

INTRODUCTION
Pyramid Lake, about 30 miles northeast of Reno, Nev., is the terminal water body of the Truckee River system. The principal inflow to the lake is from the Truckee River; local drainage around the lake contributes little. There is no outlet stream; therefore the only outflow is by evaporation. Considerable interest in the lake has developed in recent years because it is an important feature in the management of water in the Truckee and Carson River systems, and because of its potential as a recreation area. An important tool in the evaluation of Pyramid Lake from a management and recreation standpoint is an adequate physiographic and hydrologic survey. This report was prepared under the general direction of G. F. Worts, Jr., district chief of the Geological Survey's Water Resources Division in Nevada.

HISTORY
The earliest written record of Pyramid Lake is the diary of John C. Fremont, who encountered the lake in January 1844. The next record is that by King (1878), who visited the lake in 1867 and 1871. Russell (1885) surveyed the lake in August-September 1882. From records of these early visits and other evidence, the lake at that time, under natural conditions, covered about 140,000 acres (220 square miles), and its stage fluctuated perhaps as much as 20 feet between wet and dry periods (A. M. Piper, U.S. Geol. Survey, oral commun., 1968). Diversions from the Truckee River for irrigation began about 1850, and they were accelerated considerably following construction of the Truckee Canal in 1905 (fig. 1). The canal diverts water from the Truckee River to Lahontan Reservoir on the Carson River. Although some of this water is used for irrigation in the Fernley area, most is stored in Lahontan Reservoir for use in the Nevada project near Fallon. U.S. Bureau of Reclamation records show that an average of about 250,000 acre-feet per year was diverted into Truckee Canal during the period 1905-68. Altitudes of the level of Pyramid Lake from 1867 to 1968, taken from the U.S. Geological Survey records, are shown in figure 2. From 1909 to 1968 the lake level declined from an altitude of 3,869 feet to 3,789 feet above sea level, or 80 feet in 59 years.

BATHYMETRIC SURVEY
With the exception of a few fathometer surveys made by the Nevada Fish and Game Commission in the 1950's, the only previous systematic survey of Pyramid Lake was made by Russell in 1882 (1885, pl. 9). For the present survey, section corners and east-west section lines were used to locate accurately the present shoreline and control points for the fathometer survey grid. A boat-mounted recording fathometer was used to obtain cross-sectional profiles of the lake bottom. Twenty-three cross-sectional profiles were run in an east-west direction at one-mile intervals. One long profile was run roughly north-south from The Needle Rocks to Anaho Island. Additional fathometer soundings were made around The Needle Rocks, Anaho Island, The Pyramid, the mouth of the Truckee River, and several beach areas along the west shore. The boat was operated at a constant speed on all profiles, and was kept on line by transit crews on both shores, which were in radio contact with the boat. Hand soundings were made as checks on fathometer readings at 6, 25, 68, 282, and 322 feet. Aerial photography was obtained to provide details on the present shoreline configuration. Altitudes in this report are expressed in feet above mean sea level (datum of 1929, adjustment of 1965), referenced to U.S. Coast and Geodetic Survey benchmark N-21 at 3,940.29 feet altitude. The fathometer profiles and aerial photographs were used to contour the lake bottom.

LAKE AREA AND VOLUME
Tables 1 and 2 and figure 3 may be used to obtain the area and volume of the lake at given altitudes. Below altitude 3,789 feet, lake area and volume are based on the bathymetric survey; above altitude 3,802 feet, they are based on planimetry of U.S. Geological Survey topographic maps at scales of 1:24,000 and 1:62,500 by A. M. Piper. Area and volume data have been extended to altitude 3,880 feet, which is approximately the highest recorded lake level.

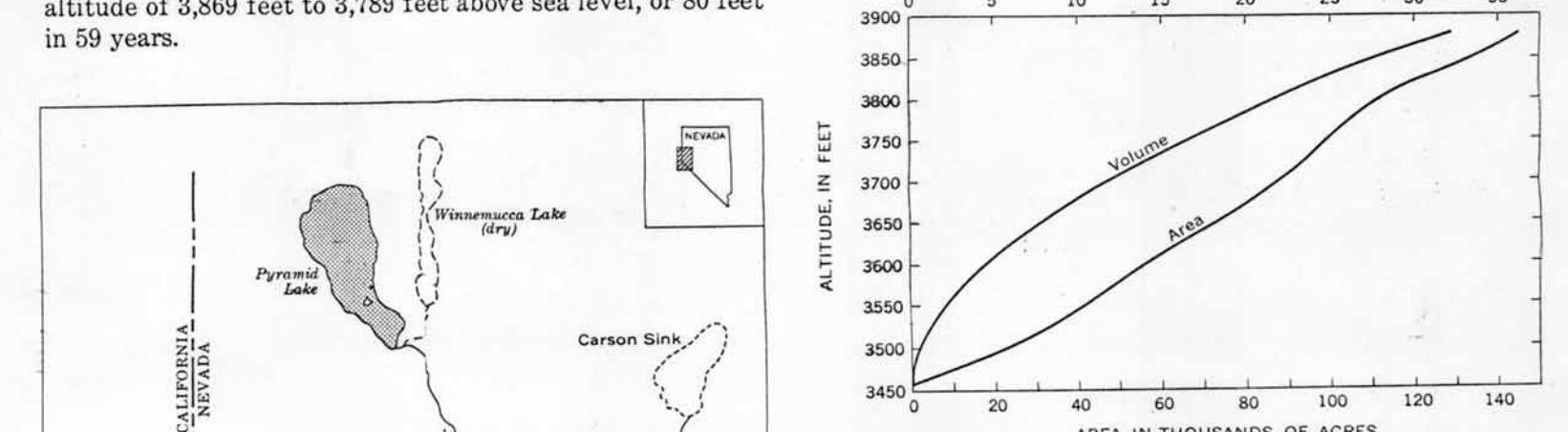


Figure 3.—Area and volume of Pyramid Lake.

PYRAMID AND ANAHO ISLANDS
As Pyramid Lake recedes, the effect on some of its prominent features is quite noticeable. Pyramid Island, for which the lake is named, is no longer an island but is now connected to the east shore by a narrow neck of land. Anaho Island, which is a National Wildlife Refuge, has been the nesting grounds for much of the bird life in the area. As the lake recedes, Anaho Island grows larger; and if the recession continues, it will soon be connected to the east shore much like Pyramid Island. In May, 1968, the width of the channel between Anaho Island and the east shore was 1,350 feet and its maximum depth was 27 feet.

TABLE 1.—Area of Pyramid Lake (thousands of acres)

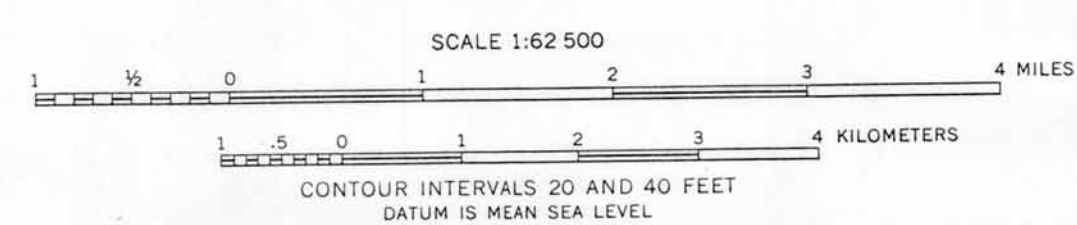
| Altitude (feet) | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 3,880 | 144.2 | 142.6 | 142.8 | 143.0 | 143.2 | 143.4 | 143.6 | 143.8 | 144.0 | 144.2 |
| 3,870 | 142.4 | 142.6 | 142.8 | 143.0 | 143.2 | 143.4 | 143.6 | 143.8 | 144.0 | 144.2 |
| 3,860 | 139.0 | 139.4 | 139.8 | 140.2 | 140.6 | 141.0 | 141.4 | 141.8 | 142.2 | 142.6 |
| 3,850 | 134.3 | 134.8 | 135.3 | 135.8 | 136.3 | 136.8 | 137.3 | 137.8 | 138.3 | 138.8 |
| 3,840 | 129.1 | 129.6 | 130.1 | 130.7 | 131.2 | 131.7 | 132.2 | 132.8 | 133.3 | 133.8 |
| 3,830 | 123.8 | 124.3 | 124.9 | 125.4 | 125.9 | 126.4 | 127.0 | 127.5 | 128.0 | 128.6 |
| 3,820 | 118.6 | 119.1 | 119.6 | 120.1 | 120.7 | 121.2 | 121.7 | 122.2 | 122.8 | 123.3 |
| 3,810 | 113.4 | 113.9 | 114.4 | 114.9 | 115.4 | 115.9 | 116.4 | 116.9 | 117.4 | 117.9 |
| 3,800 | 108.2 | 108.7 | 109.2 | 109.7 | 110.2 | 110.7 | 111.2 | 111.7 | 112.2 | 112.7 |
| 3,790 | 103.0 | 103.5 | 104.0 | 104.5 | 105.0 | 105.5 | 106.0 | 106.5 | 107.0 | 107.5 |
| 3,780 | 97.8 | 98.3 | 98.8 | 99.3 | 99.8 | 100.3 | 100.8 | 101.3 | 101.8 | 102.3 |
| 3,770 | 92.6 | 93.1 | 93.6 | 94.1 | 94.6 | 95.1 | 95.6 | 96.1 | 96.6 | 97.1 |
| 3,760 | 87.4 | 87.9 | 88.4 | 88.9 | 89.4 | 89.9 | 90.4 | 90.9 | 91.4 | 91.9 |
| 3,750 | 82.2 | 82.7 | 83.2 | 83.7 | 84.2 | 84.7 | 85.2 | 85.7 | 86.2 | 86.7 |
| 3,740 | 77.0 | 77.5 | 78.0 | 78.5 | 79.0 | 79.5 | 80.0 | 80.5 | 81.0 | 81.5 |
| 3,730 | 71.8 | 72.3 | 72.8 | 73.3 | 73.8 | 74.3 | 74.8 | 75.3 | 75.8 | 76.3 |
| 3,720 | 66.6 | 67.1 | 67.6 | 68.1 | 68.6 | 69.1 | 69.6 | 70.1 | 70.6 | 71.1 |
| 3,710 | 61.4 | 61.9 | 62.4 | 62.9 | 63.4 | 63.9 | 64.4 | 64.9 | 65.4 | 65.9 |
| 3,700 | 56.2 | 56.7 | 57.2 | 57.7 | 58.2 | 58.7 | 59.2 | 59.7 | 60.2 | 60.7 |
| 3,690 | 51.0 | 51.5 | 52.0 | 52.5 | 53.0 | 53.5 | 54.0 | 54.5 | 55.0 | 55.5 |
| 3,680 | 45.8 | 46.3 | 46.8 | 47.3 | 47.8 | 48.3 | 48.8 | 49.3 | 49.8 | 50.3 |
| 3,670 | 40.6 | 41.1 | 41.6 | 42.1 | 42.6 | 43.1 | 43.6 | 44.1 | 44.6 | 45.1 |
| 3,660 | 35.4 | 35.9 | 36.4 | 36.9 | 37.4 | 37.9 | 38.4 | 38.9 | 39.4 | 39.9 |
| 3,650 | 30.2 | 30.7 | 31.2 | 31.7 | 32.2 | 32.7 | 33.2 | 33.7 | 34.2 | 34.7 |
| 3,640 | 25.0 | 25.5 | 26.0 | 26.5 | 27.0 | 27.5 | 28.0 | 28.5 | 29.0 | 29.5 |
| 3,630 | 19.8 | 20.3 | 20.8 | 21.3 | 21.8 | 22.3 | 22.8 | 23.3 | 23.8 | 24.3 |
| 3,620 | 14.6 | 15.1 | 15.6 | 16.1 | 16.6 | 17.1 | 17.6 | 18.1 | 18.6 | 19.1 |
| 3,610 | 9.4 | 9.9 | 10.4 | 10.9 | 11.4 | 11.9 | 12.4 | 12.9 | 13.4 | 13.9 |
| 3,600 | 4.2 | 4.7 | 5.2 | 5.7 | 6.2 | 6.7 | 7.2 | 7.7 | 8.2 | 8.7 |
| 3,590 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

TABLE 2.—Volume of Pyramid Lake (thousands of acre-feet)

| Altitude (feet) | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 3,880 | 32,020 | 32,020 | 32,020 | 32,020 | 32,020 | 32,020 | 32,020 | 32,020 | 32,020 | 32,020 |
| 3,870 | 30,260 | 30,260 | 30,260 | 30,260 | 30,260 | 30,260 | 30,260 | 30,260 | 30,260 | 30,260 |
| 3,860 | 28,500 | 28,500 | 28,500 | 28,500 | 28,500 | 28,500 | 28,500 | 28,500 | 28,500 | 28,500 |
| 3,850 | 26,740 | 26,740 | 26,740 | 26,740 | 26,740 | 26,740 | 26,740 | 26,740 | 26,740 | 26,740 |
| 3,840 | 24,980 | 24,980 | 24,980 | 24,980 | 24,980 | 24,980 | 24,980 | 24,980 | 24,980 | 24,980 |
| 3,830 | 23,220 | 23,220 | 23,220 | 23,220 | 23,220 | 23,220 | 23,220 | 23,220 | 23,220 | 23,220 |
| 3,820 | 21,460 | 21,460 | 21,460 | 21,460 | 21,460 | 21,460 | 21,460 | 21,460 | 21,460 | 21,460 |
| 3,810 | 19,700 | 19,700 | 19,700 | 19,700 | 19,700 | 19,700 | 19,700 | 19,700 | 19,700 | 19,700 |
| 3,800 | 17,940 | 17,940 | 17,940 | 17,940 | 17,940 | 17,940 | 17,940 | 17,940 | 17,940 | 17,940 |
| 3,790 | 16,180 | 16,180 | 16,180 | 16,180 | 16,180 | 16,180 | 16,180 | 16,180 | 16,180 | 16,180 |
| 3,780 | 14,420 | 14,420 | 14,420 | 14,420 | 14,420 | 14,420 | 14,420 | 14,420 | 14,420 | 14,420 |
| 3,770 | 12,660 | 12,660 | 12,660 | 12,660 | 12,660 | 12,660 | 12,660 | 12,660 | 12,660 | 12,660 |
| 3,760 | 10,900 | 10,900 | 10,900 | 10,900 | 10,900 | 10,900 | 10,900 | 10,900 | 10,900 | 10,900 |
| 3,750 | 9,140 | 9,140 | 9,140 | 9,140 | 9,140 | 9,140 | 9,140 | 9,140 | 9,140 | 9,140 |
| 3,740 | 7,380 | 7,380 | 7,380 | 7,380 | 7,380 | 7,380 | 7,380 | 7,380 | 7,380 | 7,380 |
| 3,730 | 5,620 | 5,620 | 5,620 | 5,620 | 5,620 | 5,620 | 5,620 | 5,620 | 5,620 | 5,620 |
| 3,720 | 3,860 | 3,860 | 3,860 | 3,860 | 3,860 | 3,860 | 3,860 | 3,860 | 3,860 | 3,860 |
| 3,710 | 2,100 | 2,100 | 2,100 | 2,100 | 2,100 | 2,100 | 2,100 | 2,100 | 2,100 | 2,100 |
| 3,700 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 |
| 3,690 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

REFERENCES CITED
King, Clarence, 1878, United States geological explorations of the Fortieth parallel, v. 1, Systematic geology; Washington, D. C., Govt. Printing Office, 803 p.
Russell, I. C., 1885, Geological history of Lake Lahontan, a Quaternary lake of northwestern Nevada; U.S. Geol. Survey monograph 11, 288 p.

EXPLANATION
— Lines of equal water depth
Interval 10 feet. Supplemental lines (dashed) at 10 and 20 feet.
x242
Deepest point, in feet, on east-west profiles along projected section lines



RECONNAISSANCE BATHYMETRY OF PYRAMID LAKE, WASHOE COUNTY, NEVADA

By
E. E. Harris
1970

Base from U.S. Geological Survey 1:24,000 The Needle Rocks, Pyramid NE, Pyramid SW, Tonikum Peak NW, Tonikum Peak SE, Dove Creek, 1:64,000 and 1:62,500, Nixon and Sutcliffe, 1957

Hydrography mapped in May 1968

For sale by U.S. Geological Survey, price 50 cents