



Waldo Lake

Lane County

Willamette/Sandy Basin

Location	
Area	6,298 acres (2,548.8 hect)
Type	natural lake
Use	recreation
Location	55 miles southeast of Eugene in Willamette National Forest
Access	miles on Forest Service Rd from US Hw y 58, 23 miles east of Oakridge
USGS Quad	Waldo Mountain (24K), Oakridge (100K)
Coordinates	43° 46' 02" N, 122° 03' 05" W
USPLSS	township 21, range 06, section 07

Waldo Lake, located at an elevation of 5414 feet near the crest of the Cascade Range, is one of the largest natural lakes in Oregon. Its surface area of 6298 acres is second only to Upper Klamath Lake (and Agency Lake) among natural non-alkali lakes in the state. It is also the second deepest lake in the state after Crater Lake; maximum depth is 420 feet and the mean depth is 128 feet. The total volume of water in Waldo Lake is nearly 800,000 acre-feet, and it has an extremely long retention time. However, the most outstanding feature of this lake is its ultraoligotrophic character; it is indeed one of the most oligotrophic water bodies in the world. The water is a beautiful cobalt blue color and remarkably clear. Certainly this feature has changed little since the lake was first visited by surveyors in the nineteenth century. Waldo Lake and others nearby were shown as the Virgin Lakes on an 1863 survey map, and it was also at one time known as Pengra Lake. Eventually, the lake was named for Judge John B. Waldo who sought his recreation in the Cascades.

The lake basin, estimated to be 10,000 to 12,000 years old, is a glaciated depression enclosed by end and lateral moraines. This entire section of the Cascades is dotted with lakes in depressions left by the melting of ice sheets at the end of the Pleistocene Epoch. Little surface drainage has developed in the relatively flat, youthful topography. No permanent surface streams enter Waldo Lake, although there is snowmelt runoff through countless temporary streams during spring and early summer. There is also some seepage in from springs on the lake bottom. Almost one-third of the drainage basin consists of the lake itself, and direct precipitation is a major source of water. The lake is the source of the North Fork of the Willamette River, which discharges from the northwest end, and there is another outlet to the southwest. At one time there were plans to install hydroelectric generating equipment at this second outlet, but to date it has not been done. The surrounding landscape is blanketed by a coniferous forest, predominantly Douglas fir, hemlock, and pine. Huckleberry is the principal species of understory vegetation. The thin, porous soil mantle overlies basaltic bedrock and consists of moderately weathered volcanic ash and boulders from glacial outwash. Generally, the shoreline of the lake is rocky and irregular shaped with numerous indentations. Small sandy beaches are numerous along the eastern shoreline, while the western shore has fewer beaches and is generally steeper.

Prior to 1969 Waldo Lake was accessible only by trail or four-wheel drive vehicle and the majority of users lived within a 100-mile radius. In June of that year a paved road was opened, thus linking the lake with a major highway. Campgrounds were constructed by the Forest Service on the east shoreline and plans made for an all-year recreation site. As a result of the improved access, visitor use has risen dramatically, although it is for the most part confined to the period July 15 to September 15. The Waldo Lake Recreation Area of 32,000 acres is a management unit of the Willamette National Forest, designed to protect the beautiful alpine characteristics of the lake and its surroundings. A network of trails lace the area and vehicle access is restricted. Sail boaters and canoeists find the lake appealing during the short season. Anglers commonly pack into some of the many small, high lakes nearby. Waldo Lake has a lot of kokanee, eastern brook trout and rainbow trout, although populations are small; the most productive areas are in the littoral zone where the fish feed in shallow water near shore.

Waldo Lake is thermally stratified in the summer. The surface water remains cool, 59 to 64 degrees Fahrenheit (15 to 18 degrees Celsius) and the thermocline begins at a depth of about 33 feet (10 meters). Because of the lake's considerable depth, heating extends to only about this depth; bottom water is near the temperature of maximum density, 39 degrees Fahrenheit (4 degrees Celsius) year round. The chemistry and biology of the water in Waldo Lake are exceptional and clearly classify the lake as ultraoligotrophic. It is the most oligotrophic lake in the state and, as noted by Carter et al (1966), among the purest lakes in the world. Concentrations of ions, conductivity, and alkalinity are exceptionally low, closely similar to the composition of rain water in a pristine environment. The pH of the lake is slightly acid, also characteristic of uncontaminated rain water which acquires its mild acidity from atmospheric carbon dioxide.

Nutrient concentrations are exceptionally low as well. Bioassay experiments conducted by Powers et al (1975) and Maloney et al (1975) indicate that phosphorus concentrations limit the growth of algae. The population densities of planktonic algae are perennially low, seldom



Source: Oregon National Guard, 1981-82. View looking north.

Drainage Basin Characteristics	
Area	30.9 sq mi (80.0 sq km)
Relief	moderate
Precip	72 in (183 cm)
Agriculture	
Land Use %	Forest 69.2, Range -, Water 30.8, Irrig -, Non Irrig -, Urban -, Other -
Notes	-
Lake Morphometry	
Area	6,298.0 acres (2,548.8 hect)
Depth	420 ft (128.0 m)
Ave/Max Depth Ratio	0.310
Volume	787,395 acre ft (972.67 cu hm)
Shoal area	4%
Volume factor	.92
Shape factor	1.98
Length of Shoreline	21.7 mi (34.9 km)
Retention time	32 yr
Notes	-
Water Quality	
Trophic status	ultraoligotrophic, dramatically so
Sample date	08/18/81
Temp	65.7F (18.7C)
Diss. Oxygen (mg/l)	8.8
Transparency	52.5 ft (16.0 m)
Phosp (mg/l)	0.001
Chlorophylla (mg/l)	0.1
Alkalinity	<0.1
Conductivity (umhos/cm)	4
pH	6.7
Major Ions	Na 0.2, K 0.2, Ca 0.7, Mg 0.1, Cl 0.6, SO4 <0.1
Notes	-
Sample date	08/23/82
Temp	63.5F (17.5C)
Diss. Oxygen (mg/l)	-
Transparency	66 ft (20.0 m)
Phosp (mg/l)	0.009
Chlorophylla (mg/l)	0.1
Alkalinity	
Conductivity (umhos/cm)	3
pH	6.3
Major Ions	Na 0.2, K 0.0, Ca 0.4, Mg 0.1, Cl 0.6, SO4 0.3
Notes	-

exceeding 50 cells/ml. A few planktonic species of diatoms (*Asterionella formosa*, *Melosira* sp., *Synedra* sp) have been reported, but the commonest species observed all belong to the diatom genus *Eunotia*, a characteristically benthic or epiphytic species, and the dinoflagellate genus *Glenodinium*. Patches of aquatic moss (*Hygrohypnum*) appear at all depths. Much of the very limited primary production in the lake results from the growth of the moss and attached diatoms. Larson (1970a) measured the primary production of the plankton by the sensitive carbon-14 method, and observed some of the lowest productivities anywhere in the world (average of 29 mg C/m² during summer months); for example, this productivity is less than half the productivity observed in Crater Lake (Larson 1972a). The very pure water and lack of plankton are responsible for the exceptional transparency of the water. Larson (1970a) measured transparency at over 115 feet (35 meters) using a one-meter Secchi disk; other observers consistently report Secchi disk readings of 66 to 100 feet (20 to 30 meters) or more. At noted, natural fish growth in the lake is undoubtedly limited because of the very unproductive planktonic food chain; zooplankton are sparse. In some areas, there are noticeable populations of benthic invertebrates, primarily insect larvae, and this benthic productivity may be vitally important to the maintenance of fish populations

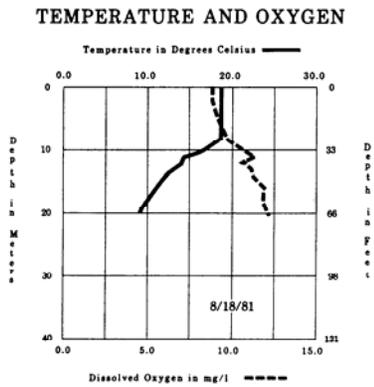
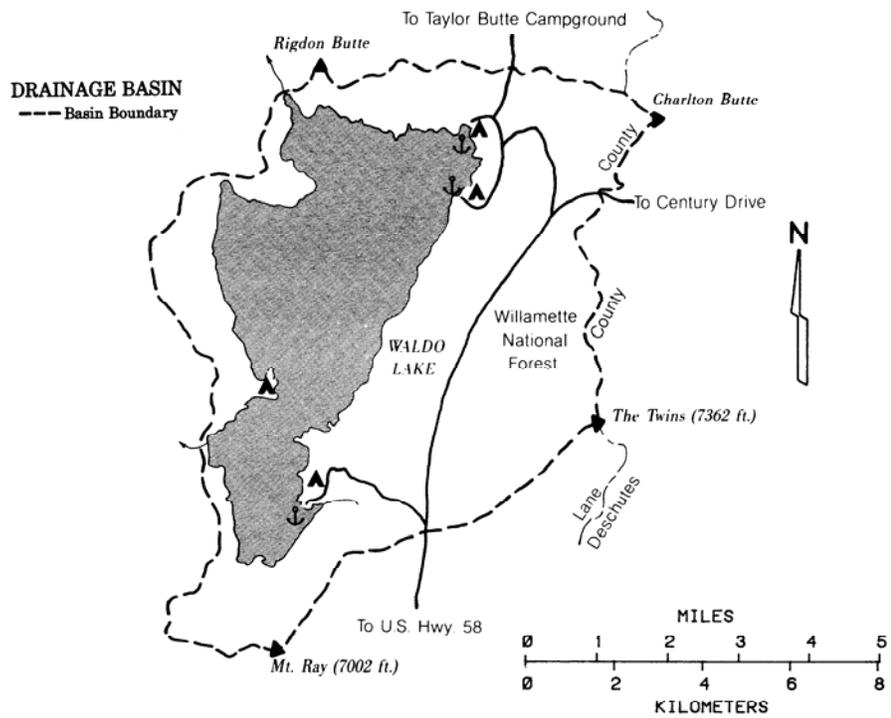
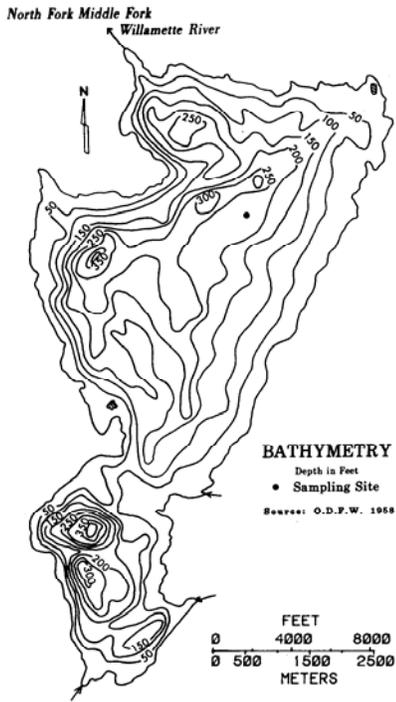
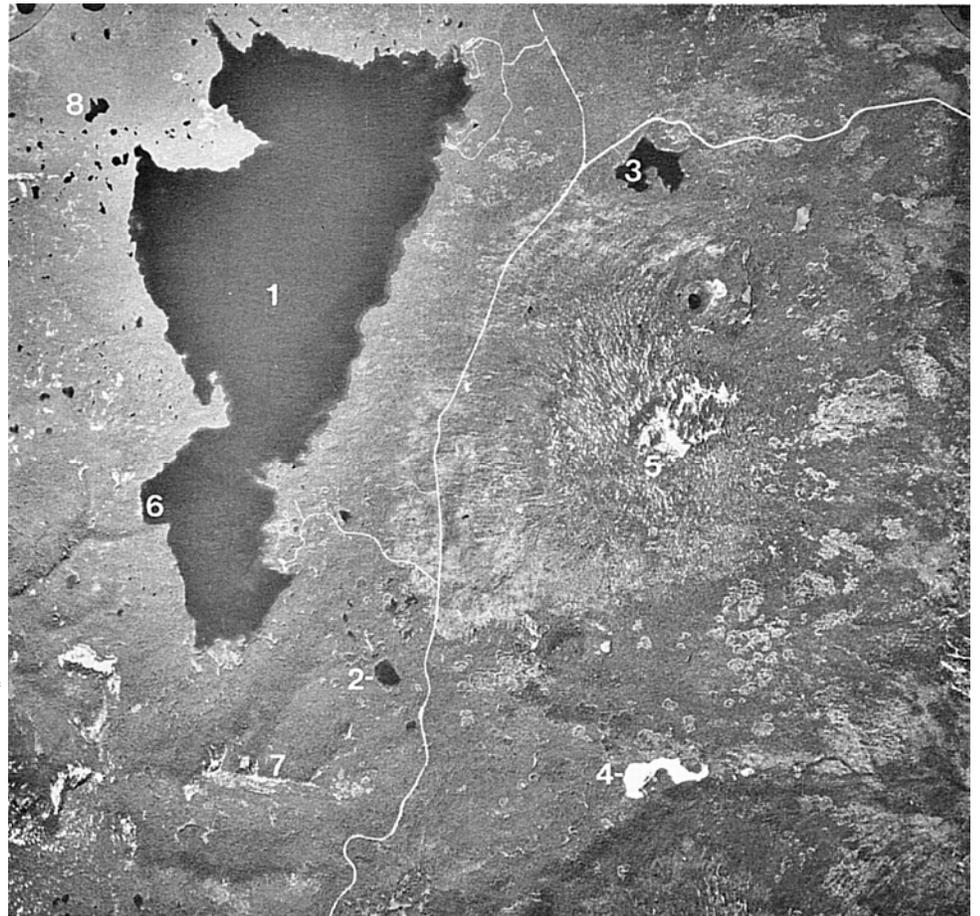


Photo Caption

1. Waldo Lake
2. Betty Lake
3. Charlton Lake
4. Bobby Lake
5. The Twins
6. Klodahl Bay
7. Mt. Ray
8. Lake Chetlo



Source: US Forest Service, 1974, Vertical photograph.