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

PIGEON BUTTE RESEARCH NATURAL AREA[1]

Oregon white oak stands growing on a low hill in Oregon's Willamette Valley.

Pigeon Butte Research Natural Area was established December 27, 1966, to exemplify Oregon white oak *(Quercus garryana)* stands typical of those found in western Oregon's Willamette Valley. The 28-ha. (70-acre) tract 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. The natural area is located in section 32, T. 13 S., R. 5 W., Willamette meridian , at $44^0$24' N. latitude and $123^0$19' W. longitude.

ACCESS AND ACCOMMODATIONS

The natural area is found in the William L. Finley National Wildlife Refuge which is located about 16 km. (10 miles) south of Corvallis, a short distance off U.S. Highway 99W (fig. PI-I). The natural area is located about 0.2 km. (0.5 mile) from a graveled all-weather road. Several dirt fire patrol roads approach the tract. Visitors should inquire at the Refuge headquarters about the best route of approach. Numerous commercial accommodations are available in Corvallis; there are no campgrounds within the refuge.

[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.

ENVIRONMENT

The Pigeon Butte Research Natural Area occupies the northerly slopes of Pigeon Butte, a relatively isolated hill rising 76 m. (250 ft.) from the floor of the valley. All of the tract is located on gentle to moderate slopes. There are no streams or springs located within the natural area. Elevations range from about 91 to 168 m. (300 to 550 ft.).

The natural area is located on a hill of light gray to yellowish brown arkosic micaceous sandstone surrounded by Willamette Valley alluvium (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 (probably basalt or gabbro) runs along the southern boundary of the natural area from east to west.

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, which is about 16 km. (10 miles) north, 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.)

The soils within the natural area have been mapped as the Dixonville silty clay loam. This soil series has been classified as a Brunizem and Pachic Ultic Argixeroll

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according to the old and new 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 Al 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.

BIOTA

Estimated areas by vegetation types are:

Name	*Area*
Oregon white oak closed forest	19 ha. (46 acres)
Oregon white oak savanna	7 ha. (18 acres)
Grassland	2 ha. (5 acres)

The areas of forest and savanna fit the Society of American Foresters (1954) cover type 233, Oregon White Oak, and Kuchler's (1964) Type 26, Oregon Oakwoods. The natural area lies within the Interior Valley *(Pinus-Quercus-Pseudotsuga)* Zone of Franklin and Dyrness (1969).

The major tree species in the natural area is Oregon white oak (fig. PI-2). Anderson (1970) indicates that about 82 percent of the canopy cover is composed of this species. Dominant oaks typically range up to 60-cm. (24-in.) d.b.h. with occasional specimens exceeding 90-cm. (36-in.) d.b.h. Heights of dominants are generally from 18 to 21 m. (60 to 70 ft.). Other tree species present include bigleaf maple *(Acer macrophyllum)* and Pacific dogwood *(Cornus nuttallii).* Grand fir *(Abies grandis)* and Douglas-fir *(Pseudotsuga menziesii)* are extremely uncommon.

The closed canopy oak forests found on the natural area are probably of relatively recent origin. Habeck (1961, 1962) documents a major conversion of prairie and oak savanna to closed oak forest since settlement of the Willamette Valley. Fire control activities instituted by the settlers are believed responsible for this major successional change. Thilenius' (1964, 1968) detailed analyses confirm the fact that most Oregon white oak stands originated after 1850. Typically they are composed of scattered large trees of open-grown form and averaging 237 years old which are surrounded by smaller oaks of forest-grown form averaging 74 to 105 years of age. The stands found on the natural area have this structure - a scattering of very large, old trees with the bulk of the stand made up of smaller oaks of forest-grown form.

Successional relationships within closed-canopy Oregon white oak stands are not clear (Franklin and Dyrness 1969). In the natural area bigleaf maple is the most conspicuous tree species in the reproductive size classes. Seedlings and saplings of oak are rarely found in closed canopy stands. Douglas-fir and grand fir, both of which have been suggested as climax species, are uncommon.

Most of the closed forest stands have relatively well-developed shrub and herb layers. Anderson (1970) describes a dense shrub layer averaging about 3,500 plants per ha. (1,400 per acre). *Corylus Cornuta* var. *californica, Amelanchier alnifolia, Crataegus douglasii,* and *Osmaronia cerasiformis* are the most common tall shrubs. *Rhus diversiloba* is one of the most common low shrubs, and it is also conspicuous in a liana growth form. Thilenius (1964) has hypothesized that *Rhus diversiloba* is favored by grazing of oak woodlands because of interconnections between shrub and liana growth forms and its less palatable status. Other common low shrubs are *Rubus ursinus, Symphoricarpos albus,* and *Rosa nutkana.* Typical herbs are *Polystichum munitum, Pteridium. aquilinum., Galium triflorum, Bromus laevipes, Montia sibirica, Hypericum perforatum., Lomatium utriculatum, Osmorhiza nuda, Satureia douglasii, Vicia americana.,* and *Tellima grandiflora.* Most of the closed forest stands seem to best fit the *Quercus garryana/Corylus cornuta/Polystichum munitum* community described by Thilenius (1964).

The savannas of Oregon white oak have not been carefully examined. The understory is typified by an abundance of grasses and forbs including many introduced species. *Rhus diversiloba* is also conspicuous in parts of the savanna.

The grasslands are located mostly on the upper west and northwest exposed slopes of Pigeon Butte (fig. PI-I). Communities are

dominated by a variety of perennial and annual grasses and forbs. Scattered bushes of *Rosa eglanteria* and *Rhus diversiloba* are also present. There is a high proportion of introduced species including all of the annual grass dominants. The grassland areas appear to be natural (as opposed to tracts created by settlers or latter-day farmers by clearing or burning). The composition has been strongly influenced by heavy grazing of domestic cattle and sheep. Successional status of the grasslands and savanna under the present regime of fire control and no grazing is unknown.

Mammals believed to reside within or to pass through the natural area are listed in table PI-I.

Anderson (1970) has provided a rather complete list of the bird species found on the natural area and data on seasonal fluctuations in their abundance. He lists 13 resident species, four occasional species, 13 summer residents, and 26 winter residents. Among the permanent residents are the hairy woodpecker *(Dendrocopos villosus),* downy woodpecker *(Dendrocopos pubescens),* scrub jay *(Aphelocoma coerulescens),* blackcapped chickadee *(Parus atricapillus)* , common bushtit *(Psaltriparus minimus),* white-breasted nuthatch *(Sitta carolinensis),* brown creeper *(Certhia familiaris),* Bewick's wren *(Thryomanes bewickii),* robin *(Turdus migratorius),* Rufous-sided towhee *(Pipilo erythrophthalmus),* and Oregon junco *(Junco oreganus).*

HISTORY OF DISTURBANCE

Human activities have significantly influenced natural processes on the natural area. As mentioned, fire control activities initiated upon settlement of the valley probably contributed to the development of the closed oak stands. The tract was heavily grazed by sheep and cattle until 1966. Some minor cutting of oaks was also carried out prior to establishment of the refuge. A rock quarry is located on the south side of Pigeon Butte just outside the natural area boundaries; it is not believed to have had any significant effect on the natural area itself, however.

RESEARC H

Several studies have been carried out within the Pigeon Butte Research Natural Area. The tract was used as a sampling site by Thilenius (1964, 1968) during ecological studies of Willamette Valley oak woodlands. Anderson (1970) used the natural area as one site in a study of bird fauna in Oregon white oak stands. Several classes in ecology and wildlife at Oregon State University, Corvallis, have utilized the natural area; details are available from the Refuge Manager.

The natural area is extremely valuable as a tract where near-natural communities typical of those found in the Willamette Valley can be studied; protected stands of Oregon white oak are extremely rare. Studies of the composition and structure and of successional and environmental relationships of Oregon white oak stands are especially appropriate. Since two natural areas representing other Willamette Valley vegetation types are nearby (Maple Knoll and Willamette Floodplain), it is also possible to use the tract as one site in studies concerning the entire valley mosaic.

MAPS AND AERIAL PHOTOGRAPHS

Special maps available 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). Aerial photos taken in June 1970 may be purchased from the Agricultural Stabilization and Conservation Service, Benton County ASC Committee, P. O. Box 1027, Corvallis. Photo DFJ-1LL-49 provides the best coverage of the natural area.

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Table PI-1. — Tentative list of mammals for Pigeon Butte Research Natural Area

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

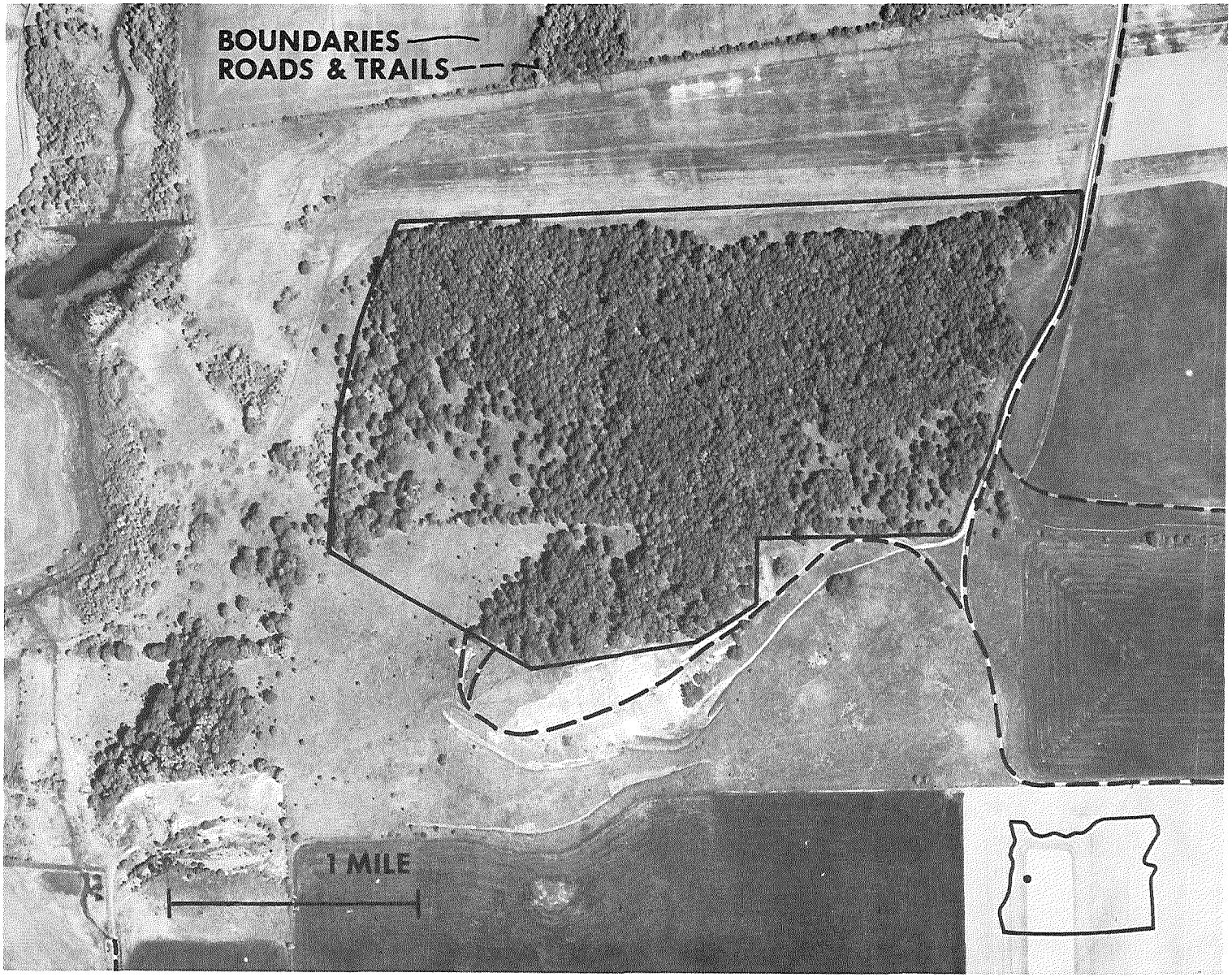

Figure PI-1.– Aerial photograph of Pigeon Butte Research Natural Area, Benton County, Oregon, showing boundaries, vegetative patterns, and other features.

Figure PI-2.-Natural features of Pigeon Butte Research Natural Area. Upper left: Typical closed stand of Oregon white oak near summit of Pigeon Butte. Upper right: Grassland and oak savanna near summit of Pigeon Butte. Center left: Oregon white oak stand showing abundant liana-form *Rhus diversiloba.* Center right: Large old-growth Oregon white oak trees of open-grown form within a closed forest stand; these are believed to be remnants of an oak savanna which originally occupied the area prior to initiation of fire control programs a century ago. Bottom: General view of Pigeon Butte and its environs from the north; the eastern edge of the Maple Knoll Research Natural Area is visible to the right of Pigeon Butte.