

Science to Sustain Terminal Lakes: The Walker River Basin Study

Section 2507 of Public Law 107-171 (2002 Farm Bill) provided \$200,000,000 to be used by the Secretary of the Interior, acting through the Commissioner of Reclamation, to provide water to at-risk natural desert terminal lakes. This bill was later amended under Public Law 108-7, Section 207 to include language "Restoration of fish, wildlife, and associated habitats in watersheds of certain lakes". The amendment specified that only Pyramid, Summit, and Walker Lakes in the State of Nevada were to be considered under Section 2507, Public Law 107-171.

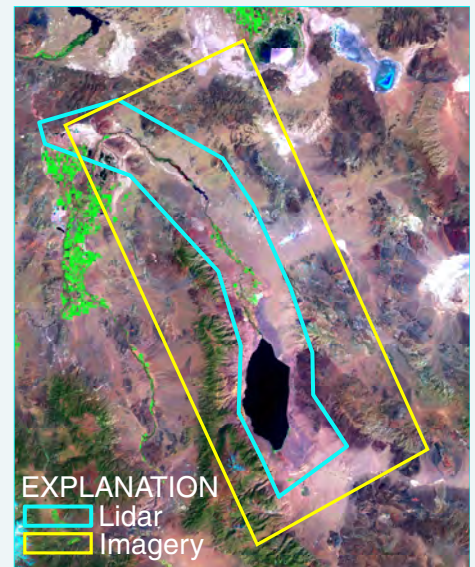
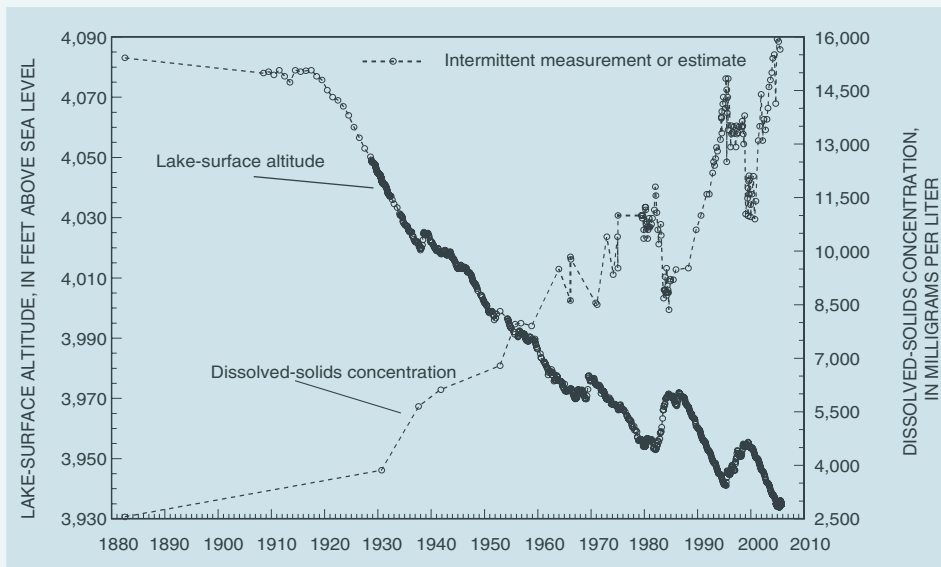
Terminal lakes are the end points for surface-water drainage in topographically enclosed basins. Terminal lakes can provide a habitat for aquatic life and migratory birds and an area for recreational activities such as fishing and boating. These lakes are sensitive to changes in climate and upstream water use such as streamflow diversions and exportation for agriculture and urban use. Since the early 1900s, as upstream agricultural diversions have increased, the fresh-water ecosystem of Walker Lake has become at-risk due to increased salinity.

In response to the 2002 Farm Bill, the U.S. Geological Survey (USGS), in cooperation with the Bureau of Reclamation, identified the following objectives to help sustain Walker Lake:

- Quantify the volume of streamflow in the Walker River Basin, and determine the percentage of that streamflow from each valley;
- Determine evapotranspiration (ET) losses from vegetation and evaporation from the lake surface;
- Develop an improved water budget for Walker Lake; and
- Develop the capability to determine how changes in water use in the Walker River Basin will affect streamflows to Walker Lake.

To accomplish these objectives, the USGS will study the Walker River Basin from near Wabuska in the northern part of the Basin to Walker Lake. The lower portion of the Basin was selected for study because (1) surface-water/groundwater interactions are complex and poorly understood, (2) few data are available, and (3) it is the terminal portion of the Basin and includes Walker Lake. The study will include the following tasks:





Task 1—New and Improved Surface-Water Stations

The USGS currently operates 14 continuous-record streamgaging stations in the basin. Data from these stations help form the basis for water management decisions and irrigation operations, as well as the surface-water component of the water-budget analysis. However, analysis of the station network identified a number of important locations where additional streamflow data and upgrades to existing stations were needed. Six streamgaging stations have been, or will be, added; three stations have been upgraded; and one station has been reactivated. Data from these stations is available from the Walker River Basin study web site at <http://nevada.usgs.gov/walker/data.htm>.

Task 2—ET Measurements

Loss of water in the Walker River Basin is mainly attributed to evaporation from open water and soils, and transpiration of water from plants (the combination of evaporation and transpiration known as ET). Sophisticated sensors in alfalfa fields, natural vegetation areas, and on the lake measure parameters such as solar radiation, air and ground temperatures, relative humidity, and wind speed and direction. These data are used to calculate daily values of ET. These values, and vegetation mapping from satellite and aerial imagery, will be used to estimate ET for the basin.

Task 3—Water Budget for Walker Lake

Surface water, ET, and additional data acquired during this study will be used to refine the water budget for Walker Lake. Additional data collection includes estimates of ground-water discharge to Walker Lake and a new bathymetric map of Walker Lake to refine the relation between lake elevation, volume, and surface area. A more precise

water budget will allow agencies to predict the effects of water management alternatives on the elevation and salinity of Walker Lake with greater accuracy.

Task 4—Surface- and Ground-Water Relations

During the first few years of this study, data will be collected to identify parts of the Walker River where streamflow infiltrates into the aquifer and where ground water discharges into the river. The USGS also plans to develop a computer model to simulate flows between the river and aquifer from Wabuska to Walker Lake. This model could be used to depict possible changes in the flow of the river resulting from changes in water use in, and above, the modeled area.

This study, started in 2004, will be completed in 2008. Results of the study will be published in USGS Scientific Investigations Reports and available on the internet. Federal, State, Tribal, and local agencies that are trying to preserve the ecosystems, agricultural economy, and lifestyle of residents in the basin may benefit from a better understanding of the hydrology of the Walker River Basin. Additional information and progress of the study is available on the Walker River Basin study web site at <http://nevada.usgs.gov/walker/index.htm>.

For more information about this study, please contact:

Thomas J. Lopes, Hydrologist
 USGS Nevada Water Science Center
 333 W. Nye Lane, Room 203
 Carson City, NV 89706-0866

Tel: (775) 887-7688
 Fax: (775) 887-7629

Email: tjlopes@usgs.gov
 URL: <http://nevada.usgs.gov>