

## INTRODUCTION

Walker Lake is one of three desert terminus lakes in the United States that support a fishery. Over the past 100 years, lake levels have declined about 150 feet and the volume of the lake has decreased from about 10 million to less than 2 million acre feet. During this decline the total dissolved solids (TDS) of the lake have increased from about 2,500 mg/l to greater than 17,000 mg/l. These changes have had far reaching impacts on the health of the lake and its associated ecosystems. High TDS values have resulted in significant population declines of threatened Lahontan cutthroat trout (LCT), a subspecies that is receiving significant conservation and restoration attention.

Walker Lake is located in a watershed that supports significant agricultural activity. The source of the lake's water comes primarily from snowmelt runoff from the Sierra Nevada, which flows through several agricultural valleys before reaching the lake. There are currently no water rights for the lake, so during low water years the lake receives little or no inflow from the Walker River.

In an effort to save Walker Lake, Congress enacted a law in 2005 (i.e., H.R. 2419 Energy and Water Development Appropriations Act, 2006, Section 208), that created a program to acquire water rights from willing sellers in the Walker Basin. In order to enact an ecologically and economically sustainable program of water acquisitions, a large-scale integrated research program was established. The goal of the Walker Basin Research Project was to provide the hydrologic, ecologic, economic, and agricultural data needed to inform decisions related to water acquisitions. This report is a product of the research program that was developed in response to direction provided in this federal legislation. Specifically, Desert Research Institute and University of Nevada, Reno faculty were funded to: (1) develop a method to optimize the purchase of water rights in the Walker River Basin, (2) evaluate options for practicing alternative agricultural practices, and (3) evaluate the impacts that water removal from crop-irrigated lands will have on the spread of invasive plants, aquatic and terrestrial ecosystems, and the local economy.

Research during Phase II of the Walker Basin Research Project was supported by the National Fish and Wildlife Foundation (NFWF) and was built upon work previously conducted during Phase I of the project. The four major elements of our Phase 2 final project include: 1) the use of alternative agriculture and irrigation scheduling technology for water conservation; 2) an evaluation of the aquatic ecosystems of the Walker River, including trout habitat; 3) the decision support tool (DST), which includes many models on surface water and groundwater flows, water rights information, and ultimately, Walker River outflows from Mason Valley at the Wabuska gauge; and 4) community economic development.

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