

Let's Talk Water – Lake Mead

By Dr. Mike Strobel

Possibly the most important source of water to Nevada at the present time is Lake Mead. I say this because Lake Mead serves the majority of Nevada's population and is critical to one of Nevada's major industries, tourism.

The area that is presently occupied by Lake Mead has a long and rich history. Man has been in the area along the Colorado River in southern Nevada for at least the last 11,000 years and possibly much longer. There is archeological evidence of camps and settlements in the area that date back many thousands of years. North of Las Vegas at Tule Springs, hearths, stone tools, mammoth bones and other artifacts indicate the area was occupied by a people referred to as the Basketweavers (www.nps.gov/lame/learncultural.htm). These people also occupied the Lost City along the Muddy River near the confluence with the Virgin River.

The first recorded non-Native American to visit the area was Jedediah Smith in 1826. In 1829, a new northern route for the Spanish Trail was established from the Muddy River through present-day Las Vegas (the Meadows) and onto the Mohave River. Later, other explorers, including John C. Fremont and John Wesley Powell, visited the area. These were followed by a number of different Mormon settlements and various mining camps. Many of the sites of the early towns, such as Callville, Rioville, and St. Thomas, have been covered by Lake Mead (www.nps.gov/lame/learncultural.htm), although recent declines in water levels in Lake Mead have exposed some sites.

Lake Mead formed following the completion of Boulder Dam (now called Hoover Dam). The lake is named for Dr. Elwood Mead, who was the commissioner for the Bureau of Reclamation from 1924 to 1936 and was the lead in designing the construction and completion of the dam. Boulder Dam was completed in 1935 and its completion created the largest artificial lake in the world for that time.

Lake Mead is one of many dams along the Colorado River. The two largest reservoirs on the Colorado River are Lake Mead and Lake Powell. Both serve as lifelines in a desert environment and both population and agricultural growth are dependent on these water bodies.

The water in the Colorado River is divided among the various States that are part of the drainage basin to the river. The Colorado River Compact was established in 1922. This compact divided the river into the Upper Basin (consisting of Colorado, New Mexico, Utah, and Wyoming) and the Lower Basin (consisting of Arizona, California, and Nevada). Because the division was based on State boundaries and water basins don't follow these lines, Arizona, New Mexico and Utah actually drain into both the Upper and Lower Basins. The compact apportioned 7.5 million acre-feet of water per year to both the Upper and Lower Basins. In addition, the compact regulated the flow from the Upper Basin to the Lower Basin (established an aggregate flow of 75 million acre-feet of water

over any consecutive 10 year period) and provided the right for an increase in the annual beneficial consumptive use of Lower Basin water by 1 million acre-feet (Southwest Hydrology, 2005).

In addition to the Colorado River Compact, the Boulder Canyon Project Act of 1928 authorized the construction of what would become Hoover Dam, apportioned the Lower Basin water such that Arizona received 2.8 million acre-feet per year, California received 4.4 million acre-feet per year, and Nevada received 300,000 acre-feet per year, or 4 percent of the 7.5 million acre-feet of water per year apportioned to the Lower Basin. In 1944, the United States entered into a treaty that guarantees Mexico 1.5 million acre-feet of water per year from the Colorado River (Southwest Hydrology, 2005).

At the time, the 300,000 acre-feet of water per year for Nevada seemed adequate, given the population, limited irrigation, and small growth projections. Most of the water used in southern Nevada was ground water, which probably seemed limitless considering the needs and uses in the 1920s. However, significant changes in southern Nevada in the coming years increased the dependence on Colorado River water contained in Lake Mead.

In the early 1940s, industrial growth in southern Nevada related to the war efforts and the rise of the casino gambling industry began to boost both the population numbers and the needs for additional water resources. As the demands for water increased, it was determined that ground-water supplies needed to be augmented with water from Lake Mead. Pipelines to bring Lake Mead water to the Las Vegas Valley were established, and dependency on that water supply grew. Into the 1950s to today, southern Nevada has seen a population boom and Las Vegas continues to be the fastest growing city in the country for most of the last decade. The needs for water to support the population growth in southern Nevada have now exceeded the allotment of water from Lake Mead as originally established in the Boulder Canyon Project Act.

One way that Nevada has been able to increase the amount of water it can withdraw from Lake Mead is to calculate the water withdrawals on consumptive use, which gives credits to return flow to the reservoir. What this means is that the 300,000 acre-feet per year is based on the overall balance of water removed from the lake. If, for example, 150,000 acre-feet per year of water is returned to the lake by means of treated wastewater, then that allows for 450,000 acre-feet per year to be withdrawn through the water intakes for supply to southern Nevada. In addition, water needs for southern Nevada are supplemented by use of ground water and by banking water during surplus years for use later. Presently, southern Nevada also is looking at other options to supplement the supply from Lake Mead, such as importing water from other basins in Nevada, banking unused portions of Nevada's Colorado River water in other States, and helping to develop desalination plants in California to augment their needs in exchange for water from Lake Mead (SNWA, 2005).

In addition to the base allocation of water from the Colorado River, there are allotments that fall under the designation of Interim Surplus. What this means is that based on the

elevation of Lake Mead, additional water for domestic uses can be withdrawn. Therefore, if the lake is at 1,125 feet above sea level or less, only the 300,000 acre-feet of water can be withdrawn that year. At various levels above 1,125 feet above sea level, this is considered surplus water in the lake and additional water can be withdrawn (how much water can be withdrawn and how it is distributed is based on the specific elevations of the lake) (SNWA, 2005).

So, how much water is in Lake Mead? The lake varies in volume dependent on climatic changes. Recently, we have seen the lake dropping because of the prolonged drought in the western U.S. and the volume has decreased significantly. Presently, the lake is down 90 feet from its level in 2000 and at the end of 2004, Lake Mead and Lake Powell were at less than 50 percent of their combined storage capacity (SNWA 2005). According to the Bureau of Reclamation, at its maximum size (the spillway gates at Hoover Dam are at 1,221.4 feet above sea level), Lake Mead contains about 28,537,000 acre-feet of water. At maximum, Lake Mead has a surface area of about 247 square miles or 157,000 acres, and extends for about 110 miles upstream along the Colorado River. The width can vary from a several hundred feet to about 8 miles depending on the canyons it occupies (www.usbr.gov/hoverdam/faqs/lakefaqs.html).

In addition to being a source of water for the southwestern U.S., Lake Mead also is a recreation destination for many boaters, swimmers, anglers, and other people who enjoy the outdoors. According to the National Park Service, Lake Mead National Recreation Area covers 1.5 million acres, has 950 miles of shoreline, and attracts about 9.1 million visitors each year (National Park Service, 2001).

Hoover Dam itself draws almost a million people a year to its visitor center. U.S. 93, which is major north-south route for commercial transport and visitor travel through Arizona and Nevada, crosses the top of Hoover Dam. Because of concerns of damage to the dam and water supplies resulting from potential vehicle accidents, the potential of vehicle-pedestrian accidents along the dam, and delays in traffic at checkpoints before crossing the dam, a new crossing is being constructed about 1,500 feet downstream of Hoover Dam. This crossing is known as the Hoover Dam Bypass Project and it is projected to be open to the public during 2008 (www.hooverdambypass.org/default.htm).

Lake Mead continues to be a critical lifeline to populations and agriculture in the southwestern U.S. and a source of water to sustain the majority of Nevada's population. As growth continues in southern Nevada, Lake Mead will continue to be important, even though other sources of water will need to be established to augment this need. Hoover Dam and the creation of Lake Mead show that man has the capability to tame nature to our benefit, but the recent drought has shown that nature can still call the shots. It will be interesting to see how Lake Mead and water distribution in general in the southwest will play a key role in population growth, agriculture, and politics in the coming years.

If you have questions about Lake Mead or other water topics, please contact me at the Ely Times or at mstrob@usgs.gov.

References

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