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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 supplement [1] 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.

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[1] Supplement 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.

[2] Federal 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.

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[3] Six 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 cells[4] 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.

[4] Cells 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.

Contents

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 balds[1] 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.

[1] We refer to "grass meadows" throughout the text, replacing the less descriptive term "grass bald."

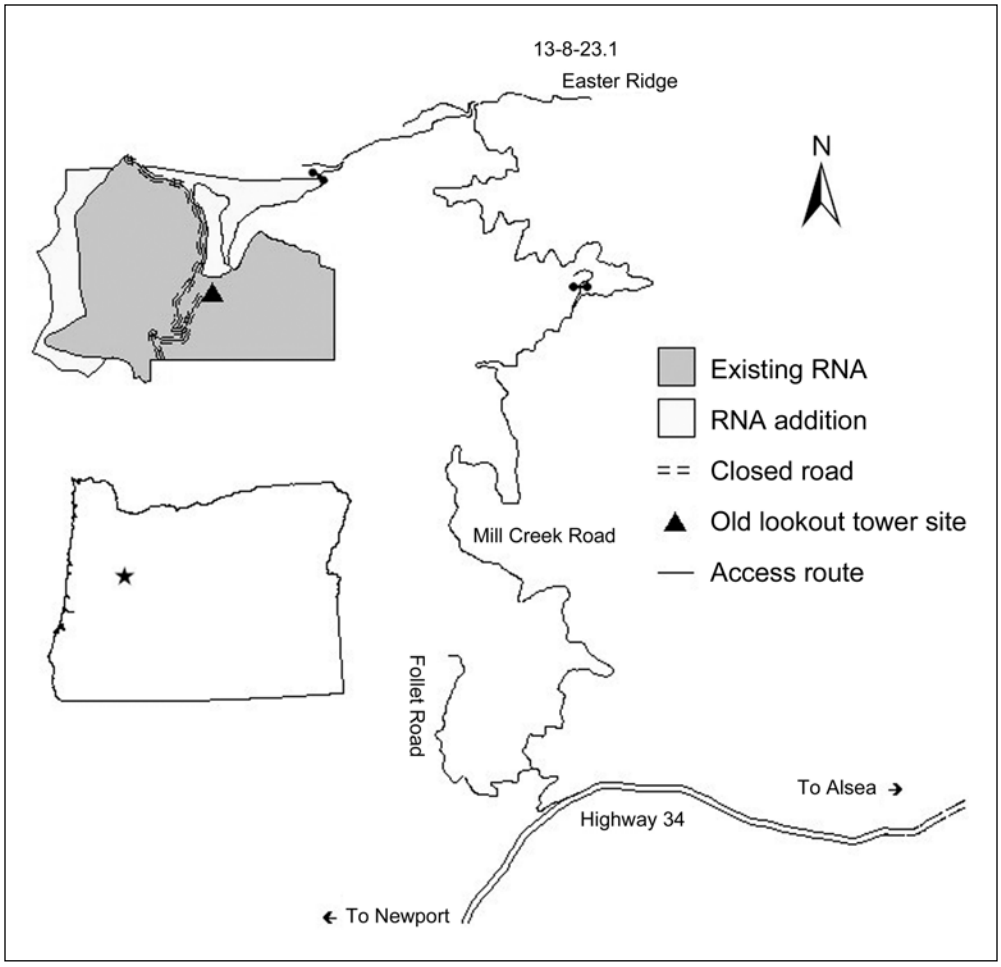

Figure 1—Grass Mountain Research Natural Area location and access.

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.

Geology

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 Tyee Formation (Baldwin 1955).

Soils

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,

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).

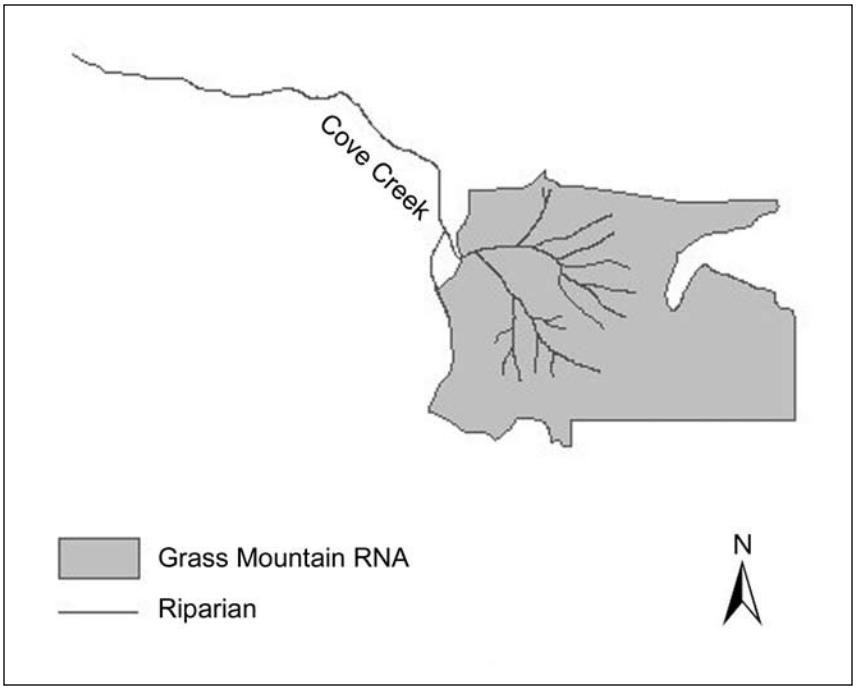

Figure 3—Cove Creek drainage basin showing headwater first-, second-, and third-order stream locations within Grass Mountain Research Natural Area.

Climate

Maritime 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

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).

Douglas-fir an overstory dominant

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.

Noble fir at higher elevations

In 2004, four permanent vegetation transects were established across forest-meadow ecotones[2] to characterize stand structure and vegetation composition and to establish a baseline to assess the pattern and rate that trees and shrubs

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 seedling[3] and sapling[4] 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											
	Seedlings						**Saplings**					
Transect	**PSME**		**ABPR**		**TSHE**		**PSME**		**ABPR**		**TSHE**	
		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											
	Seedlings						**Saplings**					
Transect	**PSME**		**ABPR**		**TSHE**		**PSME**		**ABPR**		**TSHE**	
		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

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

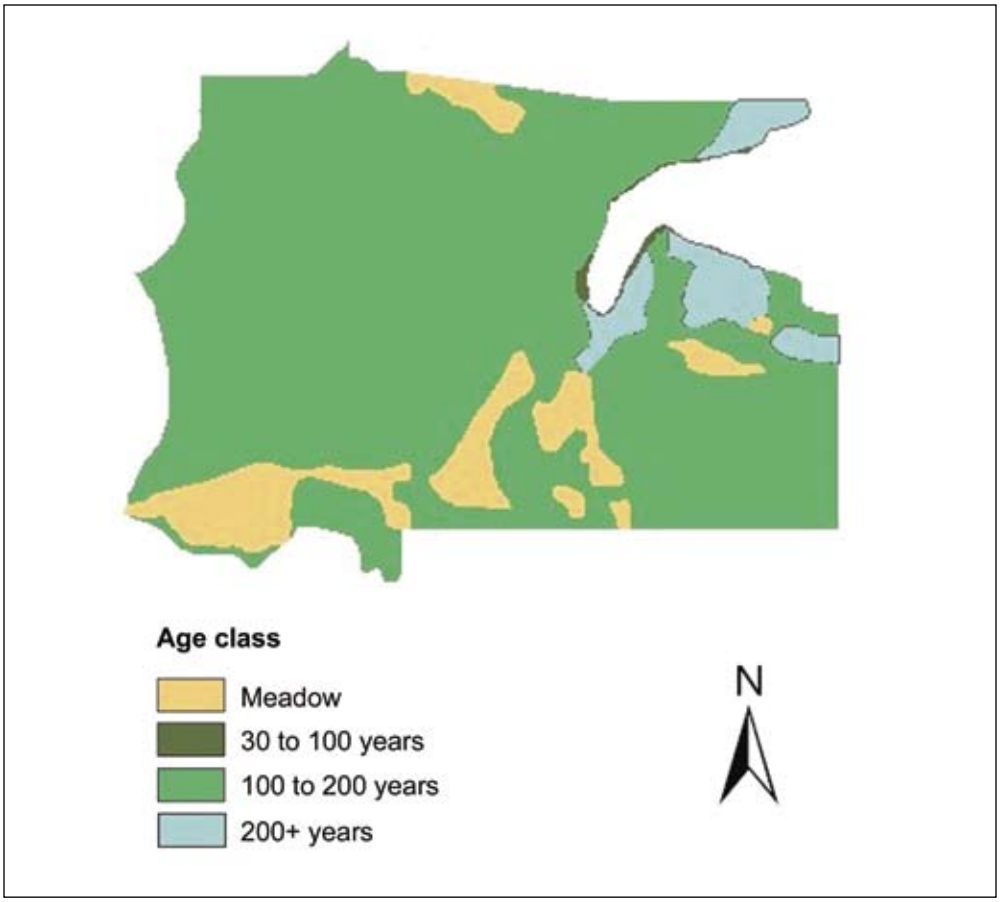

Figure 4—Forest stand age-class distribution within Grass Mountain Research Natural Area.

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 associations[5] 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 shrubs[7] (cover only).

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

	Transect			
Transect features	**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.

[7] These 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

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

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

[a] Cover is expressed as percentage of foliar cover; zero values are not included.

[b] Frequency is expressed as percentage of occurrence within fifty 20- by 50-cm plots.

[c] See 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

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

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

[a] Cover is expressed as percentage of foliar cover; zero values are not included.

[b] Frequency is expressed as percentage of occurrence within 50, 20- by 50-cm plots.

[c] See 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.

Seral noble fir stands

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*.

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*).

Invasive species

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").

"Rock garden" plant composition

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).

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 Equivalents

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

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

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

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

[a] Compiled from numerous sources. Taxa are known or expected to occur within the Grass Mountain Research Natural Area.
[b] Nomenclature 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.

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

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

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

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