

CAMPSITE
MANAGEMENT
AND
MONITORING
IN
WILDERNESS

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SOME PRINCIPLES TO GUIDE WILDERNESS CAMPSITE MANAGEMENT

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ABSTRACT. Seven principles, derived from research on wilderness campsites, are proposed: (1) campsite impacts are complex; (2) impact is inevitable with repetitive use of campsites; (3) impact occurs rapidly, recovery occurs slowly; (4) the relationship between use and impact is asymptotic; (5) certain sites are more durable than others; (6) certain users cause less impact than others; and (7) campsite monitoring data are critical to professional management. Each principle is illustrated by example and the implications of each for campsite management are explored.

Wilderness managers face the challenge of maintaining natural conditions in wilderness and minimizing the evidence of human use. This is a difficult task throughout the wilderness but particularly at campsites where human use is concentrated. Repetitive use of sites for camping causes numerous changes, including damage to and loss of vegetation, disruption of organic soil horizons, and compaction of mineral soil. On such sites conditions are far from natural and the effects of human use are immediately obvious to visitors. The severity of campsite impact varies greatly in both the magnitude of change per unit area (for example, the proportion of vegetation removed) and the area over which these changes take place. Some campsites are quite small, while others may be several acres in size. The density of campsites is also variable. In some places campsites are few and far between. Elsewhere they are numerous and coalesce into large disturbed areas. Wilderness managers are understandably concerned about campsite impacts and have taken steps to control their severity and distribution.

Researchers have been studying campsite impacts in wilderness since the early 1960's. By the mid-1980's, published data on campsite impact were available from 15

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wilderness/backcountry areas, as well as a number of more developed settings (Cole 1987). While many of the results differ in detail, certain consistent findings have emerged from these studies that can form a basis for developing campsite management strategies. This paper proposes seven principles to guide campsite management.

SEVEN PRINCIPLES

1. Campsite impacts are complex

When a site is first used for camping, visitors initiate a variety of disturbance processes that are new to the system. The ultimate effects are linked together in complex ways. Direct, indirect, and cyclic effects of recreation use can all be demonstrated (Manning 1979). Loss of vegetation as a result of the abrasive effects of trampling is a direct impact. Vegetation cover is also reduced because fewer plants can germinate in soils compacted by trampling. This is an indirect impact. Most insidious are what Manning (1979) calls the “vicious circle” effects. For example, soils compacted by trampling have reduced infiltration rates; increased runoff results, leading to increased erosion of surface organic horizons; this increases susceptibility to compaction, which leads to further erosion, and so on. Once initiated, this process can sustain itself without further recreational use.

The complexity of these interrelationships points out the importance of considering all the potential consequences of any management action. Often an action taken to correct a problem in one place can create a more serious problem someplace else. For example, if campsites next to a lake are closed to use, sites farther from the lake are likely to be impacted. Actions taken to decrease the severity of impact on individual campsites may lead to an increase in the number of impacted campsites. The guideline for managers is to carefully think about how any action contemplated is likely to influence the type, amount, and distribution of camping in the entire area they manage.

2 Impact is inevitable with repetitive use of campsites

Wherever sites are regularly used for camping, impact will occur. Impact can only be avoided where use is virtually nonexistent. In a wilderness setting it does not make sense to talk about keeping use of a campsite to a “carrying capacity.” In some cases it is possible to limit impact levels somewhat. For example, in the Boundary Waters Canoe Area Wilderness, maintenance crews work on campsites to confine their area1 spread and to confine campfires to established grills and human waste to toilets (Marion and Sober 1987). But it is not possible to avoid the vegetation loss and disturbance of organic and mineral soils that is the inevitable result of repeated camping use. Often the only option is to limit the number of impacted sites and where impact occurs.

The inevitability of impact has been illustrated in a number of studies that have reported substantial impact even on campsites used only a few nights per year (Cole 1987). Managers must accept that camping will cause substantial impact and plan for that impact in much the same way that they accept and plan for trail use and impact. They need to decide how many sites are appropriate and where sites are appropriate and then work to confine most serious impacts to those places. This points to the critical importance of monitoring data. Managers need, in particular, to avoid contributing to the natural tendency for campsite impacts to spread haphazardly across the landscape. This has occurred, in popular places, where managers have encouraged use dispersal in the hope that this “dilution is the solution” strategy Will alleviate campsite impact problems.

3. Impact occurs rapidly, recovery **occurs** slowly

The rate at which campsite impact occurs varies with such factors as the amount, type, and timing of use and the durability of the site. It also varies with type of impact; for example, vegetation loss usually occurs more rapidly than exposure of mineral soil (Cole 1985). But **in** virtually every case, the rate of campsite deterioration can be described as rapid. Vegetation loss on developed campsites reached maximum levels the first year the sites were used (LaPage 1967). Maximum levels of change were reported after just 2 to 5 years of use on wilderness campsites (Merriam and Smith 1974, Cole and Ranz 1983).

Recovery rates also vary greatly--even more so than deterioration rates. Heavily impacted campsites along the Delaware River in New Jersey, where soils are moist, and fertile and growing seasons are long, were no longer recognizable 10 years after closure (Cole and Marion 1988). But similar impacts in subalpine forests in California were quite obvious 15 years after closure and likely to remain so for decades (Parsons 1979). In all cases, however, recovery requires at least several times the time period it took for deterioration to occur.

This suggests that it is important for managers to be anticipatory rather than reactive. Once impact problems occur, it is difficult to rehabilitate sites, and recovery will take a long time. Again, this emphasizes the need to plan for where camping impacts will occur and to monitor impacts to determine whether or not problems are occurring. It also emphasizes the importance of minimizing impact in parts of the wilderness that are currently relatively undisturbed. These are the places that remain close to the wilderness ideal and where management still has the opportunity to be anticipatory. Management plans for these places should receive a high priority so that actions taken elsewhere do not unintentionally degrade these still pristine lands.

4. The relationship between use and impact is asymptotic

The nature of the relationship between the amount of use a site receives and resultant impacts has elicited considerable interest, probably on account of the early interest in defining carrying capacities and the tendency to call a highly impacted site "overused." Although the exact shape of the curve that describes this relationship varies with such factors as type of use and site durability, as well as with the type of impact being studied, the general shape of the curve is almost always asymptotic (Cole 1987). At **first**, amount of impact increases rapidly with increasing use; however, the rate of increase in impact decreases with increasing use (fig. 1). Beyond the critical point where a unit increase in use causes a unit increase in impact, differences in amount of use have relatively little influence on amount of impact.

The shape of this curve has some important management implications. At use levels substantially above the critical point, there is little reason to try to limit use levels on campsites. In fact, at these levels it is best to concentrate use on as few sites as possible. Impact will be controlled by minimizing the number of campsites. However, at use levels substantially less than the critical point even **small** decreases in amount of use can result in substantial decreases in impact. Many sites will be camped on, but the impact to any individual site should be negligible. Ideally, then, use levels on individual sites should be either as close to zero as possible or as high as possible (that is, as high as is needed to concentrate camping on as few sites in an area as possible). **This** can be accomplished by asking people to camp on undisturbed sites in remote parts of the wilderness and on well-established sites in more popular places. Alternatively, camping can be restricted to designated sites in popular places.

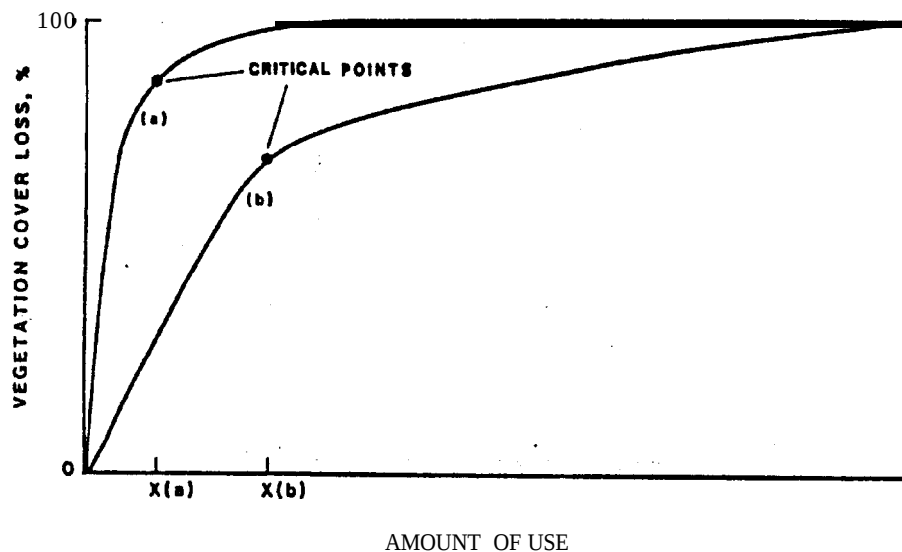


Figure 1. The general relationship between amount of use and vegetation loss on (a) a fragile vegetation type and (b) a more resistant type. The critical point is the point where a unit increase in use causes a unit increase in impact.

5. Certain sites are more durable than others

Certain sites can tolerate disturbance by campers better than others. They may have more resistant vegetation or, better yet, lack vegetation altogether. They may have thick organic horizons or be resistant to erosion. Referring to figure 1, assume an area's campsites receive the amount of use denoted by X(a). If this camping occurred in vegetation type a, the fragile type, managers should be thinking about trying to concentrate that use on a small number of sites. If, however, they could convince visitors to camp in type b, vegetation loss would only be about one-third of that in type a, and use dispersal might prove to be a useful strategy for further reducing impact levels.

The greatest difference in durability between two vegetation types occurs at moderately low use levels (Cole 1985). This suggests that selection of a durable campsite is most important on sites that are camped on repeatedly but infrequently. Sites that are only used a few times are likely to recover quickly regardless of their fragility. Sites that are used frequently are likely to be highly impacted regardless of their fragility. Because vegetation loss usually occurs more rapidly than loss of organic horizons, one useful guideline is that sites with either no vegetation or resistant vegetation make good low-use campsites, while sites with thick organic horizons make good high-use campsites. The common advice to select a forested campsite makes sense in popular places. Forested sites tend to have fragile vegetation that will be eliminated by trampling, but groups tend to be less conspicuous here, and mineral soil exposure is likely to be minimized. In remote places, however, it makes more sense to camp where the groundcover is more durable than it is in most forests. This often means that it is best to camp on meadow vegetation, advice that is seldom given.

6. Certain users cause less impact than others

Although the subject has not been studied adequately, it is clear that some users cause less impact than others (Weaver and Dale 1978). Certain types of use have much less potential to cause impact. Parties that use stoves instead of building campfires will not cause the impacts associated with collecting and burning firewood. Parties that travel on foot will not cause the impacts associated with grazing and confining packstock. Everything else being equal, small parties will tend to cause less impact than large parties. In particular, large parties can cause campsite expansion, and in relatively undisturbed areas they can cause more rapid impact than small parties. An understanding of differences in the potential to cause impact can be helpful in educating visitors with the potential to cause problems and, if need be, in deciding to limit or prohibit certain particularly damaging types of use.

Of even more importance is the behavior of individuals within certain user groups. The least amount of impact will be caused by the user who knows how to select the site that her or his group will be least likely to impact. In some situations this may mean camping on the most highly impacted campsite around; in other situations it may mean selecting a previously undisturbed site. This person also needs to know how to behave on the site. Appropriate behavior differs greatly between impacted sites and those that have never been used before. Five key behaviors appropriate in many infrequently used areas are:

1. Select previously unused sites to camp on.
2. Select sites without vegetation or with tough vegetation (e.g., grasses).
3. Disperse activities on the site.
4. Keep lengths of stay short.
5. Remove any facilities and camouflage any disturbance.

The very different five key behaviors in regularly visited areas are:

1. Select a well-impacted campsite for use.
2. Select a site in a forest with thick duff and away from other parties.
3. Concentrate activities on already disturbed parts of the site.
4. Dispose of human waste properly.
5. Keep sites attractive and leave certain facilities (e.g., one fire ring).

Although it is hard to quantify, I believe that future campsite impact levels will be determined primarily by the extent to which we succeed in tapping this potential for each individual to minimize impact.

7. Campsite monitoring data are critical to professional management

Managers need monitoring data to do their job well. Monitoring data are important to providing management with an objective view of the current condition of the wilderness and the extent to which objectives are being met. They can show the specific nature of problems, whether it is too many campsites or sites that are severely impacted, whether it is damaged trees or excessive vegetation loss. After several iterations of data collection, monitoring data will provide a clear perspective on trends in the condition of the wilderness and the effectiveness of the area's management programs. Without such data, it is difficult to get beyond personal biases when it comes to identifying problems and selecting appropriate management strategies. With constantly changing personnel, consistency is inevitably lost and it is impossible to get an objective long-term perspective on change.

The availability and use of good inventory and monitoring data are critical to professional management of any resource. Neither the timber industry nor the public would accept a timber management program that did not rely heavily on stand survey data. In the same manner, it is time to increase the professionalism of wilderness management by basing that management on good inventory and monitoring data.

CONCLUSIONS

Professional management of wilderness campsites is complex. Many factors work together to influence the number, severity, and distribution of campsite impacts. Both monitoring data and an understanding of these factors are necessary for good management. The preceding guidelines should be helpful in thinking about how to develop a campsite management and monitoring program. How best to monitor and manage will vary from place to place, however, with such factors as amount and type of use, the number of available campsites, and environmental conditions. Two papers in this proceedings describe two contrasting situations--Everglades National Park, where the number of campsites is small and many sites have had to be built on raised platforms, and Sequoia and Kings Canyon National Parks, where there are thousands of campsites.

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