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AN EVALUATION OF CAMPGROUND CONDITIONS AND NEEDS FOR RESEARCH

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ABSTRACT: Heavy use of 137 National Forest campgrounds and picnic areas surveyed in California has resulted in several critical types of site deterioration. More than half were inadequately stocked; four-fifths were disturbed by trampling, erosion, and mechanical means; and two-thirds had poor accumulations of protective plant litter on soil surfaces. Ecological studies of recreation site capacity, site maintenance and site improvement are required to supplement currently improved practices of campground and picnic site management and to develop new ones.

Recreational visits to National Forests are expected to double in the next 10 years. Yet some campsites already are used in excess of what "they can withstand without site deterioration."[1/] Can we determine the capacity of different sites for recreational use and develop improved management guides for maintenance of optimum conditions?

As a first step in starting a research program, we examined 137 campground and picnic areas in California in 1960. Our purpose was to appraise existing plant and soil conditions on these areas, isolate problems, and establish priorities for research suggested by evaluation of these conditions. This report summarizes our observations and establishes the objectives of a research program to consider the ecological

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1/ California Region, Forest Service. Report to the California Outdoor Recreation Plan Committee, Sacramento, California, covering a recreation inventory of National Forest lands. 14 pp. 1959.

factors that affect the quality of recreation sites, their maintenance, and their operation.

CAMPSITE CONDITIONS

TREES

As time goes on, tree reproduction must replace mature overstory trees essential for shade and esthetic values in campgrounds. But more than half of the camps we surveyed were without tree seedlings. Even where seedlings were found, their survival was doubtful. Trees smaller than saplings but larger than new seedlings were scarce. We concluded that reproduction rarely survived more than a few years.

Trees of poor vigor are readily susceptible to insect and disease attacks and human disturbances, and nearly 30 percent of the trees on the study areas were considered to have poor vigor:

	Percent of campgrounds
Tree seedlings:	
Present	45
Absent	55
Tree condition:	
Vigorous	72
Poor vigor	28

Most trees of poor vigor, and many vigorous ones, had been abused by campers. Small trees, bushy limbs, boughs--even litter and wood barriers--had been removed for fuel, bedding, or other uses. To support a multitude of camp conveniences, all sizes and kinds of nails, screws, and wires--objects that injure and disfigure woody plants, favor disease and insect attacks, and introduce toxic substances to the plants--were attached to trees. Carving and chopping has destroyed some young trees and girdled or scarred larger ones. Cars had damaged tree roots, boles, foliage, and seedlings. Nearly all damaged trees were considered physically weakened and susceptible to pests or such other hazards as windstorms.

Insect damage to trees was recorded on 28 percent of the campsites. Trees, like other vegetation, have greater value on intensively used recreational areas than elsewhere.

Mistletoe was recorded in 15 percent of the study areas. Though a slow killer, this pest can spread rapidly if infected trees are not promptly removed. The most intensive infestation found was in a central Sierra campground; nearly all the lodgepole pine in a fine understory had become infected by dwarfmistletoe from decadent overstory trees.

Wildlife also had damaged tree reproduction on campgrounds. On a campground in the Sierra National Forest heavy deer browsing had either

stunted or suppressed white fir so that it had grown only 30 inches high in 40 years. Ordinarily this species reaches a height of 5 feet in the same period under central Sierra conditions (Maul 1958). On this area white fir was more heavily browsed than the red fir.

In a study of deer browsing on Douglas-fir seedlings, Roy (1960) reported serious reductions in height growth. The damage was greatest where preferred browse species were lacking. In the campgrounds we inspected, desirable deer-browse plants were sparse and damage to trees was more severe than in adjacent areas containing more browse.

SHRUBS, GRASSES, AND FORBS

Shrub plants help provide screening between camp units. But on more than half of the campgrounds examined, natural screening except for the trees did not exist. Over half of the camps lacked a shrub understory, and another 35 percent contained only a medium density of such plants. Shrubs tended to be more abundant on camps located on moist sites, such as drainages, than on the drier situations. They were very sparse under fairly dense to dense forest stands. An absence of shrubs does not always indicate overuse. Well-stocked timber stands are normally devoid of shrubs, and tree boles will provide the only natural screening.

Besides contributing to screening and other qualities of the campgrounds, some shrubs serve successfully as natural barriers to control visitor movements and protect tree reproduction (figs. 1 and 2). Species that are tough, brittle, often thorny, and grow in dense stands usually provide the most effective barriers. An outstanding example is mountain whitethorn. Though it may be objectionable to some campers and an obstacle to cleanup crews, the campgrounds that had this shrub in any abundance were generally in better condition than those without.

Shrubs, as well as trees, are susceptible to insect attacks, diseases, and wildlife damage. We found cottonwood scale very destructive to snowbush and heavy deer browsing damaging to shrubs. On one campground practically all the basal shoots and foliage of bittercherry within reach of deer had been consumed by midsummer of 1960. We also found evidence that deer activity had arrested the development of mountain whitethorn, sharpleaf snowberry, and Sierra evergreen chinkapin.

Grass and forbs were abundant only on about half of the campgrounds--those situated along the foothills at lower elevations or on riparian sites where grasses and forbs usually predominate. Elsewhere, these plants were scarce in about 60 percent of all campgrounds, and entirely absent on 95 percent of the individual family units.

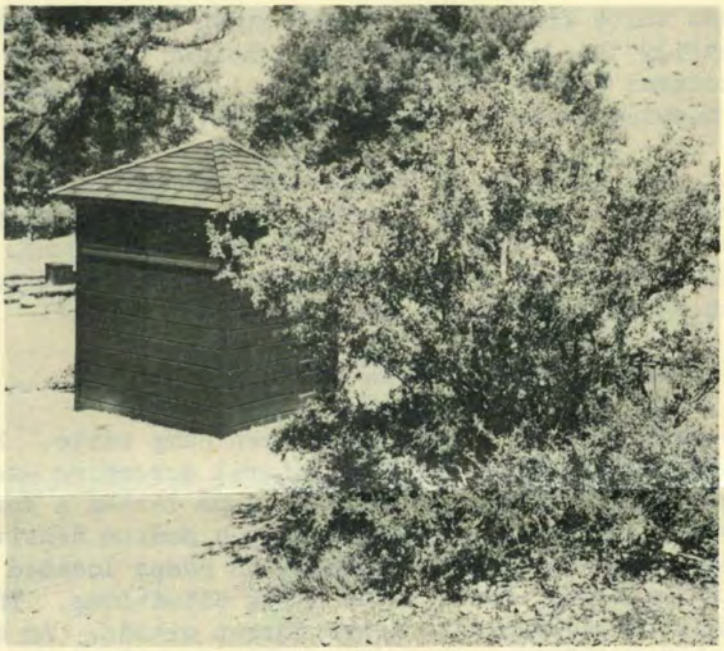

Figure 1.--Mountain whitethorn and chaparral whitethorn provide desirable ground cover and natural screening.

Figure 2.--Bearmat forms desirable ground cover between the well worn foot paths.

SOIL CONDITIONS

We found evidence of soil deterioration--hard-packed surfaces, small alluvial fans, rills and gullies, soil lines on tree bases, and exposed roots, rocks, and underground parts of camp facilities--on more than 70 percent of the campground and picnic areas visited (fig. 3). Nearly half of the camps were located on soils derived from fine granites, pumice, or other parent materials capable of producing fine-textured soils which become a very powdery dust when dry.

These conditions were aggravated by removal of the insulating layers of organic matter which reduce trampling shock, aid infiltration of water, and retard loss of soil moisture through evaporation (Auten 1933).[2/]

On nearly all new campgrounds where such a protective mantle exists the tell-tale signs of deterioration were not evident (fig. 4), but wherever litter was absent we found a dust-bed. Besides the annoyance of miniature "dust bowls" created by bare soil and trampling, the dust upsets plant metabolism by inhibiting respiration and transpiration, and hence may hasten deterioration of plant cover (Eršov 1959). Fire hazard reduction has encouraged campground "housekeeping" that tends to deplete litter. We found many instances in which too much litter had been removed while attempts were made to reduce fuel accumulations and maintain neat appearing camps.

Growth of trees was retarded on soils that appeared to be compacted. In one instance, dominant and co-dominant red and white fir had 1.24 and 2.72 inches diameter growth rates in 10 and 20 years, respectively, as compared to 1.98 and 4.04 inches during the same periods for trees outside the campground. However, we found instances within the same campground of individual trees having growth rates ranging from about 2.00 to 3.50 inches in 10 years which were comparable to those observed outside the camp. This variation suggested that release from competition occurring in certain portions of the campground tended to offset the detrimental effects of soil compaction on growth rates of trees.

Areas with rock outcroppings, often indicators of shallow soils, lose their appeal when vegetation gives way. Sites become bleak, poorly shaded, and devoid of screening vegetation. Camps on poor sites may have little chance of withstanding heavy use because shallow, coarse-textured soils do not ordinarily support abundant vegetation or litter accumulations. Conditions noted on the camps with shallow, coarse soils were:

2/ Mathieu, Theodore F. A study of some characteristics of compacted soils and their effect on the growth of Tilia cordata. 1953. (Unpublished Ph.D. thesis on file at Ohio State Univ., Columbus.)

Figure 3.--Camper prepares to erect a tent after having leveled the soil by digging and scraping. His action destroys roots, seedlings, and soil structure.

Figure 4.--The thick litter layer in a picnic area at Eagle Lake, Lassen National Forest, insulates the soil against compaction and helps retain moisture.

	Percent of 26 camps
Litter sparse	73
Soils trampled	58
Shrubs scarce	58
Grasses and forbs scarce	54
Tree seedlings absent	46
Trees unhealthy	42
Insect damage present	19
Mistletoe present	19

RESEARCH RECOMMENDATIONS

From this survey we conclude that ecological studies for campgrounds in California are needed. They would aim to provide information required to:

1. Improve guides for the selection of campgrounds and picnic areas to use those sites that can sustain heavy usage and bear low-cost development and maintenance.

2. Improve management methods for soil and native vegetation to sustain desirable conditions and esthetic values in campgrounds under heavy use.

3. Develop ways to improve vegetation and soil conditions wherever deterioration is occurring as a result of use.

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