

LAKE TWENTYTWO RESEARCH NATURAL AREA¹

"Subalpine" lake and old-growth western red cedar - western hemlock forest on a rugged mountain slope in the northern Cascades of Washington.

The Lake Twentytwo Research Natural Area was established on January 14, 1947, as a sample of virgin old-growth western red-cedar (*Thuja plicata*) - western hemlock (*Tsuga heterophylla*) forest. The 320-ha. (790-acre) tract is located in Snohomish County, Washington, and is administered by the Monte Cristo Ranger District (Granite Falls, Washington), Mount Baker National Forest. It includes: section 22 (except NW1/4 and W1/2 SW1/4), W1/2 SW1/4, SW1/4 NW1/4, and SI/2 NW1/4 NW1/4 of section 23; and NE1/4 and E1/2 NW1/4 of section 27, T. 30 N., R. 8 E., Willamette meridian (fig. LA-I). It lies at 48°04' N. latitude and 121°46' W.longitude.

ACCESS AND ACCOMMODATIONS

Access to the vicinity is via U.S. Highway 2 and State Highways 9 and 92 from Everett to Granite Falls and Forest Highway 7 to Verlot Ranger Station. Beyond the ranger station, follow Forest Highway 7 for 2.9 km. (1.8 miles) to the start of the Lake Twentytwo Trail.

The Lake Twentytwo Trail lies almost entirely within the natural area and traverses

a large part of it. The trail climbs for 4 km. (2.5 miles) and 425 m. (1,400 ft.) of elevation to its terminus at the lake. There are no other trails or roads within the natural area boundary, and cross-country access to that part of the tract east of Twentytwo Creek and Twentytwo Lake is difficult.

The nearest commercial overnight accommodations are in Everett about 40 km. (25 miles) away, although food can be obtained at Verlot and Granite Falls. There are seven public campgrounds with 3 to 8 km. (2 to 5 miles) of the natural area.

ENVIRONMENT

The Lake Twentytwo Research Natural Area occupies essentially the entire drainage of Lake Twentytwo Creek except for some of the rugged cliffs and rock ridges south and west of Lake Twentytwo. Elevations range from about 335 m. (1,100 ft.) above sea level near the South Fork of the Stillaguamish River to about 1,100 m. (3,600 ft.) on the ridges southeast and west of Lake Twentytwo. Topography is steep to very steep and broken; a few small benches are present.

Lake Twentytwo lies entirely within the natural area. It is a 17.9-ha. (44.1-acre) lake with a maximum measured depth of 16 m. (53 ft.) (Wolcott 1961). The lake was created by glacial activity. Despite its location at a relatively low elevation of 750 m. (2,460 ft.), the lake and its environs have many aspects of a much higher subalpine lake; permanent snowfields are found within the lake basin (fig. LA-2).

The natural area is located on two major geologic formations (Huntington et al. 1961). Rocks in the upper part of the natural area are granitic intrusive rocks of Tertiary - Cretaceous age, while those at lower elevation are upper Jurassic -lower Cretaceous sedimentary rocks. The cirque basin in which Lake

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Twentytwo is located, as well as the lake itself, are obviously glacial features which originated during the Pleistocene.

The natural area is subject to a wet, cool, maritime climate. Annual precipitation is heavy and highly seasonal, although rain is not uncommon during the summer months. Summers are cool. This regional cool, wet climate is, of course, accentuated on the steep north slope occupied by the natural area. Climatic data from the nearest weather bureau station - Darrington, Washington, about 24 km. (15 miles) northeast - are as follows (U.S. Weather Bureau 1956, 1965). They probably approximate climatic conditions encountered at lower elevations in Lake Twentytwo Research Natural Area:

Mean annual temperature	9.6°C. (49.4°F.)
Mean January temperature	1.1°C. (33.9°F.)
Mean July temperature	17.4°C. (63.3°F.)
Mean January minimum temperature	-3.2°C. (26.1°F.)
Mean July maximum temperature	25.9°C. (78.7°F.)
Average annual precipitation	2,045 mm. (80.51 in.)
June through August precipitation	155 mm. (6.06 in.)
Average annual snowfall	120 cm. (47.4 in.)

Soils on the natural area have recently been mapped by U.S. Forest Service personnel as part of a soil survey of the Mount Baker National Forest (Snyder and Wade 1970). Most of the higher elevational area surrounding Lake Twentytwo is shown on the map as talus slopes and intrusive igneous rock outcrop areas. In the eastern, mid-elevation portion of the area soils are derived from metasedimentary rocks and are classed as coarse loamy, mixed Typic Ferrods. These soils have a dark reddish brown loam surface layer which is underlain at about 55 cm. (22 in.) by dark yellowish brown very gravelly loam. The more gently sloping low elevational areas near the northern boundary are occupied by three soil units derived from glacial drift material. These soils have been classified as a Typic Ustifluvent, Typic Ustipsamment, and a Typic Fragiorthod. Typically these soils have a brown gravelly loam surface and are underlain at varying depths by very gravelly loamy sand.

BIOTA

A gross estimate of areas by SAF forest types (Society of American Foresters 1954) is as follows:

No.	Name	Area
227	Western Red-cedar	
	Western Hemlock	184 ha. (455 acres)
226	Pacific Silver Fir	
	Hemlock	32 ha. (80 acres)
228	Western Red-cedar	16 ha. (40 acres)
221	Red Alder	10 ha. (25 acres)

Much of the acreage of Pacific silver fir - hemlock type is composed of small patches and stringers of trees. In addition to the areas classed as forest, there are approximately 30 ha. (75 acres) of brushfields, 28 ha. (70 acres) of "barrens" - cliffs, meadows, and talus and 18 ha. (45 acres) of water within the natural area. Kuchler's (1964) Types 2 (Cedar-Hemlock-Douglas Fir Forest), 3 (Silver Fir Douglas Fir Forest), 4 (Fir - Hemlock Forest), 25 (Alder - Ash Forest), and 52 (Alpine Meadows and Barren) are represented within Lake Twentytwo Research Natural Area. The natural area spans both the *Tsuga heterophylla* and *Abies amabilis* Zones of Franklin and Dyrness (1969) and includes many elements of the *Tsuga Inertensiana* Zone in the lake basin.

The lower forests in the natural area are old-growth stands of western hemlock and western red-cedar. Some Pacific silver fir (*Abies amabilis*) are present as well as an occasional Sitka spruce (*Picea sitchensis*) at lowest elevations. The largest trees are the red-cedar which average 1.5 to 2.5 m. (5 to 8 ft.) in diameter (fig. LA-2), with a maximum of nearly 3.7-m. (12-ft.) d.b.h. Hemlocks of all ages and sizes up to 130-cm. (50-in.) d.b.h. are present. Western hemlock appears to be the climax species, as reproduction of western red-cedar is generally absent and that of Pacific silver fir is sporadic at low elevations. The understory can be typified by *Vaccinium alaskaense*, *V. ovalifolium*, *Menziesia ferruginea*, *Blechnum spicant*, *Cornus canadensis*, *Rubus pedatus*, *Spaghnum girgensohnii*, and *Hylocomium splendens*. In wetter locations, e.g., along streams, *Oplapanax horridum*,

Athyrium filix-femina, *Rubus spectabilis*, *Tolmeia menziesii*, *Ribes bracteosum*, and *Boykinia major* are conspicuous.

Forests at higher elevations are characterized by Pacific silver fir, mountain hemlock (*Tsuga mertensiana*), and Alaska-cedar (*Chamaecyparis nootkatensis*). In older stands, the trees average 75- to 100-cm. (30- to 40-in.) d.b.h. The climax species appears to be silver fir, as reproduction of the others is sparse. A dense layer of shrubs is usually present, including *Vaccinium alaskaense*, *V. ovalifolium*, *Menziesia ferruginea*, *Rubus spectabilis*, and *Cladothamnus pyrolaeformis*. Dominant herbs are *Streptopus curvipes*, *Rubus pedatus*, *Blechnum spicant*, and *Maianthemum bifolium* var. *kamschaticum*.

Another major group of communities is brushfield stands; these vary in character depending on local moisture and temperature conditions. One type, conspicuous along the Lake Twentytwo Trail, is dominated by vine maple (*Acer circinatum*); it is found on scree slopes. Many other shrubs are present, such as *Rubus spectabilis*, Sitka alder (*Alnus sinuata*), *Sambucus* sp., *Ribes lacustre*, and *Oplopanax horridum*. The rich herb layer usually includes *Athyrium filix-femina*, *Pteridium aquilinum*, *Cryptogamma acrostichoides*, *Montia* spp., *Aruncus sylvester*, *Galiuin* sp., and *Tolmeia menziesii*. A part of one vine maple-dominated brushfield includes a small stand of Bigleaf maple (*Acer macrophyllum*) 20- to 25-cm. (8- to 10-in.) d.b.h. (fig. LA-2).

The cirque basin occupied by Lake Twentytwo is a mosaic of habitats and communities, mostly nonforested (fig. LA-2). Habitats include wet rocky cliffs, margins of permanent snowpatches, boulder fields, scree slopes, and alluvial deposits along the lake shore; all are supplied with abundant moisture. The communities include: a variety of dense herbaceous stands dominated by species such as *Polygonum bistortoides*, *Athyrium americanum*, *Carex* spp., *Veratrum viride*, *Valeriana sitchensis*, and *Caltha* sp.; dense shrub fields dominated by *Vaccinium ovalifolium*, *V. alaskaense*, *Menziesia ferruginea*, *Sorbus* sp., and *Cladothamnus pyrolaeformis*; and patches of mostly small Pacific silver fir, mountain

hemlock, and Alaska-cedar. Most communities have a distinctly subalpine aspect despite the 760-m. (2,500-ft.) elevation; *Phyllocladus empetrifolius* and *Luetkea pectinata*, timberline species, are found along the lakeshore.

A variety of fauna inhabit the natural area. A list of mammals believed to utilize the tract as residents or transients is provided in table LA-I. Fish were planted in Lake Twentytwo over 30 years ago; Wolcott (1961) indicates rainbow trout were planted in 1951.

The specialized terrestrial habitats have already been mentioned, e.g., the cliffs, snowpatches, and scree slopes of the lake basin. There is also the lake itself and the entire length of Twentytwo Creek (fig. LA-2).

HISTORY OF DISTURBANCE

The Lake Twentytwo area has a long history of public use and human disturbance is evident in a few locations. At one time there was a YMCA camp on the shore of the lake; it was abandoned and the debris removed prior to establishment of the natural area. The original trail to the lake closely followed the creek. It was abandoned when the present trail was completed but is still evident in some locations. At present the most obviously disturbed areas are around the lake, especially at the north end, where campers, hikers, and fishermen have created bare openings and a system of trails. Recreational use of the trail and lake margins is heavy and continuing.

There is no evidence of wildfire within the natural area, and none have been recorded within historic times.

RESEARCH

No research is presently being conducted within the natural area. Some unique research opportunities would include (1) comparison of the forests of Lake Twentytwo Research Natural Area with those on the south-facing Long Creek Research Natural Area 3 km. (2 miles) away, and (2) study of the relationships between plant and animal communities and the environmental mosaic within the Lake Twentytwo basin.

MAPS AND AERIAL PHOTOGRAPHS

Special maps applicable to the natural area include: *Topography* - 15' Granite Falls, Washington quadrangle, scale 1: 62,500, issued by the U.S. Geological Survey in 1956; and *geology* - *Geologic Map of Washington*, scale 1: 500,000 (Huntington et al. 1961). Either the District Ranger (Monte Cristo Ranger District) or Forest Supervisor (Mount Baker National Forest, Bellingham, Washington) can provide details on the most recent aerial photo coverage and forest type maps for the area.

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Table LA-1.— Tentative list of mammals for Lake Twentytwo 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 cinereus</i>	masked shrew
	<i>Sorex obscurus</i>	dusky shrew
	<i>Sorex palustris</i>	northern water shrew
	<i>Sorex trowbridgii</i>	Trowbridge shrew
	<i>Sorex vagrans</i>	wandering shrew
	<i>Eptesicus fuscus</i>	big brown bat
Chiroptera	<i>Lasionycteris noctivagans</i>	silver-haired bat
	<i>Lasionycteris noctivagans</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
	<i>Ochotona princeps</i>	pika
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>Microtus richardsoni</i>	Richardson vole
	<i>Neotoma cinerea</i>	bushy-tailed wood rat
Carnivora	<i>Peromyscus maniculatus</i>	deer mouse
	<i>Phenacomys intermedius</i>	heather vole
	<i>Spermophilus saturatus</i>	Cascades mantled ground squirrel
	<i>Tamiasciurus douglasii</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
Artiodactyla	<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>Ursus americanus</i>	black bear
	<i>Vulpes fulva</i>	red fox
	<i>Cervus canadensis</i>	wapiti or elk
	<i>Odocoileus h. columbianus</i>	black-tailed deer
	<i>Oreamnos americanus</i>	mountain goat

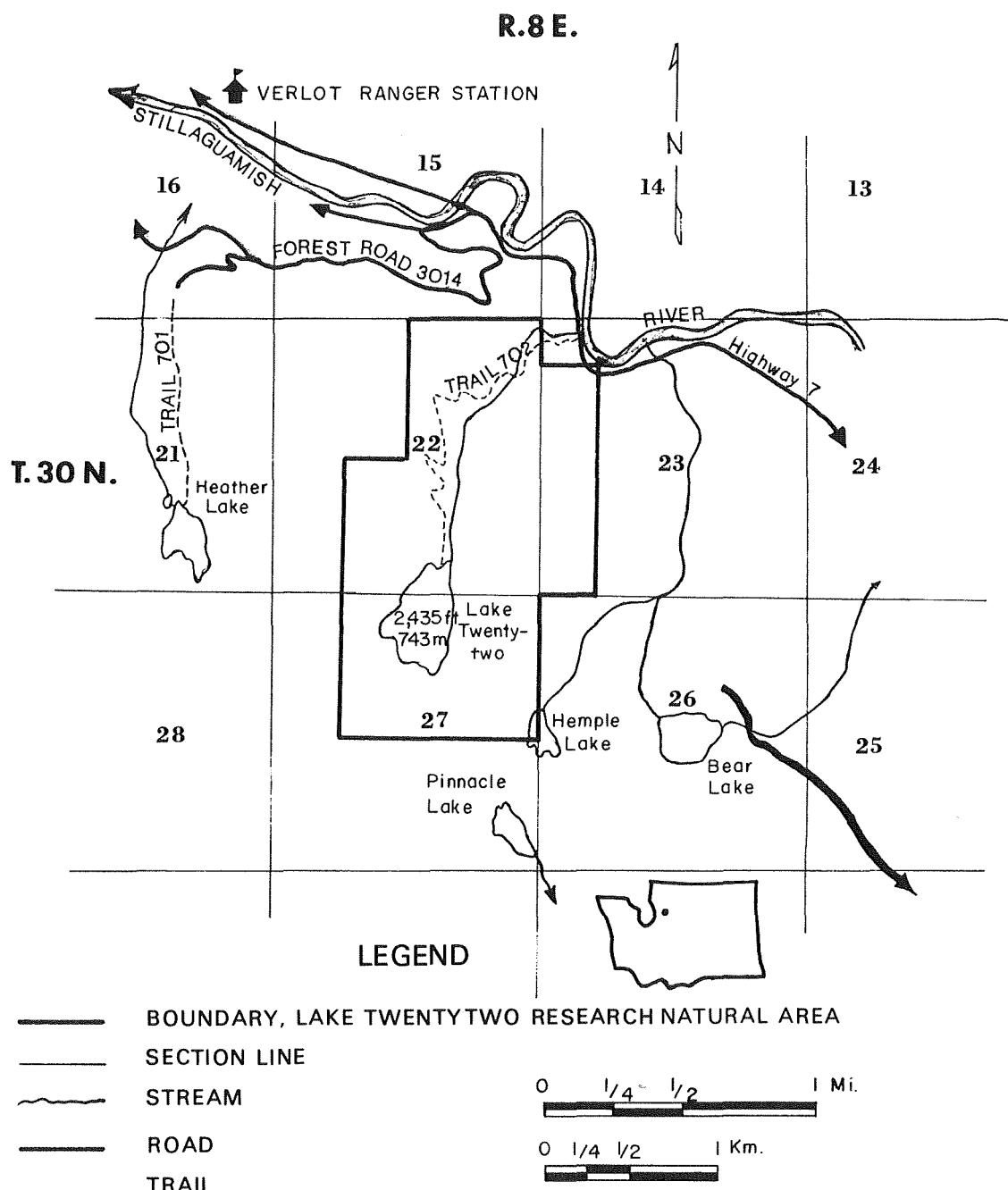


Figure LA-1.—Lake Twentytwo Research Natural Area,
Snohomish County, Washington.

Figure LA-2.-Natural features of the Lake Twentytwo Research Natural Area. Upper left: Typical specimens of old-growth western red-cedar about 2.5-m. d.b.h. growing at lower elevations. Upper right: Lake Twenty two Creek which is included almost entirely within the natural area. Lower left: Small stand of Bigleaf maple (background) which averages 20-to 25-cm. d.b.h. and vine maple community (foreground) which dominates extensive areas of brushfields growing on talus. Lower right: A portion of Lake Twenty two and the surrounding basin; note the persistent snowbanks in this later summer photograph.

