

METOLIUS RESEARCH NATURAL AREA¹

Ponderosa pine forests on flat topography and steep westerly slopes typical of the east slope of the Cascade Range in central Oregon.

The Metolius Research Natural Area was established June 1931. It exemplifies ponderosa pine/bitterbrush (*Pinus ponderosa/Purshia tridentata*) (on flats) and ponderosa pine - Douglas-fir / green manzanita (*Pinus ponderosa - Pseudotsuga menziesii/Aretostaphylos patula*) (on steep westerly slopes) communities. These occupy extensive areas on the east slopes of the Cascade Range in central Oregon. The 581-ha, (1,140-acre) tract is located in Jefferson County, Oregon, and is administered by the Sisters Ranger District (Sisters, Oregon), Deschutes National Forest. The rectangular area encompasses parts of sections 25, 26, 35, and 36, T. 12 S" R. 9 E., Willamette meridian (fig. MI-1); boundaries are based on legal lines. It is located at 49° 40' N. latitude and 121 °40' W. longitude.

ACCESS AND ACCOMMODATIONS

Access is via U.S. Highway 20 and a forest road leading into the Metolius River drainage. The natural area is located about 29 km. (18 miles) northwest of Sisters and is most easily approached via U.S. Highway .20 and a series of paved forest roads. Access is good during summer, but snow creates difficulties during the winter. Public accommodations are available at Camp Sherman, about 2 km.

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(1 mile) south of the tract, and at Sisters, Oregon; there are numerous improved forest campgrounds in the general area.

ENVIRONMENT

The Metolius Research Natural Area occupies two contrasting landforms; the western half is located on a nearly flat bench along the Metolius River and the eastern half occupies the very steep, west slope of Green Ridge. Elevations range from about 850 to 1,460 m. (2,800 to 4,800 ft.).

The geology of the natural area is strongly correlated with the topography. Bedrock in the western half is basalt and basaltic andesite lavas (Williams 1957). These Pleistocene-Recent materials belong to the High Cascade formation. The natural area actually straddles the Metolius fault and steep slopes in the eastern half of the tract are actually a fault escarpment. These slopes and Green Ridge itself are composed of Pliocene and Pleistocene olivine basalts and basaltic andesites of the High Cascades (Williams 1957). The surface of the entire natural area has 2 to 5 cm. (1 to 2 in.) of dacite pumice from ancient Mount Mazama and up to 7 cm. (3 in.) of basaltic ash from cinder cones to the east (Taylor 1968) ..

A modified continental climate prevails.

Most precipitation occurs as snow during the cool, cloudy winter. Summers are warm, generally low in precipitation and largely cloudless. One to three months of drought are common. Climatic data from Sisters, 22 km, (14 miles) southeast near the forest-steppe boundary, are as follows (West 1964):

Mean annual temperature	7.9°C. (45.5°F.)
Mean January temperature	-0.5°C. (31.0°F.)
Mean July temperature	17.4°C. (63.4°F.)
Mean annual precipitation	408 mm. (16.07 in.)
June through August precipitation	36 mm. (1.40 in.)

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Mean annual precipitation may be as much as 250 mm. (10 in.) higher on the natural area.

Soils on the natural area have not been mapped or described. Throughout the tract, they are primarily dacite pumice and other aeolian volcanic ejecta of sandy loam to loamy sand texture over buried profiles. Minimal profile development is evident and would probably be classed as Regosol. A soil profile described on similar habitat a short distance away appeared as follows (West 1964) :

0	5 to	0 cm.	Mull type humus from conifer and shrub litter.
A1	0 to	10 cm.	Dark brown (7.5 YR 4/4, dry) pumicy loamy sand; pH 7.3.
AC1	10 to	50 cm.	Strong brown (7.5 YR 5/6, dry) pumicy sand; pH 8.0.
AC2	50 to	132 cm. +	Brownish yellow (10 YR 6/6, dry) pumicy sand; pH 7.7; increasing size and density of gravel with depth.

BIOTA

Estimated area by plant community:

Name	Area
<i>Pinus ponderosa</i> / <i>Purshia tridentata</i> / <i>Stipa occidentalis</i> . . .	260 ha. (640 acres)
<i>Pinus ponderosa</i> / <i>Arctostaphylos patula</i>	270 ha. (675 acres)
<i>Pseudotsuga menziesii</i> - <i>Larix occidentalis</i> - <i>Pinus ponderosa</i> / <i>Arctostaphylos patula</i>	51 ha. (125 acres)

The ponderosa pine communities can be assigned to SAF forest cover type 237, Interior Ponderosa Pine (Society of American Foresters 1954), and to Kuchler's (1964) Type 10, Ponderosa Pine Shrub Forest. The Douglas-fir-western larch (*Larix occidentalis*)-ponderosa pine community probably relates to SAF type 214, Ponderosa Pine Larch-Douglas-Fir, and to Kuchler's Type 12, Douglas Fir Forest. Lower elevations in the area fall within the *Pinus ponderosa* Zone and higher elevations within the *Pseudotsuga menziesii* (or possibly *Abies grandis*) Zone of north central Oregon (Franklin and Dyrness 1969),

The sole overstory dominant in the *Pinus*/

Purshia/*Stipa* community is ponderosa pine. Ground vegetation is clearly dominated by bitterbrush (fig. MI-2). Herbaceous vegetation is scanty, consisting mostly of western needlegrass (*Stipa occidentalis*) with occasional bottlebrush squirrel tail (*Sitanion hystrix*) and Ross's sedge (*Carex rossii*). It typifies key winter game range in this area,

The *Pinus*/*Arctostaphylos* community has overstory dominance of ponderosa pine but often has moderate to abundant Douglas-fir seedlings, saplings, and poles in the understory. Grand fir (*Abies grandis*) and incense cedar (*Libocedrus decurrens*) may also be present. Ground vegetation is dominated by green manzanita, often with abundant bitterbrush, western needlegrass, bottlebrush squirreltail, and Ross's sedge.

In the *Pseudotsuga* - *Larix* - *Pinus*/*Arctostaphylos* community, the pine and fir are mixed with moderate amounts of western larch in the overstory. Ground vegetation is dominated by green manzanita with western needlegrass, bottlebrush squirreltail, Ross's sedge and some *Fragaria Cuneifolia*.

Mammals believed to reside in or visit the natural area are listed in table MI-1. Mule deer (*Odocoileus hemionus*) use the area as winter range.

HISTORY OF DISTURBANCE

Fire-scarred ponderosa pine and the absence of dominant, old-growth Douglas-fir and grand fir indicate ground fires periodically burned nearly all portions of the tract prior to initiation of fire control programs about 1910 (fig. MI-2). Fire scars record 10 to 12 ground fire occurrences.

Domestic livestock, mainly sheep, passed through the area on their way to grazing grounds at higher elevations in earlier years. They do not appear to have significantly altered the vegetation.

On the other hand, mule deer make heavy use of the lower bench area for primary winter range. Deer apparently have or are causing some changes in ground vegetation on the bench; bitterbrush is moderately to severely browsed and many ponderosa pine saplings are high-lined.

RESEARCH

Numerous studies have been carried out in the vicinity of the natural area and are at least partially relevant there. They include: gradient analyses of vegetation on the east flank of the central Oregon Cascade Range conducted by West (1964, 1968, 1969) and Swedberg (1961); studies of the flora and communities on Black Butte by Sherman (1969) and Johnson (1961); and Sherman's (1966) study of spatial and chronological patterns of bitterbrush as influenced by ponderosa pine overstory. Only Swedberg (1961) actually used the natural area as a sampling site, however.

The Metolius Research Natural Area provides a variety of interesting research opportunities including: (1) determination of effects of game use on forested winter range heavily used by mule deer; (2) evaluation of soil-topographic-vegetational changes along an elevational and topographic gradient across a bench and up a steep, westerly slope;

(3) evaluation of forest succession following cessation of natural ground fires; and (4) determination of influences of sharp topographic and elevational changes over short distances on biomass productivity.

MAPS AND AERIAL PHOTOGRAPHS

Special maps applicable to the natural area are: *Topography-15'* Sisters, Oregon and Whitewater River, Oregon quadrangles, scale 1:62,500, issued by the U.S. Geological Survey in 1959 and 1961, respectively; *geology-Geologic Map of the Central Part 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 (Sisters Ranger District) or Forest Supervisor (Deschutes National Forest, Bend, Oregon) can provide details on the most recent aerial photo coverage of the area.

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Table MI-1. — Tentative list of mammals for Metolius Research Natural Area

Order	Scientific name	Common name
Insectivora	<i>Scapanus orarius</i>	coast mole
	<i>Sorex palustris</i>	northern water shrew
	<i>Sorex trowbridgii</i>	Trowbridge shrew
Chiroptera	<i>Sorex vagrans</i>	wandering shrew
	<i>Eptesicus fuscus</i>	big brown bat
	<i>Lasionycteris noctivagans</i>	silver-haired bat
	<i>Lasiurus borealis</i>	red 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>	western pipistrel
Lagomorpha	<i>Plecotus townsendi</i>	Townsend big-eared bat
	<i>Lepus americanus</i>	snowshoe hare
Rodentia	<i>Ochotona princeps</i>	pika
	<i>Clethrionomys californicus</i>	California red-backed vole
	<i>Erethizon dorsatum</i>	porcupine
	<i>Eutamias amoenus</i>	yellow-pine chipmunk
	<i>Eutamias townsendi</i>	Townsend chipmunk
	<i>Glaucomys sabrinus</i>	northern flying squirrel
	<i>Microtus longicaudus</i>	long-tailed vole
	<i>Microtus oregoni</i>	Oregon or creeping vole
	<i>Neotoma cinerea</i>	bushy-tailed wood rat
	<i>Peromyscus maniculatus</i>	deer mouse
	<i>Phenacomys intermedius</i>	heather vole
	<i>Sciurus griseus</i>	western gray squirrel
	<i>Spermophilus lateralis</i>	mantled ground squirrel
	<i>Tamiasciurus douglasi</i>	chickaree
	<i>Thomomys mazama</i>	Mazama pocket gopher
	<i>Zapus trinotatus</i>	Pacific jumping mouse
	Carnivora	<i>Canis latrans</i>
<i>Felis concolor</i>		mountain lion or cougar
<i>Lynx rufus</i>		bobcat
<i>Martes americana</i>		marten
<i>Martes pennanti</i>		fisher
<i>Mustela erminea</i>		short-tailed weasel or ermine
<i>Mustela frenata</i>		long-tailed weasel
<i>Mustela vison</i>		mink
<i>Spilogale putorius</i>		spotted skunk or civet cat
<i>Taxidea taxus</i>		badger
Artiodactyla	<i>Ursus americanus</i>	black bear
	<i>Vulpes fulva</i>	red fox
	<i>Cervus canadensis</i>	wapiti or elk
	<i>Odocoileus h. hemionus</i>	mule deer

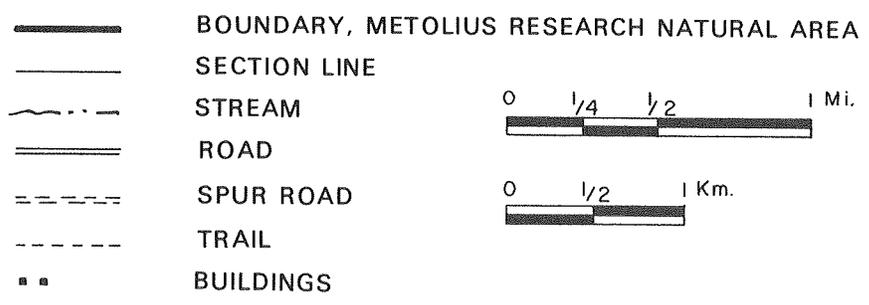
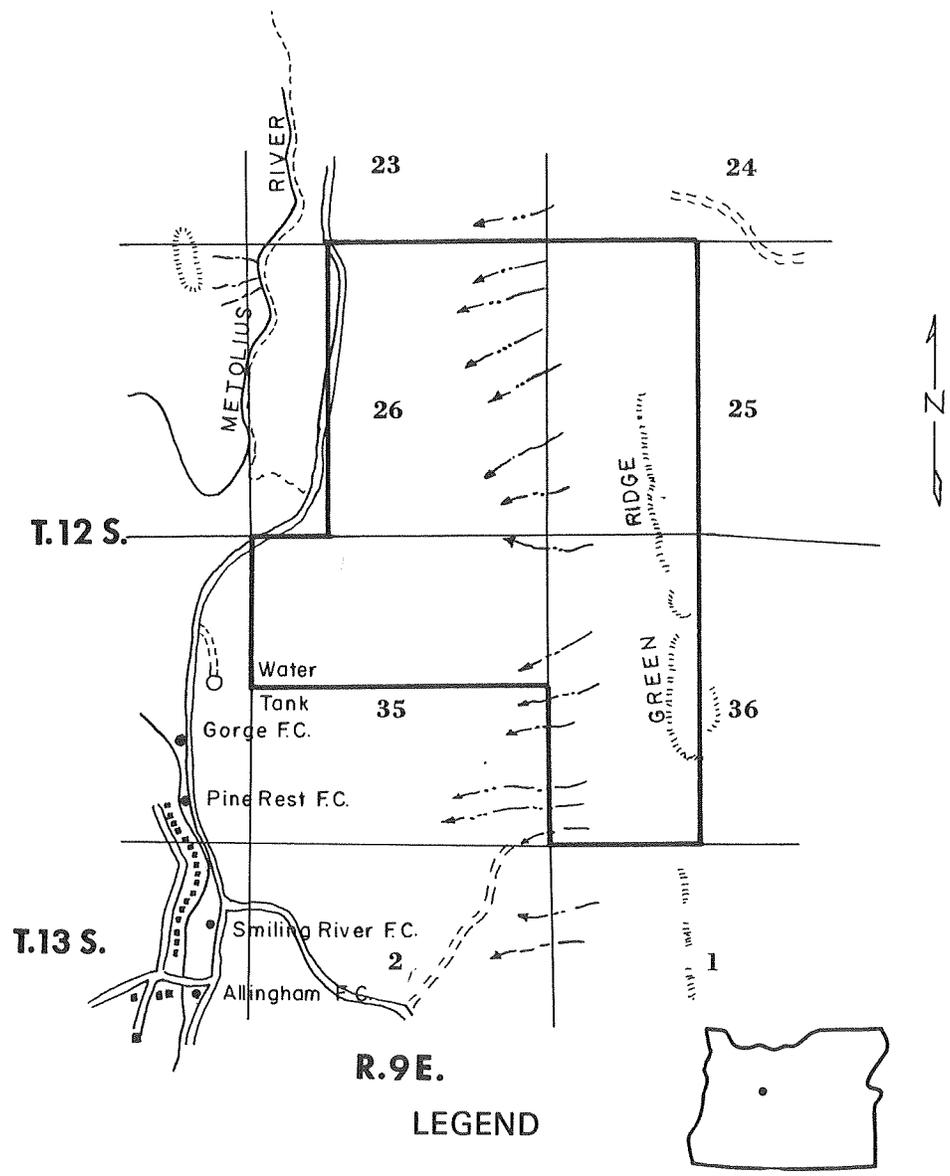


Figure MI-1.- Metolius Research Natural Area,
Jefferson County, Oregon.

Figure M/2.-Natural features of the Metolius Research Natural Area. Upper left: Flatland community of ponderosa pine, bitterbrush, and western needlegrass. Upper right: Rolling foothill community of ponderosa pine with seedling, sapling, and pole-sized Douglas-fir and an understory of bitterbrush, green manzanita, and western needlegrass. Lower left: Community of ponderosa pine, Douglas-fir, green manzanita, and western needlegrass found on steep westerly slopes. Lower right: Firescarred ponderosa pine located in flat portion of natural area; eight fires are recorded in this scar.

