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Cover photo:

Student Conservation Association work groups and YACC crews work to re-establish native vegetation on backcountry sites where heavy use has forced temporary closure.



**Research Turns Up Specific Methods
For Backcountry Rehab Management**

Editor's Note: Two detailed approaches to management, describing scientific responses to problems arising from increasing human use of wilderness have emerged from the Western and the Pacific Northwest Regions and are here excerpted with some paraphrasing and in some detail. By-lines identify the authors in each case, and directions for obtaining the papers in their entirety (including rationale, additional details and lit. cited) are given.

Measuring Impacts of Wilderness Use, by David J. Parsons and Susan A. MacLeod, (excerpted from the article appearing pp. 8-12 in the Oct., Nov., Dec. 1980 issue of PARKS, IUCN publication (limited availability), Robert Standish, editor, c/o National Parks Service, Dept. of the Interior, Washington, D.C. 20240.)

In Sequoia and Kings Canyon National Parks, California, we found it necessary to develop a system whereby campsite impact could be measured but that would be manageable over a large area (more than 348,000 ha) of rugged, remote terrain with numerous undesignated campsites.

This paper presents a method by which the extent and distribution of camp area development, or impact, in the backcountry can be inventoried and quantified. This method, now being used extensively in Sequoia and Kings Canyon NPs, provides a baseline against which to measure future change and a data base on which to evaluate accumulated impact as a product of use level and vegetation type.

Because soil and vegetation conditions in campsites are so susceptible to injury from concentrated visitor use, they are important elements in any system for evaluating backcountry impact. Additional criteria, such as developments (fire rings, wind breaks, tables, etc.) and mutilations (carvings or ax marks) are important visual indications of a developed campsite, but are not as sensitive to different use levels since they can be drastically affected by a small number of users as well as by local management actions.

In developing a system for measuring visitor impact in wilderness campsites we defined a campsite as any area showing evidence of overnight use. Such evidence might include fire rings or cleared areas where tents or beds were used. Where areas are so well developed that individual sites could not be distinguished, sites were delineated on the basis of whether on any given night separate parties would be likely to camp in each site, or in the case of larger sites, whether or not different portions appear regularly to receive independent use. Campsites in the Sequoia and Kings Canyon backcountry are undesignated. They have evolved over 100 years of repeated use and minimal management. They are thus widely dispersed and of vastly differing size and character . . .

The Camp Area Inventory system designed in Sequoia and Kings Canyon NPs uses eight visual criteria to evaluate quantitatively the level and extent of impact in each backcountry campsite. The criteria reflect vegetation and soil damage, as well as the degree of campsite development, without requiring detailed mapping or measuring. Experience indicates that these eight factors, along with measures of site crowding and the distance to water, represent an effective measure of campsite based backcountry impact.

The criteria used, rated on a five point scale include:

Density of Vegetation: A relative measure of extent of vegetative ground cover within the campsite as compared with similar unimpacted areas outside the site.

Composition of Vegetation: A measure comparing the species composition and relative abundance in the campsite to surrounding unimpacted areas.

Total Area of the Campsite: An estimate of the total area affected by trampling directly associated with use in and about the site.

Barren Core Area: An estimate of the area which, due to trampling, has been completely denuded of vegetation. This usually corresponds to the central ac-

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tivity area of the site.

Campsite Development: A descriptive rating reflecting the amount of man-made "improvements" in the campsite. (This rating often is disproportionately low where backcountry rangers are actively maintaining or managing sites.)

Litter and Duff: Applied only in forested areas, this measure indicates the relative amount of pulverization and removal of organic debris (needles, cones and twigs) as a result of trampling and other use.

Social Trails: A measure indicating the amount of concentrated trampling of surrounding vegetation by the formation of access trails to nearby destinations such as water sources, other campsites, main trails, etc.

Mutilations: A measure to document the number of permanent marks on the campsite such as carvings, ax marks, and nails in surrounding trees.

On the five point impact scale level five represents maximum impact, or diversion from natural conditions. Level one represents minimal impact. Each campsite receives a rating for each of the applicable criteria used. The resulting mean value constitutes the campsite's overall rating or "campsite class." With experience, a site can be given a class rating, briefly described, and located on a sketch map of the area in a couple of minutes.

Using this system, a class one campsite usually would be no more than a small sleep site and possibly a fire ring with little or no vegetative change or trampling evident. At the other extreme, a class five site would be a large, heavily used, barren area. Often such sites have numerous leveled sleeping sites in addition to several large, unsightly fire rings and rock walls.

In addition to campsite impact classification, descriptive information on the overstory and understory vegetation, including percent of cover, is recorded. The distance to water and the number of class three, four or five sites within 100 ft. (30.5 m), a measure of campsite crowding, also are recorded. Recommended management actions, if any, as well as the potential for each site to accommodate large groups are noted. All sites are located on a freehand map showing major geographical features, potential camping areas, and compass direction.

It should be noted that the impact rating scales and codes for other site factors have been developed in the southern Sierra Nevada and may require adjustment or refinement for use in other areas. Similarly, depending on the local environment, additional criteria may be found to be more applicable.

For each group of campsites, information characterizing the overall area is noted.

This includes vegetation type, elevation, trail access, land form (i.e. lake basin, river valley, etc.), and an estimate of the percent of the area that could potentially accommodate camping. Such information can be collected as applicable to specific management needs in any wilderness area. The factors to be recorded as well as their breakdown (specific landforms, forest types, etc.) would vary with the area studied.

Data on the campsites of a given management area (a lake basin, valley or other readily defineable management unit) then can be summarized to reflect the total number of sites, the number in each impact or class or such parameters as the relative crowding or proximity to water. When analyzed together with the other types of data collected the impact ratings provide a basis for understanding the nature and distribution of visitor impact under varying physical and ecological conditions.

The Camp Area Inventory system as developed and implemented in Sequoia and Kings Canyon has proved to be flexible enough to be applied to all of the varied ecosystems. To date, over 7,400 campsites have been inventoried covering 310,231 ha of backcountry and located in chaparral, giant sequoia, mixed conifer, subalpine forest and alpine vegetation types.

The Camp Area Inventory system described here presents a manageable approach to collecting, summarizing and analyzing data on recreational impact in wilderness camp areas. The system is especially well suited to large backcountry areas with numerous, undesignated, widely dispersed campsites. The data may be analyzed in a number of ways so as to provide both a defensible basis for immediate management decisions as well as a baseline of data against



THE ATTRACTION: Bullfrog Lake in Kings Canyon NP shows off the wilderness qualities that draw campers off the beaten path for earned enjoyment.



THE NUISANCE: Close-up of barren core, fire ring and second fire scar in background demonstrates undesirable impact on lodgepole pine forest in Sequoia NP.

which to evaluate future changes. The data provide a valuable basis on which to relate campsite impact to visitor use levels, elevation, vegetation type or any other measurable variable, and also serve as input for computer models that simulate backcountry recreational use and consequent impact. Such analyses should provide the manager with an improved predictive capability of estimating the effects of changing use levels or restrictions before they occur.

Dave Parsons is a research scientist at Sequoia and Kings Canyon NPs. Susan MacLeod, a graduate student at UCal (Berkeley), worked as a research assistant at the parks when the method described here was developed.

The authors would like to acknowledge the support of the Pacific Northwest Regional Science Office in getting this project started. They provided field assistance and cards to Olympic and support for the training of individuals at North Cascades and Mount Rainier where Human Impact Inventory is also in use. Reprints of our results and a draft of a use manual are available from the authors on request, 600 E. Park Ave., Port Angeles, WA 98362.