U.S. DEPARTMENT OF THE INTERIOR
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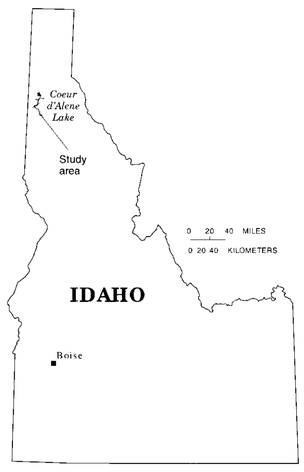
IDAHO DEPARTMENT OF HEALTH AND WELFARE, DIVISION OF ENVIRONMENTAL QUALITY

WATER-RESOURCES INVESTIGATIONS REPORT 94–4119
Woods, P.F., and Berenbrock, Charles, 1994, Bathymetric Map of Coeur d'Alene Lake, Idaho



Selected morphometric characteristics of Coeur d'Alene Lake

Characteristic	At full-pool capacity[1]	At limit of usable capacity[2]
Surface area, square kilometers	129	122
Volume, cubic kilometers	2.80	2.55
Shoreline length, kilometers	243	Not computed
Maximum depth, meters	63.7	61.2
Mean depth, meters	21.7	20.9

[1] Lake-surface elevation at 648.7 meters above NGVD.
[2] Lake-surface elevation at 646.2 meters above NGVD.

CONVERSION FACTORS AND VERTICAL DATUM

Multiply	By	To obtain
cubic kilometer	810,700	acre-foot
kilometer	0.6214	mile
meter	3.281	foot
square kilometer	247.1	acre

NGVD: In this report, NGVD of 1929 refers to the National Geodetic Vertical Datum of 1929—a geodetic datum derived from a general adjustment of the first-order level nets of the United States and Canada, formerly called Sea Level Datum of 1929.

EXPLANATION

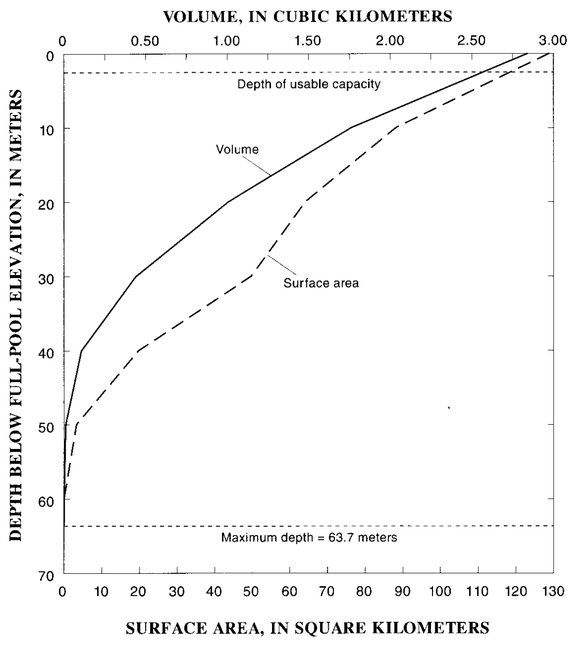
30 — **Line of equal depth below lake surface at a normal full-pool elevation of 648.7 meters**—Interval 10 meters

Base from U.S. Geological Survey, Benewah Lake, 1981; Black Lake, 1981; Chatcolet, 1981; Coeur d'Alene, 1981; Fernan Lake, 1981; Harrison, 1981; Mica Bay, 1981; Mt. Coeur d'Alene, 1981; Post Falls, 1981; Worley, 1981; 1:24,000. Universal Transverse Mercator (UTM) projection, Zone 11

SCALE 1:48,000

1 0 1 2 3 4 MILES
1 0 1 2 3 4 KILOMETERS

BATHYMETRIC CONTOUR INTERVAL 10 METERS
NATIONAL GEODETIC VERTICAL DATUM OF 1929



BACKGROUND

The U.S. Geological Survey investigated nutrient and trace-element enrichment in Coeur d'Alene Lake, northern Idaho, during 1991–92. The objectives of the investigation were to characterize limnology, quantify hydrologic and nutrient budgets, and develop a nutrient-load/lake-response model. The model required bathymetric data to compute mass balances of water and nutrients within many depth layers in the lake. A review of historical bathymetric data for the lake (Funk and others, 1973; U.S. Environmental Protection Agency, 1977; Milligan and others, 1983) revealed a need for contoured bathymetric data. Therefore, to augment past studies, the U.S. Geological Survey collected extensive bathymetric data and developed a bathymetric map of Coeur d'Alene Lake.

Coeur d'Alene Lake lies in a naturally dammed river valley and receives inflow from an area of 9,690 square kilometers. About 90 percent of surface-water inflow to the lake is from the Coeur d'Alene and St. Joe Rivers. The lake is drained by the Spokane River, a tributary to the Columbia River. The lake's surface elevation is controlled by Post Falls Dam (about 15 kilometers west of the outlet of the lake), which provides hydroelectric power, flood control, and irrigation supply.

METHODS

Bathymetric data were collected by two methods. A calibrated video depth sounder was used to measure depth from the lake surface to the lake bottom at 340 locations during August 1989 and September 1991. These measurements were dispersed throughout the lake. A narrow-beam echo sounder was used to measure depth from the lake surface to the lake bottom at 221 locations during April 1991. To ensure complete coverage of the lake, the April 1991 measurements were taken in lateral directions throughout the lake. A global positioning system receiver was used to determine the latitude and longitude of each depth-measurement site. A total of 561 depths and their latitudes and longitudes then were digitized onto a base map generated from U.S. Geological Survey 7.5-minute topographic maps. Depth contours were drawn manually to develop the bathymetric map of Coeur d'Alene Lake. Surface areas of many depth planes were digitized and input to Håkanson's equation (1981, p. 41) to compute lake volume:

$$V_p = \sum_{i=0}^{n} \frac{l_c}{3} \left(a_i + a_{i+1} + \sqrt{a_i \times a_{i+1}}\right),$$

where

V_p is the parabolic approximation of the lake volume, in cubic kilometers;

l_c is the contour line interval, in meters; and

a_i is the total surface area within the limits of the contour line l_c, in square kilometers.

BATHYMETRY

Selected morphometric characteristics of Coeur d'Alene Lake are listed in the table at the left. At a full-pool elevation of 648.7 meters above NGVD, the lake has a surface area of 129 square kilometers and a volume of 2.80 cubic kilometers. When the lake level is reduced to an elevation of 646.2 meters, the limit of its usable capacity, surface area is reduced to 122 square kilometers and the volume to 2.55 cubic kilometers. The relation of depth to lake surface area and volume is shown in the graph at the bottom left.

The bathymetric map shows that the lake's maximum depth of 63.7 meters is northwest of Driftwood Point. The shallowest areas are Cougar Bay, in the northwestern end of the lake, and the area south of the mouth of the Coeur d'Alene River. At the southern end of the lake, four small, shallow lakes (Benewah, Chatcolet, Hidden, and Round) that were flooded in 1906 when the Spokane River was impounded by Post Falls Dam are now contiguous with Coeur d'Alene Lake.

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BATHYMETRIC MAP OF COEUR D'ALENE LAKE, IDAHO

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1994

Copies of this map can be purchased from:

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