

HIGLEY CREEK RESEARCH NATURAL AREA¹

Western hemlock stands on a mountain slope and valley bottom on the southwestern Olympic Peninsula.

The Higley Creek Research Natural Area was established to exemplify coastal western hemlock (*Tsuga heterophylla*) forest stands. The 194-ha. (480-acre) tract is located in Grays Harbor County, Washington, and is administered by the Olympic National Park (Port Angeles, Washington). The natural area occupies the S1/2 and the S1/2 N1/2, section 12, T. 23 N., R. 10 W., Willamette meridian. It lies at 47°30' N. latitude and 123°54' W. longitude.

ACCESS AND ACCOMMODATIONS

The natural area is located near Lake Quinault and can be reached via U.S. Highway 101 (to Amanda Park) and the North Shore Road along the lake. The edge of the tract varies from 750 to 1,200 m. (2,500 to 4,000 ft.) north of this road. An abandoned trail leads up Higley Creek from this road skirting the natural area; its obscure terminus is located behind a house 2.7 km. (1.7 miles) from U.S. Highway 101 or 6.9 km. (4.3 miles) west of the National Park Service's Quinault Ranger Station. No roads or maintained trails enter the tract. Access is by cross-country travel.

Commercial accommodations, as well as several excellent public campgrounds, are located 3 to 8 km. (2 to 5 miles) from the

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natural area in the vicinity of Amanda Park and Quinault.

ENVIRONMENT

The Higley Creek Research Natural Area extends from the floor of the Quinault River valley onto the lower slopes of Higley Peak (fig. HI-I). Topography is gentle and undulating for 300 to 800 m. (1,000 to 2,500 ft.) from the southern boundary of the tract and then rises steeply to the northern boundary. The broken mountain slopes typically vary from 30 to 50 percent and have a generally southern exposure. Several streams flow through portions of the natural area, and several smaller streams rise within it. Drainages cut by these streams produce locally complex microtopography in the southern half of the tract. Elevations range from about 120 m. (400 ft.) in the southwestern corner to 550 m. (1,800 ft.) in the northwestern corner.

According to Huntting et al. (1961), higher elevations in the natural area are located on upper Cretaceous - lower Tertiary sedimentary rocks belonging to the Soleduck formation, while at lower elevations these rocks are covered by recent deposits of alluvium and, possibly, glacial drift. The Soleduck formation developed from marine sediments which have been intensely folded and faulted and slightly metamorphosed (Danner 1955). The dominant, dark gray, massive to poorly-bedded graywackes and sandstones are commonly interbedded with slate, argillite, and volcanic rock. The natural area was glaciated at least three times during the Wisconsin epoch and at least once before that (Crandell 1964).

A maritime climate, wet with muted temperature extremes, prevails. Winters are mild and summers are cool with frequent cloudy days. Precipitation is heavy but highly seasonal with January and December the peak months. Only about 7 percent of the annual

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precipitation falls during June, July, and August; and some years a drought period of a month or more occurs. Snow is rare. Climatic data from the nearby Quinault Ranger Station are as follows (U.S. Weather Bureau 1956) :

Mean annual temperature 10.6°C. (51.0°F.)
 Mean January temperature 3.8°C. (38.9°F.)
 Mean July temperature 17.3°C. (63.2°F.)
 Mean January minimum
 temperature 1.2°C. (34.2°F.)
 Mean July maximum temperature 23.8°C. (74.9°F.)
 Average annual precipitation 3,371 mm. (132.73 in.)
 June through August
 precipitation 244 mm. (9.61 in.)
 Average annual snowfall 30.2 cm. (11.9 in.)

The soils on the area have not been mapped or described. In the valley bottom, they appear relatively deep and loamy, and on the mountain slopes they are somewhat shallower and contain greater amounts of loose rock. At least a portion of the soils would probably be classed as Sols Bruns Acides.

BIOTA

Essentially all 194 ha. (480 acres) of the natural area are occupied by SAF cover type 224, Western Hemlock (Society of American Foresters 1954). The area would probably fall entirely within Kuchler's (1964) Type 1, Spruce - Cedar - Hemlock Forest, and contains elements of both the *Picea sitchensis* and *Tsuga heterophylla* Zones as defined by Franklin and Dyrness (1969).

Western hemlock is the most abundant tree within the research natural area, attaining diameters of 75 to 100 cm. (30 to 40 in.) b.h. and heights of 60 m. (200 ft.). Specimens up to 152-cm. (60-in.) d.b.h. and larger are occasionally encountered (fig. HI-2). Other coniferous tree species include western red-cedar (*Thuja plicata*), Douglas-fir (*Pseudotsuga menziesii*), Pacific silver fir (*Abies amabilis*), and Sitka spruce (*Picea sitchensis*). Western red-cedar is most common in wet areas on gentle topography, where it may occur as very large (in excess of 254-cm. or 100-in. d.b.h.), old specimens. Douglas-fir is common as large, old trees, averaging 125- to 150-cm. (50- to 60-in.) d.b.h. with a maximum

of about 203 cm. (80 in.). Both Pacific silver fir and Sitka spruce are rare, the former being encountered on the mountain slopes and the latter on the flat topography in the valley bottom. Red alder (*Alnus rubra*) is common along larger streams and in some swampy areas (fig. HI-2). Bigleaf maple (*Acer macrophyllum*) is also occasionally found on moist slopes or along stream-sides.

Western hemlock is clearly the climax species throughout most of the natural area; it is the only species consistently represented by all age classes. Seedlings and saplings of hemlock are abundant; some stand openings are completely choked by sapling hemlocks. Reproduction of western red-cedar, Douglas-fir, and Sitka spruce is generally absent. Much tree reproduction is found on rotting logs, "nurse logs," which often support hundreds of seedlings. Some of these can be expected to survive and their roots to reach mineral soil.

Four major community types were recognized within the natural area during the reconnaissance. These were (1) *Tsuga heterophylla*/*Polystichum munitum* - *Oxalis oregana*; (2) *Thuja plicata* - *Tsuga heterophylla*/*Vaccinium alaskaense* - *Gaultheria shallon*/*Blechnum spicant*; (3) *Tsuga heterophylla* - *Pseudotsuga menziesii*/*Gaultheria shallon*/*Vaccinium parvifolium*; and (4) an *Alnus rubra* swamp type. The most common community type is the *Tsuga*/*Polystichum* - *Oxalis* which is found both on mountain slopes and in the valley bottom. Typical understory species in this community include *Polystichum munitum*, *Oxalis oregana*, *Blechnum spicant*, *Tiarella trifoliata*, *Maianthemum bifolium* var. *kamschaticum*, *Gallium triflorum*, and *Viola sempervirens*. The shrubby layer is not well developed, consisting primarily of *Vaccinium parvifolium*.

The *Thuja* - *Tsuga*/*Vaccinium* - *Gaultheria*/*Blechnum* community is found on relatively wet habitats and gentle topography. The shrubby layer in this community is dominated by *Vaccinium alaskaense* and *Gaultheria shallon*. Important herbs include *Blechnum spicant*, *Rubus pedatus*, *Cornus canadensis*, *Polystichum munitum*, *Gymnocarpium dryop-*

teris, *Athyrium filix-femina*, *Tiarella trifoliata*, and *Galium triflorum*,

The *Tsuga - Pseudotsuga/Gaultheria - Vaccinium* community is generally found on drier habitats on the slopes. Vine maple (*Acer circinatum*) is a common shrub dominant along with the *Gaultheria shallon*. Other shrubby species include *Berberis nervosa*, *Vaccinium parvifolium*, and *Rubus ursinus*. Herbaceous species may include *Polystichum munitum*, *Oxalis oregana*, *Trillium ovatum*, and *Viola sempervirens*.

Extremely wet or swampy areas on gentle topography are occupied by an open mosaic of tree, shrub, and herb-dominated stands (fig. HI-2). Red alder is the conspicuous tree species in such areas. These mosaics provide a rich variety of microhabitats for many plant and animal species not found elsewhere in the natural area. Plant dominants include the shrubs vine maple, *Gaultheria shallon*, *Rubus spectabilis*, *Menziesia ferruginea*, *Corydalis scouleriana*, *Stachys* sp., *Rhamnus purshiana*, and *Sambucus* sp. The rich selection of herbs includes *Athyrium filix-femina*, *Lysichitum americanum*, *Gymnocarpium dryopteris*, *Carex* spp., *Scirpus* sp., *Boykinia major*, *Cardamine* sp., and *Chrysosplenium glechomaefolium*, as well as several species of grass.

The Roosevelt elk (*Cervis canadensis roosevelti*) is the most important animal present on the natural area; their trails ease the problem of access through the area. Undoubtedly they have also affected the composition of the understory vegetation (Kirk 1966, Sharpe 1956), Mammals believed to occur within the natural area are listed in table HI-I.

Streams and stream-sides are the only specialized habitats which are present. No lakes, ponds, rock outcrops, etc., exist within the natural area,

HISTORY OF DISTURBANCE

The most common natural disturbance encountered within the natural area is wind-throw of trees, which may occur either singly or in small patches (fig. HI-2). There is no evidence of recent wildfires; fire scars can be seen on very old Douglas-firs. The parasitic dwarf mistletoe (*Arceuthobium campylopodum*) is commonly found on western hemlock within the natural area. Human disturbance within the natural area is essentially nonexistent.

RESEARCH

No research is presently known to be in progress within the natural area. Special research opportunities existing here include studies of contrasts in community composition and structure associated with variations in soils and topography, and effects of Roosevelt elk on their habitat.

MAPS AND AERIAL PHOTOGRAPHS

Special maps applicable to the natural area include: *Topography - 15' Quinault Lake*, Washington quadrangle, scale 1: 62,500, issued by the U.S. Geological Survey in 1955, and topographic map of Olympic National Park and Vicinity, Washington, scale 1: 125,000, issued by the U.S. Geological Survey in 1957; and *geology - Geologic Map of Washington*, scale 1: 500,000 (Hunting et al. 1961), The Superintendent, Olympic National Park (Port Angeles, Washington), can provide details on the most recent aerial photo coverage and forest type maps for the area.

LITERATURE CITED

- Crandell, Dwight R.
1964. Pleistocene glaciations of the southwestern Olympic Peninsula, Washington. U.S. Geol. Surv. Prof. Pap. 501B:B135-B139, illus.
- Danner, Wilbert R.
1955. Geology of Olympic National Park. 68 p., illus. Seattle: Univ. Wash. Press.
- Franklin, Jerry F., and C. T. Dyrness
1969. Vegetation of Oregon and Washington. USDA Forest Servo Res. Pap. PNW-80, 216 p., illus. Pac. Northwest Forest & Range Exp. Stn., Portland, Oreg.
- Hunting, Marshall T., W. A. G. Bennett, Vaughan E. Livingston, Jr., and Wayne S. Moen
1961. Geologic map of Washington. Wash. Dep. Conserv., Div. Mines & Geol.
- Kirk, Ruth
1966. The Olympic Rain Forest. 86 p., illus. Seattle: Univ. Wash. Press.
- Kuchler, A. W.
1964. Manual to accompany the map of potential natural vegetation of the conterminous United States. Am. Geogr. Soc. Spec. Publ. 36, various paging, illus.
- Sharpe, Grant William
1956. A taxonomical-ecological study of the vegetation by habitats in eight forest types of the Olympic rain forest, Olympic National Park, Washington. 335 p., illus. (Ph.D. thesis, on file at Univ. Wash., Seattle.)
- Society of American Foresters
1954. Forest cover types of North America (exclusive of Mexico). 67 p., illus. Washington, D.C.
- U.S. Weather Bureau
1956. Climatic summary of the United States - supplement for 1931 through 1952, Washington. Climatography of the United States 11-39, 79 p., illus.

Table HI-1. — Tentative list of mammals for Higley Creek Research Natural Area

Order	Scientific name	Common name	
Insectivora	<i>Neurotrichus gibbsi</i>	shrew mole	
	<i>Scapanus orarius</i>	coast mole	
	<i>Sorex bendirii</i>	marsh shrew	
	<i>Sorex obscurus</i>	dusky shrew	
	<i>Sorex trowbridgii</i>	Trowbridge shrew	
Chiroptera	<i>Sorex vagrans</i>	wandering shrew	
	<i>Eptesicus fuscus</i>	big brown bat	
	<i>Lasiorycteris noctivagans</i>	silver-haired 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 volans</i>	long-legged myotis	
	<i>Myotis yumanensis</i>	Yuma myotis	
	<i>Plecotus townsendi</i>	Townsend big-eared bat	
Lagomorpha	<i>Lepus americanus</i>	snowshoe hare	
Rodentia	<i>Aplodontia rufa</i>	mountain beaver	
	<i>Castor canadensis</i>	beaver	
	<i>Clethrionomys gapperi</i>	Gapper red-backed vole	
	<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>Tamiasciurus douglasi</i>	chickaree	
	<i>Zapus trinotatus</i>	Pacific jumping mouse	
	Carnivora	<i>Canis latrans</i>	coyote
		<i>Felis concolor</i>	mountain lion or cougar
		<i>Lutra canadensis</i>	river otter
		<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>Procyon lotor</i>		raccoon	
<i>Spilogale putorius</i>		spotted skunk or civet cat	
<i>Ursus americanus</i>		black bear	
Artiodactyla		<i>Cervus canadensis roosevelti</i>	Roosevelt elk
	<i>Odocoileus h. columbianus</i>	black-tailed deer	

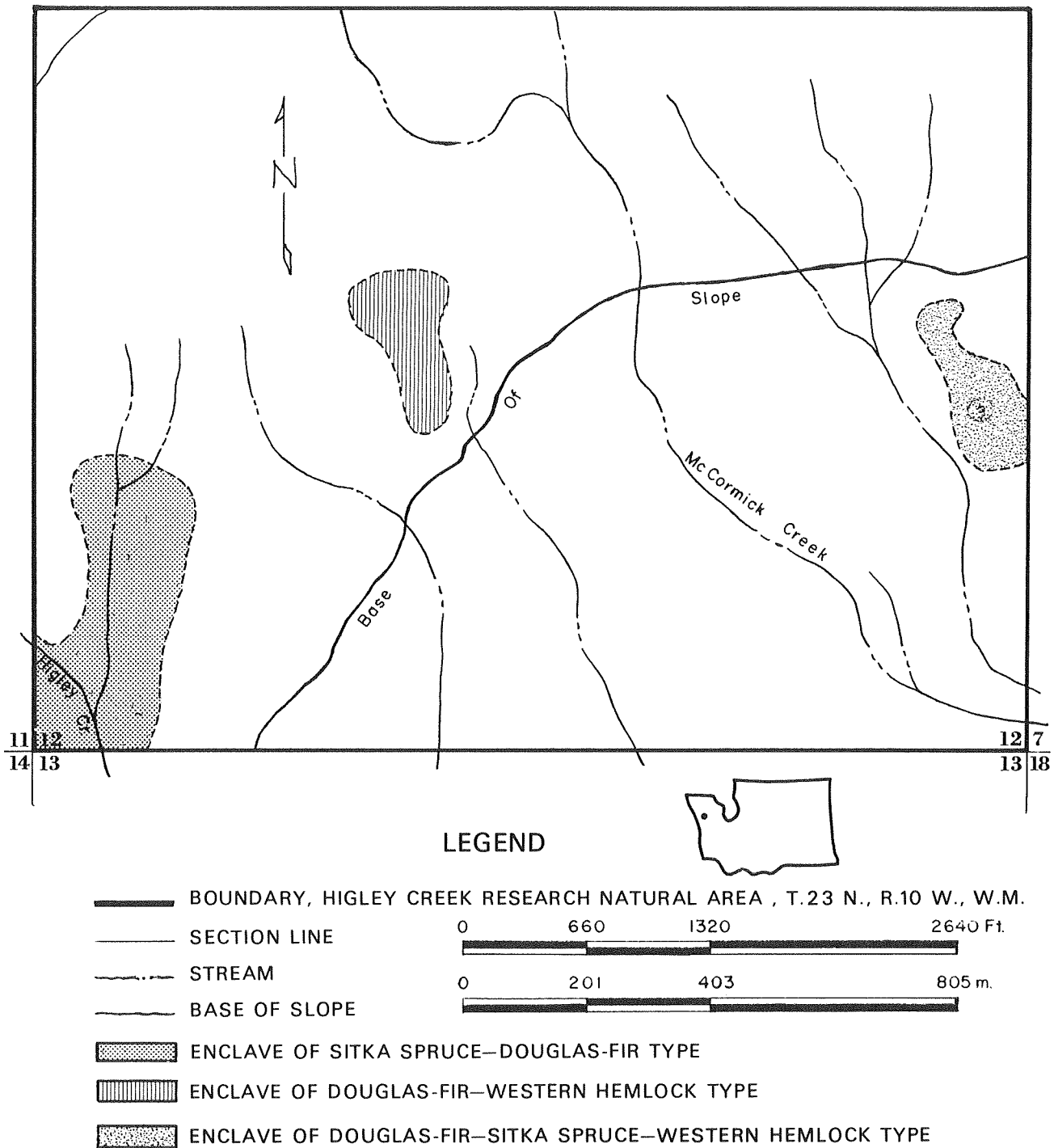


Figure H1-1.- Higley Creek Research Natural Area,
 Grays Harbor County, Washington.

Figure HI-2.-Natural features of Higley Creek Research Natural Area.
Upper left: Typical large western hemlock, with smaller hemlock
in the background. Upper right: Swampy opening ringed with red
alder. Bottom: Small patch of recently wind-thrown trees.

