

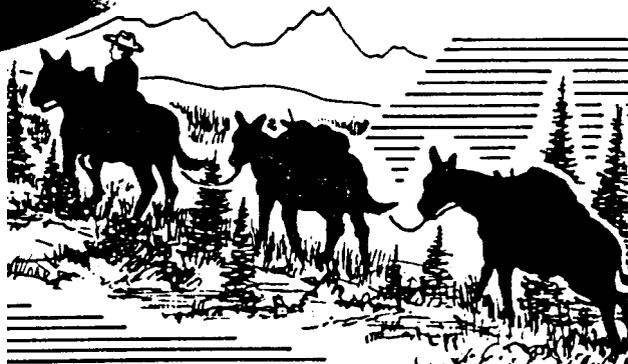
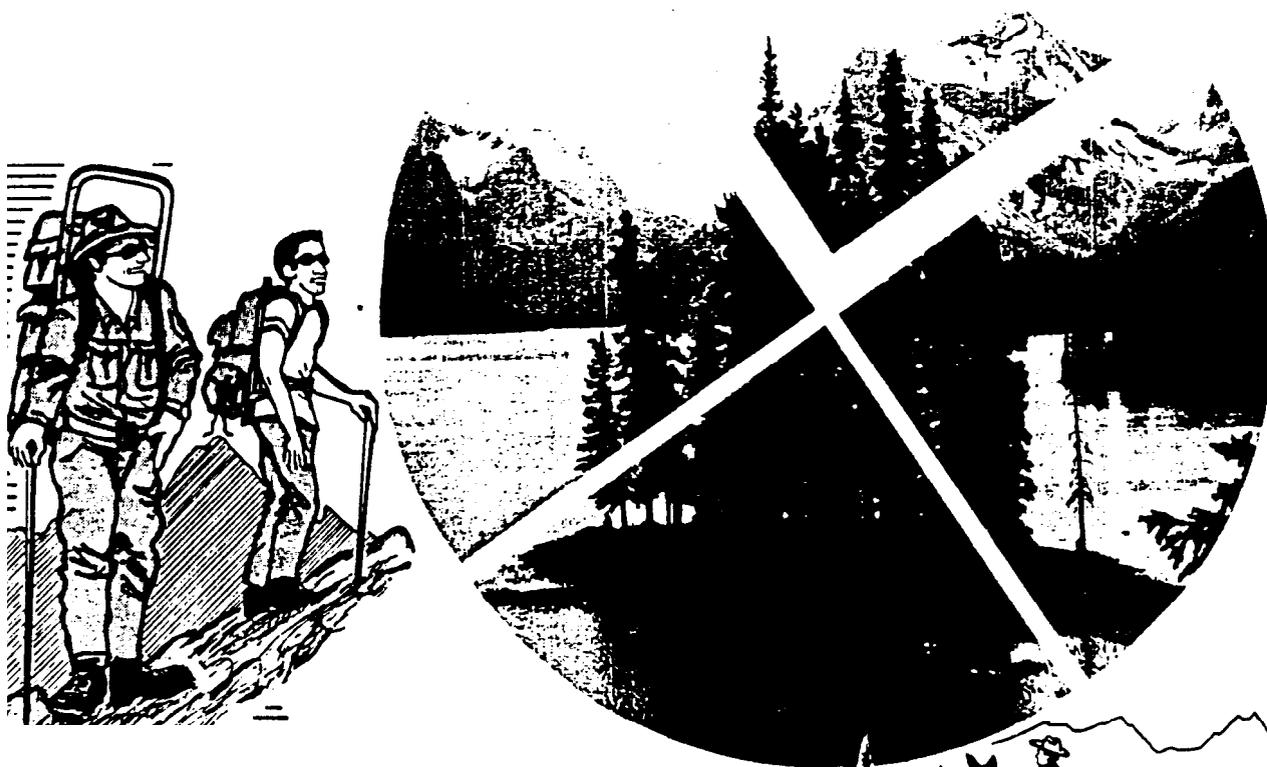
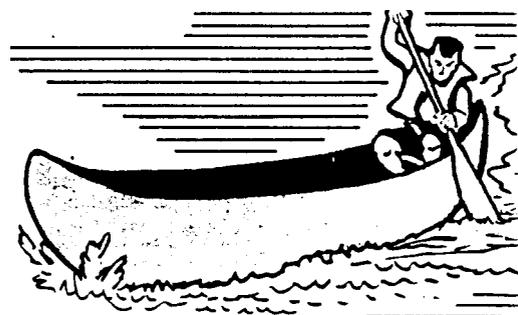
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RATIONING WILDERNESS USE: METHODS, PROBLEMS AND GUIDELINES

George H. Stankey and John Baden



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RESEARCH SUMMARY

Wilderness managers can regulate ecological and social impacts by implementing one or more of five basic rationing systems: reservations, fees, queuing, lottery, or merit. Each system has advantages and disadvantages for both administrators and users. Managers must consider the effect on user groups, administrative experience with the rationing system, acceptability to users, difficulty of administration, efficiency, principal way impacts are controlled, and effect on user behavior.

Managers should strive to control environmental and social impacts, not merely visitor numbers, with a minimum of regimentation. The following guidelines will help managers implement effective rationing: (1) Know both the wilderness and its users, (2) Ration only when less restrictive measures fail, (3) Combine rationing systems to help minimize costs to users and administrators, (4) Adopt rationing systems that require users to judge the relative value of the opportunity, (5) Monitor and evaluate rationing programs.

INTRODUCTION

One major fact confronting our society today is that the stocks of natural resources from which we derive our material and social wellbeing are not infinite. Although it is true that economic and technological advances continually redefine the nature and extent of the natural resource base, it is also true that the days of relatively free and unlimited access to these resources are past. Daily, we are confronted with headlines that warn of impending shortages and the need to ration our consumption of such things as gasoline, fuel oil, and natural gas.

The need to control consumption has spread beyond traditional products such as food and fuels. In 1972, Rogers C. B. Morton, then Secretary of the Interior, announced the National Park Service would take actions to limit the number of visitors to backcountry areas in the parks because "our parks are threatened now as never before ...we must set new standards of usage." Recently, the Forest Service began limiting the number of visitors in several wildernesses, including the Boundary Waters Canoe Area in Minnesota, the San Jacinto and San Geronimo in California, and on the Mt. Whitney Trail in the John Muir Wilderness, actions taken in response to rapidly increasing use, and the resulting crowding and resource damage.

The rationing of wilderness use has been a controversial issue (Behan 1974; Hendee and Lucas 1974). One of the important traditional values recognized in the preservation of National Parks and wilderness has been the opportunity for respite from the cares and worries of the everyday world. Numerous studies of wilderness users indicate that one of the principal values derived from wilderness is escape--an opportunity for temporary release from the rules and pressures of everyday life (ORRRC 1962; Hendee and others 1968; Stankey 1973). Freedom of choice and spontaneity of action appear to be key characteristics of what is commonly called "the wilderness experience."

Rationing the use of areas producing such values might seem akin to charging people to go to church. Or, it might simply appear to be an unwarranted bureaucratic intrusion into yet another area of our lives. What justification is there, after all, for restricting access to areas that many people visit to escape the controls and stresses that increasingly characterize modern life?

There is also great concern that rationing decisions avoid or minimize discriminatory or inequitable consequences. The National Park Service, for example, in restricting use on the Colorado River of Grand Canyon National Park, allocated the available openings between commercial concessionaires and noncommercial users. Most of the openings were allotted to the commercial operators. As a result, many private, noncommercial parties have been denied access to the river. In the belief that the commercial-noncommercial allocation was discriminatory, Senator Gary Hart (D-Colo.) submitted a concurrent resolution to the Senate in July 1975 "calling for a fair and equitable allocation of restricted-use outdoor-recreational resources" and requested that the Secretary of the Interior review regulations governing the allocation of use to insure fair and equitable treatment. (Senate Concurrent Resolution 56, July 25, 1975.)

Concerns about excessive or inequitable regulations are well founded. But three important facts place the issue of rationing squarely before us. First, the supply of land that qualifies as wilderness is finite. Currently, about 14.4 million acres have been formally designated for preservation. Estimates vary as to the potential size of the National Wilderness Preservation system (NWPS), but about 40 to 50 million acres (2 percent of the United States) might eventually be classified as wilderness (McCloskey 1966; Stankey 1971). However, although future additions to the NWPS might expand its current size by a factor of three or four, these additions will not increase net capacity. Areas currently unclassified, but possessing wilderness qualities, frequently have substantial use.

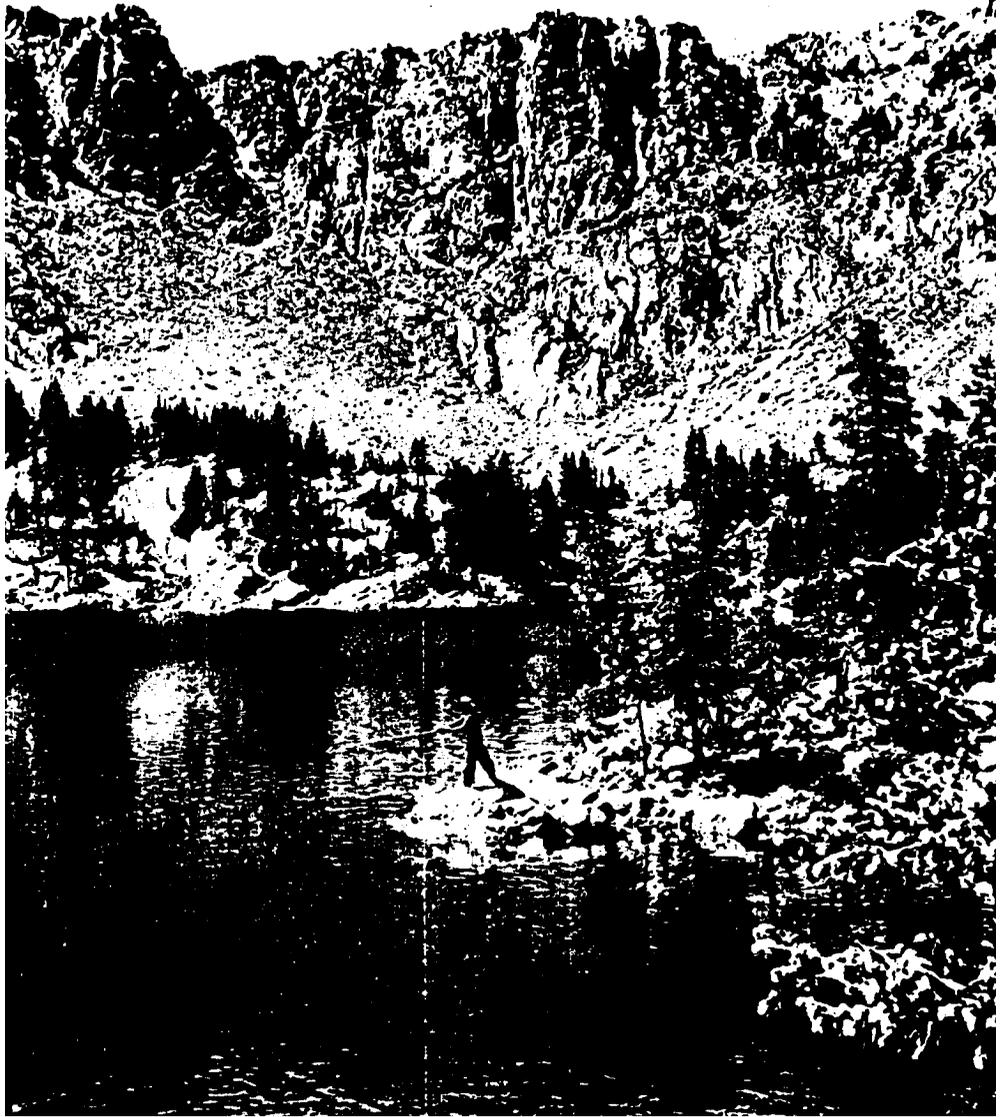
Second, wilderness use is steadily growing. Nationally, Forest Service statistics indicate about an 8 percent annual growth rate in wilderness since 1969. Moreover, wilderness use is growing at a faster rate than other forest-based recreation demands such as campground use. Although the current economic situation casts uncertainty on future trends, it seems reasonable to expect further growth, and as a consequence, more problems.

Third, the goals that society has established for the NWPS emphasize that wilderness shall be, first, an area where ecological processes operate as unmodified as possible (fig. 1) and second, an area providing solitude and challenging, primitive recreation (fig. 2) (Hendee and Stankey 1973). While use is to be permitted, it must be consistent with the preservation of the area as wilderness. Moreover, management guidelines in the Wilderness Act seem to disallow an "engineering" response to overuse problems; namely, extensive "hardening" of sites, developing facilities, and so forth. Although this approach has been proposed (Zivnuska 1973; Behan 1974)) we believe it is both illegal and inappropriate in areas managed for the preservation of natural ecological processes.



Figure 1.--A major objective of the Wilderness Act is to preserve natural processes that shaped the land and its community of life--conditions that prevail at this unnamed lake in the Anaconda- Pintlar Wilderness.

Figure 2. --Wilderness should provide the visitor with solitude, or primitive and unconfined recreation, conditions enjoyed by this fisherman in the Pecos Wilderness of New Mexico.



The extent of overuse varies within and between individual wildernesses (fig. 3). While severe problems exist in some locations, others retain those pristine qualities that originally led to their designation as wilderness. However, as we look ahead, and as we consider the goals of ecosystem naturalness and the provision of a unique recreational experience in light of the supply and demand factors reviewed earlier, rationing will certainly become an increasingly significant issue. In the face of continued increases in use on a relatively fixed resource base, it is unlikely that goals set forth in the Wilderness Act can be achieved unless some management action is taken. Guidelines for regulating wilderness use consistent with physical, biological, and social standards need to be developed (fig. 4). Unless this occurs, the quality of the wilderness experience will deteriorate and unacceptable levels of resource degradation will occur.

Wilderness managers have a variety of tools for coping with excessive impacts (Lime and Stankey 1971). Improving use distributions, providing information to improve user behavior, and establishing regulations to control especially heavy impact, such as restrictions on stock in high mountain meadows, are examples. Direct control in the numbers of users, or rationing, is yet another technique and, as we noted above, has been already implemented on some areas.



Figure 3.--Failure to manage use has severely damaged natural qualities and processes at many locations such as this campsite in the Selway-Bitterroot Wilderness.

These different management techniques can be arrayed along a continuum ranging from those that are lighthanded and subtle to those that are authoritarian and heavy-handed. Gilbert and others (1972) have described this continuum as ranging from manipulative to direct controls. To the maximum extent possible, we believe managers should attempt to utilize the more subtle, lighthanded systems so as to preserve the independence, spontaneity, and freedom from regimentation that are major parts of the wilderness experience (Lucas 1973). But the time will come, and has already come in some locations, where direct rationing of use will be necessary. Our discussion assumes that the more subtle measures have failed to control use impacts and that more direct forms of use control are needed. And we are not alone. A major recommendation of the President's Advisory Panel on Timber and the Environment (1973, p. 46) noted:

That some system must be established in all wilderness areas to limit use to the reasonable carrying capacity of the area, having in mind primarily the nature of the wilderness experience. Unless such limitations can be devised and enforced, the Panel sees little national gain from the withdrawal of additional forest land for wilderness use since in a relatively few years, overuse could destroy its wilderness character.



Figure 4. --*Heavy use can destroy solitude and unconfined recreation. Both ecological and social concerns are important in managing wilderness.*

ALTERNATIVE SYSTEMS OF RATIONING

Rationing is a procedure for gaining an opening or "slot" in some system. In wilderness, the number of available openings is determined by the area's carrying capacity, a value based upon the manager's judgment as to what constitutes acceptable levels of change in ecological and social conditions (Frissell and Stankey 1972).

Given a relatively fixed number of openings that can be distributed to users, wilderness managers are thus faced with the task of allocating these openings in as fair, efficient, and nondiscriminatory a manner as possible. In the following discussion, we will consider five basic rationing systems that managers might use to limit visitor use. These include: (1) rationing by advance reservation; (2) rationing by lottery; (3) rationing by queuing; (4) rationing by price; and (5) rationing by merit. Each system has certain advantages and disadvantages that must be defined before any system or mixture of systems is adopted.

Rationing by Advance Reservation

The capacity of a wilderness could be allocated by requiring potential visitors to request, or reserve, an opening in advance. Such a system would operate fairly simply, at least in theory. For example, a calculated daily capacity (say, 100 people at one time [PAOT]) would be distributed to that number of visitors, probably on a first-come, first-served basis. Once that capacity was filled, further requests would either be placed on a waiting list (another way of rationing, as we shall discuss shortly), offered an alternative time period, or returned to the applicant.

The advance reservation system is an advantage to persons who work and live orderly lives. Requesting a specific time implies an ability to foresee obligations and opportunities. It also calls for a certain psychological disposition towards predictable behavior. Thus, a request system tends to discriminate against those who are unable or unwilling to make long-term commitments--the spur-of-the-moment, impromptu sorts of people.

Our knowledge of wilderness users tells us that this system will create problems. In a recent, yet unpublished study of rationing in the San Geronimo and San Jacinto Wildernesses in southern California, less than 20 percent of applicants planned trips more than 1 month ahead of time.¹ Spontaneity and relatively short planning horizons seem to characterize many wilderness trips.

Among wilderness users, two major subgroups are those employed in professional-technical occupations and students. In many areas, these two groups often comprise over one-half the users. Unforeseen demands on persons in professional occupations often keep them from obligating future time. Students, although they have relatively abundant leisure time, often operate in a fairly unstructured style. Moreover, the degree of certainty about future events for both these groups is probably low. As a result, the request system could discriminate fairly heavily against these two major users of wilderness.

Where free of charge, people make reservations even if there is a low probability that they will ever, in fact, use their privilege. In effect, the reservation is free insurance of the opportunity to go. For example, in 1973 the Inyo National Forest, California, rationed use on the Mt. Whitney trail to a maximum of 75 parties per day. Forest officials estimate that approximately one-half of the reservations resulted in "no shows." People also make multiple reservations to maintain the broadest options until a decision has to be made. Unless no-shows can be allocated, the area will often be underutilized even at times when demand for entry is very high.

Rationing by request also does not discriminate among users on the basis of the relative importance of the wilderness experience: a phenomenon called "suboptimization." For example, a wilderness buff who gains great satisfaction from wilderness could be denied entry by a casual, relatively disinterested visitor whose request happened to be postmarked earlier. The enthusiast might have few alternatives, while the other person might have many. The relative worth of the experience would have little bearing on chances for getting a reservation. Obviously, a perfectly functioning system for marketing reservations would substantially reduce this source of inefficiency.

¹Stankey, George H. [n.d.] Rationing wilderness use: visitor evaluation Of use control in the San Geronimo and San Jacinto Wildernesses, California. Unpubl. rep., USDA For. Serv., Intermt. For. and Range Exp. Stn., Missoula, Mont.

The advance reservation system could be burdensome to users and administrators alike. Short, numerous trips characterize the style of use for most wilderness visitors (Hendee and others 1968; Lucas²). Having to make multiple reservations over the use season would be a problem for many people, particularly, as we pointed out previously, when a high degree of uncertainty surrounds the future. Because of the typical short planning horizon, many wilderness enthusiasts would frequently find their first choice denied.

Selection of rationing techniques should take into account the relative acceptability of the various alternatives to users. In a study of user attitudes toward various control techniques, a reservation system was found to be the most acceptable (Stankey 1973). Forty-three percent of the respondents favored such a system while 39 percent opposed it. These figures, of course, are subject to change with actual exposure to alternative rationing methods.

Rationing by Lottery

A lottery system is a variant of a reservation system. Under a lottery system, visitation rights would be distributed randomly. In many States, certain big-game hunting permits are allocated in this fashion. Individuals seeking a permit might be assigned a number and a drawing equal to the area's carrying capacity would be made. Each individual would have the same probability of success. Operated properly, no individual or group would be favored over another; a lottery, as Hardin (1969) has noted, is "eminently fair."

As was the case with the request system, a lottery would not discriminate among users according to the relative value they place on the wilderness opportunity. Persons who entered the lottery frivolously or to whom wilderness is relatively unimportant would hold the same chance of winning as the wilderness enthusiast. Thus, the sub-optimization problem is not eliminated with a lottery.

A lottery would also favor those persons who sought entry to any wilderness rather than persons who sought one particular area. The former group would be able to apply for any of several areas, while the latter group would prefer only one location. However, this situation might help disperse use from heavy-use areas to more lightly used ones, as users consider the relative probabilities of success. This idea has been explored in a recent paper by Greist (1975) in which he suggests the risks of success be made inversely proportional to the use intensity allowed in any one area, a notion he refers to as "risk zoning." By focusing on the risk of rejection, such a system requires the user to weigh the probability of rejection against the benefits of his desired experience, thus eliminating the efficiency problem normally associated with a lottery.

There is also a problem with "leadtime," or the timespan between an applicant receiving notice of having "won" the lottery and the date of his scheduled visit. A short leadtime discriminates against those visitors requiring long planning horizons and makes it difficult to arrange for alternative activities. But a long leadtime is hard on the spontaneous user.

In most wildernesses, crowding occurs only at certain times or at certain places. For instance, during a recent use season, the Desolation Wilderness in California recorded its highest use on August 8, when nearly 3,000 people were in the area. That

²Lucas, Robert C. 1970. Preliminary tabulations--1970 survey of visitors to seven wilderness and related areas in Montana. Unpubl. rep., USDA For. Serv., Intermt. For. and Range Exp. Stn., Missoula, Mont.

is almost twice the number of persons in the area on July 22, only about 2 weeks earlier. A random selection mechanism would function most smoothly if information were provided as to the probabilities of success as a function of time. If, for example, people were advised that on the basis of previous years' experience, the probability (chance) of obtaining a permit was 1 in 5 for the 4th of June, 1 in 10 for the 4th of July, and 1 in 2 for the 4th of October, people might be expected to weigh the relative advantages of visiting at a specified time against the probability of gaining admission. From this information, then, one would apply for the dates that would maximize the chances of success. If this information were provided, we might expect more even use levels over the season.

A similar system could be used to even out use spatially, either within or between areas. In areas where capacity has always been fully used in the past, the probability of gaining entry would be less than it would be for areas where the capacity was ordinarily underutilized.

A lottery could be extremely cumbersome to administer. For example, a lottery might issue permits for individuals, for groups, or for time. Lotteries that issued permits to individuals would be unpalatable to most visitors because almost all use is in groups. Similarly, lotteries that issued permits to groups would need to account for the variation in group size, so that excessive numbers of individuals did not gain entry. Finally, lotteries that issued permits for time would need to reconcile varying trip lengths in order to prevent use from exceeding an area's capacity.

Although lotteries have been used successfully to distribute permits for big-game hunting, the conditions are different for allocating wilderness-use permits. Duration of big-game seasons is clearly specified in advance, and usually a permit holder may hunt at any time he wishes during that season. To hold use in line with capacity, a wilderness lottery would need to specify when a visit was to occur as well as where.

Wilderness users apparently oppose a lottery as a means of allocating permits to visit wildernesses. Only 18 percent favored a lottery; 62 percent opposed it (Stankey 1973). Many people appear reluctant to leave to chance the opportunity for a wilderness permit. However, because a lottery to allocate wilderness permits is not in use at present, visitor unfamiliarity with the system might contribute to the low level of support.

Rationing by Queuing

Filtering demand through a queue (first-come, first-served or "wait your turn in line" without any provision for advance reservations) is a complex and often misunderstood system of rationing. Queuing actually imposes a price in terms of time. Time pricing has been suggested as preferable to monetary pricing because time is more equally distributed than money (Smolensky 1972). However, available leisure time is not evenly distributed; rather it probably is a U-shaped relationship, relatively more available during youth and old age. Conversely, because leisure time is relatively abundant, its value or opportunity cost is low. While wilderness users are spread across a wide age range, most are found in the 20- to 45-year-old range (footnote 2), where the opportunity costs of time are generally high because of job obligations, income, family responsibilities, etc.

Because time is a price, some of the disadvantages noted for reservation and lottery systems are eliminated; notably the lack of a market that discriminates on the basis of willingness to pay. But queuing also has problems. For example, although the person obtaining the goods or service pays for it in time, no one receives the benefit of the price. When we give up money, our loss is someone else's gain; when we give up time, it is not available to anyone else but is lost forever. Also, this system discriminates against those for whom time has a high opportunity cost.' To a considerable

degree, the opportunity cost of time is a function of wages per unit of time; thus, this system, in effect, constitutes a progressive tax on the use of facilities (as income rises, and thus the opportunity cost of time, so does the cost [tax] of using the facility).

As long as there is competition for the use of the recreational resource base, say for logging or mining, capacity cannot be expanded indefinitely. Further it would be difficult even for Disney to duplicate the vast reaches of, say, the 1.2 million acre Selway-Bitterroot Wilderness. Hence, at zero money price in a situation where demand exceeds supply, the queue filters out users for whom time has a high opportunity cost relative to the value they place on a wilderness experience. Therefore, under queuing, goods supplied publicly at congested facilities are not "public goods" in the Samuelson sense, but goods whose price is a function of the opportunity costs of time rather than money.

Because queuing would benefit persons with abundant leisure time (or low opportunity cost for their time), groups such as students (currently, a major use group) would be favored, while those with little leisure time (a high opportunity cost for time) such as professional-technical people, another major use group, would be penalized. It would also favor local users over those from more distant locations because "locals" would face smaller risks of lost time and money from being turned away.

A queuing system could impose substantial administrative costs. Because many people will choose to "wait in line," services and facilities will need to be provided, including camping areas, garbage collection, and sanitary facilities. Some State Park and National Park campgrounds have waiting or overflow areas. Such areas can be an administrative headache.

Queuing as a method for rationing wilderness use does not appear to have a great deal of support. In the study of attitudes about control, only 28 percent favored a first-come, first-served system, while 57 percent opposed it (Stankey 1973). It might be that the high degree of uncertainty associated with such a system ("Will we be able to get a permit after traveling all this way?" or "How long will we have to wait?") is responsible for the relatively low level of support.

Rationing by Price

The President's Advisory Panel on Timber and the Environment (1973) has recommended that charges be levied for wilderness use, as a means of holding use within the carrying capacity of these areas. Regulating demand through pricing is, of course, one of the most common forms of rationing in our society today. When the idea is applied to wilderness, however there is considerable resistance. Two basic reasons appear to underlie these objections.

First, people object to paying for what has always been free, or for what appears to have been free. However, when use exceeds capacity, costs are unavoidable. The choice is not whether to pay, but how. Society can choose to "pay" through the diminished quality of the wilderness resource and the experiences it produces, or it can "pay" by selective exclusion from rights to access. Rationing systems are systems for selection, and pricing selects against those unable or unwilling to pay. Preferably, the rationing system would filter those unwilling to pay because they do not place a high relative value on wilderness.

Moreover, we do have precedents for public reaction to the pricing of a traditionally free resource. Participation in hunting as well as many forms of outdoor recreation (e.g., car camping) is now charged for and this is accepted by most people. Occasionally, the costs are high; nonresident fees for hunting exceed \$100 many places. What might be critical for obtaining public support is the understanding that the money spent to gain access is used to protect and manage that particular location. For

example, McCurdy and Miller (1968) found that a majority of visitors to a National Wildlife Refuge favored user-fees if the revenues were returned to that refuge for maintenance and facility development. Under current Federal regulations, entrance fees cannot be used in this manner (they are returned to the U.S. Treasury). If such earmarking of funds were permitted, support of pricing as a rationing technique might grow.

A second concern about pricing is that a fee, if high enough, would unduly discriminate against the poor. The concern about discriminating against the poor is, in a sense, paradoxical. Wilderness is often said to be available only to the well-to-do because of the high costs thought to be associated with its use. However, studies of wilderness users suggest that per-person, per-day expenditures are generally quite low (Stankey 1971; footnote 2).

The income distribution of wilderness users generally resembles that of the population as a whole. For instance, in a study of users to seven areas in Montana, the income distribution of users was found to be virtually identical to that of the national population (footnote 2). However, there is also evidence of a bimodal distribution of users according to occupation, with about one-third in professional-technical occupations and another one-fourth students. In the above mentioned study, about 25 percent of the users reported incomes under \$7,000.

In a recent paper, Vaux (1975) reports that with the exception of students, he found a disproportionately small number of low-income people in four randomly sampled wildernesses in California. And, he argues, students tend to understate their income, reporting their own earned income rather than that of their parents. In his study, 57 percent of the users reported incomes in excess of \$10,000 as opposed to 41 percent of the State population and 37 percent for the Nation.

Krutilla and Knetsch (1970) have argued that because of the generally high income distribution of wilderness users, the normal concern with "distributive justice" is less appropriate. Thus, pricing represents a reasonably equitable mechanism for establishing an equilibrium between supply and demand. However, as we have seen, the actual distribution of income groups appears to be fairly wide; low-income groups are represented to a significant degree and we must be concerned with the possible discriminatory implications of a rationing system based solely on pricing.

Beyond the discriminatory shortcomings of pricing, an additional problem concerns the extent to which price could be used to "fine tune" demand. In other words, as the level of use approaches an area's capacity, could a gradual increase in prices keep demand below capacity? (This issue is based upon two assumptions: (1) that we possess accurate knowledge of an area's capacity and can regulate use through other means, and (2) that we understand the relationship between the demand for wilderness at the various price levels that might be assigned.) The three systems discussed earlier all permit exact regulation of use; pricing is a manipulative, rather than a direct control device (Gilbert and others 1972).

There appears to be substantial resistance to the rationing of wilderness through pricing. About one-half of the visitors in an earlier study opposed the imposition of a fee; however, one-quarter favored such a move (Stankey 1973). Although Americans accept market allocations in most areas, there is a strong cultural notion affirming that the opportunity to experience nature should be "free" to the user. This, of course, is not to imply that because the experience has no "cost," it is valueless.

An increasing proportion of choice private lands have hunting rights allocated by pricing mechanisms. Participation in many other recreational activities is regulated by price. Perhaps after more exposure to this system, together with the fading of the initial shock associated with the suggestion of pricing wilderness, resistance will decline.

The primary value of pricing is that it regulates demand through market mechanisms. As the price increases, the quantity demanded diminishes. Because a market is present, problems of nondiscrimination among users based on relative value (problems found in reservation and lottery systems) are reduced. Pricing is a highly flexible system. For instance, it would permit weekly or seasonal fluctuation in use to be evened out by corresponding fluctuations in price. Thus, there could be high prices at peak periods, with low prices, or no prices, at low-use periods,

The system has the further advantage of providing inexpensive, immediate, and fairly accurate information on user preferences. Because actual behavior is an important measure of preference, we should be able to extract the relative values assigned to various activities by different users, based on prices they are willing or unwilling to pay. Also, a user is assured access if he pays, so he can travel long distances without worry.

Finally, imposing a dollar fee to ration use allows the price of the rationing program to be captured rather than lost as is the case with time pricing.

Rationing by Merit

The capacity of a wilderness could be allocated by requiring applicants to demonstrate knowledge and skill. In many ways, merit is the oldest rationing scheme. In a 1940 American Forests article, Wagar noted that "nature once certified outdoorsmen." Those who were unequipped, underskilled, and foolish simply did not return from the wilderness. Because modern transportation and improved equipment made access to the wilderness increasingly easy, there was a need, Wagar argued, to develop programs to certify outdoorsmen. Those achieving the appropriate level of skill and knowledge would be "safe to leave in the woods" (Wagar 1940).

To be useful as a rationing technique, a merit system would have to rely upon more than a simple requirement of physical prowess. As Robinson (1975) argues, the reasonably rigorous enforcement of wilderness standards already results in the exclusion of many people. The problem of what to do with the remaining people who still "make it" remains. Moreover, a merit system that functions solely on the basis of physical fitness suffers from serious normative problems. There is no clear basis for assuming that a person in good physical shape is more deserving of an opportunity to visit wilderness than his flabby neighbor. As Robinson notes, "What is the 'merit' of physical vigor?"

The demonstration of skill and knowledge is a fairly common prerequisite in our society for a variety of enterprises; for example, driver's licenses. But more to the point of this paper, such demonstrations are already being used for such things as whitewater river running. Hunter safety programs, now mandatory in 18 States, requires persons 12 to 18 years of age to complete an approved course of instruction in safety and marksmanship before obtaining a hunting license. In many European countries such as Germany, hunting is tightly controlled through a thorough program of instruction in gun handling, ethics, safety, and wildlife biology. All are examples of the use of merit as a means of access to a resource.

The merit system is founded on the notion that improved behavior will reduce impact. Its focus would be upon reducing the per-unit impacts of use so that, conceivably, higher levels of use would be possible. It also assumes that much of the behavior that currently creates undesirable resource impacts or conflicts with other users results from innocently uninformed, rather than malicious, behavior. For example, nearly two-thirds of the users to seven western Montana wildernesses and backcountry recreation areas reported that burying their noncombustible trash was the appropriate way to dispose of it, despite Forest Service efforts to promote a "pack it in, pack-it out" program (footnote 2). Thus, by supplying factual information, much undesirable behavior could probably be reduced.

A merit system could perform three important functions in holding use consistent with capacity. First, as we discussed above, it could reduce per capita impact, thereby possibly postponing the need for other more direct restrictive actions. Second, the numbers of visitors wanting to visit wilderness could be restricted by means of raising the minimum "score" required to obtain entry. Third, the presence of a system demanding time and effort on the part of the individual desiring entry imposes an important "cost" that is paid through the willingness of that individual to gain the necessary qualifications. Thus, merit meets an important criterion as a wilderness rationing device; namely, it places a positive relationship on the value of the opportunity and the behavior required to achieve that opportunity.

A merit system might also increase the enjoyment and appreciation that participants derive from wilderness. Understanding the complexity of the natural surroundings and being able to live in concert with the environment might add substantially to the values enjoyed by users.

There might be opportunities for cooperative training programs developed by the wilderness management agencies in conjunction with some of the major outdoor recreation, educational, and conservation clubs. Approved courses for instructors could perhaps be developed in order to make the program available to as many people as possible. Initially, it might be possible to contact people about the new requirements through such sources as outdoor recreation and conservation groups or through lists of names from wilderness permits now required in some areas.

Substantial practical problems exist with the merit system. It would be necessary to determine desired behavior. For instance, it is not yet clear what method of disposing of human waste is best; the best method probably varies as one moves from the Oregon Cascades to the Grand Canyon of Arizona. Ways of accurately testing knowledge could be difficult to develop. Settling upon who should establish the standards for entry would be controversial. Determining the appropriate level of knowledge or ability would also have to be reconciled. Finally, developing procedures, personnel, and facilities to carry out such tests would be an awesome task.

Demonstration of merit could be interpreted as being discriminatory against those people who are physically handicapped or of such age they cannot meet the minimum standards (Hardin 1969). However, some modest level of skill and knowledge is necessary for any wilderness visit, regardless of whether one has to demonstrate their ability to gain access or not. The system could also lead to charges of being "elitist," that wilderness was available to only the young and the strong. To the extent that alternative opportunities catering to the handicapped or the elderly are not provided, these latter charges would be difficult to refute.

Generally, merit systems have been founded on a safety criterion. To use merit as a means of limiting use in wilderness, it would be necessary to demonstrate that its implementation is more than another bureaucratic hassle; that it will provide benefits to users. If such a system could in fact lower per capita impact, the time at which more authoritarian rationing might become necessary could be postponed, a situation most users would probably favor.

A SUMMARY OF IMPACTS

A number of criteria for evaluating each of the rationing systems can be specified. Depending upon the criteria chosen, the system which is "best" in any given situation will probably differ. In table 1, we have summarized the probable impacts of each system in light of eight selected criteria. These criteria include such things as the user groups most affected (adversely and beneficially), current administrative experience with the system, acceptability to users, difficulty of administration, efficiency, the principal way in which use impacts are controlled, and how each system affects user behavior. These criteria are by no means the only relevant ones, but they provide the basic information to help managers judge the system they should use.

Table 1.-- Summary evaluation of impacts and consequences of alternative rationing systems

Evaluation Criteria				
Rationing System	Clientele group benefitted by system	Clientele group adversely affected by system	Experience to date with use of system in wilderness	Acceptability of system to wilderness users
Request (Reservation)	Those able and/or willing to plan ahead i.e., persons with structured life styles	Those unable or unwilling to plan ahead; e.g., persons with occupations that Do not permit long-range planning, such as many professionals.	Main type of rationing system used in both National Forest and National Park wilderness.	Generally high. Good acceptance in areas where used. Seen as best way to ration by users in areas not currently rationed.
Lottery (Chance)	No one identifiable group benefitted. Those who examine probabilities of success at different areas have better chance.	No one identifiable group discriminated against. Can discriminate against the unsuccessful applicant to whom wilderness is very important.	None. However, is a common method for allocating big-game hunting permis.	Low
Queuing (First-come first-served)	Those with low opportunity cost for their time (e.g., unemployed). Also favors users who live nearby.	Those persons with high opportunity cost of time. Also those persons who live some distance from areas. The cost of time is not recovered by anyone.	Used in conjunction with reservation system in San Jacinto Wilderness. Also used in some National Park Wildernesses.	Low to moderate.
Pricing (Fee)	Those able or willing to pay entry costs.	Those unwilling or unable to pay entry costs.	None	Low to moderate.
Merit (Skill and knowledge)	Those able or willing to invest time and effort to meet requirements.	Those unable or unwilling to invest time and effort to meet requirements.	None. Merit is used to allocate use for some related activities such as river running.	Not clearly known. Could vary considerably depending on level of training required to attain necessary proficiency and knowledge level.

Evaluation Criteria				
	Difficulty for administrators	Efficiency - extent to which system can minimize problems of suboptimization	Principal way in which use impact is controlled	How system affects user behavior ²
Request (Reservation)	Moderately difficult. Requires extra staffing, expanded hours. Record keeping can be substantial.	Low to moderate. Under-utilization can occur because of "no shows," thus denying entry to others. Allocation of permits to applicants has little relationship to value of the experience as judged by the applicant.	Reducing visitor numbers. Controlling distribution of use in space and time by varying number of permits available at different trail-heads or at different times.	Affects both spatial and temporal behavior.
Lottery (Chance)	Difficult to moderately difficult. Allocating permits over an entire use season could be very cumbersome.	Low. Because permits are assigned randomly, persons who place little value on wilderness stand equal chance of gaining entry as those who place high value on opportunity.	Reducing visitor numbers. Controlling distribution of use in space and time by number of permits available at different places or times, thus varying probability of success.	Affects both spatial and temporal behavior.
Queuing (First-come first-served)	Low difficulty to moderate. Could require development of facilities to support visitors waiting in line.	Moderate. Because system rations primarily through a cost of time, it requires some measure of worth by participants.	Reducing visitor numbers. Controlling distribution of use in space and time by number of persons permitted to enter at different places or times.	Affects both spatial and temporal behavior. User must consider cost of time of waiting in line.
Pricing (Fee)	Moderate difficulty. Possibly some legal questions about imposing a fee for wilderness entry.	Moderate to high. Imposing a fee requires user to judge worth of experience against costs. Uncertain as to how well use could be "fine tuned" with price.	Reducing visitor numbers. Controlling distribution of use in space and time by using differential prices.	Affects both temporal and spatial behavior. User must consider cost in dollars.
Merit (Skill and knowledge)	Difficult to moderately difficult. Initial investments to establish licensing program could be substantial.	Moderate to high. Requires users to make expenditures of time and effort (maybe dollars) to gain entry.	Some reduction in numbers as well as shifts in time and space. Major reduction in per capita impact.	Affects style of user's behavior.

¹Based upon actual field experience as well as upon evidence reported in visitor studies (Stankey 1973).

²This criterion is designed to measure how the different rationing system would directly impact the behavior of wilderness users (e.g., where they go, when they go, how they behave, etc.).

MANAGEMENT IMPLICATIONS

As contradictory to the idea of wilderness as it might seem, rationing of wilderness use will become increasingly common. In our judgment, this will be necessary if the significant ecological and social values of such areas are to be fully protected.

At the same time, we are concerned that rationing might be adopted because it appears to be administratively more convenient than other measures. Similarly, rationing decisions made in response to problems that are more imagined than real, or that are based on highly localized or temporary problems, could lead to public opposition to rationing as a legitimate management tool.

Sound management principles are the most effective safeguard against such problems. We particularly endorse two principles that will help insure the appropriate and legitimate use of rationing. First, we advocate the control of the environmental expense of use rather than use per se (Lucas 1973; Hendee 1974). That is, we should be primarily concerned with reducing the physical and social **impacts** associated with use rather than simply cutting back on use itself. This is an important distinction; not all kinds of wilderness use create similar levels of impact. A good example, with all else being equal, is the relative ecological impact created by one backpacker as opposed to one visitor on horseback. Moreover, use by itself is a fairly poor predictor of impact (Wagar 1964). Variables such as method of travel (Lucas 1964), season of use (LaPage 1967), and habitat type (Helgath 1975) seem more critical elements in the equation of predicting impact.

From a management perspective, this principle suggests that we develop measures of the relative impacts of different styles of wilderness use so that logical decisions regarding use restrictions can be implemented. Those uses that are more destructive or consumptive than others should be the first ones restricted. By focusing on eliminating unwanted impacts rather than indiscriminately cutting use, the time when direct rationing would be appropriate can probably be postponed.

A second tenet we might label as the principle of minimum regimentation. We have already discussed the fact that for many people, the wilderness experience is an opportunity for freedom and spontaneity. Restrictions and regulations obviously intrude on this experience. Consequently, we endorse management programs that use only that level of regulation necessary to achieve preservation objectives (Lucas 1973). For example, if a program informing visitors about current use distributions is sufficient to change use patterns in a desirable fashion, then it would be inappropriate as well as unnecessary to impose more heavy-handed measures, such as directly controlling where people can go.

A rough continuum of use-control measures can be outlined, specific actions ranging from subtle, light-handed techniques such as providing information to users, to authoritarian actions accompanied by sanctions, such as mandatory permits, with fines imposed for noncompliance. Gilbert and others (1972) distinguished between what they label as "manipulative" measures that influence behavior by controlling the

factors that influence decisions about where to go or how long to stay, and “regulatory” measures that directly control when, where, or how people may use an area. Both types of control are legitimate, but their appropriateness must be determined in light of specific conditions.

These principles help bring the issue of rationing into perspective. We would like to repeat ourselves: rationing is a management option, that, when used in the appropriate conditions, is both legitimate and useful. Under such conditions, it should be used without apology and in full confidence that where a rational explanation for its need exists, public support and understanding can be expected. Lucas (footnote 2) reports that about three out of four visitors to seven Montana areas supported the idea of restricting use if an area was being used beyond capacity. Stankey (footnote 1) found that 80 percent of sampled visitors in the San Geronio and San Jacinto Wildernesses, where rationing is now in effect, agreed that such a measure was necessary. Fazio and Gilbert (1974) also found strong support for the rationing program instituted in Rocky Mountain National Park, with 80 percent of those who did not get a permit indicating that such a program was necessary.

SOME GUIDELINES FOR RATIONING WILDERNESS USE

The five rationing systems we have reviewed represent different techniques for accomplishing a similar objective; holding use at a level consistent with the preservation of natural ecological processes and the opportunity for a primitive, low-use intensity recreational experience. Each system offers certain advantages to accomplishing that objective; each has its drawbacks. In choosing when to ration and how to do it, certain guidelines can be used that we believe will aid managers in making good decisions.

Guideline 1: An Accurate Base of Knowledge Is Necessary

As with all other forms of resource management, the availability of good information about wilderness and its use is a prerequisite to using rationing effectively as a tool. First, as we suggested earlier, it is important that rationing be instituted in response to real problems; not to imaginary problems or to temporary problems. Solid data, not impressions, are required. Certainly one of the major advantages of the mandatory wilderness permit system now in effect in over 40 National Forest wildernesses and in many national park backcountry areas is that it provides an accurate record of use and of developing trends, permitting a much improved assessment of conditions (Lime and Buckman 1974). Systematic monitoring of physical-biological conditions, or the careful analysis of records kept by wilderness managers would provide additional information for managers. Such information is absolutely necessary to identify problem areas, their precise nature, and alternative solutions.

Second, it is important that managers know something about who the users are and what kind of use they make of the wilderness. Because alternative rationing measures impose different kinds of costs on different kinds of users, a knowledge of the clientele could head off implementation of a measure that might severely affect some users. For instance, a fee system might greatly restrict the ability of students, a major use group, to gain access. Similarly, a lottery allocating a place in time might make use excessively difficult for persons whose schedule is highly uncertain more than a week or so ahead.

Guideline 2: Use Direct Rationing Only When Less Restrictive Measures Fail

In line with the general principle of limiting visits only as necessary to achieve wilderness preservation objectives, we want to reemphasize that rationing should be a "last resort" measure, taken only when other less restrictive and authoritarian measures fail. Making this judgment demands quality information; hence, our first guideline.

At times, rationing might appear to be more convenient from an administrative point of view than less authoritarian measures. For instance, attempting to alter use distributions through the use of information supplied to visitors can be a complex and costly task, with no clear evidence that it will be successful. However, we believe it is extremely important to explore all reasonable alternatives to direct rationing before implementing such a program. Protecting the quality of the wilderness experience should be a primary concern and holding direct controls on visitors to a minimum seems particularly important in satisfying this concern.

Guideline 3: Combination of Rationing Systems Will Help Minimize Costs

There are no cost-free solutions in rationing. Each technique imposes certain systematic costs that will be felt by users and managers alike. Usually, certain groups will be affected by one system more than another. Thus, the issue before managers is not one of preventing costs from occurring, but rather, one of minimizing the costs that will be inevitable.

Because of the differential costs of the five rationing systems, and the need to minimize these costs, it will usually be necessary as well as desirable to develop combinations of rationing systems. One good example of such a combination is found in the San Jacinto Wilderness. Here, 75 percent of the daily capacity is allocated through a request system, with requests being filled on a first-come, first-served basis by mail, phone, or in person. As we noted earlier, the disadvantage of the request system is that it can lead to underutilization of a facility through "no-shows." Additionally, it discriminates against those persons not able (or willing) to plan ahead. To offset these problems, the remaining 25 percent of the daily capacity in the San Jacinto is allocated through a queuing system, and is assigned only on that specific day. In this way, drop-ins are afforded an opportunity to obtain a permit.

On the Mt. Whitney trail, 100 percent of the daily capacity is allocated on a request basis, but the high percentage of "no shows" (40 percent in 1974 and 50 percent in 1975) allows administrators to accommodate almost all other persons arriving without a permit on a first-come, first-served basis.

In the Boundary Waters Canoe Area, overnight use is now regulated by a request system. Twenty-five percent of the permits for any given period are allocated by a long-term reservation system to accommodate those who can plan ahead and/or travel long distances to reach the area. The remaining 75 percent of the permits are allocated on a short-term reservation system (really a queuing system) to handle the more spontaneous users. The relative proportion of permits assigned to these two systems was based on an analysis of past USC records, so that officials felt confident that the availability of permits was in accord with demand. Such information confirms the importance of our first guideline emphasizing the need for an accurate base of information.

Officials in the BWCA also considered the imposition of a \$5 deposit on advance reservations, refunded on arrival to pick up the permit, in order to reduce the problem of "no shows." Although this was dropped because of uncertainty of its legality, it was an imaginative suggestion that might have been quite effective.

Multiple rationing systems are also in effect in several National Park backcountry areas, generally involving a combination of request and queuing systems.

Queuing might also represent an important complementary system in conjunction with a pricing system. For the many present day wilderness visitors who possess higher incomes, a fee would not be discriminatory because those rationed out would be primarily those who placed a higher value on alternative uses of their money. In other words, it would not be a matter of inability to pay that rationed these people out, it would be a matter of willingness. This is how an efficient rationing system should operate. But there are clearly others who would be willing but unable to pay the price. For instance, students and low-income people would be discriminated against by a fee set at a level sufficient enough to reduce use. However, time generally has a low opportunity cost for many of these people. By implementing a queuing system in conjunction with a fee system, users could choose to pay by money or by time.

We should also point out that each system is capable of flexible application. For instance, the imposition of a fee does not necessarily mean one price for all locations. In fact., differential pricing to alter use patterns would appear to be a more appropriate action. Also, to counter problems of discriminating against those willing but unable to pay, subsidies might be available to certain individuals.

There are certainly difficult questions about rationing for which no clear answers exist. For instance, if a combination of systems is planned, what is the relative proportion of the capacity that should be allocated by each system? In areas where commercial outfitting occurs, how should permits for entry be allocated to the commercial sector; should the same system for private use be utilized or should some special provision for commercial users be developed? Certainly the answer to such questions would rest in knowing the present clientele, as well as the clientele in the near future.

Guideline 4: Rationing Should Require Users to Judge the Relative Worth of the Opportunity

What rationing system is best? Although there are again no pat answers, we can offer this observation. It appears to us that the ideal system or combination of systems should be based on establishing a relationship between the opportunity to visit wilderness and the value an individual places on that opportunity. One of the advantages of pricing is that it clearly requires people to make choices among the possible alternative uses of their money--it makes people "put their money where their mouth is." At the same time, the uneven distribution of income makes pricing an imperfect system. But people can pay in other ways--by time in a queue or by time and personal effort in a merit system. Because wilderness is a scarce resource, it is our belief that rationing should demand a personal assessment of worth on the part of potential participants.

Guideline 5: Rationing Programs Need Monitoring and Evaluation

Although there is evidence that people will support the institution of rationing in wilderness, there is still much uncertainty about its effect on use, how it will alter the wilderness experience, and so forth. Consequently, it seems important that when the decision to ration is made and a particular system or combination of systems is chosen, that a program of monitoring and evaluation also be established. From a simple economic perspective, it seems unwise to invest a high level of money, manpower, and time into the development of what is an inherently controversial program, without also establishing the ability to accurately evaluate performance at a later date. Moreover, because there are only limited data about how rationing might work in wilderness, how people will behave and think of such measures, it seems doubly important that managers have an accurate and systematic source of feedback. Well-designed surveys are important sources of such information but even review by persons running the system would be helpful as long as the information gathered was systematic and as objective as possible.

S U M M A R Y

Increasing levels of demand on a diminishing wilderness resource, combined with the objective of preserving the natural ecological integrity and the unique recreational qualities of wilderness, are making the task of wilderness management increasingly difficult. Managers have a variety of tools to contend with some of these problems, including rationing.

Five basic systems of rationing can be defined: (1) rationing by request; (2) rationing by lottery; (3) rationing by queuing; (4) rationing by price; and (5) rationing by merit. Each system has certain systematic advantages and disadvantages associated with it.

Currently there are few guidelines for adopting rationing. The manager's most effective tool is a set of principles that allow him to place rationing in the proper perspective as a management strategy. Combinations of systems that offset the respective disadvantages of each system appear to be the best overall strategy, particularly when the systems require visitors to place a value on the wilderness opportunity. It is important that objective and systematic sources of feedback be established to permit evaluation of rationing programs.

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