

Monitoring and Protecting Water Quality in Lake Mead, Nevada



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YSI Source Water Monitoring
Application Note A539-02

Nevada is America's driest state. Lake Mead, an impoundment of the Colorado River, lies on the Nevada-Arizona border and is one of the most intensely used reservoirs in the western United States. It provides recreational water activities (such as boating, fishing, and swimming) and domestic drinking, industrial, and irrigation water for over 22 million users - including 1.8 million residents of Nevada along with tourists. It is crucial to maintain the quality and level of this water to guarantee a reliable and safe resource for its many uses.

Lake Mead, formed following the completion of Boulder Dam (now called Hoover Dam) in 1935, was the largest artificial lake in the world at the time of completion. It is one of several reservoirs along the Colorado River; however, due to increases in population and agricultural operations in recent decades, this once-expansive lake in the desert is becoming more compromised.

While inflow into Lake Mead primarily is from the Colorado River, a small percent is also from rivers on the northern side of the Lake and from Las Vegas Wash on the northwest side. Las Vegas Wash transports treated municipal wastewater effluent, stormwater and urban runoff, and shallow groundwater seepage from the Las Vegas urban area to Boulder Basin in Lake Mead. Effluent flow rates have more than doubled in recent years, prompting concern over potential effects to reservoir water quality, especially since some of the water is pumped for the municipal water treatment plant at Saddle Island.

Near Real-Time Monitoring System

The U.S. Geological Survey (USGS) - in cooperation with the Southern Nevada Water Authority (SNWA), National Park Service (NPS), and the Bureau of Reclamation (USBR) - is monitoring water quality on a near real-time basis with floating platforms on Lake Mead.

Monitoring platforms are (or were at the time of this writing) located in the westernmost Boulder Basin - in Las Vegas Bay and near Sentinel Island; a third platform is located in the Overton Arm near the Overton Marina; and the fourth



The time it takes to complete a profile depends on the depth interval between measurements and the total depth profiled. Profiles at Virgin Basin and Sentinel Island, which are deep-water sites (>50 meters), with target depths 5 meters apart, take about 60 minutes to complete. Profiles at Las Vegas Bay and Overton Arm, which are shallow-water sites (<50 meters), with target depths 2 meters apart, take 30 minutes to complete.

platform is located in the Virgin Basin, near the Narrows, which separates the Virgin and Boulder Basins. (Platforms are occasionally moved around as deemed necessary). In addition to monitoring water quality, USGS collects meteorological data such as air temperature, relative humidity, wind direction and speed, solar radiation, and barometric pressure.

Each floating platform, built by the USGS, is approximately 7 by 11 feet and anchored by two 400-pound concrete blocks (a 2-point mooring system). Water quality profiling instrumentation, from YSI Systems, profiles the water at different depths throughout the Lake. YSI water quality sondes are equipped with sensors that measure dissolved oxygen, pH, turbidity, depth, temperature, specific conductance, and fluorescence.

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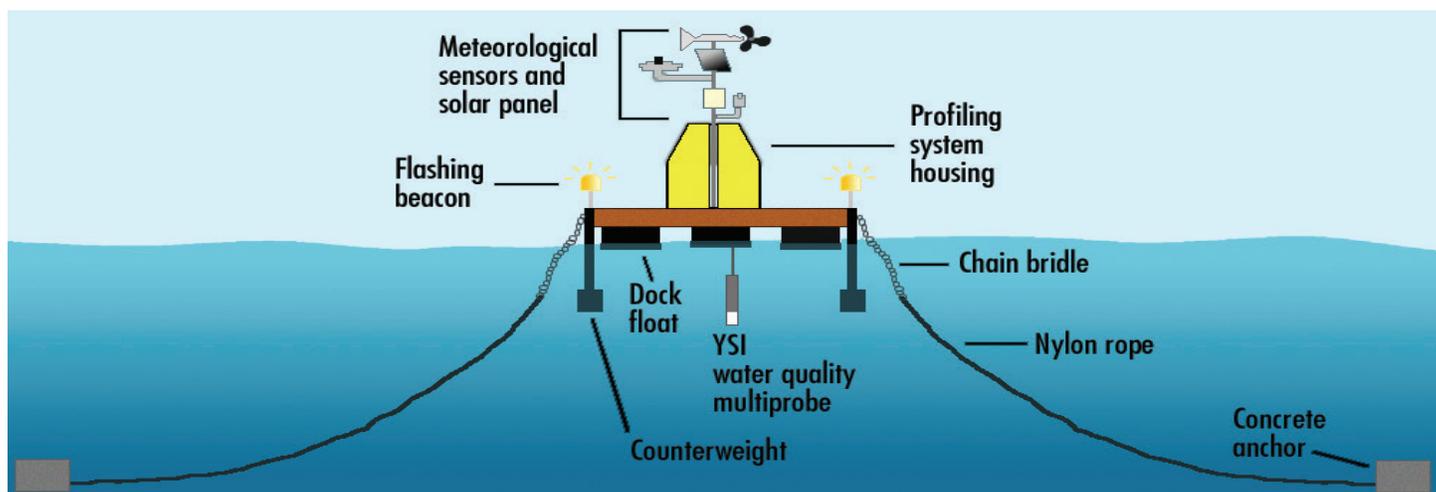


Illustration of Lake Mead
monitoring platform configuration.

The system automatically performs water quality profiles at user-defined time intervals and depths. Every 24 hours the USGS office in Henderson, Nevada, downloads data from the platforms to its base station computer.

Monitoring the watershed and analyzing water quality data are crucial steps in maintaining the state's water quality standards. If parameters such as dissolved oxygen or temperature do not fall within the specified ranges, then the Lake's beneficial uses are adversely affected. These uses include: propagation of aquatic life including a warm water fishery; recreation; irrigation and watering of livestock; and municipal drinking water supply.

For water quality and meteorological data from the Lake Mead monitoring platforms, please visit:
<http://nevada.usgs.gov/lmqw/index.htm>

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