

40. Highland Lakes (Nachlinger 1988a)

Location

This area has been dropped from consideration as an RNA. It is on the Stanislaus National Forest, Alpine County, and lies adjacent to the Carson Iceberg Wilderness, 5.5 miles (9 km) S. of Ebbetts Pass, 17 miles (27 km) NW. of Sonora Pass in the Calaveras Ranger District. The survey area is included in sects. 4 and 5 of T7N, R20E and sects. 32 and 33 of T8N, R20E MDM (38°29'N., 119°48'W.), USGS Dardanelles Cones quad (fig. 83). Ecological subsection – Glaciated Batholith and Volcanic Flows (M261Ek).

Target Element

Mountain Hemlock (*Tsuga mertensiana*) Forest

Distinctive Features

Mountain hemlock forests are present here in diverse stand sizes and age structures. Stands range from open, old-growth populations in stable habitats to dense successional stands in unstable habitats.

In addition to mountain hemlock, the area contains distinctive examples of central Sierran subalpine landscapes with diverse topographic and geologic features (subalpine tarns), a species-rich flora, and diversity of plant communities (including shrublands, meadows, and fell-fields) (fig. 84).

Physical Characteristics

The area covers 440 acres (178 ha) with an elevation of 8700-9235 ft (2650-2815 m). The most common slope directions are NW., N., and NE.

NE. of Hiram Peak, at the headwaters of Arnot Creek, are several small cirque lakes caused by glacier erosion. Subalpine tarns are present below Hiram Peak. The area includes the headwaters of two Sierran river systems; the larger Highland Lake flows to the N. Fork of the Mokelumne River, and the smaller Highland Lake flows to the N. Fork of the Stanislaus River.

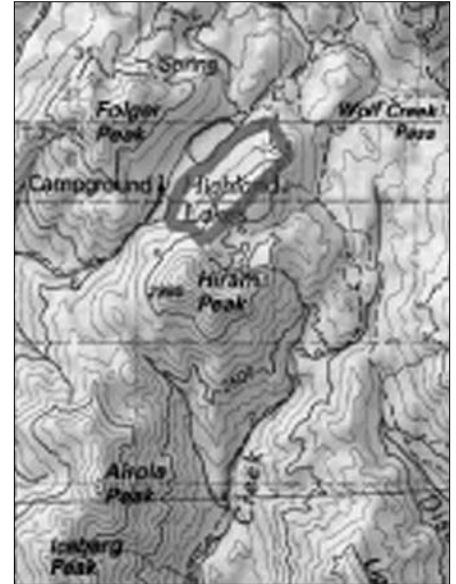
Tertiary pyroclastic volcanics and mudflow deposits are present throughout the area. Highland Peak (just N. of the survey area) is a good example of a rhyolitic dome and cinder cone. Some pre-Tertiary granitic rocks are present W. of the immediate survey area.

No comprehensive soil survey has been conducted for this area, but soils in adjacent areas have been described as: 1) Cindery Typic Cryadepts (moderately deep, cobbly, coarse sandy loams), found on strongly sloping to steep slopes that support subalpine forest and scrub vegetation, and 2) unclassified incipient "soils" of rock outcrops, talus, and scree slopes derived from slightly weathered volcanoes.

No permanent weather station exists in the survey area. Climate data are estimated from the nearest climate station at Twin Lakes, about 20 miles (32 km) N. and 900 ft (275 m) lower than the Highland Lakes area. Mean annual temperature and precipitation are estimated as 38 °F (3.3 °C) and 89 inches (2265 mm), respectively, for the Highland Lakes area.

Association Types

Two representative mountain hemlock stands were sampled using a randomly positioned, 100-meter-long transect line with 10- by 10-m plots placed along random sides of the transect.



**Figure 83—
Highland Lakes
ecological sur-
vey area**

Whitebark Pine-Mountain Hemlock Forest (86210): 225 acres (103 ha). Most of the survey area is dominated by relatively pure stands of mountain hemlock forest. The area is well-suited for supporting mountain hemlock due to the

abundance of moderately steep to steep, N.-trending slopes that accumulate large snow packs and retain moisture late into the growing season.

Hemlock stands found on gentle, protected slopes are open, old-growth forests of well-spaced individuals, with *Evernia* spp. growing on tree trunks and downed wood scattered on the forest floor. Tree density in these mature stands is 400 stems/ha, and basal area is 104 m²/ha. Younger stands have a tree density of 6100

stems/ha, and a basal area of 61 m²/ha. Steeper slopes support stands of tightly clumped trees, often asymmetrically swollen at the bases, with broken limbs and ground layering, characteristics indicative of very deep, heavy snowpacks and snow creep.

Other conifers commonly present in these forests are *Abies magnifica* (at the lowest elevations), *Pinus albicaulis*, *P. monticola*, and *P. contorta* var. *murrayana*. Understory cover is depauperate. Common plants found in association with mountain hemlock forests are *Arabis platysperma* var. *howellii*, *Carex rossii*, *Chrysopsis breweri*, *Juncus parryi*, *Ligusticum grayi*, *Lupinus lyallii*, *Luzula divaricata*, *Phyllodoce breweri*, and *Ribes montigenum*.

Wet Subalpine Meadow (45210): Approximately 62 acres (25 ha). This association type is found on gentle slopes and flats throughout the survey area and is surrounded by subalpine vegetation (whitebark pine-mountain hemlock forest vegetation). Herbaceous perennials and woody shrubs (shrubby thickets dominated by *Salix eastwoodiae* are common) develop 100 percent cover. Common herbaceous species found in subalpine meadows include *Aster alpigenus* ssp. *andersonii*, *Calamagrostis breweri*, *Carex scopulorum*, *Castilleja miniata*, *Dodecatheon alpinum* ssp. *majus*, *Gentiana newberryi*, *Juncus mertensianus*, *Kalmia polifolia* var. *microphylla*, *Luzula comosa*, *Mimulus primuloides*, *Phleum alpinum*, *Phyllodoce breweri*, *Potentilla flabellifolia*, *Scirpus criniger*, *Senecio triangularis*, *Veratrum californicum*, and *Vaccinium nivictum*.

Sierra Nevada Fell-Field (91120): With alpine talus and scree slopes (91200), this type covers 124 acres (50 ha). This association occurs at the highest elevations along principal ridgelines and between whitebark pine-mountain hemlock stands near treeline. Plants are low and rock-hugging, as is characteristic of plant physiognomy in fell-fields, although slightly taller plants occur on more protected sites. Common species in this community include *Antennaria media* var. *media*, *Carex spectabilis*, *Haplopappus acaulis*, *Leptodactylon pungens* ssp. *pulchriflorum*, *Linum perenne* ssp. *lewisii*, *Phoenicaulis cheiranthoides*, *Primula suffrutescens*, and *Silene sargentii*.

Alpine Talus and Scree Slope (91200): With Sierra Nevada fell-field (91120), this type covers 124 acres (50 ha). This is a minor plant community in the survey



Figure 84—Highland Lakes, a wet subalpine meadow at 9105 ft (2775 m) on the upper bench of Arnot Creek in the Highland Lakes study area. The lowest vegetation cover is composed of tufted graminoids while the taller shrub is *Salix eastwoodiae*. Surrounding forest vegetation is whitebark pine-mountain hemlock. (1987)

area, developed on the slopes of Hiram Peak. Common species found in these areas are *Arenaria kingii* var. *glabrescens*, *Carex spectabilis*, *Eriogonum incanum*, *Haplopappus suffruticosus*, *Phlox diffusa*, *Polygonum davisiae*, *P. shastense*, and *Stipa californica*.

Dry Subalpine Meadow (45220): This association is a minor community type found at the edges of subalpine forest. The vegetation is low and fairly open. It consists of *Achillea lanulosa* ssp. *alpicola*, *Antennaria alpina* var. *media*, *Calyptridium umbellatum*, *Carex exserta*, *Erigeron peregrinus* ssp. *callianthemus*, *Juncus parryi*, *Lewisia nevadensis*, *Penstemon heterodoxus*, *Saxifraga aprica*, and *Trisetum spicatum*.

Plant Diversity

A list of 200 plant taxa that have a high probability of occurrence within the study area is included in the Nachlinger surveys (1988a, 1988b).

Conflicting Impacts

The Pacific Crest Trail skirts the main Sierra Nevada crestline E. of the area, with heavy hiker use on this trail. A well-graded dirt road exists to Highland Lakes. Heavy summer overnight camping in both the upper basin and the established campground between the two Highland Lakes appears to pose little impact on the area outside of the lake and stream areas.

Cattle grazing occurs around Highland Lakes and on higher open slopes adjacent to the mountain hemlock stands. Additional evidence of grazing is present throughout the area (including at the subalpine tarns), except within the densest forest stands.