

76. Sentinel Meadow (DeDecker 1975b, Talley 1978, Inyo National Forest 1982b)

Location

This established RNA is on the Inyo National Forest, Mono County. It is about 14 miles (27 km) NE. of the town of Mammoth Lakes. It lies within portions of sects. 7, 8, 9, 10, 15, 16, 17, and 18 of T2S, R29E MDBM (37°47'N., 118°47'W.), USGS Crestview and Dexter Canyon quads (fig. 153). Ecological subsection – Glass Mountain (341DI).

Target Elements

Lodgepole Pine (*Pinus contorta* ssp. *mur-rayana*) and Limber Pine (*Pinus flexilis*)

Distinctive Features

Tree Growth: A large number of lodgepole pine, Jeffrey pine (*Pinus jeffreyi*), whitebark pine (*P. albicaulis*), and limber pine were sampled throughout the area, and quantitative estimates of diameter and height growth-rates were made. These are too detailed to summarize here, but the information is valuable and may be compared to the estimates for the same species at other sites or for different species under similar climatic regimes (e.g., the extensive dendrochronological data for White Mountains bristlecone pine [*Pinus longaeva*] stands [Fritts 1969]).

Structure and Forest History: by using the data accumulated for growth-rate estimates, establishment times and age-classes for the major tree species were constructed. Thus, a large body of knowledge exists for the structure of the major tree-dominated associations at Sentinel Meadow. For example, the clusters of the few Jeffrey pine age-classes were found to be closely associated with periods in history when climate was relatively moist. Fire history of the Jeffrey pine forest suggests that fires were frequent between 1800 and 1900. In contrast, only one widespread fire (about 1800) is evident in the lodgepole pine forest.

Solar Beam Irradiation: The major plant associations were evaluated for solar intensity on the basis of estimates calculated for their characteristic slope exposures. Sites with the highest insolation include *Cercocarpus ledifolius* and Jeffrey pine types, whereas sites with the lowest insolation contain whitebark and western white pine mixed with lodgepole pine.

Mesicness of an E.-Side Range: The presence of such species as *Chrysolepis sempervirens*, whitebark pine, western white pine (*Pinus monticola*), and, according to C. Millar (personal communication 1989), mountain hemlock (*Tsuga mertensiana*) was unknown in this area before this survey and suggests that, perhaps because of the gap in the Sierra Crest to the W. near Mammoth Mountain, a relatively large amount of precipitation falls at this site given its E.-side location.

Physical Characteristics

The ecological survey of this RNA covers 3840 acres (1554 ha) (actual size of the established RNA is 2041 acres, or 827 ha). Elevations range from 9200 to 10,171 ft (2805-3101 m). The RNA straddles a high E.-W. ridge (plateau) in the Glass

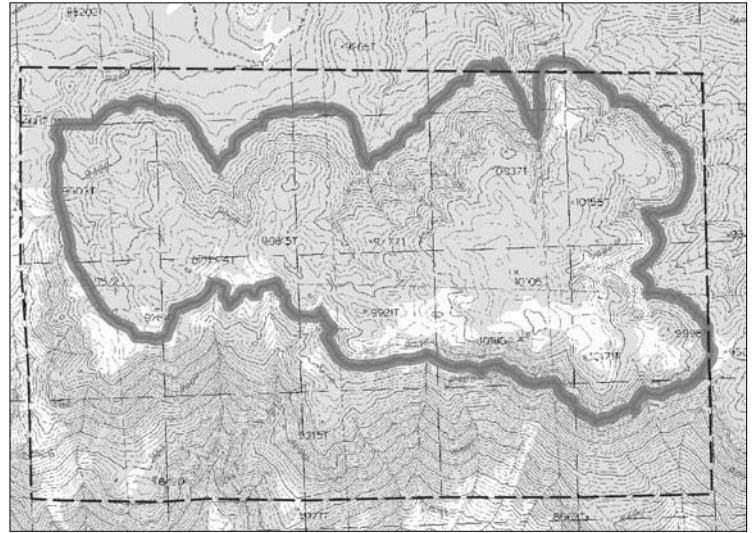


Figure 153—Sentinel Meadow RNA

Dashed line =
Ecological study area;
Solid gray line = RNA
Boundary

Mountains on the N. rim of the Long Valley caldera. N. slopes drain into the Mono Basin, and the S. escarpment drops into the Owens River drainage. All aspects are represented. Slopes range from less than 7° to more than 45°.

S.-facing slopes are underlain by granite and are steeper than N.-facing slopes which are underlain by rhyolite with local obsidian outcrops. Climate is somewhat moister than at other similar ridges lying E. of the main Sierra Crest, with estimated precipitation at 18-22 inches (450-550 mm) annually. Seasonal temperature variation is relatively high, with estimated average January lows of 7 °F (-14 °C) and July highs of 78 °F (25.4 °C).

Association Types

Description and acreage are based on ecological survey. The area was sampled using 0.07-ha plots. The Jeffrey pine forest has 16 plots, lodgepole pine forest 18 plots, lodgepole-whitebark pine forest 7 plots, and limber pine forest 9 plots.

Lodgepole Pine Forest (86100, 81B00): 1289 acres (522 ha). Pure or nearly pure stands of lodgepole pine occur on level or gently sloping ground on the E., N., and W. flanks of Sentinel Ridge and on the W. and NE. slopes of the Sentinel Ridge plateau (*fig. 154*). The sample plots average 245 stems/ha and a basal area of 29 m²/ha. Frequency, cover, and basal area of lodgepole pine decline with increasing elevation and exposure. Upper plateau stands exposed to strong S. winds are composed of scattered trees with wind-trained branches but significant girth. Combined under-story and tree stratum cover is estimated at 43 percent on gentle W.-facing slopes, but cover is much reduced at upper elevations. Total cover of the herb stratum seldom exceeds 25 percent. Typical understory species include *Carex* spp., *Gayophytum nuttallii*, *Sitanion hystrix*, *Stipa elmeri*, *Poa nervosa*, *Ribes cereum*, *R. roezlii*, *Symphoricarpos vac-cinifolia*, *Lupinus breweri*, and *L. alpestris*. Species apparently locally confined to this type include *Chaenactis douglasii*, *Frasera puberulenta*, and *Pterospora andromedea*. Scrubby aspen (*Populus tremuloides*) occur in this type on gentle slopes on the N. edge of the RNA.

Jeffrey Pine Forest (85100): 862 acres (349 ha). This association occurs on S. exposures. Soil is a coarse friable granite. Stocking is relatively uniform (124 stems/ha), accounting for 41 m²/ha basal area and 43 percent cover. Jeffrey pine is the sole dominant at most sites, with some admixture of western juniper (*Juniperus occidentalis* ssp. *australis*) on convex slopes at elevations of about 8038 ft (2450 m) and *Cercocarpus ledifolius* on rocky or exposed convex slopes. All mature Jeffrey pines are wind-sheared at their tops, with crooked stems. At 9842 ft (3000 m) Jeffrey pine and limber pine forests form an ecotone. The Jeffrey pine are strongly stunted and may not produce viable seed at this level.

Ecotones with sagebrush scrub indicate invasion by Jeffrey pine with good cone production. Common associates with Jeffrey pine are shared with sagebrush scrub and mountain mahogany woodland. A few species locally restricted to this type include *Chrysolepis sempervirens*, *Streptanthus tortuosus*, *Cryptantha muricata* var. *dentata*, and *Eriogonum spergulinum* var. *reddingianum*.

Lodgepole Pine-Whitebark Pine Forest (86220): 709 acres (287 ha). Mixed stands of lodgepole and whitebark pines are largely restricted to N. slopes. Some of these forests contain occasional western white pine (*Pinus monticola*). Whitebark and lodgepole pines have nearly equal density and cover (292 vs. 218 stems/ha and 12 vs. 8 percent cover, respectively). Locally (one plot), basal area cover of whitebark pine may be as high as 200 m²/ha, but the average for the other six 0.07-ha plots is 7.8 m²/ha, one-third that of typical lodgepole-pine-forest basal area. Lodgepole pines in this mixed forest are smaller than those in pure lodgepole pine forest. However, cover is similar. Understory species include

Arabis holboellii, *A. inyoensis*, *A. platysperma*, *Calyptridium umbellatum* var. *caudiciferum*, *Carex* sp., *Erysimum argillosum*, *Lupinus alpestris*, *Poa nervosa*, *Stipa elmeri*, and *Eriogonum lobbi*.

Limber Pine Forest (86700): 507 acres (205 ha). Limber pine forest extends over S. and E. exposures between 9462 and 10,000 ft (2884-3048 m) in the E. half of the study area. Open stands (10-15 percent tree cover) are typical of exposed sites. Jeffrey pine may occur in these forests on S. slopes below 9514 ft (2900 m). More gradual slopes at the plateau rim or other exposed sites with N. to NW. exposures may have mixed stands of limber, whitebark, and lodgepole pines. Tree cover and density varies widely throughout the sampled plots (1-30 percent, 14-290 stems/ha, respectively), as does basal area (0.1-17.0 m²/ha). Establishment of limber pines is limited to xeric exposures.

Herb- and shrub-stratum taxa are typically widespread species from other types. *Lesquerella kingii* and *Chamaebatiaria millefolium* are locally confined to this type.

Subalpine Forest (86600): 177 acres (54 ha). This type occurs above 9810 ft (2990 m) on the S. half of the plateau. Soil is loose and rhyolitic, with local obsidian outcrops. Clusters of whitebark, limber, and lodgepole pines dominate. Total tree cover is less than 1 percent. Three subtypes occur on the basis of varying degrees of slope exposure and wind action.

Subtype one occurs at the S. and E. rims of the high, 9842-ft (3000-m), plateau. It is characterized by stony soil pavement because of removal of fine particles by wind. This type has isolated clusters of primarily limber and whitebark pines and a sparse (5-15 percent) understory including *Chrysothamnus viscidiflorus* ssp. *viscidiflorus*, *Haplopappus macronema*, *Leptodactylon pungens* ssp. *hallii*, *Phlox covillei*, *Eriogonum ovalifolium* var. *nivale*, *Eriophyllum lanatum* var. *monoense*, *Holodiscus microphyllus*, *Lupinus breweri*, and occasional *Cercocarpus ledifolius*.

Areas characterized by alternating removal and deposition of sandy soil (subtype two) comprise well over half of the subalpine forest. Vegetation is dominated by patches of *Ribes cereum*, with largely open ground dotted with sparse cover of most species mentioned in subtype one scattered in between. In addition to those species, several others including *Hulsea vestita*, *Raillardella argentea*, *Senecio spartioides*, *Cryptantha confertiflora*, *Lupinus montigenus*, and *Mimulus coccineus* appear to occur only in this type.

Subtype three is characterized by sand deposition areas in depressions left by two volcanic craters. Vegetation is virtually absent except for widely spaced *Lupinus breweri*.

Sagebrush Scrub (35100, 35210): 158 acres (64 ha). This association occurs on gradual S. to SE. aspects at about 9600 ft (2926 m). It is characterized by deep sandy soil, and most of it is relatively undisturbed by grazing. Cover is about 50 percent, 20-50 percent of which is *Artemisia tridentata*. Other significant species include *Symphoricarpos vaccinioides*, *Monardella odoratissima* ssp. *parviflora*, *Haplopappus suffruticosus*, *Leptodactylon pungens*, *Holodiscus microphyllus*, *Purshia tridentata*, *Ribes cereum*, *Eriogonum umbellatum* var. *umbellatum*, *Sitanion hystrix*, *Stipa elmeri*, *Orobanche corymbosa*, *Tetradymia canescens*, *Silene montana* ssp. *bernardina*, *Oryzopsis hymenoides*, and *Stephanomeria tenuifolia*.

Mountain Mahogany Woodland (no Holland equivalent): 89 acres (36 ha). This type is concentrated along the upper margin of the Jeffrey Pine forest and restricted to windy sites below 9842 ft (3000 m) with steep convex S. exposures and rocky soil. *Cercocarpus* accounts for at least 700 stems/ha, but

only 20 percent cover and 10 m²/ha basal area. Most species are shared with the sagebrush scrub with the possible exception of *Abronia turbinata* and *Lygodesmia spinosa*.

In the establishment record, vegetation cover is divided into lodgepole pine (788 acres [319 ha]), mixed stands of lodgepole and whiteback pines (637 acres [258 ha]), limber pine (228 acres [92 ha]), and 388 acres (157 ha) of shrubs, Jeffrey pine, and pinyon pine.

Plant Diversity

Seventy-one species are listed.

Conflicting Impacts

Domestic grazing in the sagebrush scrub has significantly disturbed portions of that community. No other impacts are mentioned.

**Figure 154—
Sentinel
Meadow**, exposed
hillsides result in
open lodgepole
pine stands in
Sentinel Meadow
RNA. (between
1977-1982)

