

MAPLE KNOLL RESEARCH NATURAL AREA¹

Bigleaf maple and Oregon white oak stands on opposite slopes of a foothill ridge in Oregon's Willamette Valley.

Maple Knoll Research Natural Area was established on December 27, 1966. It provides examples of bigleaf maple (*Acer macrophyllum*) and Oregon white oak (*Quercus garryana*) stands typical of hilly areas in and adjacent to the Willamette Valley in western Oregon. The 4.5-ha. (100-acre) natural area is located in Benton County, Oregon, and is administered by the William L. Finley National Wildlife Refuge (Route 2, Box 208, Corvallis, Oregon), Bureau of Sport Fisheries and Wildlife. It is located in sections 31 and 32, T. 13 S., R. 5 W., Willamette meridian, at 44 °24' N. latitude and 123°20' W. longitude.

ACCESS AND ACCOMMODATIONS

The Maple Knoll Research Natural Area is located a short distance off U.S. Highway 99W, about 16 km. (10 miles) south of Corvallis. An all-weather graveled road approaches within about 0.8 km. (0.5 mile) of the tract. It is bounded by a fire road along its northeastern edge, but this road cannot be driven during winter months. A maintained trail traverses the natural area from west to east (fig. MA-1). Visitors should contact the Refuge Manager about the best route

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of approach. Commercial accommodations are available in Corvallis; there are no public campgrounds available within the refuge.

ENVIRONMENT

The Maple Knoll Research Natural Area occupies both slopes (north and south) and the top of a low, east-west oriented valley foothill ridge (fig. MA-2). Slopes are generally moderate. Elevations range from about 91 to 168 m. (300 to 500 ft.). There are no streams or springs within the natural area. A swampy area is located on low ground adjacent to its northern boundary.

The ridge occupied by the natural area is composed of light gray to yellowish brown arkosic micaceous sandstone with thin siltstone partings (Vokes et al. 1954). This material belongs to the Spencer formation of upper Eocene age. A narrow dike or sill-like body of intrusive igneous rocks runs from east to west along the ridge line; this intrusion may be composed of basalt, gabbro, or diabase.

The natural area is located in western Oregon, an area of mild, moist climate. However, it is within the Willamette Valley, which is located between the Coast and Cascade Ranges and is, therefore, subject to the somewhat warmer and drier climate typical of interior western Oregon valleys. The summer dry period is especially pronounced. Representative climatic data from the Corvallis weather station are as follows (U.S. Weather Bureau 1965):

Mean annual temperature	11.6°C. (53.0°F.)
Mean January temperature	4.1°C. (39.4°F.)
Mean July temperature	19.2°C. (66.6°F.)
Mean January minimum temperature	0.6°C. (33.1°F.)
Mean July maximum temperature	27.1°C. (80.8°F.)
Average annual precipitation	957 mm. (37.67 in.)
June through August precipitation	49 mm. (1.93 in.)

MA-1

According to a recent soil survey, two soil series are found within the natural area. The Bellpine silty clay loam occupies the north slopes of the ridge, and the Dixonville silty clay loam occupies the ridge top and south slopes. The Dixonville series has been classified as a Brunizem and Pachic Ultic Argixeroll according to the old and new soil classifications, respectively. It consists of a well-drained silty clay loam surface soil over clay and is formed in colluvium from basic igneous rock. A typical horizon sequence is as follows: very dark brown A1 from 0 to 13 cm.; very dark gray brown A3 from 13 to 32 cm.; and very dark brown, clayey B2t from 32 to 66 cm. The Bellpine series (ex-Bellfountain soil series) has been classified as a Red-Yellow Podzolic and Typic Haploxerult. It consists of a moderately deep silty clay loam surface soil over clay and is typically formed in colluvium from sedimentary rocks. A typical horizon sequence is as follows: dark reddish brown A 1 from 0 to 15 cm.; dark reddish brown B 1 from 15 to 25 cm.; and dark red silty clay IIB2t from 25 to 50 cm.

BIOTA

Areas by vegetation types are as follows:

Name	Area
Bigleaf maple forest	14 ha. (35 acres)
Oregon white oak forest	18 ha. (45 acres)
Grassland	12 ha. (29 acres)

The Oregon white oak stands can be assigned to SAF forest cover type 233, Oregon White Oak (Society of American Foresters 1954); the Society does not recognize a type in which bigleaf maple is the dominant species. The oak forest can also be assigned to Kuchler's (1964) Type 26, Oregon Oakwoods, and bigleaf maple stands are possibly assignable to his Type 25, Alder-Ash Forests. The natural area is located within the Interior Valley (*Pinus-Quercus-Pseudotsuga*) Zone of Franklin and Dyrness (1969).

Bigleaf maple dominates the stands found on the north side of the ridge. These developed following logging of the area during or prior to World War II. Trees are relatively

small in size averaging 25- to 40-cm. (10- to 15-in.) d.b.h. Scattered through the tract are older, larger specimens of grand fir (*Abies grandis*) which were not removed at the time of logging. Oregon white oak and Douglas-fir (*Pseudotsuga menziesii*) are also encountered. The trend of forest succession is not entirely clear; grand fir and bigleaf maple are generally both represented in reproductive size classes.

The forest stands on the top and south slopes of the ridge are dominated by Oregon white oak with a scattering of Douglas-fir. According to Anderson (1970), there is a relatively dense canopy cover (80 percent) and trees often exceed 18 m. (60 ft.) in height. Bigleaf maple are occasionally encountered in the south slope stands and, with Douglas-fir, appear to dominate reproductive size classes.

Composition of the understory community varies with aspect and strong changes in the overstory. Bigleaf maple stands on the north slopes typically have well-developed shrub and herbaceous layers. *Philadelphus lewisii*, *Corylus cornuta* var. *californica*, and Pacific yew (*Taxus brevifolia*) are common tall shrub species. *Polystichum munitum* dominates the herbaceous layer with a rich variety of associated herbs and mosses. The understory in the white oak stands is characterized by the low shrub and liana species *Rhus diversiloba*. The abundance of this species is believed a consequence of heavy grazing (Thilenius 1964, 1968). Other understory species encountered include *Rosa eglanteria*, *Symphoricarpos albus*, and *Rubus ursinus* in the shrub layer and *Galium* sp., *Osmorhiza nuda*, *Satureja douglasii*, and several perennial and annual grasses in the herb layer. The oak stands relate to Thilenius (1964, 1968) *Quercus garryana/Rhus diversiloba* community type.

The grasslands were not examined in detail. They have been heavily grazed and contain a high proportion of introduced species which include all of the annual grass dominants. In addition to a variety of herbaceous plants - perennial and annual grasses and forbs - bushes of *Rosa eglanteria* and *Rhus diver-*

siloba are scattered through the grasslands.

Mammals believed or known to reside or pass through the Maple Knoll Research Natural Area are listed in table MA-1. The avifauna of the oak stands are known in detail (Anderson 1970). There are 15 species which inhabit the tract as permanent residents, in addition to seven occasional species, 12 summer resident species, and three winter resident species. These include the hairy woodpecker (*Dendrocopos villosus*), downy woodpecker (*Dendrocopos pubescens*), black-capped chickadee (*Parus atricapillus*), white-breasted nuthatch (*Sitta carolinensis*), brown creeper (*Certhia familiaris*), Bewick's wren (*Thryomanes bewickii*), robin (*Turdus migratorius*), Hutton vireo (*Vireo huttoni*), Rufous-sided towhee (*Pipilo erythrophthalmus*), and Oregon junco (*Junco oreganus*).

HISTORY OF DISTURBANCE

Human activities have had a strong influence on the development of existing forest stands within the Maple Knoll Research Natural Area. The stands on the north slope of the ridge were logged 30 or more years ago. The original stands were probably a mixture of Douglas-fir, grand fir, and bigleaf maple. Selection of Douglas-fir during the logging operations assisted in the conversion of the stand to bigleaf maple. The Oregon white oak stands on the south slope of the ridge have probably never suffered significant logging. However, Habeck (1961, 1962) and Thilenius (1964, 1968) have provided abundant evidence that most of the closed canopy Oregon white oak stands in the Willamette Valley are a consequence of fire control activities instituted with the settlement of the valley in the early 1800's. Prior to this time, open oak savannas and grasslands were believed to have been maintained by periodic fires, possibly set by Indians.

Sheep heavily grazed the oak woodlands and grasslands on the south slope of the ridge until establishment of the wildlife refuge in 1963. No grazing of the area has been allowed since that time. This grazing has significantly altered the composition of the grassland communities and is one reason for the abundance

of introduced species. As mentioned, it may also be one of the reasons for the abundance of *Rhus diversiloba* in the oak stands.

RESEARCH

The natural area has been used as a site for undergraduate research work by ecology and wildlife students from Oregon State University; the Refuge Manager can provide details. The south slope stands of Oregon white oak were one of five sampling sites used by Anderson (1970) in a study of fluctuations in composition and abundance of bird species in Oregon white oak stands.

Despite the disturbances by logging and grazing, the Maple Knoll Research Natural Area is a very valuable research tract since the communities are typical of many forested areas found in the Willamette Valley, and protected sites of these types are extremely rare. Successional studies in the maple, oak, and grassland types seem especially appropriate to determine what effect human activities have had on them and how rapidly they are returning to a more natural state now that logging and grazing have been eliminated. Other opportunities include the study of variations in community composition, structure, and productivity on contrasting but contiguous topography and soils and of variations in animal populations and behavior in strongly contrasting vegetation types.

MAPS AND AERIAL PHOTOGRAPHS

Special maps applicable to the natural area include the following: *Topography* - 15' Monroe, Oregon quadrangle, scale 1: 62,500, issued by the U.S. Geological Survey in 1957; *geology - Geology of the West Central Border Area of the Willamette Valley, Oregon*, scale 1:62,500 (Vokes et al. 1954). Photographs taken in June 1970 can be purchased from the Agricultural Stabilization and Conservation Service, Benton County ASC Committee, P.O. Box 1027, Corvallis, Oregon. Photo DF J -1LL-67 provides the best coverage of the natural area.

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Table MA-1. — Tentative list of mammals for Maple Knoll Research Natural Area

Order	Scientific name	Common name	
Marsupialia	<i>Didelphis marsupialis</i>	opossum	
Insectivora	<i>Neotrichus gibbsi</i>	shrew mole	
	<i>Scapanus orarius</i>	coast mole	
	<i>Scapanus townsendi</i>	Townsend mole	
	<i>Sorex trowbridgii</i>	Trowbridge shrew	
	<i>Sorex vagrans</i>	wandering shrew	
Chiroptera	<i>Antrozous pallidus</i>	pallid bat	
	<i>Eptesicus fuscus</i>	big brown bat	
	<i>Lasiomycteris 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>	Yuma myotis	
	<i>Plecotus townsendi</i>	Townsend big-eared bat	
	Lagomorpha	<i>Sylvilagus bachmani</i>	brush rabbit
		<i>Sylvilagus floridanus</i>	eastern cottontail
	Rodentia	<i>Arborimus longicaudus</i>	red tree vole
<i>Eutamias townsendi</i>		Townsend chipmunk	
<i>Glaucomys sabrinus</i>		northern flying squirrel	
<i>Microtus canicaudus</i>		gray-tailed vole	
<i>Microtus oregoni</i>		Oregon or creeping vole	
<i>Microtus townsendi</i>		Townsend vole	
<i>Neotoma fuscipes</i>		dusky-footed wood rat	
<i>Peromyscus maniculatus</i>		deer mouse	
<i>Sciurus griseus</i>		western gray squirrel	
<i>Spermophilus beecheyi</i>		California ground squirrel	
<i>Tamiasciurus douglasi</i>		chickaree	
<i>Thomomys bulbivorus</i>		giant pocket gopher	
Carnivora		<i>Canis latrans</i>	coyote
		<i>Lynx rufus</i>	bobcat
	<i>Mephitis mephitis</i>	striped skunk	
	<i>Mustela erminea</i>	short-tailed weasel or ermine	
	<i>Mustela vison</i>	mink	
	<i>Procyon lotor</i>	raccoon	
	<i>Spilogale putorius</i>	spotted skunk or civet cat	
	<i>Urocyon cinereoargenteus</i>	gray fox	
	<i>Ursus americanus</i>	black bear	
Artiodactyla	<i>Vulpes fulva</i>	red fox	
	<i>Odocoileus h. columbianus</i>	black-tailed deer	

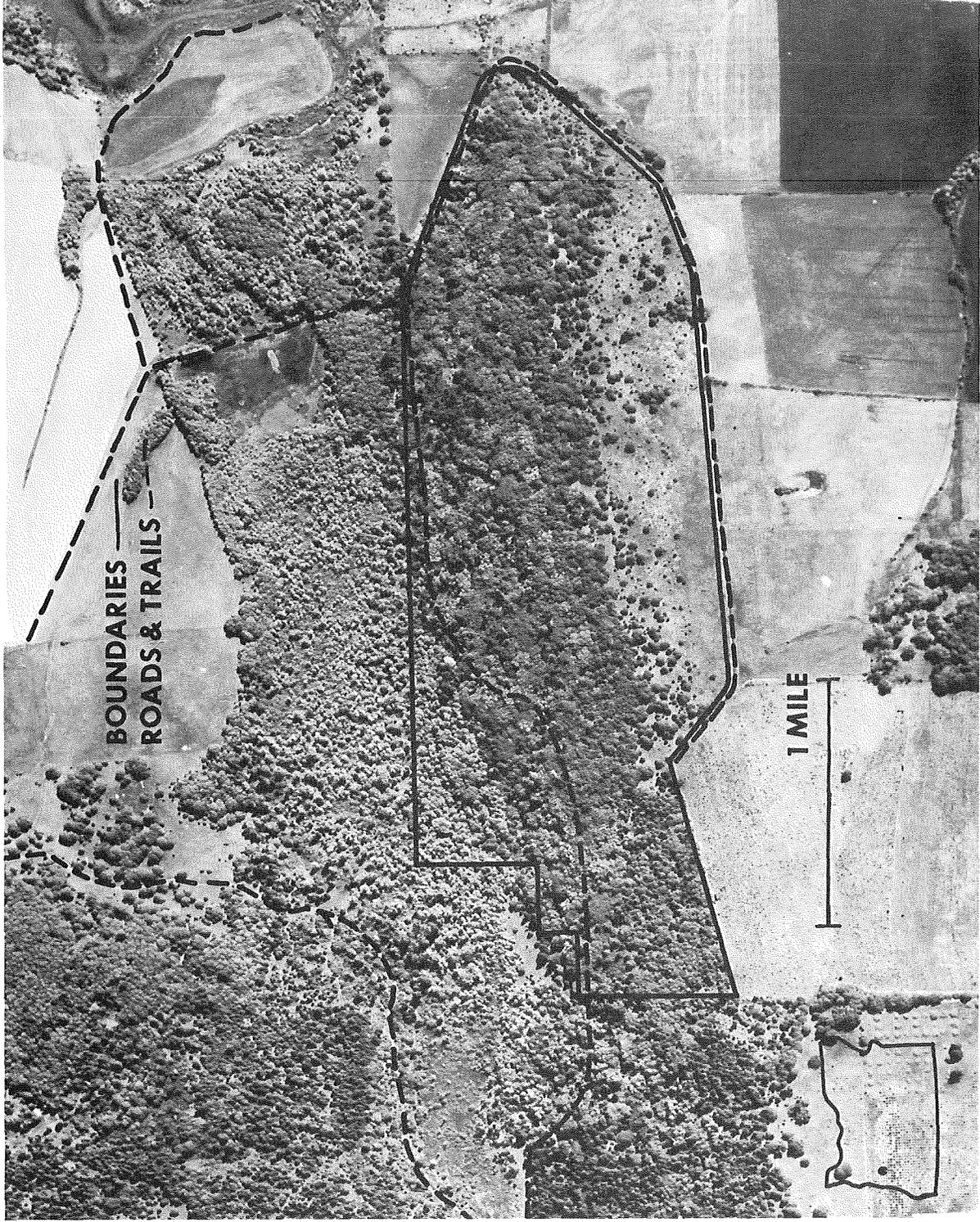


Figure MA-7.- Aerial photograph of Maple Knoll Research Natural Area, Benton County, Oregon, showing boundaries, vegetative patterns, and other features.

Figure MA-2. -Natural features of Maple Knoll Research Natural Area. Upper: Typical stand of bigleaf maple on the north slope of the tract. Center: View of the eastern edge of the natural area where the Oregon white oak and bigleaf maple stands found on south (left) and north (right) slopes, respectively, merge. Bottom: General view of the north side of the Maple Knoll Research Natural Area and its environs; Pigeon Butte Research Natural Area is on the left.

