turned away from desired settings may have difficulty understanding that total recreational benefits can be increased by limiting use on selected areas and foregoing obvious benefits. Administrators who choose to impose use limits will therefore need courage, a good conceptual framework to guide their decisions, and highly visible evidence that a *system* of opportunities is available to meet the needs of diverse or conflicting groups of visitors.

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