

Morena Reservoir



Morena is a City of San Diego-owned impoundment reservoir located approximately 50 miles east of downtown San Diego. It is situated high in the Cleveland National Forest (elevation 3,000 feet) and has a holding capacity of 50,694 acre feet. The only source of water to the reservoir is local runoff collected within its 114-square-mile watershed that receives rainfall averaging more than 20 inches a year.

The reservoir was created with the construction of the Morena Dam. The project began in 1895 but was not completed until 1912. In 1914, the City of San Diego purchased the dam from a private water company for \$1.5 million. The dam has been raised several times: 5 feet in 1917, 10 feet in 1923, and an additional 4 feet in 1930. The spillway crest is now at 3,039.4 feet above sea level (157.00 gage) after it was widened and raised an additional 2 feet in 1946.

Morena Reservoir lies within Lake Morena Regional Park, a camping and recreation area leased and managed by the County of San Diego. While the reservoir provides a scenic and enjoyable place for fishing and boating, its main purpose is to capture and store raw water which will eventually be used as potable water by the citizens of the City of San Diego.



Water Supply

In February 2013, the City began transferring water from Morena Reservoir for the first time in more than 11 years. The water was transferred many miles down Cottonwood Creek to Barrett Reservoir and then to Lower Otay Reservoir for use at the City's Otay Water Treatment Plant just east of Chula Vista. This is known as the Cottonwood-Otay Water System (system). Barrett is a more efficient reservoir, in terms of evaporation losses, compared to Morena. This is an important factor that dictates the transfer of Morena water to Barrett as soon as storage space is available in Barrett.

The transfer begins at Morena Dam where water is discharged through the outlet tower into Cottonwood Creek. The water then flows approximately 7 miles to Barrett Reservoir where it is then transferred to Lower Otay Reservoir via a 14 mile long Dulzura Conduit and Dulzura Creek. Transferring water from Morena and Barrett Reservoirs to the treatment plant at Otay saves the City of San Diego millions of dollars by reducing the purchase of expensive imported water. As part of normal water supply operations, the City has historically drafted from Morena in the range of 1,600 to 15,000 acre feet per year, depending on the amount of available water stored in the reservoir.

The last time the City drafted from Morena was during the March to August 2001 period. Drafting from Morena has been on hold since 2004, due to severe damage to the Dulzura

Public Utilities

Department Mission:

To ensure the quality, reliability, and sustainability of water, wastewater, and recycled water services for the benefit of the ratepayers and citizens served.



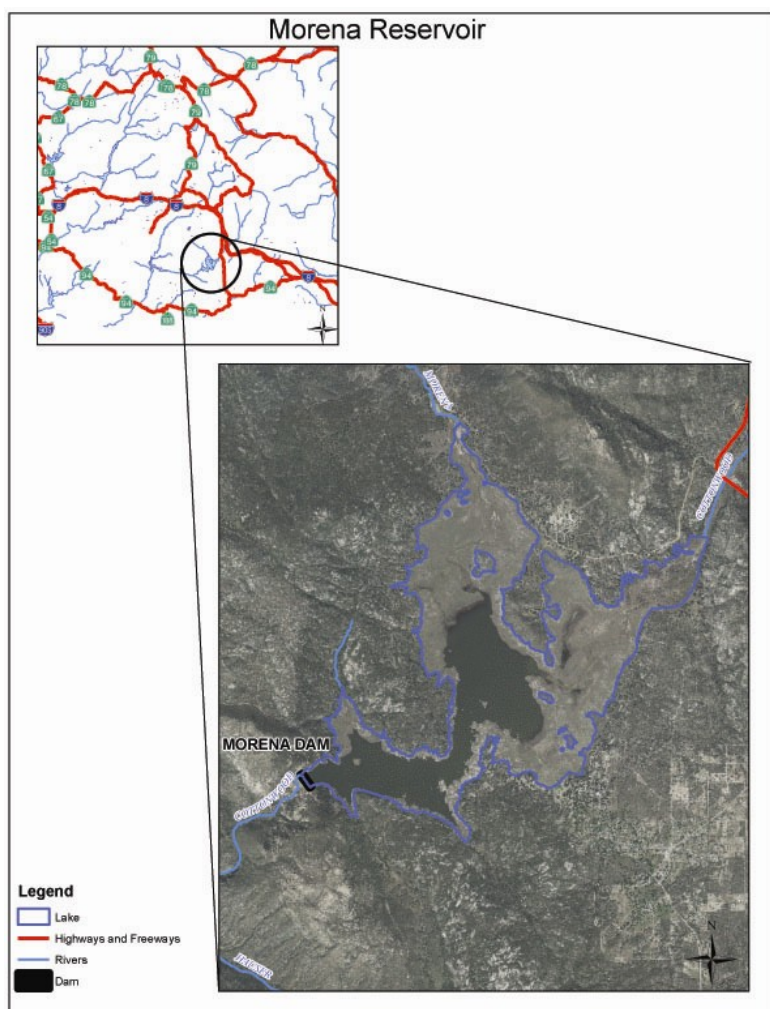
THE CITY OF SAN DIEGO



Conduit caused by the 2004-2005 heavy rains and again during the 2007 Harris Wildfire. This damage to the Dulzura Conduit prevented the City from moving water out of Barrett to Otay, which would have created storage space in Barrett for Morena water transfers. Necessary extensive repairs have been completed to the Dulzura Conduit and the system has been back in operation since January 2011. Since January 2011, the City has been drafting water from Barrett in order to draw down that reservoir and begin the movement of water from Morena. The water level in Barrett has now reached a point where the City can begin to move Morena water downstream to Barrett, while withdrawals from Barrett continue to Otay.

The City had planned to release about 20 million gallons per day from Morena to Barrett from February 2013 until June 30, 2013, resulting in an estimated savings of about \$5 million to City of San Diego ratepayers. The current cost of imported raw water is about \$800 per acre-foot. However, the Morena release was stopped in March 2013. During the two month period (February-March), the City released only 2,126 acre-feet, therefore, an additional 4,100 acre-feet still need to be released from Morena in order to meet the projected savings of \$5 million.

Before water transfer began, the Morena reservoir water level was at gage 115 feet and contained about 10,300 acre feet. The current reservoir water level is at about gauge 107 with storage of about 7,100 acre feet of storage.



Plans to Improve Dam and Tower

The City has a Capital Improvement Program (CIP) project scheduled for necessary repairs and improvements to Morena Reservoir's outlet tower and dam. Much of the mechanical equipment inside the existing outlet tower was installed in 1912 and has managed to operate well past its service life. In the interest of safety, the California Division of Safety of Dams (DSOD) is requiring the Public Utilities Department to renovate the outlet tower and add improvements to the dam.

As part of this CIP project, the top 23 feet of the outlet tower will be demolished and replaced with a new structure that will include a bridge extending to the top of the dam. All pipes, valves, ladders, and platforms inside the tower will be replaced. This project also includes a seismic stability evaluation of outlet tower and construction of a new parapet wall on top of the dam. The reservoir outlet pipe will be upsized to meet the DSOD emergency drawdown requirements. The estimated cost of this project will be in the range of \$8 million. The project construction is scheduled to start in late 2014 and continue through 2017. The timing of this CIP project was set based upon City's planned operation to lower the reservoir in order to reduce CIP-related costs.