

31. Grass Lake (Beguin and Major 1975, Burke 1987, Berg 1991a)

Location

This established RNA is in the Lake Tahoe Basin Management Unit in the Eldorado National Forest. It lies immediately W. of Luther Pass on State Highway 89 and is approximately 12 miles (19 km) SSE. of South Lake Tahoe. It lies within sects. 13, 14, 15, 22, 23, and 24 T11N, R18E MDBM (38°47'N., 119°59'W.), USGS Freel Peak quad (*fig. 64*). Ecological subsection – Glaciated Batholith and Volcanic Flows (M261Ek).

Target Element

Moss Bog

Distinctive Features

Significance of the Bog: Peatlands and bogs are rare in California. Grass Lake is the largest *Sphagnum* bog in California and is considered the best representative floating bog in the Sierra Nevada (*fig. 65*). Grass Lake has been the focus of several scientific surveys including palynological and phytosociological research.

Varied and Pristine Environment: This is a large site with a complex association of habitats ranging from aquatic and meadow types through upland forest types. This diversity, along with a largely intact watershed surrounding the marshlands and meadows, contributes to the value of this site. This site supports a number of boreal plant species unusual in the Sierra Nevada. In addition, several species of plants occur locally at substantially lower elevations than typical elsewhere in the Sierra Nevada. Along with a few uncommon or disjunct plants, the wetlands support three species of carnivorous plants and four species of orchids. The plant associations are relatively pristine with virtually no introduced plants in the bog and meadow associations. The bog and meadow associations are diverse, with 11 types described.

Physical Characteristics

The survey area covers about 2400 acres (972 ha), although the final established area is much smaller (360 acres [146 ha]). Grass Lake is a small body of water surrounded by a large *Sphagnum* bog. Portions of the marshland are underlain by water, forming a true quaking bog. Grass Lake is in a low-lying basin between peaks in the Carson Range, E. of the main Sierra Crest. Elevations range from 7680 to 9497 ft (2341-2895 m). Slopes vary from 0° to 50°. Three streams feed the lake and bog from the N., and one stream and several small seeps feed it from the S. The basin was glacially scoured in the Pleistocene. The Grass Lake Basin drains to the W., but before the damming by a Pleistocene terminal moraine it drained to the E. over Luther Pass.

Rocks are all granitic, including the Bryan Meadow Granodiorite, the Echo Lake Granodiorite, and the Waterhouse Peak Granodiorite. The first is the most extensive. Quaternary alluvium underlies the meadow and lake of the main basin. Soils include marsh soils, Meeks very stony loamy coarse sand, 15-30 percent slopes; Meeks extremely stony loamy coarse sand, 15-30 percent slopes; Tallac stony coarse sandy loam, 5-15 percent slopes; Rock Land, Rock Outcrop-

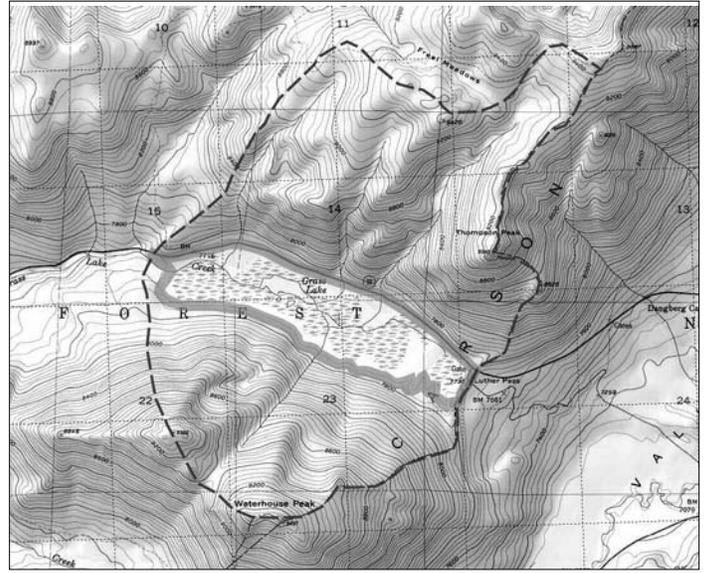


Figure 64—Grass Lake RNA

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

Cagwin complex, 30-50 percent slopes; and Rock Outcrop-Toem complex, 30-50 percent slopes. Precipitation is estimated at about 40 inches (1016 mm) annually with the majority as snow. Average minimum temperatures are 15 to -24 °F (-9 to -31 °C), and average maximum temperatures are 72-82 °F (22-28 °C). Frost-free days average 70-120 per year.

Figure 65—Grass Lake, the Grass Lake RNA contains the largest and best example of *Sphagnum* fen in the Sierra Nevada. Note dense stand of *Eriophorum gracile* in foreground. (around 1986)



Association Types

The plant associations of the Grass Lake RNA are divided into five main groups. Four of these are tree-dominated; the fifth includes the *Sphagnum* bog and meadow associations. Extensive sampling was conducted by Beguin and Major (1975) in the bog and associated wet meadow vegetation. However, no additional sampling was done for this survey.

Jeffrey Pine Forest (85100, 85210): 1274 acres (516 ha), not included in the RNA. This is typically a tall, open forest dominated by Jeffrey pine (*Pinus jeffreyi*) and white fir (*Abies concolor*), occurring on S.-facing slopes. The relatively sparse understory includes *Artemisia tridentata*, *Chrysolepis sempervirens*, *Chrysothamnus nauseosus*, *Symphoricarpos* spp., *Ceanothus cordulatus*, and *Arctostaphylos nevadensis*.

On the steepest S.-facing slopes the forest is very open (about 30 percent canopy cover), and Jeffrey pine is associated with white fir and lodgepole pine (*Pinus contorta* ssp. *murrayana*). Open ground or rocks may cover up to 75 percent of the surface. However, scattered shrubs of *Artemisia tridentata*, *Eriogonum umbellatum*, *Symphoricarpos acutus*, as well as herbs such as *Wyethia mollis*, *Cirsium andersonii*, *Castilleja* spp., *Hieracium albiflorum*, and *Lupinus* spp. may sometimes cover up to 50 percent of the surface.

In hollows on steep slopes *Arctostaphylos nevadensis* or *Ceanothus cordulatus* form thickets of up to 100 percent cover under a very open canopy. On relatively level slopes with deeper soil, the understory is similar to an open meadow with such species as *Chrysothamnus nauseosus*, *Sitanion hystrix*, *Wyethia mollis*, *Monardella odoratissima* ssp. *pallida*, *Stipa* spp., and *Erigeron* spp. averaging 25-30 percent cover.

Red Fir Forest (85310): 819 acres (332 ha); 36 acres (15 ha) are included in the RNA. Locally red fir (*Abies magnifica*) grows to 197 ft (60 m) tall and 300-400 years old. The forest is typically dense and casts heavy shade. Understory vegetation is very sparse, with scattered species such as *Pyrola picta*, *Chimaphila menziesii*, *Poa* sp., and *Monardella odoratissima* ssp. *pallida*. At high elevation,

occasional mountain hemlock (*Tsuga mertensiana*) may be intermixed along with western white pine (*Pinus monticola*). At lower elevations adjacent to the wetlands, lodgepole pine also occurs.

Slopes are typically steep. On open avalanche slopes, *Arctostaphylos nevadensis* forms low thickets. Around rocks, *Penstemon newberryi* and *Heuchera* sp. may occur. Rock cover in this association varies from 10 to 85 percent.

Meadow and Bog Vegetation (45100, 45210, 51110, 51200, 52430, 63500): 250 acres (101 ha) are included in the RNA. Beguin and Major (1975) sampled 73 stands (relevés) in the meadows and wetlands of Grass Lake. They described 11 associations. These are listed below with common names rather than the original Latin names:

Brown Moss-Bladderwort Association: The most aquatic grouping, this association occupies the open water (up to 3-4 m deep). Brown moss (*Drepanocladus fluitans*) and the bladderwort *Utricularia vulgaris* dominate along with *Myrophyllum spicatum* ssp. *exaltescens*, *Nuphar polysepalum*, and *Potamogeton natans*. *Potentilla palustris* may also codominate at some sites.

Monkeyflower-Shortsedge Association: This association is the classic quaking bog. It is dominated by *Menyanthes trifoliata*, *Carex limosa*, a dense understory of brown moss, and *Sphagnum squarrosum*. *Potentilla palustris* and *Mimulus primuloides* var. *pilosellus* are widespread. *Eriophorum gracile* may form conspicuous dense stands. This association typically borders the brown moss-bladderwort association in shallower water.

The Long- and Short-Beaked Sedge Association: This association also often lines the edge of open water; it is dominated by the large sedges *Carex rostrata* and *C. simulata*. *Sparganium angustifolium*, *Heleocharis palustris*, and *Glyceria grandis* also may be important. *Drepanocladus fluitans* and *Utricularia vulgaris* from the brown moss-bladderwort association overlap frequently.

The Shortbeak-Inflated Sedge Association: This association occurs some distance away from the deepest water and is dominated by *Carex vesicaria*. It is similar to the long- and short-beaked association, but the presence of *Juncus balticus*, *Deschampsia caespitosa*, and occasionally *Muhlenbergia filiformis* indicate drier conditions. There is some species overlap with the previous three associations, but those species show reduced vigor and coverages compared to their optimum habitats.

Nebraska Sedge Association: *Carex nebrascensis* is blue-green and, thus, this association is clearly distinguished from others adjacent to it. This association occurs between the drier meadow and the wetter sedge associations. Other common species include *Deschampsia caespitosa*, *Muhlenbergia filiformis*, and *Aster andersonii* var. *alpigenus*.

Nevada Rush-Spikerush Association (Holland 51200): The outer edges of the bog intergrade into a wet meadow with *Juncus nevadensis*, *Heleocharis quinqueflora* var. *suksdorfiana*, and *Carex simulata*. This association is restricted to areas where cold spring water and melt water keep the soil above field capacity throughout the summer.

Mountain Bluegrass-Smooth Beaked Sedge Association: This dry meadow association intergrades with surrounding lodgepole pine forest. It is dominated by *Poa epilis*, *Carex integra*, *Penstemon oreocharis*, and *Erigeron peregrinus*. Lodgepole pine is scattered, often with an understory of *Poa pratensis*. Two subassociations occur: a xerophytic type with *Artemisia tridentata*, *Cirsium drummondii*, and *Stipa columbiana* (typical of open disturbed areas, e.g., high gopher activity or human disturbance), and a more hydric type characterized by *Mimulus primuloides*, *Aster andersonii*, and *Polygonum bistortoides*.

Alpine Laurel-Lodgepole Pine Association: This association occurs on the land bridge between the two main parts of Grass Lake. It is a relatively open

community with stunted lodgepole pines and a well-developed shrub stratum including *Kalmia polifolia* ssp. *microphylla*, *Vaccinium occidentale*, *Salix orestera*, *Lonicera caurina*, and *Ledum glandulosa*. Herbs include *Luzula comosa*, *Saxifraga oregana*, *Allium validum*, *Pedicularis groenlandica*, *Carex aquatalis*, and *Carex capitata*.

Willow Thicket Association: This is an area of shrubby riparian thickets dominated by *Salix rigida* in low swales and along some stream courses within the Grass Lake basin. These thickets intergrade with meadow associations in wet fine-grained soils or with red fir and lodgepole pine forest on coarser, better-drained soils. Associated species include *Lupinus polyphyllus* ssp. *supurbus*, *Veratrum californicum*, *Achillea lanulosa*, *Potentilla glandulosa*, *Castilleja miniata*, *Aconitum columbianum*, *Aquilegia formosa*, *Senecio triangularis*, *Thalictrum fendleri*, *Allium validum*, and *Mimulus guttatus*.

Sandwort-Cudweed Association: This is an ephemeral streamside association occurring on sandy terraces of the numerous meandering rivulets in the basin. *Sagina saginoides*, *Gnaphalium palustris*, *Rorippa curvisiliqua*, *Tofieldia glutinosa* ssp. *occidentalis*, and *Mimulus suksdorfii* are characteristic. The high proportion of annuals is remarkable for such a boreal association.

Few-Flowered Alkali Grass Association: This association, dominated almost exclusively by *Torreyochloa* (*Puccinellia*) *pauciflora*, occurs on wet sandy soils covered with decomposing matter. Other infrequent species include *Deschampsia caespitosa*, *Carex vesicaria*, and *Juncus balticus*.

Lodgepole Pine Forest (86100): 57 acres (23 ha), all included in the RNA. This association occurs around the meadows of the Grass Lake basin. Lodgepole pine accounts for most of the 50 percent canopy cover, with red fir and mountain hemlock as occasional associates. At the ecotone between this forest and the meadows, mountain alder (*Alnus tenuifolia*) forms thickets. Understory associates include *Ribes* spp., *Holodiscus microphyllus*, *Chrysolepis sempervirens*, and *Arnica* spp. In moist sites *Epilobium angustifolium*, *Aster andersonii*, *Castilleja miniata*, *Aquilegia formosa*, *Thalictrum fendleri*, *Senecio triangularis*, and *Equisetum* spp. occur. In drier sites *Ledum glandulosum*, *Pedicularis* spp., and *Rubus parviflorus* are typical understory members.

Aspen Riparian Forest (61520): This association is of limited extent and unmapped in this study. Seventeen acres (7 ha) are included in the RNA. A fairly open riparian growth dominated by aspen (*Populus tremuloides*) follows the streams which feed Grass Lake from the N. Perennial and annual understory species are often dense. They include *Aquilegia formosa*, *Veratrum californicum*, *Habenaria sparsiflora*, *Mertensia ciliata*, *Smilacina stellata*, *Sphenosciadium capitellatum*, *Thalictrum fendleri*, and *Castilleja miniata*.

Plant Diversity

Two hundred seventy-six species of lower and higher vascular plants are listed.

Conflicting Impacts

A major State highway (89) runs through the area and borders the sensitive bog on its N. side. Several turnouts have been built along the marsh and bog area, and these areas are used frequently as scenic viewing sites. Until recently, gravel roads led into meadow areas and had a serious impact on the vegetation. The roads have been closed, ripped, and sewn with non-native grasses (which are unlikely to invade the wet meadow and bog). Recreational impact on the most sensitive areas is not heavy; most people appreciate the wetlands from afar. The accessibility of Grass Lake to the public may be useful for publicizing the values of RNAs. The most serious potential impact to the area may be road salting in the winter. Illegal gathering of firewood has been a problem in the N. part of the area.