Climate and Recreation in the Santa Ana River Watershed

Results

Is Lake Elsinore in danger of drying up?

Lake Elsinore, shown in Figure 1, is southern California's largest natural lake and is situated at the bottom of the San Jacinto Watershed. Because Lake Elsinore is a terminal lake, fed only by rain and natural runoff, it has been impacted by low lake levels. In 2005, the Elsinore Valley Municipal Water District (EVMWD) began a two-year project to introduce recycled water into Lake Elsinore to stabilize lake levels. The project now delivers approximately 5 million gallons per day (MGD) of recycled water to Lake Elsinore, and includes repair and retrofit of three local, shallow groundwater wells that deliver approximately 1 MGD. An analysis was done to determine if these measures are enough to meet the minimum goal volume of 41,704 acre-ft (elevation of 1,240 ft), avoid low lake levels (below 24,659 acre-ft, elevation of 1,234 ft), or prevent the lake from drying up altogether (as occurred in the 1930s).

Figure 2 shows the distribution of projected average annual volume for two future periods, 2000-2049 and 2050-2099, based on 112 different climate change projections. The two future periods were also analyzed with the addition of the EVMWD project. For the 2000-2049 period there is a >50% chance that the average annual lake level will meet the minimum goal; adding in the EVMWD project brings that likelihood up to >75%. For the 2050-2099 period there is a <5% chance that the minimum goal will be met; adding the EVMWD project brings that up to a >25% chance. Both periods are likely to stay above low lake level, with the 2050-2099 period having <10% chance of drying up completely.

Figure 1 - VIC model grid cell used to determine data for Lake Elsinore analysis
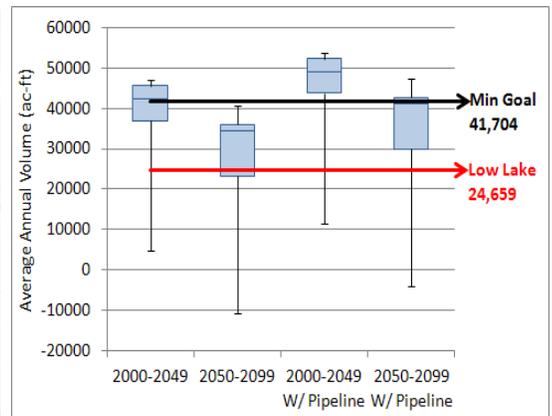

Figure 2 - Boxplot of projected average annual volumes for two future periods, with and without EVMWD project

Methods

Monthly streamflow and open water evaporation values from 1950-2099 were determined by using BCSD-CMIP3 climate projections and the Variable Infiltration Capacity (VIC) macro-scale hydrology model. Historical observed data from 1950-1999 were modeled using the gridded daily data set from Maurer et al. 2002. The upstream contributing basin was determined at the inlet to Lake Elsinore, excluding the effect of any upstream regulation.

A mass balance analysis of Lake Elsinore was conducted, resulting in a natural (unregulated by upstream reservoirs) volume. Change values were determined for each future period using modeled observed average annual volume applied to historic annual average volume.

Link to full technical report: www.usbr.gov/lc/socal/basinstudies/OWOW.html

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Key Findings

- Lake Elsinore has less than a 10% chance of drying up (2000-2099).

- In the future period 2000-2049 Lake Elsinore has a greater than 75% chance of meeting the minimum elevation goal.

- In the future period 2050-2099 Lake Elsinore has less than a 50% chance of meeting the minimum goal elevation.

- There is less than a 25% chance that Lake Elsinore will drop below low lake levels in either period.

- The EVMWD project does aid in stabilizing lake levels. However, for the period 2050-2099 additional measures will likely be required to meet the minimum goal elevation.

Additional Considerations

- Operations of Canyon Lake, a reservoir upstream from Lake Elsinore, were not taken into account in this analysis.

- In addition to lake level stress, Lake Elsinore has many water quality issues.

- Lake Elsinore is not used as a drinking water source.