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Managing Ecological Impacts at Wilderness Campsites: An Evaluation of Techniques

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ABSTRACT—Visitor dispersal and campsite closure are common managerial reactions to campsite degradation in classified wilderness and other backcountry areas. Ecological research suggests that such actions will do little to improve the condition of campsites and will usually increase the areal extent of deterioration. Concentrating use on as few campsites as possible and closure on a site-by-site basis would confine inevitable damage, leaving most of the wilderness undisturbed by recreational use.

One of the most vexing problems in managing wilderness and backcountry areas is deciding what to do about degradation of natural conditions in areas of concentrated recreational use. Ecological changes, such as loss of ground cover and exposure of tree roots, occur on most popular campsites. Among the strategies that managers have adopted or are considering, one is to divert recreationists from areas of heavy use to areas of lesser use. Some managers have also closed highly disturbed campsites, either temporarily or permanently. Temporary closure is sometimes an attempt to rehabilitate a site damaged by types of use that are no longer tolerated. More commonly, closures are part of a rest-rotation system. Permanent closures have also been established, particularly close to lakes or streams.

Although more research and experimentation will undoubtedly increase our ability to manage wilderness campsites, actions are already being taken and precedents are being set. Therefore, it seems worthwhile to discuss the probable consequences of visitor dispersal and campsite closures.

Visitor dispersal and campsite closures have social and ecological justifications as well as repercussions. This review will be largely confined to the ecological consequences, regardless of why the action was taken. Furthermore, my primary goal is to provoke discussion;

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some of the interpretations presented are subject to debate and further research, particularly in areas where potential campsites are numerous and resilience is great.

Visitor Dispersal

Dispersal is an attempt to improve distribution of visitors by diverting use from popular to less popular places. This strategy will reduce campsite damage if heavily used areas recover significantly when less frequently used, and if an increase of visitors in lightly used areas does not result in significant deterioration.

Research indicates that most changes on campsites occur with even light use, and that a step-up in use causes little additional change. In the Boundary Waters Canoe Area of northern Minnesota, Frissell and Duncan (1965) found that heavily used campsites (occupied 61 to 90 days per season) had lost 87 percent of their ground cover, while lightly used sites (0 to 30 days per season) had lost 80 percent. On developed campsites in Illinois, Young (1978) found no statistically significant differences in species composition, amount of organic litter, or shrub cover between lightly (0-33 days per season) and heavily (>66 days per season) used sites, despite large differences in amount of litter and plant cover between unused and lightly used sites. Comparable studies show that differences in soil organic matter, bulk density, compaction, and moisture content are much greater between unused and lightly used sites than between lightly and heavily used sites (Dotzenko et al. 1967, Young and Gilmore 1976).

Consequently, reduced camping on heavily used sites will do little to decrease site alteration. In many areas, unless all visitation is curtailed on a site, there appears to be little chance for recovery (Willard and Marr 1971). On the other hand, even light use of formerly unused sites will cause considerable deterioration.

Amount of alteration varies greatly from site to site, and there has been a general assumption that the primary cause is a difference in use intensity—that campsites in poor condition receive heavy use, while sites in good condition receive only light use. Campsites in good condition, however, often receive more use than those in poor condition (LaPage 1967, Merriam et al. 1973, Schreiner and Moorhead 1979). This is not to say that if everything else is equal, increased use will not increase impact. It does suggest, however, that amount of use is less important than other factors.

Site location, for example, may be much more important than amount of use. Trail condition provides a good illustration. It is quite common to find badly eroded sections along a trail that is otherwise in good condition. The erosion usually is related to environmental differences such as steepness of slope, soil texture, or moisture content. On campsites, meadow vegetation is usually less severely disturbed by camping than the understory plants in adjacent forests (Cole 1979).

Another factor that may be more important than amount of use is type of use. Campsites frequented by horse parties are often in worse condition than backpacker sites. In the Spanish Peaks Primitive Area in Montana, for example, Frissell (1973) found horse camps to be ten times larger than hiker camps, and they had seven times as much bare ground. Furthermore, most damage on campsites may be caused by a few atypically destructive parties.

It is not yet possible to quantify the degree to which campsite alteration is dependent on amount and type of use, or site location. The implication of research, however, is that, except where use is very light, the amount a site receives is the least important of these three variables.

Despite this apparent ineffectiveness at reducing the severity of impact, visitor dispersal would markedly affect the total area of impact. Unless campers could be directed to preexisting sites, visitor dispersal would increase the total area of alteration and distribute impact throughout a greater percentage of the wilderness area. In a part of the Eagle Cap Wilderness in Oregon, for example, it was estimated that campsite use had altered only about 0.2 percent of the area (Cole 1981); use dispersal could greatly increase this figure. Consequently, managers should be particularly concerned about the spatial implications of altering use patterns. Both Olympic and Great Smoky Mountains national parks, for example, have decided to monitor campsite impacts primarily in terms of total area rather than degree of disturbance (Schreiner and Moorhead 1979, Bratton et al. 1978).

That total area of disturbance can be most effectively minimized by concentrating use is illustrated by Bratton et al. (1978), who found greatly reduced per capita disturbance around shelters where use is highly concentrated. This does not mean that campsites need to be clustered, a practice that can detract from the wilderness experience and lead to problems such as inadequate waste disposal and bear depredations (Merrill 1978). What is important is to concentrate visitors on existing sites so that the total number of campsites is minimized.

Concentration has been labeled the "sacrifice site concept" because a few areas are "sacrificed" so that the rest can remain undisturbed. The idea is understandably unpopular in wilderness. But the decision to sacrifice is made when any appreciable use is allowed, because most damage occurs with light use. It would be more appropriate to equate the concept with the visitor dispersal strategy in which currently undamaged areas would be sacrificed in an attempt to improve conditions in a few localized areas.

It has been suggested that degradation could be reduced by requiring visitors to camp on areas with no signs of previous use. Although such a program may have some merit, it should be undertaken with extreme care because (1) many areas do not have enough potential campsites; (2) many campers do not know how to avoid damaging a site; and (3) most campers continue to use previous sites regardless of instructions (Canon et al. 1979). Furthermore, such a program could easily lead to disturbance of fragile sites not recognized as such by the camper, and the undisturbed appearance may merely disguise less obvious effects, such as changes in species composition. Because this type of dispersal system would affect so much land, any changes would be extremely widespread.

The real challenge is to minimize both the number of campsites and the degree of impact on each. Visitor dispersal should be critically questioned because it appears likely to increase the number of sites and, in most cases, will do little to reduce the degree of alteration on existing sites. Site alteration could be more effectively reduced by concentrating visitors on resistant sites and by modifying visitor behavior and the type of use a site receives.

Campsite Closures

Permanent closure of highly altered campsites is becoming increasingly common, particularly around lakes where camping within a certain distance of the water, usually 100 to 300 feet, may be prohibited. The comments which follow deal specifically with the example of lakeshore closures, but are generally applicable to closures in other situations.

To justify closures ecologically, one must assume that the areas are more fragile than the alternative ones where people will camp. Otherwise, impact is merely shifted from one site to another.

Three conditions which might make lakeshores particularly vulnerable are (1) moist soil, resulting in greater potential for vegetation damage and soil compaction (Liddle 1975); (2) steeply sloping shores which are prone to erosion; and (3) potential for water pollution. Soil moisture and slope steepness do not necessarily decrease with distance from the lakeshore, however. Flat rock outcrops close to shores are undoubtedly much more tolerant of use than moist sites or sloping sites a considerable distance from the lake. Although the immediate lakeshore may often be fragile, it is not always so, as in the case of beaches. Further, this fragile zone is usually narrow and the pattern of fragility varies tremendously, both around individual lakes and from lake to lake.

Most water quality studies, even in high-use areas, suggest that pollution from human sources is not a significant health problem (Aukerman and Springer 1976, Silverman and Erman 1979). Nevertheless, there is some evidence that concentrated lakeshore camping can lead to changes in benthic plant populations and in the concentration of certain ions (Erman 1979).

Although fragility is not a valid justification for wilderness-wide lakeshore closures, maintenance of public access and esthetic qualities may be. If so, these reasons should be explicitly stated, as should the probable costs of decreased freedom of campsite choice, increased law enforcement, and an expansion in the area of alteration around lakes.

Managers should consider evaluating the fragility of each individual site. This approach to closures would avoid increasing the number of campsites by creating a new set of sites further from the shore. It would also avoid eliminating many of the preferred existing sites. In the Spanish Peaks Primitive Area in Montana, for example, a 100-foot setback would preclude use of 70 percent of the area's campsites (Brown and Schomaker 1974).

Managers have also temporarily closed or "rested" campsites. This practice will be effective only if recovery periods are short in relation to periods of use and deterioration.

In two studies of the time it takes a site to deteriorate, change was monitored on previously unused areas that had been opened for camping. Both studies, one of wilderness sites in the Boundary Waters Canoe Area and the other of car-camping sites in Pennsylvania, found that impacts reached a stable maximum after only two years of campsite use (Merriam et al. 1973, LaPage 1967).

Time required for recovery varies greatly in response to such things as length of the growing season and moisture regime. In a Minnesota oak stand where the soil had been artificially compacted, Thorud and Frissell (1976) found that recovery in the upper 3 inches of soil took between 4.5 and 8.75 years, and the soil below 3 inches remained compacted after 8.75 years. At a backcountry lake in Kings Canyon National Park, California, Parsons and DeBenedetti (1979) found that after 15 years of closure, soil compaction had returned to inferred pre-use values, but the depth of soil organic horizons and accumulation of woody fuels had not. Ground cover on closed campsites in the Selway-Bitterroot Wilderness, Montana, increased significantly over five years, but the species composition was closer to that of a suburban lawn than of undisturbed wilderness (Ranz 1979). In alpine areas in Rocky Mountain National Park, Colorado, Willard and Marr (1971) estimate that complete recovery of disturbed sites may take as much as 1,000 years!

Recovery periods might be shortened with an aggressive rehabilitation program, but this would be costly, its appropriateness in wilderness is controversial, and many years would still be needed (Fay 1975). As Merriam et al. (1973) concluded, slow recovery means there must be several closed campsites for every open site. Enforcement of so many closures would be difficult, and the NO CAMPING signs would probably irritate visitors. Moreover, in many areas, there would not be enough alternative campsites.

Conclusions

In most cases, visitor dispersal and campsite closures will do little to alleviate campsite alteration. Dispersal will not improve campsite conditions unless the number of campsites can be reduced or unless significant recovery can occur. In most areas, significant recovery will only occur when use approaches zero. Rest-rotation systems are also unlikely to work, because deterioration occurs much more rapidly than recovery. Finally, permanent closures will only be effective if less fragile campsites are available and if use of the closed site can truly be eliminated.

Visitor dispersal, campsite rest-rotation, and permanent closures would usually divert use to previously unused sites, increasing the number and total area of impacted sites. Permanently closing fragile sites would increase the number of impacted sites until the closed ones could recover; the other strategies would permanently increase the area of alteration.

Ecological consequences of management policies need special consideration, because they are difficult to reverse. Currently, most wilderness areas have been largely undisturbed by recreational use. This fortunate situation, along with the irreversibility of most ecological changes, suggests that managers should be very conservative in implementing policies with questionable ecological consequences.

Campsite alteration is unfortunate but inevitable. Therefore, managers should attempt to confine it to as small an area as possible. In most places, this could be done by encouraging users to concentrate, as they usually do, on permanent campsites. The permanent sites could be dispersed locally to increase solitude and could be located on the sites most capable of absorbing use. Damage to these sites could then be minimized through regulations on type of use, an educational program, and, if necessary and appropriate, site hardening and maintenance. If strategies are unobtrusive and do not unnecessarily reduce visitor freedom and spontaneity,

managers should minimize ecological impacts and maximize opportunities for a wilderness-dependent type of recreation. ■

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