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Grass Mountain Research Natural Area

Guidebook Supplement 32

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The PNW Research Station is publishing this guidebook as part of a continuing series of guidebooks on federal research natural areas begun in 1972.

Cover

Grass meadow (grass bald) dominated by graminoids and perennial herbaceous species including blue wildrye (*Elymus glaucus*), California sedge (*Carex californica*), California brome (*Bromus carinatus*), bracken fern (*Pteridium aquilinum*), starry false-Solomonseal (*Maianthemum stellatum*), slender-tubed iris (*Iris chrysophylla*), and Chamisso sedge (*Carex pachystachya*). Adjacent forest is co-dominated by Douglas-fir (*Pseudotsuga menziesii*) and noble fir (*Abies procera*) with western hemlock (*Tsuga heterophylla*) regenerating in the forest understory.

Abstract

Schuller, Reid; Exeter, Ronald L. 2007. Grass Mountain Research Natural Area: guidebook supplement 32. Gen. Tech. Rep. PNW-GTR-732. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 29 p.

This guidebook describes the Grass Mountain Research Natural Area, a 377-ha (931-ac) tract in the Oregon Coast Range. The area supports a grass bald complex surrounded by stands dominated by noble fir (*Abies procera*) and/or Douglas-fir (*Pseudotsuga menziesii*) in the overstory, and western hemlock (*Tsuga heterophylla*) in the understory. The area also contains a small rock garden plant community along high-elevation ridges, and young Douglas-fir forest that originated from a wildfire. Headwaters of high-elevation, Oregon Coast Range streams are surrounded by noble fir forest and add to the site diversity.

Keywords: Research natural area, grass bald, grass meadow, rock garden community, noble fir forest, Douglas-fir forest, Oregon Coast Range, grass meadow invasion, high-elevation stream headwaters.

Preface

The research natural area (RNA) described in this supplement¹ is administered by the Bureau of Land Management (BLM), U.S. Department of the Interior. The BLM Salem District office has RNA program administrative responsibility and the Marys Peak Resource Area has on-the-ground management responsibility for the RNA. Scientists and educators wishing to visit or use the RNA for scientific or educational purposes should contact the resource area field manager in advance and provide information about research or educational objectives, sampling procedures, and other prospective activities. Research projects, educational visits, and collection of specimens from the RNA all require prior approval. There may be limitations on research or educational activities.

Grass Mountain RNA is part of a federal system of such tracts established for research and educational purposes. Each RNA constitutes a site where natural features are protected or managed for scientific purposes and natural processes are allowed to dominate. Their main purposes are to provide:

- Baseline areas against which effects of human activities can be measured or compared.
- Sites for study of natural processes in undisturbed ecosystems.
- Gene pool preserves for all types of organisms, especially rare and endangered types.

The federal system is outlined in *A Directory of the Research Natural Areas on Federal Lands of the United States of America*.²

Of the 96 federal RNAs established in Oregon and Washington, 45 are described in *Federal Research Natural Areas in Oregon and Washington: a Guidebook for Scientists and Educators* (see footnote 1). Supplements to the guidebook such as this publication constitute additions to the system.

The guiding principle in management of RNAs is to prevent unnatural encroachments or activities that directly or indirectly modify ecological processes or conditions. Logging and uncontrolled grazing, for example, are not allowed nor is public use that might impair scientific or educational values. Management practices necessary to maintain or restore ecosystems may be allowed.

¹Supplement No. 32 to Franklin, J.F.; Hall, F.C.; Dyrness, C.T.; Maser, C. 1972. Federal research natural areas in Oregon and Washington: a guidebook for scientists and educators. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station. 498 p.

²Federal Committee on Ecological Reserves. 1977. A directory of the research natural areas on federal lands of the United States of America. Washington, DC: U.S. Department of Agriculture, Forest Service. [Irregular pagination].

Federal RNAs provide a unique system of publicly owned and protected examples of undisturbed ecosystems where scientists can conduct research with minimal interference and reasonable assurance that investments in long-term studies will not be lost to logging, land development, or similar activities. In return, a scientist wishing to use an RNA is obligated to:

- Obtain permission from the appropriate administering agency before using the area.³
- Abide by the administering agency's regulations governing use, including specific limitations on the type of research, sampling methods, and other procedures.
- Inform the administering agency on progress of the research, published results, and disposition of collected materials.

The purpose of these limitations is to:

- Ensure that the scientific and educational values of the tract are not impaired.
- Accumulate a documented body of knowledge and information about the tract.
- Avoid conflict between studies and activities.

Research must be essentially nondestructive; destructive analysis of vegetation is generally not allowed, nor are studies requiring extensive modification of the forest floor or extensive excavation of soil. Collection of plant and animal specimens should be restricted to the minimum necessary to provide voucher specimens and other research needs. Under no circumstances may collecting significantly reduce populations of species. Collecting also must be carried out in accordance with agency regulations. Within these broad guidelines, appropriate uses of RNAs are determined by the administering agency.

³Six federal agencies cooperate in this program in the Pacific Northwest: U.S. Department of the Interior, Bureau of Land Management, Fish and Wildlife Service, and National Park Service; U.S. Department of Agriculture, Forest Service; U.S. Department of Energy; and U.S. Department of Defense.

Salem BLM management direction is to preserve, protect, or restore native species composition and ecological processes of biological communities (including terrestrial and aquatic cells⁴ listed in the 2003 Oregon Natural Heritage Plan. Research natural areas are available for short- or long-term scientific study, research, and education and serve as baselines against which human impacts on natural systems can be measured. The Marys Peak Resource Area does not issue special forest product permits within RNAs.

⁴Cells are the basic units that must be represented in a natural area system. A cell can be an ecosystem, community, habitat, or organism. Taken from: Dyrness, C.T.; Franklin, J.F.; Maser, C.; Cook, S.A.; Hall, J.D.; Faxon, G. 1975. Research natural area needs in the Pacific Northwest: a contribution to land-use planning. Gen. Tech. Rep. PNW-GTR-38. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station. 231 p.

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Introduction

Grass Mountain Research Natural Area (RNA) is a 293.8-ha (726-ac) tract of land occupying the summit and upper slopes of Grass Mountain located in Benton County in the central Oregon Coast Range. An additional 82.96 ha (205 ac) is currently proposed for inclusion to the existing RNA, bringing the total to 377 ha (931 ac). The addition includes more grass balds¹ along the northern boundary and shrublands bordering the grass meadows. Magee (1985) defined grass bald as any meadow that occurs on or near the summits of montane peaks and ridges. The sites on which they occur are generally located within the climatic tolerance ranges of adjacent tree species. The proposed RNA addition also reshapes the boundary along roads, ridges, and streams so that it is easily identifiable in the field.

The RNA was established to protect a grass meadow complex (eight discrete grassland meadows), noble fir (*Abies procera*) stands (see appendixes for species names and authorities) and the headwaters of a high-elevation stream containing noble fir along its upper reaches. Grass Mountain also contains a rock garden vegetation community representative of mountain vegetation in the Oregon Coast Range (Dyrness et al. 1975, Federal Register 1984, Franklin and Dyrness 1988).

Grass Mountain RNA was established in 1983 as a research natural area under the Salem Management Framework Plan (Federal Register 1984). The RNA is administered by the Salem District of the Bureau of Land Management (BLM) and managed as part of the Marys Peak Resource Area.

Access and Accommodations

Figure 1 shows road access up to the RNA boundary from U.S. Highway 34. Grass Mountain RNA is located approximately 5 mi (8 km) northwest of Alsea, Oregon, in sections 17, 20, 21, and 29, T. 13 S., R. 8 W., Willamette Meridian. Directions are as follows: From the town of Alsea proceed west on Highway 34 approximately 2.7 km (1.7 mi) to the junction of Follet Road. Turn north on Follet Road (14-8-3) and proceed 0.8 km (0.5 mi) to the junction of Mill Creek Road. Turn right on Mill Creek Road and continue north, uphill on the main roads 14-8-3.1, 13-8-35, and 13-8-23.1 for approximately 16 km (10 mi) to the junction of Road 13-8-15 at the summit of Easter Ridge. Turn left on Road 13-8-15 and stay to the left at any road junctions and proceed for 1.6 km (1 mi) to the gate at the northern edge of the Grass Mountain RNA. The road is closed at this point to vehicle traffic and washed out a short distance past the gate. Proceed 3.7 km (about 2.3 mi) on foot to the summit of Grass Mountain, an old lookout tower site.

¹We refer to “grass meadows” throughout the text, replacing the less descriptive term “grass bald.”

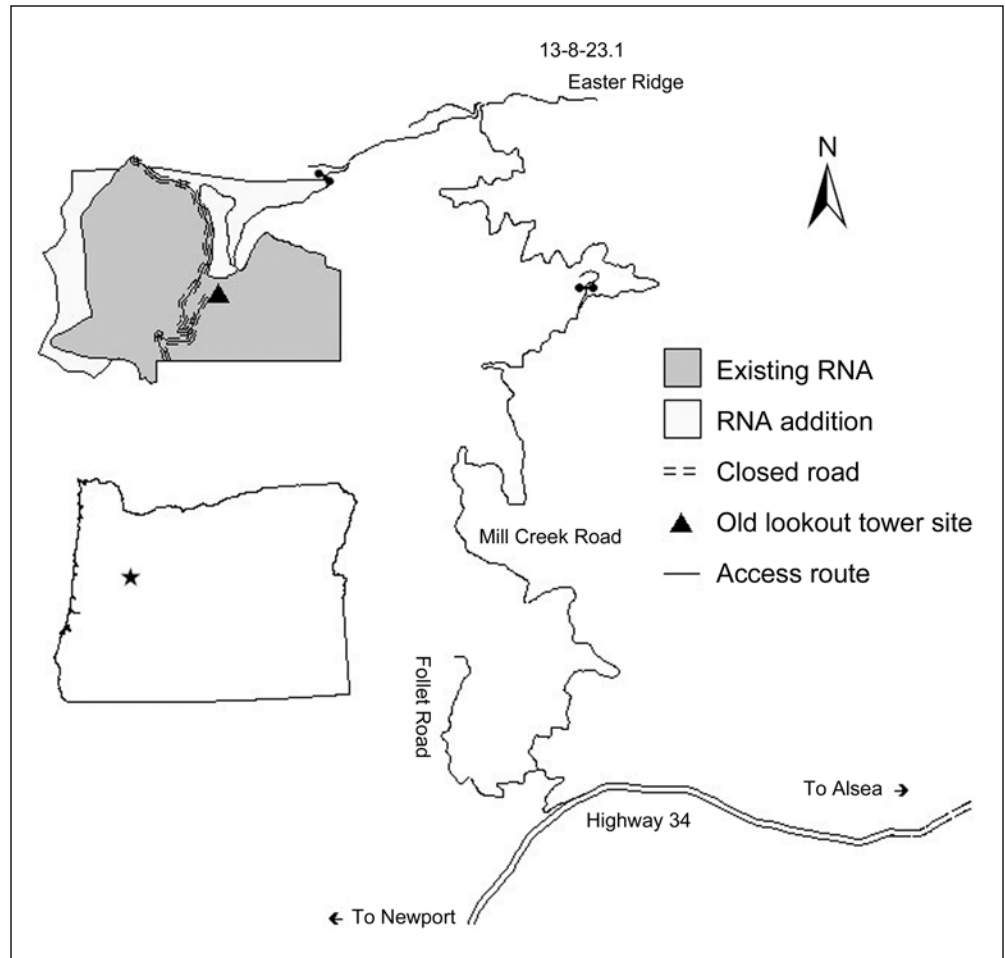


Figure 1—Grass Mountain Research Natural Area location and access.

There are no maintained trails within the RNA. However, past the gate described above, there is an existing roadway to the northernmost grass meadow, which is located on a north-south ridge approximately 1.9 km (1.2 mi) from the gate. From this point, all roadways have been decommissioned (earth berms and water bars). The decommissioned roadbed continues south to a grass meadow and turns back to the north to the summit of Grass Mountain in the vicinity of the old lookout tower. Another roadbed from near the summit connects to the southern boundary of the RNA to private lands and is also decommissioned and blocked by gates. Informal trails are present within some of the grass meadows. Foot travel may be restricted in some forested areas by ground vegetation and steep terrain. Permission is required to cross these lands. Alternate routes to the Grass Mountain RNA may be available. Please contact the Salem BLM, Marys Peak Resource Area for access information and to obtain permission to use the area. Lodging accommodation is available in Waldport, Oregon.

Environment

Elevations range from 560 m (1,837 ft) in the northwestern portion of the tract to 1098 m (3,603 ft) along the central ridge, which includes the Grass Mountain summit (fig. 2). Slope orientations are predominantly west-northwest and south-southeast, although a full range of slope aspects (360°) occurs within the RNA. Four perennial streams have their headwaters on Grass Mountain: Skunk Creek and Mill Creek flow south and southeast; Easter Creek flows northeast, and Cove Creek flows northwest. Figure 3 shows the first-, second-, and third-order reaches of Cove Creek in relation to the RNA boundary. Easter Creek flows directly into the North Fork Alsea River and is included in the North Fork Alsea River Watershed. Mill Creek flows directly into the mainstem Alsea River and both Skunk Creek and Cove Creek flow into Fall Creek, which flows into the mainstem of the Alsea River downstream from Mill Creek. Mill Creek, Skunk Creek, and Cove Creek are included in the Lower Alsea River Watershed.

The summit of Grass Mountain is capped by a gabbro sill, as much as 305 m (1,000 ft) thick. The mountain is a complex of three ridges of mafic intrusive granophyric gabbro and granophyric diorite (Baldwin 1964) in the form of an inverted “Y” trending north-south and connected at the intersection of the three ridges (Aldrich 1973). Dikes and sills of gabbro, diorite, and basalt are common in the Marys Peak and Alsea quadrangles. The gabbro cap is surrounded at lower elevations by rhythmically bedded sandstone and intercalated sandy siltstone of the Tye Formation (Baldwin 1955).

Soils along the upper slopes and ridgeline of Grass Mountain are moderately deep with depth to bedrock of 51 to 102 cm (20 to 40 in). Ridgeline soils supporting grass meadows have been mapped as Mulkey medial loam, 3- to 60-percent slopes, and are composed of colluvium derived from igneous bedrock, or residuum weathered from igneous rock. Grass bald soils are classified as medial, ferrihydritic Pachic Fulvicryands (USDA NRCS 2006).

Forest soils supporting noble fir (*Abies procera*) and Douglas-fir (*Pseudotsuga menziesii*) occupy about 25 percent of the RNA, and are mapped as Lurnick-Luckiamute-Maryspeak complex, 3- to 60-percent slopes. Parent material is colluvium derived from sandstone and siltstone. Soils are very cobbly to extremely cobbly sandy loam with a depth to bedrock of 102 cm (40 in). These soils occur at upper elevations on north- and south-facing slopes on Grass Mountain. They are classified as loamy skeletal, isotic Lithic and Andic Dystrocryepts. Other prominent forest soil mapping units occur within the RNA: Chintimini-Blodgett complex, 60- to 90-percent slopes, with loamy-skeletal, isotic, frigid, shallow Typic Dystrudepts; Chintimini-Blodgett-Fiverivers complex, 30- to 60-percent slopes, with fine-loamy,

Geology

Soils

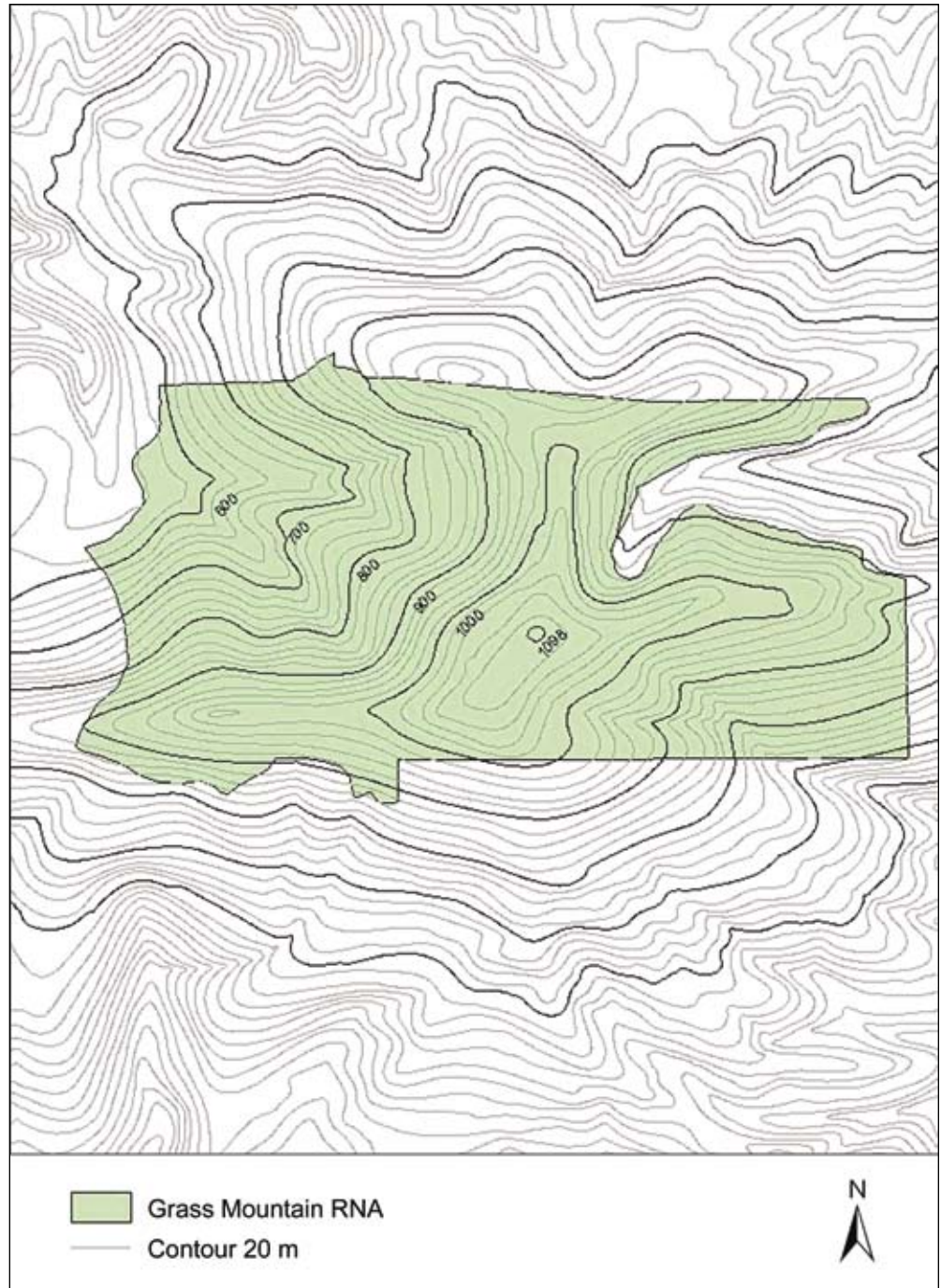


Figure 2—Grass Mountain Research Natural Area boundary and topographic map.

isotic, frigid Andic Dystrudepts; Burntwoods-Oldblue complex, 30- to 60-percent slopes with medial-skeletal over loamy-skeletal, mixed over isotic, frigid Typic Fulvudands; and Oldblue-Burntwoods complex, 5- to 30-percent slopes, with fine-loamy, isotic, frigid Andic Dystrudepts (USDA NRCS 2006).

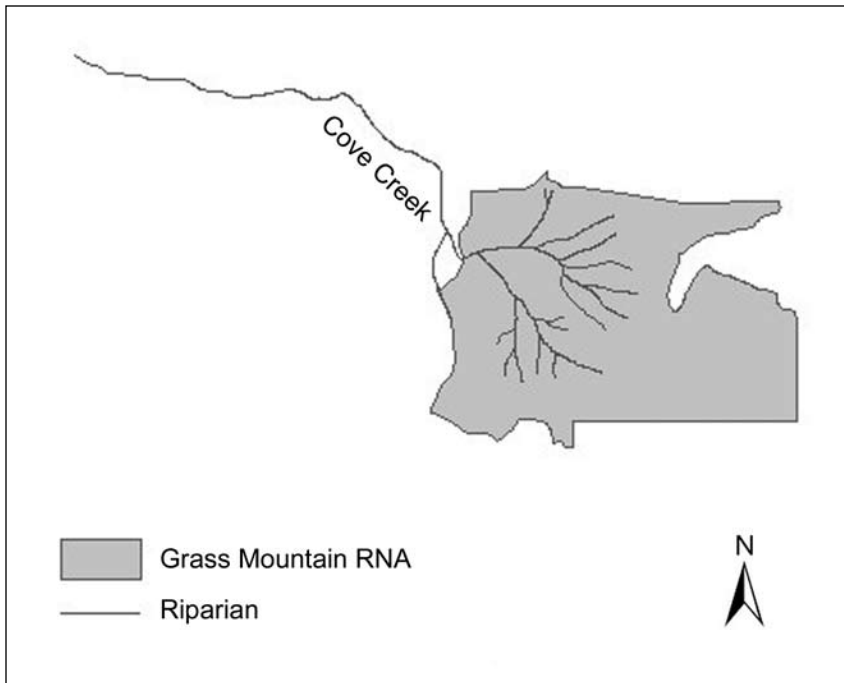


Figure 3—Cove Creek drainage basin showing headwater first-, second-, and third-order stream locations within Grass Mountain Research Natural Area.

Climate

The climate of Grass Mountain is strongly maritime and typical of wetter portions of the Oregon Coast Range. Grass Mountain is near the Pacific Ocean and is one of the highest peaks in the central Oregon Coast Range. As such, it directly intercepts moisture from storms moving inland off the Pacific Ocean. Winters are typically cool and wet. The majority of precipitation occurs November through March, mostly in the form of rain at lower elevations with an increasing proportion of snow at upper elevations on Grass Mountain. Summers are usually moderately dry and warm with the June-August period receiving about 5 percent of the total annual precipitation (Western Regional Climate Center 2006).

Snowfall data for 1978–2005 are from October through May. The highest monthly snowfall averages occurred between December and March. January received the highest average monthly snowfall of 59 cm (23 in), with average monthly maximum snow depths of 25.4 cm (10 in). Average monthly snow depth in excess of 5.1 cm (2 in) occurred from November through April (Western Regional Climate Center 2006). Microclimatic conditions differ significantly with elevation, slope, and aspect.

Meteorological data from the nearest climate station of comparable elevation in the Oregon Coast Range are taken from Laurel Mountain. The climate station at

Maritime Climate

Laurel Mountain is located approximately 56.3 km (35 mi) north-northeast of the RNA. The Laurel Mountain station is located slightly below the mountain summit at 1094 m (3,589 ft) elevation. In comparison, Grass Mountain summit is 1098 m (3,603 ft) elevation.

Climate data for Laurel Mountain, Oregon. Period of Record: 3/1/1978 to 9/30/2005—Laurel Mountain, Oregon (Station 354776)

Average minimum January temperature	-0.8 °C (30.5 °F)
Average maximum January temperature	4.4 °C (40.0 °F)
Average minimum July temperature	9.3 °C (48.7 °F)
Average maximum July temperature	18.7 °C (65.6 °F)
Average annual precipitation	3132 mm (123.30 in)
Average June–August precipitation	160 mm (6.30 in)
Average annual snowfall	2995 mm (117.9 in)

Vegetation

Grass Mountain lies within the *Tsuga heterophylla* Zone (Franklin and Dyrness 1988) where western hemlock is the potential climax species in the absence of major disturbance. The zone is widespread and occupies much of the Oregon Coast Range and the western slopes of the Cascade Mountains. In the Oregon Coast Range today, Douglas-fir often is a major overstory dominant in stands that have developed over the past 175 years following logging, fire, or both logging and fire. Even old-growth (400+ years) stands, not directly modified by human activity, often have Douglas-fir as a major overstory component (Franklin and Dyrness 1988).

Upper elevations on Grass Mountain are typical of high peaks in the central Oregon Coast Range in supporting noble fir as a major overstory component. Ridgelines and upper slopes of Grass Mountain are dominated by noble fir or by mixed stands of noble fir, Douglas-fir, and western hemlock. Larger trees and snags are predominantly Douglas-fir. Sapling densities in these stands are an even mix of noble fir and western hemlock. Regeneration of Douglas-fir is minor in these closed-canopy settings. However, Douglas-fir is present in minor amounts as a sapling in forest openings and edges bordering grass meadows and rock gardens. Tree recruitment is primarily noble fir and western hemlock within closed, shaded forest understories.

In 2004, four permanent vegetation transects were established across forest-meadow ecotones² to characterize stand structure and vegetation composition and to establish a baseline to assess the pattern and rate that trees and shrubs

Douglas-fir an overstory dominant

Noble fir at higher elevations

Permanent vegetation transects established

² An “ecotone” is a transition area between two adjacent ecological communities.

are invading the grass meadows. Four, 100-m-long transects were established so that roughly 50 m occurred within closed forest, and 50 m extended through a forest/meadow transition into an (open) grass meadow. Tree seedling³ and sapling⁴ densities were tallied within a 20-m-wide belt along the 100-m transect in both the closed forest and extending into the grass meadow (table 1). Eighty percent of the seedlings in the closed forest were noble fir, and the remainder were Douglas-fir and western hemlock (10 percent each). Densities of seedlings in the grass meadow are comparable, but the distribution of species differs considerably. In the grass meadow, noble fir and Douglas-fir compose 50 and 46 percent, respectively, western hemlock only 4 percent. The smaller contribution of Douglas-fir seedlings in the forest can be attributed to the species' shade-intolerance in the closed-canopy forest environment. The pattern is reversed for western hemlock, which has more than twice as many seedlings in the shaded forest compared to the grass meadow. The lack of downed wood in the grass meadow may account for the lack of western hemlock regeneration.

³ "Seedlings" refers to individual trees 10 cm to 1.47 m (4 in to 4.8 ft) in height.

⁴ "Saplings" refers to individual trees greater than 1.47 m (4.8 ft) in height, and less than 5 cm (2 in) diameter at breast height.

Table 1—Seedling and sapling number and density in four, 20-by 100-m belt transects, Grass Mountain Research Natural Area

Forest segment 0–50 m												
Transect	Seedlings						Saplings					
	PSME		ABPR		TSHE		PSME		ABPR		TSHE	
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	
112	0	0	0	0	0	0	0	0	0	0	0	0
113	7	47	73	65	2	14	0	0	5	71	5	71
114	5	33	20	18	0	0	0	0	0	0	0	0
115	3	20	20	18	12	86	0	0	2	29	2	29
Total	15		113		14		0		7		7	

Meadow grassland segment 50–100 m												
Transect	Seedlings						Saplings					
	PSME		ABPR		TSHE		PSME		ABPR		TSHE	
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	
112	0	0	12	21	5	100	0	0	0	0	4	80
113	1	2	0	0	0	0	0	0	0	0	0	0
114	10	20	18	32	0	0	0	0	0	0	0	0
115	40	78	27	47	0	0	2	100	3	100	1	20
Total	51		57		5		2		3		5	

Note: PSME = *Pseudotsuga menziesii*; ABPR = *Abies procera*; TSHE = *Tsuga heterophylla*.

**Conifer invasion into
grass meadow**

The total number of saplings present within both the forest and the grass meadow segments is low when compared to the tree seedling densities. For all trees combined, seedling densities are 10 times sapling densities in the combined forest transect segments (142 to 14) and in the grass meadow segments (113 to 10) (table 1). One possible explanation for this may be heavy snowpacks abrading and uprooting saplings as the snowpack moves gravitationally downslope.

Describing density only in terms of numbers obscures the spatial pattern of tree invasion into the meadow that is so prominent in the field. That is, the very large majority of both seedlings and saplings were spatially clustered along the forest/ecotone edge, and appear to be encroaching into the grass meadow incrementally along a more-or-less continuous advancing front. Although a few outlier seedling colonies occurred in the open meadow, these composed only a small percentage of the total densities for any tree species occurring within the meadow.

In his reference to grass meadow invasion by trees in the mid-1970s, Aldrich (1973) observed "...almost no tree growth occurred within the grass meadows except for a few Douglas-fir on the north and upper perimeter of the meadows." The interior of the grass meadow was entirely free of conifer growth at that time. The data described above and in table 1 indicate that meadow invasion has progressed along an advancing front in the past 30 to 40 years. Field observation suggests this pattern of invasion is supplemented in a minor way by seedling establishment adjacent to the few mature trees located in the central parts of the grass meadow.

Tree age data were also collected within each of four 20- by 100-m belt transects. A minimum of four dominant trees were sampled within each transect. A total of 20 trees were cored. Tree diameters at core height (about 1.47 m) and ages of 12 noble fir, 7 Douglas-fir, and 1 western hemlock reflect a major period of postwildfire forest establishment from 1909 to 1919. Diameters at core height ranged between 49 and 116 cm (19 and 46 in). Tree ages ranged from 66 years old to 97 years. Median tree age of the 20 cores was 90 years old. Ages of current forest canopy trees were similar for all species. Figure 4 shows the age-class distribution of forested stands within the Grass Mountain RNA.

Grass Mountain RNA is one of the southernmost locations of naturally occurring noble fir within the Oregon Coast Range. The noble fir plant community may be a relic from past climatic conditions when noble fir was probably more widespread in the Oregon Coast Range (Hemstrom and Logan 1986). Noble fir-dominated plant communities occur sporadically on high peaks and ridges north of Grass Mountain into Washington where the community is more prevalent.

Because noble fir often occurs at densities greater than 10 percent on Grass Mountain, the noble fir community would fall into the Pacific silver fir series as

Tree age data

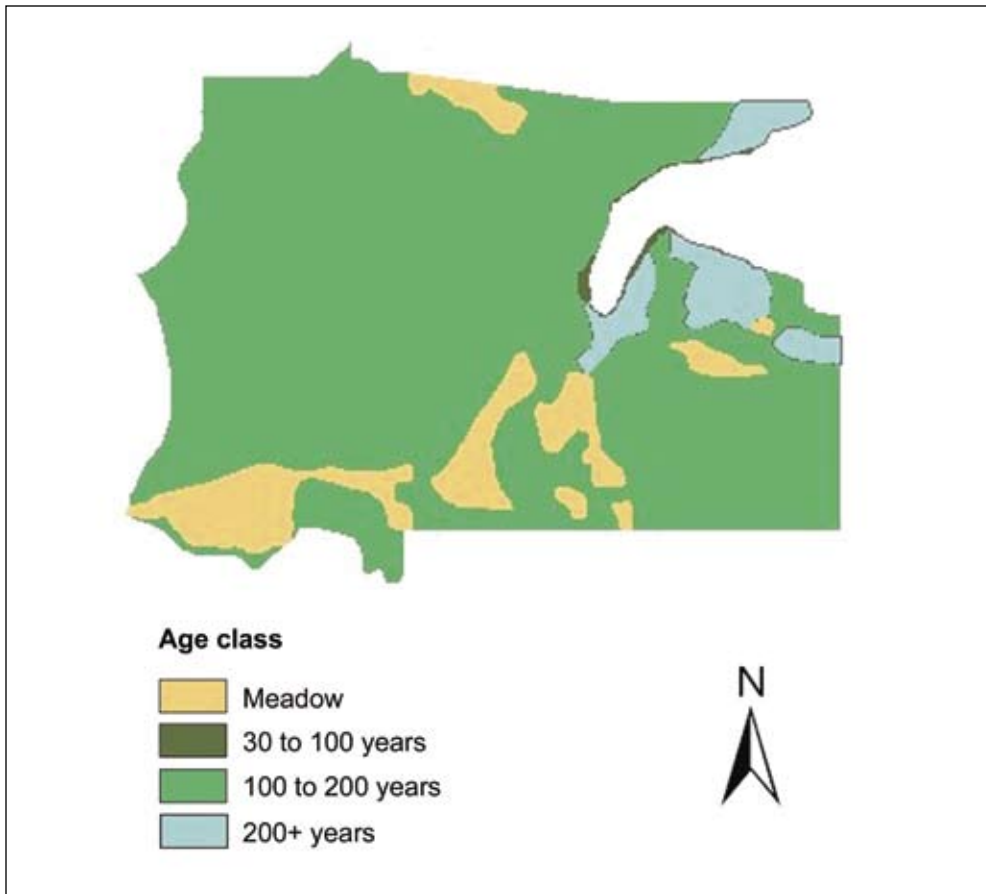


Figure 4—Forest stand age-class distribution within Grass Mountain Research Natural Area.

described by McCain and Diaz (2002). However, McCain and Diaz cautioned, “there are places in the Coast Range where noble fir occurs, but Pacific silver fir is absent. In this guide [*Field Guide to the Forested Plant Associations of the Northern Oregon Coast Range*], such sites are being treated in the Pacific silver fir series.” Both McCain and Diaz (2002) and Hemstrom and Logan (1986) pointed out that vegetation of the noble fir community is similar to that of the Pacific silver fir series described from the Cascade Mountains. However, Hemstrom and Logan (1986) stated, “We do not have a sufficient sample of noble fir dominated communities to develop floristic descriptions or assign a plant association name.” McCain and Diaz (2002) also discussed limited occurrences of western hemlock associations having a noble fir component within the Oregon Coast Range, and both of these associations were unclassified. In this guidebook, we treat the noble fir component as a community type within the western hemlock association, as Pacific silver fir (*Abies amabilis*) has not been verified to occur on Grass Mountain.

Data on trees, shrubs, and herbs were used to provisionally classify forest plant associations⁵ and grass meadow plant community types.⁶ Each transect was divided into a 20- by 50-m forest segment and a 20- by 50-m grass meadow segment. Table 2 summarizes the physical features of the four 20- by 100-m transects. Tables 3 and 4 document percentage of foliar cover and frequency of understory herbs and shrubs⁷ (cover only).

Table 2—Physical features of four permanent transects in Grass Mountain Research Natural Area

Transect features	Transect			
	112	113	114	115
Length (m)	100	100	100	100
Elevation (m)	973	947	1043	1048
Aspect (°)	183	130	144	122
Slope grade (%/°)	54/28	52/27	35/19	60/31
Slope position	Mid	Mid	Mid	Mid

**Western hemlock/
Oregon oxalis plant
association**

Figure 5 shows an example of the understory and midcanopy conditions of the western hemlock/Oregon oxalis (*Tsuga heterophylla/Oxalis oregana*) plant association taken from forested parts of transect 113 (table 3). Douglas-fir and noble fir occupy the forest canopy, and the shade-tolerant western hemlock occurs as seedlings, saplings, and subcanopy individual trees. Stand age is approximately 95 years old. Douglas-fir live-stem diameters range from 52 to 103 cm diameter at breast height (d.b.h.). Noble fir live-stem diameters range from 54 to 89 cm d.b.h. Douglas-fir is present as standing and downed coarse woody debris. Vine maple (*Acer circinatum*), and hazelnut (*Corylus cornuta* var. *californica*) occur sporadically as tall shrubs. Salal (*Gaultheria shallon*) is prominent, but patchy, in the medium shrub layer. Understory ferns and herbs typically include Oregon oxalis

⁵“Plant associations” are described by vegetation having a specific range of biophysical environment that is repeated in similar environments across the landscape. Their environment is typically defined by moisture and temperature regimes, light, and soil nutrients (McCain and Diaz 2002). Plant association names are based on the dominant and/or diagnostic plant species of two or more vegetation layers currently present or having the potential to develop barring major environmental or human-induced disturbance.

⁶“Plant community” and “plant community type” refer to current, existing vegetation (not future or potential) that occupies specific biophysical environments. These may occur in response to natural or human-induced disturbance regimes (e.g., domestic livestock grazing, fire suppression, windthrow resulting from timber cutting patterns). Plant community and plant community type names are based on existing (not potential) dominant or diagnostic plant species in two or more vegetation layers.

⁷These data are on file at the Salem District office of the Bureau of Land Management, and at the USDA Forest Service, Pacific Northwest Research Station, Corvallis, Oregon.

Table 3—Shrub cover and herbaceous cover and frequency in forested portions of four permanent transects in Grass Mountain Research Natural Area

Species	Transect							
	112		113		114		115	
	Cover ^a	Frequency ^b	Cover	Frequency	Cover	Frequency	Cover	Frequency
	<i>Percent</i>							
Shrubs:								
<i>Gaultheria shallon</i> ^c	20	—	6	—	—	—	1	—
<i>Corylus cornuta</i> var. <i>californica</i>	12	—	tr	—	—	—	—	—
<i>Acer circinatum</i>	—	—	1	—	—	—	—	—
<i>Vaccinium parvifolium</i>	—	—	1	—	—	—	—	—
Herbs, grasses, and ferns:								
<i>Maianthemum stellatum</i>	7	41	1	12	38	100	11	53
<i>Oxalis oregana</i>	23	53	17	59				
<i>Polystichum munitum</i>	2	12	7	18				
<i>Anemone deltoidea</i>	3	35	1	24	1	12	2	35
<i>Viola sempervirens</i>	3	35	1	18	tr	18	2	35
<i>Claytonia sibirica</i>	tr	12	tr	6			1	12
<i>Moehringia macrophylla</i>	tr	12	tr	6				
<i>Viola glabella</i>	tr	12	tr	6				
<i>Galium oreganum</i>	tr	6	tr	6				
<i>Bromus vulgaris</i>	1	18						
<i>Synthyris reniformis</i>	1	12						
<i>Dicentra formosa</i>	1	6						
<i>Cardamine</i> sp.	tr	12						
<i>Asarum caudatum</i>	tr	6						
<i>Coptis laciniata</i>	tr	6						
<i>Luzula parviflora</i>	tr	6						
<i>Iris chrysophylla</i>	tr	6						
<i>Campanula scouleri</i>	1	12					1	12
<i>Osmorhiza berteroi</i>	tr	12					1	6
<i>Prosartes smithii</i>	tr	6					1	6
<i>Vancouveria hexandra</i>	1	6			2	18		
<i>Trillium ovatum</i>			tr	6				
<i>Melica subulata</i>			tr	6				
<i>Clintonia uniflora</i>					1	12	1	18
<i>Xerophyllum tenax</i>					7	18		
<i>Rubus ursinus</i>					tr	6		

Note: tr = trace (<0.5 percent foliar cover); — = not recorded.

^aCover is expressed as percentage of foliar cover; zero values are not included.

^bFrequency is expressed as percentage of occurrence within fifty 20- by 50-cm plots.

^cSee appendix 1 for a listing of scientific and common names.

(*Oxalis oregana*), starry false-Solomonseal (*Maianthemum stellatum*), western swordfern (*Polystichum munitum*), three-leaved anemone (*Anemone deltoidea*), and redwoods violet (*Viola sempervirens*). Based on elevation, soil depth, forest overstory composition, and understory tree reproduction, forested portions of belt transects 112 and 113 are classified as seral stands of the western hemlock/Oregon oxalis plant association (McCain and Diaz 2002).

Table 4—Herbaceous cover and frequency in grass meadow portions of four permanent transects in Grass Mountain Research Natural Area

Species	Transect							
	112		113		114		115	
	Cover ^a	Frequency ^b	Cover	Frequency	Cover	Frequency	Cover	Frequency
	<i>Percent</i>							
Herbs, grasses, and ferns:								
<i>Elymus glaucus</i> ^c	29	81	20	94	6	56		
<i>Carex californica</i>	11	69	16	81	12	81	31	100
<i>Pteridium aquilinum</i>	5	31	7	63	2	19	5	31
<i>Rumex acetosella</i>	1	31	tr	6	8	100	19	94
<i>Maianthemum stellatum</i>	3	25	tr	6	19	63	tr	6
<i>Rubus ursinus</i>	3	38	35	100	14	56		
<i>Melica subulata</i>	1	6	2	25	tr	13	1	31
<i>Anemone deltoidea</i>	tr	6	tr	6	tr	13	tr	6
<i>Viola adunca</i>	tr	13			tr	6	4	50
<i>Festuca roemerii</i> / <i>F. rubra</i>	tr	6			tr	6	1	13
<i>Iris chrysophylla</i>	2	19			6	69	2	50
<i>Moehringia macrophylla</i>	1	13			1	25	6	44
<i>Thermopsis montana</i>	1	13						
<i>Vancouveria hexandra</i>	1	6						
<i>Fragaria virginiana</i>	1	6						
<i>Nemophila parviflora</i>	tr	6						
<i>Viola sempervirens</i>	tr	6						
<i>Oxalis oregana</i>	tr	6						
<i>Anemone lyallii</i>	tr	6						
<i>Bromus vulgaris</i>	2	19						
<i>Galium oreganum</i>	4	25	1	6				
<i>Galium triflorum</i>	tr	13	1	50				
<i>Osmorhiza berteroi</i>	1	6	tr	6				
<i>Cardamine</i> sp.	tr	25	tr	13				
<i>Viola glabella</i>	1	13	3	56	tr	6		
<i>Achillea millefolium</i>	2	19	1	13	4	25		
<i>Poa</i> sp.	1	31	tr	6	tr	6		
<i>Cerastium arvense</i>	1	13	tr	19	tr	19		
<i>Synthyris reniformis</i>	1	6	tr	6	1	6		
<i>Poa compressa</i>			tr	6	tr	25	tr	6
<i>Claytonia sibirica</i>			tr	6			tr	6
<i>Carex pachystachya</i>			tr	6	tr	6		
<i>Oxalis suksdorfii</i>			3	63				
<i>Cirsium vulgare</i>			1	13				
<i>Collinsia parviflora</i>			tr	6				
<i>Danthonia californica</i>					tr	6		
<i>Phlox gracilis</i>					tr	13	1	6
<i>Lupinus latifolius</i>							5	31
<i>Digitalis purpurea</i>							1	13
<i>Hypochaeris radicata</i>							tr	6

Note: tr = trace (<0.5 percent foliar cover).

^aCover is expressed as percentage of foliar cover; zero values are not included.

^bFrequency is expressed as percentage of occurrence within 50, 20- by 50-cm plots.

^cSee appendix 1 for a listing of scientific and common names.



Figure 5—Vegetation of the western hemlock/Oregon oxalis plant association (taken from transect 113). The forest canopy is co-dominated by Douglas-fir and noble fir. Shade-tolerant western hemlock dominates forest regeneration. Stand age is approximately 95 years. Douglas-fir live-stem diameters range from 52 to 103 cm. Noble fir live-stem diameters range from 54 to 89 cm diameter at breast height. Douglas-fir is present as standing and downed coarse woody debris. In canopy openings, vine maple and hazelnut occur sporadically as tall shrubs. Ground vegetation includes Oregon oxalis, starry false-Solomonseal, western swordfern, three-leaved anemone, and redwoods violet.

Owing to the paucity of diagnostic shrubs and herbs, no attempt has been made to classify plant associations occurring within belt transects 114 and 115 (table 3), which are located within noble fir forest stands (fig. 3). As an alternative, plant community names are provisional and are based solely on current vegetation dominants in the tree and herb layers. As such, forested portions of transects 114 and 115 are seral stands currently dominated by noble fir or noble fir with Douglas-fir (transect 115) in the tree layer and starry false-Solomonseal in the herbaceous understory (fig. 6). Shrubs are absent or very sparse in these belt transects. A provisional community type name for these stands is *Abies procera/Maianthemum stellatum*.

Seral noble fir stands



Figure 6—Vegetation of the upper elevation Douglas-fir–noble fir plant community (taken from transect 115). The overstory is co-dominated by noble fir and Douglas-fir and is approximately 95 years old. Western hemlock and noble fir regeneration predominate in the closed forest. Shrubs are mostly absent. Starry false-Solomonseal forms a dense ground cover.

Forested midslopes of Grass Mountain, not sampled by the four transects, have not been classified as plant associations or plant community types. This area lies within the *Tsuga heterophylla* Zone (Franklin and Dyrness 1988, McCain and Diaz 2002) and occupies a broad range of elevations and varied aspects within the RNA. It is expected that many plant associations within the *Tsuga heterophylla* Zone are present on Grass Mountain.

Grass meadow plant composition

Grass meadows occupy the summit ridgeline and adjacent south- to southeast-facing upper slopes of Grass Mountain. Grass meadow vegetation has been classified in the Oregon Coast Range by Aldrich (1973), who identified two climax plant associations: blue wildrye (*Elymus glaucus*), and Martindale's desert parsley (*Lomatium martindalei*); and two seral plant community types: Ross' sedge (*Carex rossii*) and hook violet (*Viola adunca*).

Prominent meadow species on Grass Mountain are a mix of native and introduced species. Common native species include (table 4) blue wildrye (*Elymus*

glaucus), California sedge (*Carex californica*), California brome (*Bromus carinatus*), bracken fern (*Pteridium aquilinum*), starry false-Solomonseal (*Maianthemum stellatum*), slender-tubed iris (*Iris chrysophylla*), Chamisso sedge (*Carex pachystachya*), Ross' sedge (*Carex rossii*), hook violet, bigleaf sandwort (*Moehringia macrophylla*), and trailing blackberry (*Rubus ursinus*). Nonnative species include sheep sorrel (*Rumex acetosella*), Kentucky bluegrass (*Poa pratensis*), and Canada bluegrass (*Poa compressa*).

The conspicuous presence and abundance of nonnative, invasive species such as Kentucky bluegrass, Canada bluegrass, and sheep sorrel coupled with native species such as bracken fern, which increase with soil disturbance, reflect the partial degradation of the grass meadow. This condition has resulted, at least in part, from periodic use by domestic livestock during much of the 20th century (see "Site History").

The summit ridgeline of Grass Mountain also supports small areas of rocky soil, which are inhabited primarily by herbaceous species. Aldrich (1973) has identified this plant community in similar habitats on Grass Mountain and other high peaks in the Oregon Coast Range, including Prairie Peak, Roman Nose Mountain, and Saddle Mountain. The most common diagnostic plant species that occurs in this community type is *Lomatium martindalei* (Martindale's desert parsley). Other conspicuous native herbs include *Lupinus lepidus* (prairie lupine), *Erythronium oregonum* (Oregon fawnlily), and the native grass *Koeleria macrantha* (prairie junegrass). Nonnative species also characterize this community type. The most prominent of these are the herbaceous *Hypochaeris radicata* (hairy cat's-ear) and two small annual grasses: *Aira praecox* (little hairgrass) and *Aira caryophyllea* (silver hairgrass).

Appendix 1 lists plant species known or likely to occur within Grass Mountain RNA. Species lists are arranged by growth form, and both scientific and common names are provided. Appendix 2 lists scientific names of fungi likely to occur within the RNA based largely on the vegetative and environmental similarities between Grass Mountain and the more extensively researched Marys Peak to the east (Hawley et al. 1975).

Fauna

Appendix 3 lists amphibians, reptiles, birds, mammals, and insects likely to occur at Grass Mountain RNA. These lists have been compiled from a combination of field observations, habitat types present, and species range maps. Together, they represent an informed approximation of species expected to occur within or use the RNA for portions of their life cycles (Csuti et al. 1997, Hawley et al. 1975).

Invasive species

"Rock garden" plant composition

Disturbance History

The Oregon Coast Range is characterized by a pattern of large-scale (some greater than 20,000 ac), infrequent (150- to 300-year mean fire-return interval) stand-replacement fires typical of cool moist climates where lightning is uncommon (Agee 1990). Drought conditions in the Oregon Coast Range occur infrequently. However, during drought periods, lightning plays an increased role in occurrence of fire, and fire intensity can be high and lead to extensive stand-destroying crown fires (Agee 1993). Almost all natural (i.e., unlogged) coniferous forest stands within the northern Oregon Coast Range are first- or multigeneration stands originating from fire. Fire has occurred throughout the area in recent times and probably has helped maintain the open structure of the grass meadows.

Although the Oregon Coast Range can receive storm winds exceeding 161 km per hour (100 mi per hour) (Western Region Climate Center 2006), there is little current evidence of large-scale windthrow within the RNA. Damage resulting from insects or disease is of minor significance.

Research History

The Grass Mountain grass bald complex was one of six research study areas used by Aldrich (1973) in his Ph.D. thesis, "A Chorological Analysis of the Grass Balds in the Oregon Coast Range." Magee (1985) has studied the process of conifer invasion into grass balds along meadow-forest transitions (ecotones) adjacent to noble fir stands on Marys Peak, Oregon. Juday (1976) classified old-growth Douglas-fir forests in the Oregon Coast Range. This work placed the natural forest stands on Grass Mountain into a regional perspective, which subsequently contributed to conservation planning by identifying both the unique features and representative aspects of the forests on Grass Mountain (Oregon Natural Heritage Program 2003).

Four permanent vegetation plots were established in 2006 to characterize and monitor change in forest composition and structure (the project is summarized, in part, in tables 1, 2, 3, and 4.) Data are on file at the Salem District office of the BLM, and the Pacific Northwest (PNW) Research Station, USDA Forest Service, Corvallis, Oregon.

Although they did not specifically conduct research, Hawley et al. (1975) compiled historical land use information and species lists from secondary sources as part of a site recommendation made to designate Grass Mountain as an RNA.

Site History

In the early days of settlement by Euro-Americans, ranchers drove their livestock to the top of Grass Mountain to graze their animals as they did in other grass meadows in the Oregon Coast Range. This practice was discontinued, then resumed for 20 years beginning in 1954. No grazing by domestic livestock has been permitted on Grass Mountain since 1974 (USDI BLM 1984).

An Oregon state forestry lookout tower was built on the summit of Grass Mountain in the late 1930s. In 1955, BLM clearcut a 3-ha (7.5-ac) area of forest immediately adjacent to the lookout tower to improve visibility from the tower. The tower was decommissioned and dismantled in 1970 (USDI BLM 1984).

Over the years, Grass Mountain has been visited by hunters, hikers, sightseers, picnickers, and, more recently, by all-terrain-vehicle users. In the past, BLM issued permits for the collection of noble fir cones but has discontinued this practice. Several private companies and organizations have inquired about using Grass Mountain for communications purposes, especially for radio relay (USDI BLM 1984).

A mineral resource analysis by BLM indicates that lands within the RNA are prospectively valuable for oil and gas and salable minerals, but are without value for locatable minerals. Sections 20 and 29 are currently under lease for oil and gas. No other form of mineral entry is presently in effect. There is no history of minerals production on the site (USDI BLM 1984).

Maps and Aerial Photography

Maps applicable to Grass Mountain RNA:

Topographic—Falls City 7.5 minute 1:24,000 scale, 1974; BLM Salem District Westside Recreation Map 1:10,560 1996.

Aerial photography:

2003 color 1:12,000 (6-26-2003 BLM 12 0-03-SAL 14-20, 0-20, 21, 24, 25); 1993 (8-1-1993 BLM 12 0-93-ASC 40-23-27); and 1982 (5-29-1982 BLM 12 0-82-ASC 9-18 23, 24, 25, 26).

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English Equivalentents

1 hectare (ha) = 2.47 acres (ac)

1 kilometer (km) = 0.62 mile (mi)

1 meter (m) = 3.28 feet (ft)

1 centimeter (cm) = 0.394 inch (in)

1 millimeter (mm) = 0.0394 inch

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Appendix 1: Plants

Table 5—Plants known or expected to occur within Grass Mountain Research Natural Area^{a b}

Scientific name	Common name
Coniferous trees:	
<i>Abies amabilis</i> (Dougl.) Forbes	Pacific silver fir
<i>Abies procera</i> Rehder	Noble fir
<i>Pseudotsuga menziesii</i> (Mirbel) Franco.	Douglas-fir
<i>Tsuga heterophylla</i> (Raf.) Sarg.	Western hemlock
Deciduous trees >8 m (26.3 ft) tall:	
<i>Acer macrophyllum</i> Pursh	Bigleaf maple
<i>Alnus rubra</i> Bong.	Red alder
<i>Prunus emarginata</i> (Dougl.) Walpers	Bitter cherry
<i>Rhododendron macrophyllum</i> G. Don	Pacific rhododendron
Tall shrubs 2 to 8 m (6.6 to 26.3 ft) tall:	
<i>Acer circinatum</i> Pursh	Vine maple
<i>Amelanchier alnifolia</i> Nutt.	Serviceberry
<i>Chrysolepis chrysophylla</i> (Dougl. ex Hook.) Hjelmqvist	Golden chinquapin
<i>Corylus cornuta</i> L. var. <i>californica</i> (DC.) Sharp	Hazelnut
<i>Holodiscus discolor</i> (Pursh) Maxim.	Oceanspray
Medium shrubs 0.5 to 2 m (1.6 to 6.6 ft) tall:	
<i>Gaultheria shallon</i> Pursh	Salal
<i>Ribes bracteosum</i> Dougl.	Stink currant
<i>Rosa gymnocarpa</i> Nutt.	Baldhip rose
<i>Rubus spectabilis</i> Pursh	Salmonberry
<i>Symphoricarpos alba</i> (L.) Blake	Common snowberry
<i>Vaccinium membranaceum</i> Dougl. ex Hook.	Blue huckleberry
<i>Vaccinium parvifolium</i> Smith	Red huckleberry
Low shrubs <0.5 m (1.6 ft) tall:	
<i>Berberis nervosa</i> Pursh	Oregongrape
<i>Chimaphila menziesii</i> (R. Br.) Spreng.	Little Prince's-pine
<i>Linnaea borealis</i> L. var. <i>longiflora</i> Torr.	Western twinflower
Ferns and allies:	
<i>Athyrium filix-femina</i> (L.) Roth.	Lady fern
<i>Blechnum spicant</i> (L.) With.	Deerfern
<i>Lycopodium clavatum</i> L.	Runningpine club moss
<i>Polypodium glycyrrhiza</i> DC. Eat.	Licorice fern
<i>Polystichum munitum</i> (Kaulf.) Presl	Western swordfern
<i>Pteridium aquilinum</i> (L.) Kuhn.	Bracken fern
Herbs:	
<i>Achillea millefolium</i> L.	Yarrow
<i>Achlys triphylla</i> (Smith) DC.	Vanilla leaf
<i>Actaea rubra</i> (Ait.) Willd.	Western red baneberry
<i>Adenocaulon bicolor</i> Hook.	Pathfinder
<i>Anaphalis margaritacea</i> (L.) B. & H.	Pearly-everlasting
<i>Anemone deltoidea</i> Hook.	Three-leaved anemone
<i>Anemone lyallii</i> Britt.	Lyall's anemone

Scientific name	Common name
<i>Aquilegia formosa</i> Fisch.	Red columbine
<i>Arabis</i> sp.	Rockcress
<i>Arnica latifolia</i> Bong.	Broadleaf arnica
<i>Asarum caudatum</i> Lindl.	Wild ginger
<i>Campanula scouleri</i> Hook. ex A. DC.	Scouler's harebell
<i>Cardamine</i> sp.	Toothwort
<i>Cardamine nuttallii</i> Greene	Slender toothwort
<i>Cerastium arvense</i> (L.) Scop.	Field chickweed
<i>Cerastium glomeratum</i> Thuill.	Sticky chickweed
<i>Circaea alpina</i> L.	Alpine circaea
<i>Cirsium arvense</i> (L.) Scop.	Canada thistle
<i>Cirsium vulgare</i> (Savi) Tenore	Bull thistle
<i>Claytonia perfoliata</i> (Donn) Howell	Miner's lettuce
<i>Claytonia sibirica</i> (L.) Howell	Siberian miner's lettuce
<i>Clintonia uniflora</i> (Schult.) Kunth	Bride's bonnet
<i>Collinsia parviflora</i> Lindl.	Small-flowered blue-eyed-Mary
<i>Collomia heterophylla</i> Hook.	Varied-leaf collomia
<i>Coptis laciniata</i> Gray	Cut-leaf goldthread
<i>Corallorhiza mertensiana</i> Bong.	Pacific coralroot
<i>Crepis capillaris</i> (L.) Wallr.	Smooth hawkbeard
<i>Delphinium menziesii</i> DC.	Menzies' larkspur
<i>Dicentra formosa</i> (Andr.) Walpers	Pacific bleedingheart
<i>Digitalis purpurea</i> L.	Foxglove
<i>Epilobium angustifolium</i> L.	Fireweed
<i>Epilobium brachycarpum</i> C. Presl	Tall annual willowherb
<i>Erythronium oregonum</i> Appleg.	Oregon fawnlily
<i>Fragaria vesca</i> L. var. <i>bracteata</i> (Heller) Davis	Woods strawberry
<i>Fragaria virginiana</i> Duchesne var. <i>platypetala</i> (Rydb.) Hall	Broadpetal strawberry
<i>Galium boreale</i> L.	Northern bedstraw
<i>Galium oregonum</i> Britt.	Oregon bedstraw
<i>Galium triflorum</i> Michx.	Sweetscented bedstraw
<i>Goodyera oblongifolia</i> Raf.	Western rattlesnake plantain
<i>Hieracium albiflorum</i> Hook.	White-flowered hawkweed
<i>Hydrophyllum tenuipes</i> Heller	Slender-stem waterleaf
<i>Hypochaeris radicata</i> L.	Hairy cat's-ear
<i>Iris chrysophylla</i>	Slender-tubed iris
<i>Lilium columbianum</i> Hanson	Tiger lily
<i>Listera caurina</i> Piper	Western twayblade
<i>Listera cordata</i> (L.) R. Br.	Heart-leaf twayblade
<i>Lomatium martindalei</i> Coult. & Rose	Martindale's desert parsley
<i>Lotus micranthus</i> Benth.	Field lotus
<i>Lupinus latifolius</i> Agardh.	Broadleaf lupine
<i>Lupinus lepidus</i> Dougl.	Prairie lupine
<i>Maianthemum stellatum</i> (L.) Desf.	Starry false-Solomonseal
<i>Mimulus dentatus</i> Nutt. ex Benth.	Tooth-leaved monkeyflower
<i>Mitella ovalis</i> Greene	Oval-leaved mitrewort
<i>Moehringia macrophylla</i> (Hook.) Fenzl	Bigleaf sandwort
<i>Monotropa hypopithys</i>	Pinesap
<i>Montia parvifolia</i> (Moc.) Greene	Streambank springbeauty
<i>Nemophila parviflora</i> Dougl. ex Benth.	Smallflower nemophila

Scientific name	Common name
<i>Orthocarpus pusillus</i> Benth.	Dwarf owl-clover
<i>Osmorhiza berteroi</i> DC.	Mountain sweet-cicely
<i>Oplopanax horridus</i> (Smith) Miq.	Devilsclub
<i>Oxalis oregana</i> Nutt.	Oregon oxalis
<i>Oxalis suksdorfii</i> Trel.	Western yellow oxalis
<i>Penstemon ovatus</i> Dougl.	Egg-leaf penstemon
<i>Penstemon rattanii</i> Gray	Coast penstemon
<i>Phacelia hastata</i> Dougl.	Silverleaf phacelia
<i>Phlox gracilis</i> (Hook.) Greene	Slender phlox
<i>Prosartes smithii</i> (Hook.) Utech, Shinwari & Kawano	Smith's fairybells
<i>Pyrola picta</i> Smith	Whitevein pyrola
<i>Ranunculus uncinatus</i> D. Don	Little buttercup
<i>Rubus ursinus</i> Cham. & Schlecth.	Trailing blackberry
<i>Rumex acetosella</i> L.	Sheep sorrel, sour weed
<i>Scrophularia californica</i> Cham. & Schlect.	California figwort
<i>Stachys cooleyae</i> Heller	Cooley's hedge-nettle
<i>Stachys mexicana</i> Benth.	Mexican hedge-nettle
<i>Stellaria crispa</i> Cham. & Schlect.	Crisped starwort
<i>Synthyris reniformis</i> (Dougl.) Benth.	Snow queen
<i>Thermopsis montana</i> Nutt.	Mountain thermopsis
<i>Tiarella trifoliata</i> L.	Threeleaf foamflower
<i>Tolmiea menziesii</i> (Pursh) T. & G.	Piggyback plant
<i>Trautvetteria caroliniensis</i> (Walt.) Vail	False bugbane
<i>Trientalis latifolia</i> Hook.	Starflower
<i>Trillium ovatum</i> Pursh	Western trillium
<i>Vancouveria hexandra</i> (Hook.) Morr. & Dene.	Inside-out flower
<i>Veratrum insolitum</i> Jepson	Siskyou false-hellebore
<i>Veronica arvensis</i> L.	Common speedwell
<i>Veronica serpyllifolia</i> L.	Thymeleaf speedwell
<i>Viola adunca</i> Sm.	Hook violet
<i>Viola glabella</i> Nutt.	Stream violet; yellow wood violet
<i>Viola sempervirens</i> Greene	Redwoods violet
<i>Xerophyllum tenax</i> (Pursh) Nutt.	Common beargrass
Grasses, sedges, and rushes:	
<i>Agrostis exarata</i> Trin.	Spike bentgrass
<i>Aira caryophyllea</i> L.	Silver hairgrass
<i>Aira praecox</i> L.	Little hairgrass
<i>Anthoxanthum odoratum</i> L.	Sweet vernalgrass
<i>Bromus carinatus</i> Hook. & Arn.	California brome
<i>Bromus vulgaris</i> (Hook.) Shear	Columbia brome
<i>Carex californica</i> L.H. Bailey	California sedge
<i>Carex hendersonii</i> L.H. Bailey	Henderson's sedge
<i>Carex pachystachya</i> Cham.	Chamisso sedge
<i>Carex rossii</i> Boott	Ross' sedge
<i>Danthonia californica</i> Boland	California danthonia
<i>Elymus glaucus</i> Buckl.	Blue wildrye
<i>Festuca roemerii</i> (Pavlick) Alexeev	Roemer's fescue
<i>Festuca occidentalis</i> Hook.	Western fescue
<i>Festuca rubra</i> L.	Red fescue
<i>Glyceria striata</i> (Lam.) A. Hitchc.	Tall mannagrass

Scientific name	Common name
<i>Hierochloa occidentalis</i> Buckl.	California sweetgrass
<i>Holcus lanatus</i> L.	Common velvetgrass
<i>Koeleria macrantha</i> (Ledeb.) JA Schultes	Prairie junegrass
<i>Luzula multiflora</i> (Ehrh.) Lejeune ssp. <i>multiflora</i>	Common woodrush
<i>Luzula parviflora</i> (Ehrh.) Desv.	Small-flowered woodrush
<i>Melica subulata</i> (Griseb.) Scribn.	Alaska oniongrass
<i>Poa annua</i> L.	Annual bluegrass
<i>Poa compressa</i> L.	Canada bluegrass
<i>Poa pratensis</i> L.	Kentucky bluegrass
<i>Schedonorus arundinaceus</i> (Schreb.) Durmort.	Tall fescue
<i>Scirpus microcarpus</i> Presl	Panicled bulrush
<i>Trisetum cernuum</i> Trin.	Nodding trisetum

^aCompiled from numerous sources. Taxa are known or expected to occur within the Grass Mountain Research Natural Area.

^bNomenclature for vascular plants, ferns, and fern-allies follows the Flora of North America Web site (2006) and the Oregon Flora Project Web site (2006).

Appendix 2: Fungi^{a b}

Grass meadows (grass balds):

Phycomycetes

Endogonaceae

Glomus fasciculatum (Thaxt.) Gerd. & Trappe

Glomus macrocarpum Tul. & C. Tul.

Glomus microcarpum Tul. & C. Tul.

Glomus mosseae (T.H. Nicolson & Gerd.) Gerd. & Trapp

Noble fir (*Abies procera*) forest:

Phycomycetes

Endogonaceae

Endogone flammicorona Trappe & Gerd.

Endogone lactiflua Berk.

Endogone pisiformis Berk.

Ascomycetes

Tuberales

Fischerula subcaulis Trappe

Geopora cooperi Harkn.

Hydnotrya variiformis Gilkey

Tuber spp.

Elaphomycetaceae

Elaphomyces granulatus Fr.

Elaphomyces muricatus Fr.

Basidiomycetes

Gasteromycetes

Alpova diplophloeus (Zeller & Dodge) Trappe & A.H. Sm.

Alpova luteus (Zeller) Trappe

Endoptychum depressum Singer & A.H. Sm.

Gastroboletus turbinatus (Snell) Singer & A.H. Sm.

Gastropila fumosa (Zeller) P. Ponce de Leon

Gastropila subcretacea (Zeller) P. Ponce de Leon

Gautieria graveolens Vittad.

Gautieria monticola Harkn.

Hymenogaster spp.

Hysterangium darkeri Zeller

Hysterangium separabile Zeller

Leucogaster magnatus Zeller

Martellia spp.

Rhizopogon spp.

Thaxterogaster pinguis (Zeller) Singer & A.H. Sm.

Agaricales & Aphyllophorales

Amanita muscaria (L.) Lam.
Amanita pantherina (DC.) Krombh.
Amanita vaginata (Bull.) Lam.
Boletus edulis Bull.
Cantharellus cibarius Fr.
Cortinarius semisanguineus (Fr.) Gillet
Gomphidius spp.
Hydnum imbricatum L.
Hygrophorus spp.
Inocybe spp.
Laccaria amethystina (Bull.) Murrill
Laccaria laccata (Scop.) Fr.
Lactarius spp.
Lepiota spp.
Mycena spp.
Phaeocollybia spp.
Pholiota spp.
Polyporus spp.
Pseudohydnum gelatinosum (Scop.) P. Karst.
Ramaria spp.
Russula spp.
Tricholoma spp.

^a Reported in Hawley et al. 1975. List compiled by James Trappe on Marys Peak, Oregon. Similarity in elevation, geographic proximity, and presence of comparable habitats between Grass Mountain and Marys Peak suggest the probability of occurrence on Grass Mountain. This list is incomplete.

^b Nomenclature for fungi follows CABI Bioscience, Centraalbureau voor Schimmelcultures, and Landcare Research Web site (2006).

Appendix 3: Amphibians, Reptiles, Birds, Mammals, and Insects

Table 6—Animals known or expected to occur within Grass Mountain Research Natural Area^{a b}

Order	Scientific name	Common name
Amphibians:		
Caudata	<i>Ambystoma gracile</i>	Northwestern salamander
	<i>Ambystoma macrodactylum</i>	Long-toed salamander
	<i>Aneides ferreus</i>	Clouded salamander
	<i>Dicamptodon tenebrosus</i>	Pacific giant salamander
	<i>Ensatina eschscholtzi</i>	Ensatina
	<i>Plethodon dunni</i>	Dunn's salamander
	<i>Plethodon vehiculum</i>	Western redback salamander
	<i>Rhyacotriton variegatus</i>	Southern torrent salamander
	<i>Taricha granulosa</i>	Rough-skinned newt
Anura	<i>Ascaphus truei</i>	Tailed frog
	<i>Bufo boreas</i>	Western toad
	<i>Pseudacris regilla</i>	Pacific chorus frog
	<i>Rana aurora</i>	Red-legged frog
Reptiles:		
Squamata	<i>Elgaria coerulea</i>	Northern alligator lizard
	<i>Charina bottae</i>	Rubber boa
	<i>Coluber constrictor</i>	Racer
	<i>Contia tenuis</i>	Sharptail snake
	<i>Eumeces skiltonianus</i>	Western skink
	<i>Sceloporus occidentalis</i>	Western fence lizard
	<i>Thamnophis elegans</i>	Western terrestrial garter snake
	<i>Thamnophis ordinoides</i>	Northwestern garter snake
	<i>Thamnophis sirtalis</i>	Common garter snake
Birds:		
Falconiformes	<i>Accipiter cooperii</i>	Cooper's hawk
	<i>Accipiter gentilis</i>	Northern goshawk
	<i>Accipiter striatus</i>	Sharp-shinned hawk
	<i>Buteo jamaicensis</i>	Red-tailed hawk
	<i>Cathartes aura</i>	Turkey vulture
	<i>Circus cyaneus</i>	Northern harrier
	<i>Falco sparverius</i>	American kestrel
	<i>Haliaeetus leucocephalus</i>	Bald eagle
	Galliformes	<i>Bonasa umbellus</i>
<i>Callipepla californica</i>		California quail
<i>Dendragapus obscurus</i>		Blue grouse
<i>Oreortyx pictus</i>		Mountain quail
<i>Phasianus colchicus</i>		Ring-necked pheasant
Charadriiformes	<i>Actitis macularia</i>	Spotted sandpiper
	<i>Brachyramphus marmoratus</i>	Marbled murrelet
	<i>Charadrius vociferus</i>	Killdeer
Columbiformes	<i>Columba fasciata</i>	Band-tailed pigeon
	<i>Zenaida macroura</i>	Mourning dove

Order	Scientific name	Common name
Strigiformes	<i>Aegolius acadicus</i>	Northern saw-whet owl
	<i>Bubo virginianus</i>	Great-horned owl
	<i>Glaucidium gnoma</i>	Northern pygmy owl
	<i>Otus kennicottii</i>	Western screech-owl
	<i>Strix occidentalis</i>	Spotted owl
	<i>Strix varia</i>	Barred owl
Caprimulgiformes	<i>Chordeiles minor</i>	Common nighthawk
Apodiformes	<i>Chaetura vauxi</i>	Vaux's swift
	<i>Selasphorus rufus</i>	Rufous hummingbird
Coraciiformes	<i>Ceryle alcyon</i>	Belted kingfisher
Piciformes	<i>Colaptes auratus</i>	Northern flicker
	<i>Dryocopus pileatus</i>	Pileated woodpecker
	<i>Picoides pubescens</i>	Downy woodpecker
	<i>Picoides villosus</i>	Hairy woodpecker
	<i>Sphyrapicus ruber</i>	Red-breasted sapsucker
Passeriformes	<i>Bombycilla cedrorum</i>	Cedar waxwing
	<i>Carduelis pinus</i>	Pine siskin
	<i>Carduelis tristis</i>	American goldfinch
	<i>Carpodacus purpureus</i>	Purple finch
	<i>Catharus ustulatus</i>	Swainson's thrush
	<i>Certhia americana</i>	Brown creeper
	<i>Chamaea fasciata</i>	Wrentit
	<i>Cinclus mexicanus</i>	American dipper
	<i>Coccothraustes vespertinus</i>	Evening grosbeak
	<i>Contopus borealis</i>	Olive-sided flycatcher
	<i>Contopus sordidulus</i>	Western wood peewee
	<i>Corvus brachyrhynchos</i>	American crow
	<i>Corvus corax</i>	Common raven
	<i>Cyanocitta stelleri</i>	Steller's jay
	<i>Dendroica coronata</i>	Yellow-rumped warbler
	<i>Dendroica nigrescens</i>	Black-throated gray warbler
	<i>Dendroica occidentalis</i>	Hermit warbler
	<i>Dendroica petechia</i>	Yellow warbler
	<i>Empidonax difficilis</i>	Pacific-slope flycatcher
	<i>Empidonax hammondi</i>	Hammond's flycatcher
	<i>Empidonax traillii</i>	Willow flycatcher
	<i>Geothlypis trichas</i>	Common yellowthroat
	<i>Ixoreus naevius</i>	Varied thrush
	<i>Junco hyemalis</i>	Dark-eyed junco
	<i>Loxia curvirostra</i>	Red crossbill
	<i>Melospiza melodia</i>	Song sparrow
	<i>Molothrus ater</i>	Brown-headed cowbird
	<i>Myadestes townsendi</i>	Townsend's solitaire
	<i>Oporornis tolmiei</i>	MacGillivray's warbler
	<i>Parus atricapillus</i>	Black-capped chickadee
	<i>Parus rufescens</i>	Chestnut-backed chickadee
<i>Perisoreus canadensis</i>	Gray jay	
<i>Pheucticus melanocephalus</i>	Black-headed grosbeak	
<i>Pipilo maculatus</i>	Spotted towhee	
<i>Piranga rubra</i>	Western tanager	
<i>Progne subis</i>	Purple martin	

Order	Scientific name	Common name
	<i>Psaltriparus minimus</i>	Bushtit
	<i>Regulus satrapa</i>	Golden-crowned kinglet
	<i>Sialia mexicana</i>	Western bluebird
	<i>Sitta canadensis</i>	Red-breasted nuthatch
	<i>Spizella passerina</i>	Chipping sparrow
	<i>Stelgidopteryx serripennis</i>	Northern rough-winged swallow
	<i>Tachycineta bicolor</i>	Tree swallow
	<i>Tachycineta thalassina</i>	Violet-green swallow
	<i>Thryomanes bewickii</i>	Bewick's wren
	<i>Troglodytes aedon</i>	House wren
	<i>Troglodytes troglodytes</i>	Winter wren
	<i>Turdus migratorius</i>	American robin
	<i>Vermivora celata</i>	Orange-crowned warbler
	<i>Vermivora ruficapilla</i>	Nashville warbler
	<i>Vireo gilvus</i>	Warbling vireo
	<i>Vireo huttoni</i>	Hutton's vireo
	<i>Vireo solitarius</i>	Solitary vireo
	<i>Wilsonia pusilla</i>	Wilson's warbler
	<i>Zonotrichia leucophrys</i>	White-crowned sparrow
Mammals:		
Didelphimorphia	<i>Didelphis virginiana</i>	Virginia opossum
Insectivora	<i>Neurotrichus gibbsii</i>	Shrew-mole
	<i>Scapanus orarius</i>	Coast mole
	<i>Scapanus townsendii</i>	Townsend's mole
	<i>Sorex bairdi</i>	Baird's shrew
	<i>Sorex bendirii</i>	Pacific marsh shrew
	<i>Sorex pacificus</i>	Pacific shrew
	<i>Sorex sonomae</i>	Fog shrew
	<i>Sorex trowbridgii</i>	Trowbridge's shrew
	<i>Sorex vagrans</i>	Vagrant shrew
Chiroptera	<i>Corynorhinus townsendii</i>	Townsend's big-eared bat
	<i>Eptesicus fuscus</i>	Big brown bat
	<i>Lasionycteris noctivagans</i>	Silver-haired bat
	<i>Lasiurus cinereus</i>	Hoary bat
	<i>Myotis californicus</i>	California myotis
	<i>Myotis evotis</i>	Long-eared myotis
	<i>Myotis lucifugus</i>	Little brown myotis
	<i>Myotis thysanodes</i>	Fringed myotis
	<i>Myotis volans</i>	Long-legged myotis
	<i>Myotis yumanensis</i>	Yuma myotis
Lagomorpha	<i>Lepus americanus</i>	Snowshoe hare
	<i>Sylvilagus bachmani</i>	Brush rabbit
Rodentia	<i>Aplodontia rufa</i>	Mountain beaver
	<i>Castor canadensis</i>	American beaver
	<i>Clethrionomys californicus</i>	Western red-backed vole
	<i>Erethizon dorsatum</i>	Common porcupine
	<i>Glaucomys sabrinus</i>	Northern flying squirrel
	<i>Microtus longicaudus</i>	Long-tailed vole
	<i>Microtus oregoni</i>	Creeping vole
	<i>Microtus townsendii</i>	Townsend' vole
	<i>Neotoma cinerea</i>	Bushy-tailed woodrat

Order	Scientific name	Common name
	<i>Neotoma fuscipes</i>	Dusky-footed woodrat
	<i>Peromyscus maniculatus</i>	Deer mouse
	<i>Phenacomys albipes</i>	White-footed vole
	<i>Phenacomys longicaudus</i>	Red tree vole
	<i>Spermophilus beecheyi</i>	California ground squirrel
	<i>Tamias townsendii</i>	Townsend's chipmunk
	<i>Tamiasciurus douglasii</i>	Douglas' squirrel
	<i>Thomomys mazama</i>	Western pocket gopher
	<i>Zapus trinotatus</i>	Pacific jumping mouse
Carnivora	<i>Canis latrans</i>	Coyote
	<i>Felis concolor</i>	Mountain lion
	<i>Lutra canadensis</i>	Northern river otter
	<i>Lynx rufus</i>	Bobcat
	<i>Martes americana</i>	American marten
	<i>Mephitis mephitis</i>	Striped skunk
	<i>Mustela erminea</i>	Ermine
	<i>Mustela frenata</i>	Long-tailed weasel
	<i>Mustela vison</i>	Mink
	<i>Odocoileus hemionus</i> ssp. <i>columbianus</i>	Black-tailed deer
	<i>Procyon lotor</i>	Common raccoon
	<i>Spilogale gracilis</i>	Western spotted skunk
	<i>Urocyon cinereoargenteus</i>	Common gray fox
	<i>Ursus americanus</i>	Black bear
	<i>Vulpes vulpes</i>	Red fox
Artiodactyla	<i>Cervus elaphus</i>	Elk
Insects: ^{3 4}		
Hemiptera	<i>Acalypta barberi</i>	Barber's lace bug
	<i>Acalypta saundersi</i>	Saunders' lace bug
	<i>Allorhinocoris flavus</i>	
	<i>Blissus occiduus</i>	Buffalograss chinch bug
	<i>Derephysia foliacea</i>	Foliaceous lace bug
	<i>Irlusia perricans</i>	
	<i>Leptopterna ferrugata</i>	
	<i>Mecomma giluiiper</i>	
	<i>Mimaceps insigoris</i>	
	<i>Pithanus maerkeli</i>	
	<i>Stenocorus pedestris</i>	
	<i>Trapezonatus</i> spp.	
Grylloblattidae	<i>Grylloblatta</i> spp.	
Mecoptera	<i>Brachypanorpa oregonensis</i>	
	<i>Boreus brevicaudis</i>	
Orthoptera	<i>Boonacris</i> spp.	Grasshopper
Homoptera	<i>Errhonus</i> spp.	Leafhopper
	<i>Evacanthus</i> spp.	

¹ Nomenclature, distribution and habitat characteristics taken from Csuti et al. 1997. Atlas of Oregon Wildlife. Corvallis, OR: Oregon State University Press, 492 p. + map.

² Taxa are known or expected to occur based upon geographic range, elevation, and habitat availability.

³ Reported in Hawley et al. 1975. List compiled by Dr. J.D. Lattin in 1975 as "an extremely abbreviated list" based on similarity in elevation, geographic proximity, and presence of comparable habitats between Grass Mountain and Marys Peak, Oregon. This list is incomplete.

⁴ Common names are often unavailable for many insect species.

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