Federal Research Natural Areas in Oregon and Washington A Guidebook for Scientists and Educators. 1972. Pacific Northwest Forest and Range Experiment Station, Portland, Oregon.

OLALLIE RIDGE RESEARCH NATURAL AREA[1]

Subalpine mosaic of mountain meadows and true fir - mountain hemlock forest on some ridgetops in the western Cascades of Oregon.

The Olallie Ridge Research Natural Area was established on January 9, 1963, to provide examples of the mountain meadow and true fir *(Abies* spp.) - mountain hemlock *(Tsuga mertensiana)* communities found on high ridges in the western Cascades of Oregon. The 292-ha. (720-acre) tract is located in Lane County, Oregon, and is administered by the McKenzie Bridge Ranger District (McKenzie Bridge, Oregon), Willamette National Forest. The natural area is in two blocks each occupying the summit area of a ridgetop peak. The irregular boundaries (fig. OR-I) generally follow contour lines. The natural area is located in portions of sections 3, 4, 5, 8, 9, and 10, T. 17 S., R. 6 E., Willamette meridian, at 44 °06' N. latitude and 122°05' W. longitude.

ACCESS AND ACCOMMODATIONS

The Olallie Ridge Research Natural Area can only be reached on foot. Several maintained trails penetrate or border portions of the tract. To reach the vicinity, turn south off of U.S. Highway 126 (McKenzie River Highway) onto the South Fork Road (Forest Road 1663). Follow this road and then the East Fork Road (Forest Road 1778) to the trail heads for either Forest Trails 3326 or 3312, located on the slopes below the natural area. These trails provide the quickest access and require from 1 to 21J2 miles of foot travel to reach the natural area.

The nearest commercial accommodations are at Blue River or McKenzie Bridge along U.S. Highway 126. There are numerous improved public campgrounds along the McKenzie River and the South Fork of the McKenzie River, as well as a primitive campsite in the saddle between the two units of the natural area.

ENVIRONMENT

The Olallie Ridge Research Natural Area occupies summits of two peaks on a major, north-south trending ridge (fig. OR-2). Slopes are generally steep to moderate, and rock outcrops are common. There are no permanent streams or ponds within the natural area. Elevations range from about 1,341 to 1,686 m. (4,400 to 5,530 ft.) at the summit of O'Leary Mountain in the west unit and from 1,463 to 1,725 m. (4,800 to 5,660 ft.) on the summit of Horsepasture Mountain in the east unit.

The natural area lies within a geologically older (Eocene to Miocene) part of the Cascade Range known as the western Cascades (Peck et al. 1964; Williams 1957). The pyroxene andesites which dominate belong to the Sardine formation of Miocene age. Basalt, dacite, and various types of volcanic tuffs and breccias may also be present. Some data on lithology and petrography of the bedrock are found in Peck et al. (1964).

A cool, wet climate prevails. Summers are relatively dry; much of the heavy winter precipitation accumulates in snowpacks which probably attain maximum depths of 1 to 3 m. (3 to 9 ft.). The nearest climatic station (McKenzie Bridge) is at such a low elevation

1 Description prepared by Dr. J. F. Franklin, U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station, Forestry Sciences Laboratory, Corvallis, Oregon.

that the temperature and precipitation data are not very representative of conditions on the natural area. Isohyetal maps indicate the natural area receives an average annual precipitation slightly in excess of 2,000 mm. (80 in.).

Soils in the natural area have not been mapped or described. Forest soils are typically weakly developed Brown Podzolics developed at least partially in surficial layers of aeoliandeposited volcanic ash. Soils under the non-forested communities tend to be shallow and stony.

BIOTA

Approximately 118 ha. (290 acres) of the Olallie Ridge Research Natural Area are occupied by non-forested communities, including both meadow- and shrub-dominated types. The remaining area can be assigned to SAF forest cover types (Society of American Foresters 1954) as follows:

No.	*Name*	*Area*
205	Mountain Hemlock - Subalpine Fir	130 ha. (325 acres)
229	Pacific Douglas-Fir	33 ha. (82 acres)
211	White Fir	9 ha. (23 acres)

Kuchler's (1964) types represented include Silver Fir - Douglas Fir Forest (3), Fir Hemlock Forest (4), and possibly, Grand Fir Douglas Fir Forest (14), and Alpine Meadows and Barren (52). The natural area is located within the *Abies amabilis* Zone of Franklin and Dyrness (1969).

The most outstanding features of the Olallie Ridge Natural Area are the non forested communities which occupy a variety of habitats and support a rich flora. During a study of disjunction and endemism, Hickman (1968) examined the vascular plant flora of over 42 peaks; he found that Horsepasture Mountain is one of the most floristically diverse areas in the entire western Cascades. Hickman provides a checklist of species found on both Horsepasture and O'Leary Mountains; it includes at least 30 disjunct species of phytogeographic significance.

There are a variety of rock outcrop and meadow community types within the natural area. They include the following types described by Hickman (1968): Snowbed, Rocky Melt Seep, Wet Meadow, Mesic Meadow, Subalpine Xeric Meadow, Fine Gravel Scree, Outcrop Ridge, and Vertical Outcrop. Snowbed communities are found on outcrops or steep, open slopes of north aspect where snow accumulations reach considerable depth in winter. Characteristic species include *Claytonia lanceolata, Luetkea pectinata, Orogenia fusiforma, Erythronium grandiflorum.,* and *Mertensia bella.* The Rocky Melt Seep community occurs where snowmelt trickles over rock outcrops, particularly on south-facing slopes; such habitats are dry after midsummer. Typical species include *Dodecatheon jeffreyi, Lewisia triphylla, Mimulus brewerii, M. guttatus, Saxifraga. occidentalis* var. *rufidula,* and *Gayophytum. humile.*

The Wet Meadow community is one of the more extensive in the natural area. It is found on habitats with a constant moisture source and relatively deep soil. *Veratrum viride, Senecio triangularis,* and *Valeriana sitchensis* are characteristic dominants. Associated species include *Ribes bracteosum, Rubus spectabilis, Mitella oreweri, Ligusticum. grayi,* and *Hydrophyllum. fendleri,* and *H. tenuipes.*

The Mesic Meadow community is also well represented. It is dominated by herbaceous perennials which have sufficient time to set seed in early summer before moisture supplies are exhausted. Typical dominants are *Rubus parviflorus, Pteridium aquilinum,* and *Rudbeckia occidentalis.* Associated species include *Erigeron aliceae, Lupinus latifolius, Ribes binominatum., R. viscosissimum, Polygonurn phytolaccaefolium, Cirsium centaurea, Mertensia paniculata, Vicia americana* var. *truncata, Epilobium. angustifolium,* and *Gayophytum humile.*

A third common meadow type is the Subalpine Xeric Meadow community which is found on habitats intermediate between the mesic meadows and the dry, rocky surrounding areas. Representative species include *Gilia aggregata, Collomia linearis, Gayophytum. diffusum* var. *parviflorum, Orthocarpus imbricatus, Luina stricta, Polygonum minimium, P. douglasii, Navarretia divaricata,*

Microsteris gracilis, Collinsia parviflora, Potentilla glandulosa, Cerastium arvense, Calochortus lobbii, Rumex acetosella, Pachystima myrsinites, Amelanchier alnifolia var. *semiintegrifolia,* and *Phacelia heterophylia.* A closely associated community is confined to ridges of rapidly weathering rock (Fine Gravel Scree), Many of the species common in the xeric meadow community occur here, as well as *Lotus nevadensis, Sedum oregonense,* and *Sanicula graveolens.*

Outcrop Ridge communities are found where mass wasting of small fragments has produced outcroppings of small patches of parent rock which are barely exposed and eroded parallel to the general slope of the area. Many species root in the weathered cracks of the outcrops or pockets of finer material: *Delphinium menziesii* var. *pyramidale, Castilleja hispida, Penstemon procerus* var. *brachyanthus, Sedum stenopetalum, S. divergens, Eriophyllum. lanatum, Arctostaphylos nevadensis, Haplopappus hallii, Silene douglasii, Comandra umbellata, Lomatium martindalei, Sanicula graveolens, Eriogonum umbellatum, E. compositum, Juniperus Communis, Erigeron foliosus* var. *confinis, Arenaria capillaris* var. *americana, Erysimum asperurn, Antennaria rosea, Phacelia heterophylla, Anaphalis margaritacea,* and *penstemon cardwellii.* A few areas typifying the Vertical Outcrop community are present. Species adapted to these exposed environments include *Saxifraga bronchialis* var. *vespertina, Penstemon rupicola, Selaginella wallacei, Erigeron cascadensis, Polemonium pulcherrimum, Saxifraga caespitosa,* and *Heuchera micrantha.*

Tree species found within the natural area include mountain hemlock, Pacific silver fir *(Abies amabilis),* noble fir *(Abies procera),* western hemlock *(Tsuga heterophylla),* white fir *(Abies concolor),* subalpine fir *(Abies lasiocarpa),* and western white pine *(Pinus monticola).* All of the forests are relatively young in age (less than 130 years) and small in size; forest inventories of the area place all stands in either pole (maximum 28-cm. or ll-in. d,b.h,) or small sawtimber (maximum 53-em. or 21-in. d.b,h.) size classes.

As indicated, the bulk of the forests are of the mountain hemlock - true fir type (fig. OR-2). Pacific silver fir appears to be the major climax species based on reproductive success in closed forest stands. The understory is typically poor in shrubs and relatively rich in herbaceous species. Common understory plants include *Achlys triphylla, Cornus canadensis, Clintonia unifiora, Pyrola secunda, Viola sempervirens, Rubus lasiococcus, Vnccinium membranaceum, Osmorhiza chilensis,* and *Arnica* sp.

On the dry, south-exposed slopes, forests are more typically dominated by Douglas-fir or white fir or both; Pacific silver fir often dominates the tree reproduction in these stands. Typical understory plant species include *Symphoricarpos* spp., *Chimaphila umbellata,* vine maple *(Acer circinatum), Pyrola picta, Rosa gymnocarpa, Pteridium aquilinum, Achlys triphylla, Smilacina sessilifolia,* and *Vaccinium membranaceum.*

In addition to meadows and forests there are significant areas occupied by shrub dominated communities. These are typically found on wet sites adjacent to meadows or forests, on steep, north-facing slopes, and on talus associated with rock outcrops. Sitka alder *(Alnus sinuata)* is the common dominant on wetter substrates and north slopes where it forms dense thickets. Hickman (1968) considered this community to be a phase of his Wet Meadow type; they certainly are frequently associated with wet meadows and actually intergrade with them in some situations where the alder stems are more scattered. Deep winter snow accumulations and extensive snow creep cause strong bowing of the 3 to 5 m. (10 to 16 ft.) tall stems. In a nearby area the occurrence of these stands has been related to high soil water tables due to a nearly impervious subsoil[2], but in other regions they are associated with recurrent avalanches. Vine maple dominates the shrub communities on drier sites, and both species occasionally occur as co-dominants in mixed

[2] Unpublished soil survey data from the H. J. Andrews Experimental Forest on file at USDA Forest Service, Forestry Sciences Laboratory, Corvallis, Oregon.

stands. Both types of shrub communities appear to be stable as there is generally no evidence of forest encroachment.

The natural area is used as spring and early summer and fall range by blacktail deer *(Odocoileus hemionus columbianus)* and Roosevelt elk *(Cervus canadensis roosevelti).* Other mammals believed to occur within the natural area as residents or transients are listed in table OR-I.

HISTORY OF DISTURBANCE

The dominance of 130-year-old stands indicates the area has been subject to at least occasional fires, the last major one occurring in the mid-1800's. There are extensive areas of dead subalpine fir in and around the wet meadows which are probably the result of infestations of balsam woolly aphid over the last decade (Franklin and Mitchell 1967).

The natural area was intensively used as a sheep range until about the middle of the 1930's. There is still evidence of sheep camps around some grassy openings. Meadow composition has undoubtedly been strongly influenced by overgrazing of sheep.

RESEARCH

Extensive observations of the flora and plant communities of O'Leary and Horsepasture Mountains were made during Hickman's (1968) study of disjunction and endemism in the western Cascades of Oregon. His findings of floral diversity and community types have already been highlighted; for more complete information, see his original paper which includes commentary upon the adaptive strategies used by various disjunct species. The natural area has also been used as a collecting site in mycological studies.:)

The Olallie Ridge Research Natural Area provides an unusual opportunity for studying subalpine meadow-forest mosaics. Possible studies include variation in community composition, structure, productivity, and succession in relation to environmental factors. It is also an important refugium for disjunct populations of numerous plant species.

MAPS AND AERIAL PHOTOGRAPHS

Special maps applicable to the natural area are: *Topography* - 15' McKenzie Bridge, Oregon quadrangle, scale 1: 62,500, issued by the U.S. Geological Survey in 1955; and *geology* - *Reconnaissance Geologic Map and Sections of the Western Cascade Range, Oregon, North of Latitude* 43^0 *N.,* scale 1: 250,000 (Peck et al. 1964), *Geologic Map of the Central Park of the High Cascade Range, Oregon* (Williams 1957), and *Geologic Map of Oregon West of the 121st Meridian,* scale 1:500,000 (Peck 1961). Either the District Ranger (McKenzie Bridge Ranger District) or Forest Supervisor (Willamette National Forest, Eugene, Oregon) can provide details on the most recent aerial photo coverage and forest type maps for the area.

[3] Research by Dr. J. M. Trappe, U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station, Forestry Sciences Laboratory, Corvallis, Oregon.

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Table OR-1. — Tentative list of mammals for Olallie Ridge Research Natural Area

Order	Scientific name	Common name
Insectivora	*Neürotrichus gibbsi*	shrew mole
	Scapanus orarius	coast mole
	Sorex bendirii	marsh shrew
	Sorex palustris	northern water shrew
	Sorex trowbridgii	Trowbridge shrew
	Sorex vagrans	wandering shrew
Chiroptera	*Eptesicus fuscus*	big brown bat
	Lasionycteris noctivagans	silver-haired bat
	Lasiurus borealis	red 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
	Plecotus townsendi	Townsend big-eared bat
Lagomorpha	*Lepus americanus*	snowshoe hare
	Ochotona princeps	pika
Rodentia	*Aplodontia rufa*	mountain beaver
	Arborimus longicaudus	red tree vole
	Clethrionomys californicus	California red-backed vole
	Erethizon dorsatum	porcupine
	Eutamias amoenus	yellow-pine chipmunk
	Eutamias townsendi	Townsend chipmunk
	Glaucomys sabrinus	northern flying squirrel
	Microtus longicaudus	long-tailed vole
	Microtus oregoni	Oregon or creeping vole
	Microtus richardsoni	Richardson vole
	Microtus townsendi	Townsend vole
	Neotoma cinerea	bushy-tailed wood rat
	Peromyscus maniculatus	deer mouse
	Phenacomys intermedius	heather vole
	Tamiasciurus douglasi	chickaree
	Thomomys mazama	Mazama pocket gopher
	Zapus trinotatus	Pacific jumping mouse
Carnivora	*Canis latrans*	coyote
	Canis lupus	wolf
	Felis concolor	mountain lion or cougar
	Gulo luscus	wolverine
	Lynx rufus	bobcat
	Martes americana	marten
	Martes pennanti	fisher
	Mustela erminea	short-tailed weasel or ermine
	Mustela frenata	long-tailed weasel
	Mustela vison	mink
	Procyon lotor	raccoon
	Spilogale putorius	spotted skunk or civet cat
	Ursus americanus	black bear
Artiodactyla	*Cervus canadensis*	wapiti or elk
	Odocoileus h. hemionus	mule deer

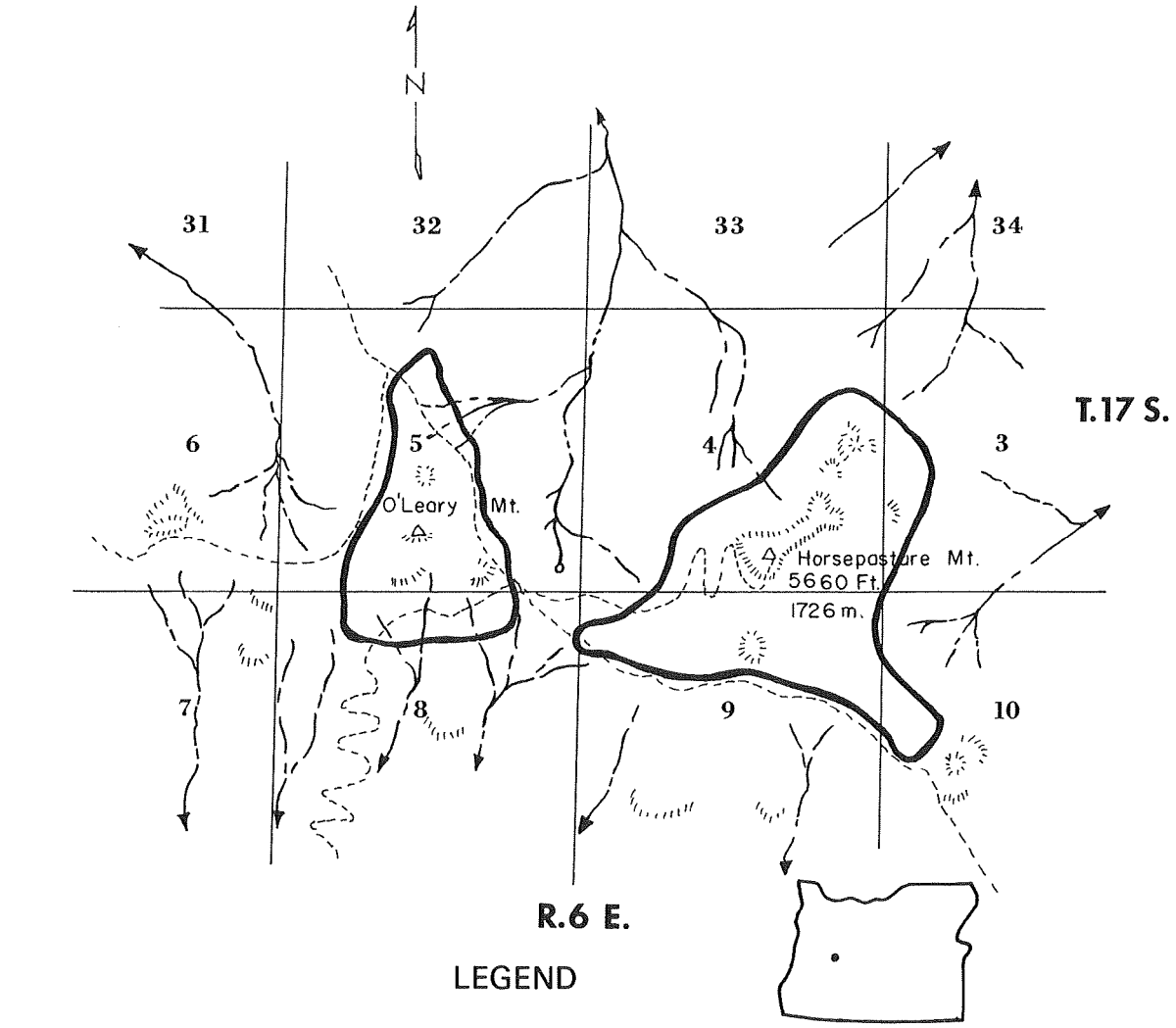

Figure OR-1.– Olallie Ridge Research Natural Area, Lane County, Oregon.

Figure OR-2.-Natural features of Olallie Ridge Research Natural Area. Upper left: Stand of noble fir, Pacific silver fir, and mountain hemlock typical of closed forest areas on cool, northerly exposed slopes. Upper right: Stand of Douglas-fir, grand fir, and western white pine typical of closed forest areas on drier, southerly aspects. Center left: Grassy opening typical of those found interspersed through forested areas on dry south slopes. Center right: Southeastern slopes of O'Leary Mountain; note the forest-meadow mosaic typical of southerly exposures and open nature of the true fir stand on the northeast slope. Bottom: Northwestern slopes of Horsepasture Mountain showing true fir-mountain hemlock stands and a wet meadow area surrounding a community of Sitka alder; note the numerous subalpine firs near the summit of the mountain which have been killed by insects.