

Subalpine and Montane Revegetation in Yosemite

By Richard L. Hadley and Barbara J. Moritsch

The Tuolumne Meadows region of Yosemite National Park is a scenic and fragile subalpine region easily reached by California State Highway 120. As a result it has experienced extensive damage from high levels of human use. In the summer of 1987, a revegetation program was begun, designed to restore heavily impacted wilderness campsites and trail segments currently closed to use. Methods that prove effective will be incorporated into the park's Comprehensive Wilderness Restoration Plan, now under development.

Subalpine Vegetation

Twenty-seven subalpine sites received a variety of soil and plant restoration treatments. Within these sites, experiments were conducted on 37 subalpine plant species. Field tests included direct transplants, seeds and the use of cuttings. Following treatments, interpretive signs were installed for site protection.

In addition to site rehabilitation, a controlled trampling study was set up to evaluate individual species and plant communities for their relative resistance to trampling. Data were collected on three species and two different plant communities.

To assess accurately the nursery propagation potential of subalpine plant species, the park established an interagency agreement with the Soil Conservation Service (SCS). Stock plants and seeds from seven different species were collected and transported to the SCS plant materials center in Lockeford, Calif., where they are being propagated by seed and division.

Several years will be required for accurate assessment of the program's effectiveness, but preliminary results are encouraging. Six of the seven species under propagation by SCS exhibited good top growth and root growth and were divided in mid-March. *Carex exserta* has responded poorly to treatments with a 30 percent mortality rate. Of the seeds tested, *Calamagrostis breweri* has shown the most promise with a 90

percent germination rate. Other species being tested are *Juncus parryi*, *Carex rossii*, *Oryzopsis kingii*, *Deschampsia caespitosa* and *Antennaria* species.

Visually, direct transplanting has been immediately successful at mitigating camping impacts on many sites. Monitoring of these sites in 1988 will determine mortality, survival and seed germination rates. Field trials will be expanded to include an extensive portion of the John Muir Trail that has been closed and rerouted. Controlled trampling plots will be monitored to determine long and short term effects, and treatments will be replicated to verify results.

Montane Meadow Revegetation

In addition to the subalpine work, a montane meadow restoration project was undertaken in Yosemite Valley. Stoneman Meadow is the most abused and least pristine of Yosemite's meadows. Aerial photographs taken in July 1987 revealed the extent of the damage. Less than 25 acres in size, the meadow was bisected by 27 substantial trails that totaled 1.5 miles of tread. Trails ranged in width from 1 to 5 feet.

A restoration plan was implemented in October 1987 with funding provided by Chevron USA, through a grant of \$104,000 to the Yosemite Association. The revegetation work was completed by the San Francisco Conservation Corps under direction of NPS resources management and trail maintenance personnel.

To protect the restored treads, use was diverted out of Stoneman meadow by installation of interpretive signs. A temporary redwood post and rope fence was constructed around the meadow and along one major trail, which bisects the meadow's eastern margin. This trail was selected as a compromise to allow concentrated access across the meadow. The trail's condition will be monitored and the data collected will guide management decisions as to what type of trails should be maintained in montane meadows. Other options and types of surfaces under consideration include:

complete removal of the trail or construction of an elevated boardwalk, rock causeway and asphalt.

Meadow trails selected for restoration were scarified, planted with direct transplants, sown with native seed and temporarily irrigated. Unfortunately alien grass species dominate in what was once a meadow of native wildflowers, grasses, sedges and rushes. In light of this, revegetation efforts attempted to match the existing vegetation mosaic and not the mosaic that existed prior to European influences. However, native species were utilized whenever possible.

Where a trail bisected a relatively pristine stand of native plants, natives were targeted. At the mouth of the largest trails western raspberry (*Rubus leucodermis*) was transplanted to form thickets as an additional deterrent to human use. The result of matching planting prescriptions with adjacent vegetation is a blending effect, which softens the abrupt edges of trail scars. Camouflaging the site in this manner also helps protect the site from visitors.

As with the subalpine restoration project, the results are encouraging but not yet conclusive. Prior to winter snows, transplants exhibited several inches of new growth. By February, 1988 raspberries still above the snow appeared healthy and survival rates are expected to be high. The ultimate success of any revegetation program depends on the effectiveness of restoration techniques and the continued protection of sites from additional use. The subalpine sites and Stoneman Meadow have been given a chance to recover. The final ingredient in this process is time. Given sufficient time and protection, these areas will heal.

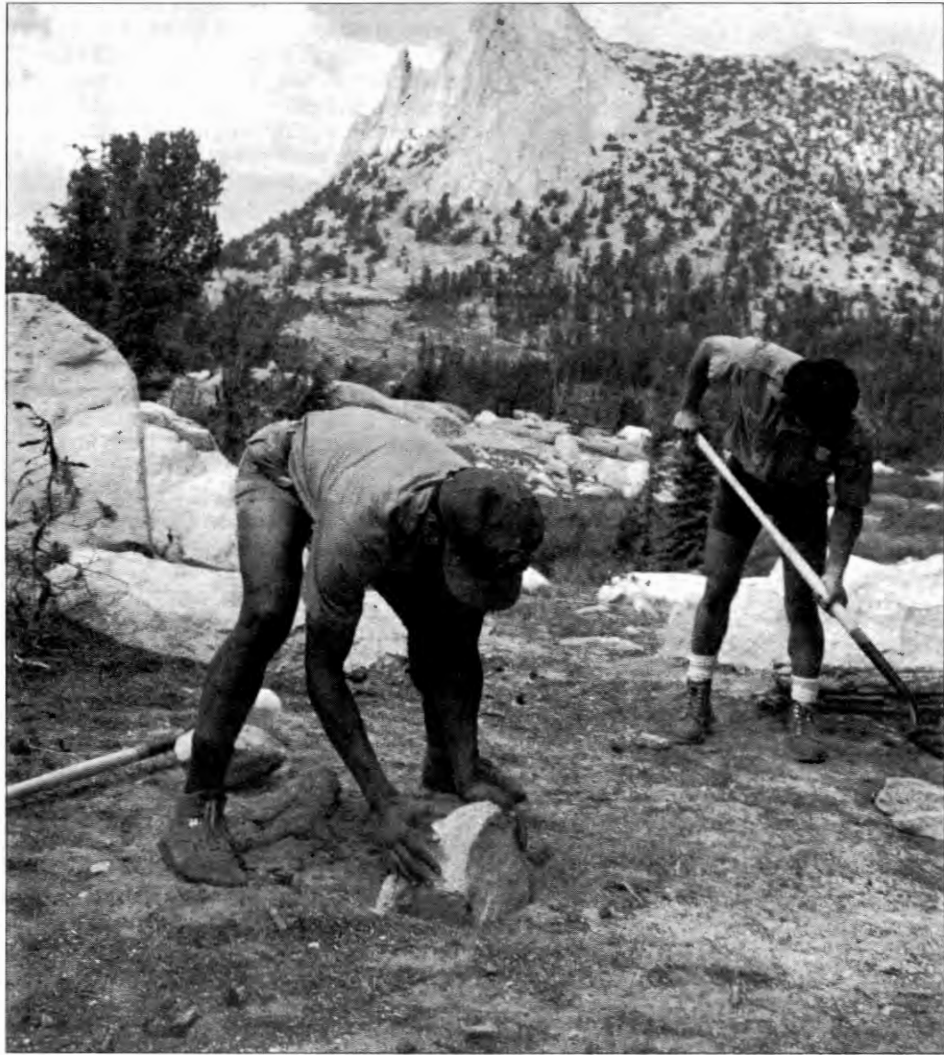
Project summaries and preliminary results are available from the Resources Management Division. For additional information, contact Richard Hadley, Yosemite National Park, P.O. Box 577, Yosemite, CA 95389 (FTS 448-4318; Comm 206-452-4501).

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After careful preparation and treatment (Jerome Shaw waters *Trisetum spicatum* (left), the camp site at Budd Lake looked like this (right). Budd Lake is 10,000 feet up in the Cathedral Range, Yosemite NP.



Revegetation site at Budd Lake in Yosemite NP is prepared by Jerome Shaw (left) and Russ Tenka.