

TWIN CREEK RESEARCH NATURAL AREA¹

"Rain forest" Sitka spruce-western
hemlock stands growing on terraces
along the Hoh River on the western
Olympic Peninsula, Washington.

The Twin Creek Research Natural Area was established in 1958 to exemplify Sitka spruce (*Picea sitchensis*) forests as they occur under the "rain forest" conditions found in river valleys on the west side of the Olympic Peninsula. The 40-ha. (100-acre) tract is located in Jefferson County, Washington, and is administered by Olympic National Park (Port Angeles, Washington). The natural area is located in two units which occupy portions of sections 20, 21, and 29, T. 27 N., R. 10 W., Willamette meridian. Legal lines provide the boundaries. The tract is located at 47°50' N. latitude and 124 °00' W. longitude.

ACCESS AND ACCOMMODATIONS

The natural area is located a short distance from the Hoh River Road, about 23 km. (14 miles) from its junction with U.S. Highway 101. The west unit is located about 1.6 km. (1 mile) inside the park boundary and 9 km. (5.5 miles) from the visitors center at the end of the Hoh River Road. The east unit is located about 1.6 km. (1 mile) east of the west unit. There are no trails within the natural area, but cross-country travel is not too difficult because of the gentle topography.

Commercial accommodations are available in Forks or Kalaloch, along U.S. Highway

101, from 40 to 56 km. (25 to 35 miles) away. However, there is an excellent public campground at the end of the Hoh River Road and several smaller State campgrounds along the road outside the park.

ENVIRONMENT

The natural area occupies gentle topography on river terraces in the Hoh River valley. Elevations range from about 130 to 195 m. (420 to 640 ft.) in the west unit and 150 to 175 m. (500 to 580 ft.) in the east unit. Two branches of Twin Creek flow through a portion of the east unit and swampy areas are found in both units of the natural area (fig. TW-1).

The natural area is located on upper Cretaceous-lower Tertiary sedimentary rocks belonging to the Soleduck formation (Danner 1955, Hunting et al. 1961); however, bedrock is completely buried beneath depositions of alluvium and possibly some glacial drift. The valley of the Hoh River, including the natural area, has been glaciated at least three times during the Wisconsin age and at least once in pre-Wisconsin time (Crandell 1964).

A wet, mild, maritime climate prevails. Winters are mild and summers are cool with frequent cloudy days. Precipitation is heavy, but less than 10 percent falls during summer months. The following climatic data are from the Forks weather station located approximately 32 km. (20 miles) northwest of the natural area (U.S. Weather Bureau 1965):

Mean annual temperature	.....	9.55°C. (49.2°F.)
Mean January temperature	.....	3.72°C. (38.7°F.)
Mean July temperature	.....	15.39°C. (59.7°F.)
Mean January minimum		
temperature	.....	0.17°C. (32.3°F.)
Mean July maximum temperature	.....	21.55°C. (70.8°F.)
Average annual precipitation	..	2,974 mm. (117.10 in.)
June through August		
precipitation	.....	214 mm. (8.44 in.)
Average annual snowfall	348 cm. (13.7 in.)

TW-1

¹ Description prepared by Dr. J. F. Franklin, U.S.
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Precipitation is significantly higher on the natural area itself, probably averaging about 3,600 mm. (142 in.) annually (Kirk 1966).

Soils appear to be predominantly Sols Bruns Acides. Fonda² has described profiles on similar terrace areas in the vicinity of the natural area and found the following sequence to be typical:

O2	2 to 0 cm.	Fresh litter.
A1	0 to 16 cm.	Very dark grayish brown with moderate crumb structure.
B1	16 to 46 cm.	Very dark gray sand, compact breaking to single grain.
B2	46 to 57 cm.	Very dark gray sand with single grain to weak crumb structure and some clay accumulation.
C1	57 to 150 cm.	Black sands with single grain structure.
IIC2	150 cm. +	River cobbles and gravels.

BIOTA

Essentially all the forest within the natural area can be considered a mixture of SAF forest cover types 225, Sitka Spruce-Western Hemlock, and 223, Sitka Spruce, with the latter type probably dominant (Society of American Foresters 1954). They belong to Kuchler's (1964) Type 1, Spruce-Cedar-Hemlock Forest. The tracts are located within the *Picea sitchensis* Zone of Franklin and Dyrness (1969). Categorizing the area in this fashion does not do it justice, however; it is a fine example of the so-called "Olympic Rain Forest" found on major river terraces on the west side of the Olympic Peninsula (Kirk 1966).

The two units are mosaics of Sitka spruce and western hemlock (*Tsuga heterophylla*) forest of varying ages and sizes interspersed with open areas dominated by vine maple (*Acer circinatum*) and occasionally bigleaf maple (*Acer macrophyllum*). Sitka spruce and western hemlock make up about 80 and 20 percent of the stand volume, respectively. Both the spruce and hemlock are present in

all size classes ranging up to a maxima of 230- to 330-cm. (90- to 130-in.) d.b.h. for spruce and 100- to 150-cm. (40- to 60-in.) d.b.h. for hemlock. Mature trees of either species obtain heights of 60 m. (200 ft.) and more. Bigleaf maple and Douglas-fir (*Pseudotsuga menziesii*) occur in more localized portions of the natural area. Bigleaf maple typically obtains diameters of 75 to 100 cm. (30 to 40 in.) b.h. and heights of 15 to 21 m. (50 to 70 ft.). Douglas-fir is largely confined to the steep terrace faces found towards the north edge of both of the units.

The forests in the natural area appear in a near climax condition. Although Sitka spruce is considered a sub-climax species in the *Picea sitchensis* Zone of Franklin and Dyrness (1969), this does not appear to be the case in this area. Spruce seedlings and saplings up to small poles are encountered throughout most of the area. Climax status is probably a partial consequence of the special conditions found in "rain forest" valleys of the western Olympic Peninsula, particularly the relatively open nature of many of the stands and selective grazing of hemlock seedlings by elk.³ Most tree reproduction is found on rotting logs, "nurse logs," which often support hundreds of hemlock and spruce seedlings. Some of these survive, and their roots reach mineral soil. The consequences are visible throughout the natural area as lines of mature trees growing on remains of original nurse logs and in the stilted root systems of many of the spruce and hemlock.

Forest stands have relatively rich and well developed under-stories. Vine maple, *Vaccinium ovalifolium*, *V. parvifolium*, *Rubus ursinus*, and *R. spectabilis* are the most common species in the shrub layer. Vine maple is clearly the most important. Relative sparsity of *Rubus spectabilis* compared to many other coastal forest stands may be a consequence of grazing by elk. The major herbaceous species are *Oxalis oregana*, *Polystichum munitum*, *Tiarella unifoliata*, *Carex deweyana*, *Trisetum cernuum*, *Maianthemum bifolium* var. *kamschaticum*, *Rubus pedatus*, *Montia sibirica*, *Athyrium filix-femina*, and

² Personal communication from Dr. Richard V. Fonda, Department of Biology, Western Washington State College, Bellingham.

³ See footnote 2.

Gymnocarpium dryopteris, *Polystichum* and *Oxalis* are clearly the most important herbs.

The "rain forest" region of the western Olympic Peninsula is famous for an abundance of cryptogams, and the natural area is no exception. Mosses, liverworts, and lichens blanket the ground, downed logs, shrubs, and tree trunks. Some of the more common ground species are *Eurhynchium oreganum*, *Hypnum circinale*, *Rhytidiadelphus loreus*, *Mnium menziesii*, *Hylocomium splendens*, and *Mnium insigne*. One of the most conspicuous epiphytes is the club moss, *Selaginella serpens*, which is particularly abundant on the maples. Other common epiphytes are *Pseudoisothecium stoloniferum*, *Porella navicularis*, *Rhytidiadelphus loreus*, *Radula bolanderi*, *Frullania nisqualensis*, *Scapania bolanderi*, and *Ptilidium californicum*.

The Roosevelt elk (*Cervis canadensis roosevelti*) is the most important animal present. Elk use the natural area most heavily during the winter and spring. Other mammals believed to utilize the area as residents or transients are listed in table TW-1.

Twin Creek provides some area of aquatic habitat in the east unit of the natural area. As mentioned, both units contain open swampy area, providing additional specialized habitat for a variety of plants and animals not typical of heavily forested areas. These swampy areas have standing water for at least a portion of the year.

HISTORY OF DISTURBANCE

Human disturbance appears to be very minor despite the proximity of the area to the Hoh River Road. There is no evidence of wildfires within the tract within the last several centuries.

RESEARCH

The only research known to have been conducted within the natural area are reconnaissance level examinations of the stands in connection with a study of relationships between forest communities and environmental conditions in the Hoh River Valley.⁴

The natural area appears to offer unusually good opportunities for research on: (1) successional development in coastal forests, particularly the relative successional positions of Sitka spruce and western hemlock in typical second-terrace rain forest condition; (2) effect of Roosevelt elk on community composition and forest succession; and (3) the ecology of epiphytic mosses, club mosses, liverworts, and lichens.

MAPS AND AERIAL PHOTOGRAPHS

Special maps applicable to the natural area include: *Topography-15' Spruce Mountain and Mount Tom, Washington* quadrangles, scale 1:62,500, issued by the U.S. Geological Survey in 1956 (Spruce Mountain quadrangle covers the west unit and Mount Tom quadrangle the east unit of the natural area) 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.

⁴ Research by Dr. R. W. Fonda, Department of Biology, Western Washington State College, Bellingham.

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.
- Society of American Foresters
1954. Forest cover types of North America (exclusive of Mexico). 67 p., illus. Washington, D.C.
- U.S. Weather Bureau
1965. Climatic summary of the United States-supplement for 1951 through 1960, Washington. Climatography of the United States 86-39, 92 p., illus.

Table TW-1. — Tentative list of mammals for Twin Creek Research Natural Area

Order	Scientific name	Common name
Insectivora	<i>Neurotrichus gibbsi</i>	shrew mole
	<i>Scapanus orarius</i>	coast mole
	<i>Scapanus townsendi</i>	Townsend mole
	<i>Sorex bendirii</i>	marsh shrew
	<i>Sorex obscurus</i>	dusky shrew
	<i>Sorex trowbridgii</i>	Trowbridge shrew
	<i>Sorex vagrans</i>	wandering shrew
Chiroptera	<i>Eptesicus fuscus</i>	big brown bat
	<i>Lasionycteris 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
	<i>Lepus americanus</i>	snowshoe hare
Lagomorpha	<i>Aplodontia rufa</i>	mountain beaver
Rodentia	<i>Castor canadensis</i>	beaver
	<i>Clethrionomys gapperi</i>	Gapper red-backed vole
	<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>Microtus townsendi</i>	Townsend vole
	<i>Neotoma cinerea</i>	bushy-tailed wood rat
	<i>Peromyscus maniculatus</i>	deer mouse
	<i>Tamiasciurus douglasi</i>	chickaree
	<i>Zapus trinotatus</i>	Pacific jumping mouse
	<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>Mephitis mephitis</i>	striped skunk
Carnivora	<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
	<i>Cervus canadensis roosevelti</i>	Roosevelt elk
	<i>Odocoileus h. columbianus</i>	black-tailed deer
Artiodactyla		

LEGEND

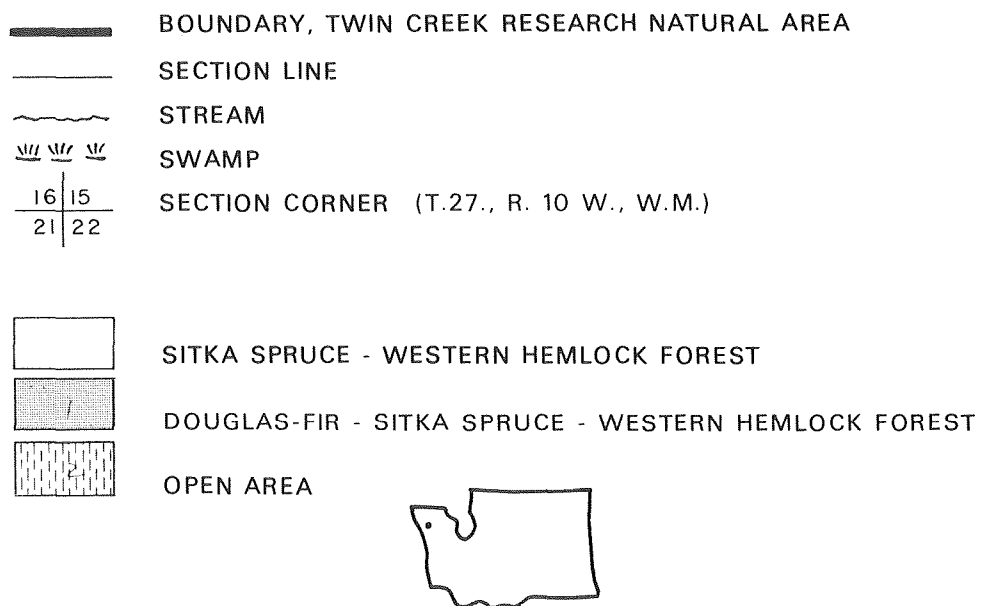
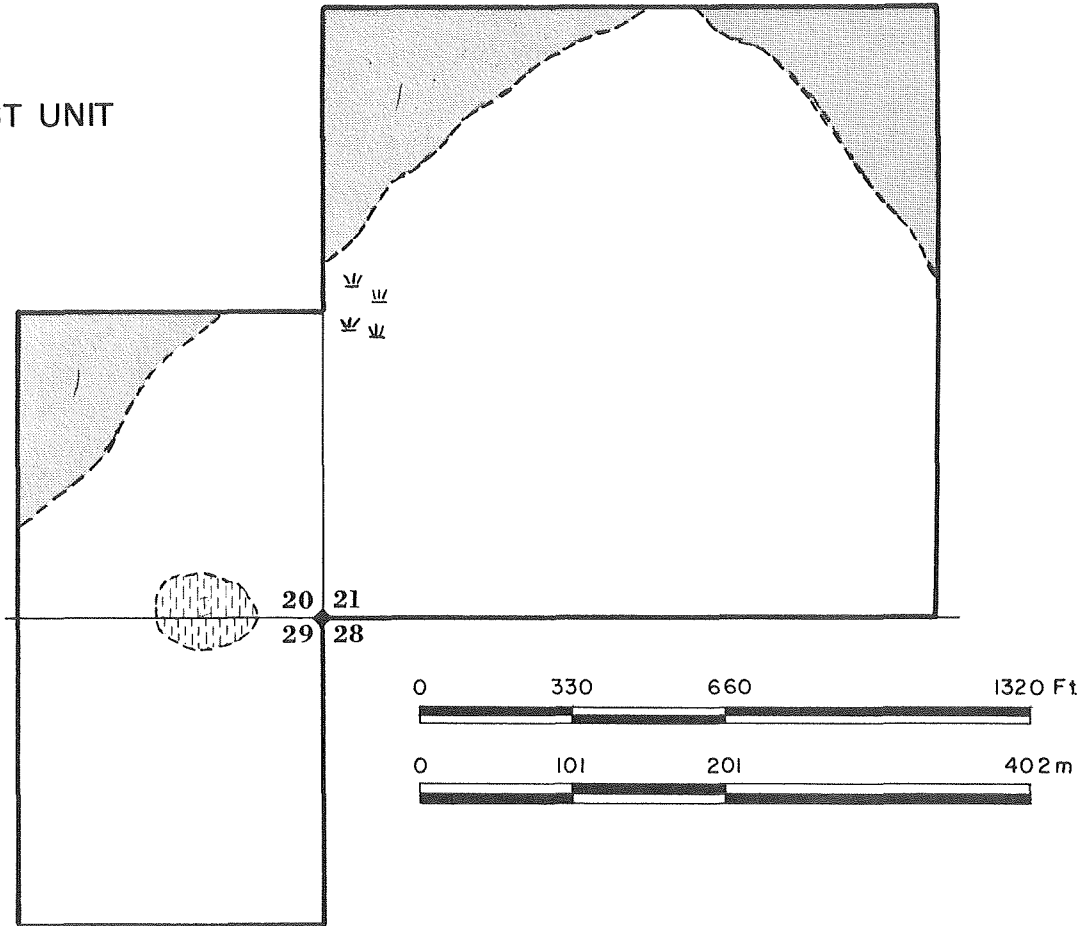


Figure TW-1.—Twin Creek Research Natural Area,
Jefferson County, Washington.

WEST UNIT



EAST UNIT

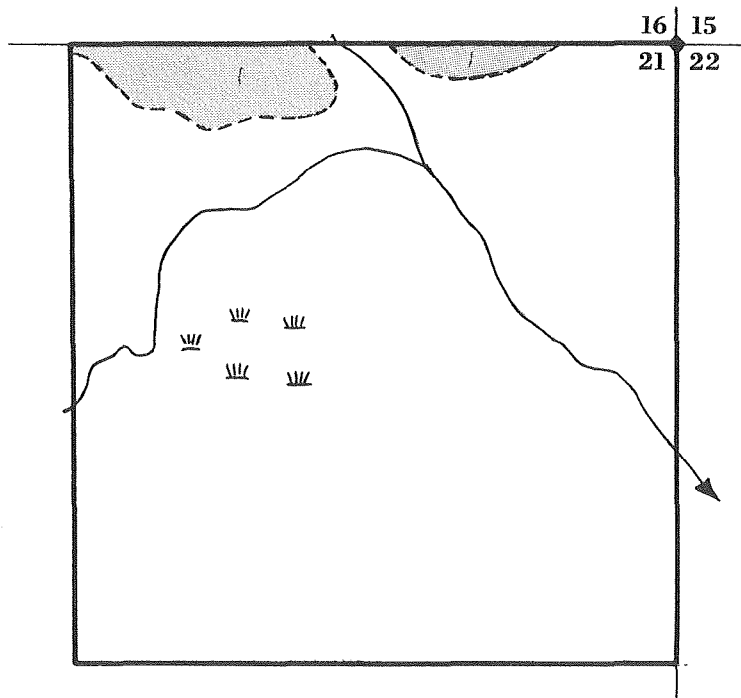


Figure TW-2.- Typical forest community of bigleaf maple, Sitka spruce, and vine maple found within portions of the Twin Creek Research Natural Area; note the abundance of epiphytes on the maples.

