

The Herbst Lab

at the Sierra Nevada Aquatic Research Lab,
University of California, Santa Barbara

www.herbstlab.msi.ucsb.edu

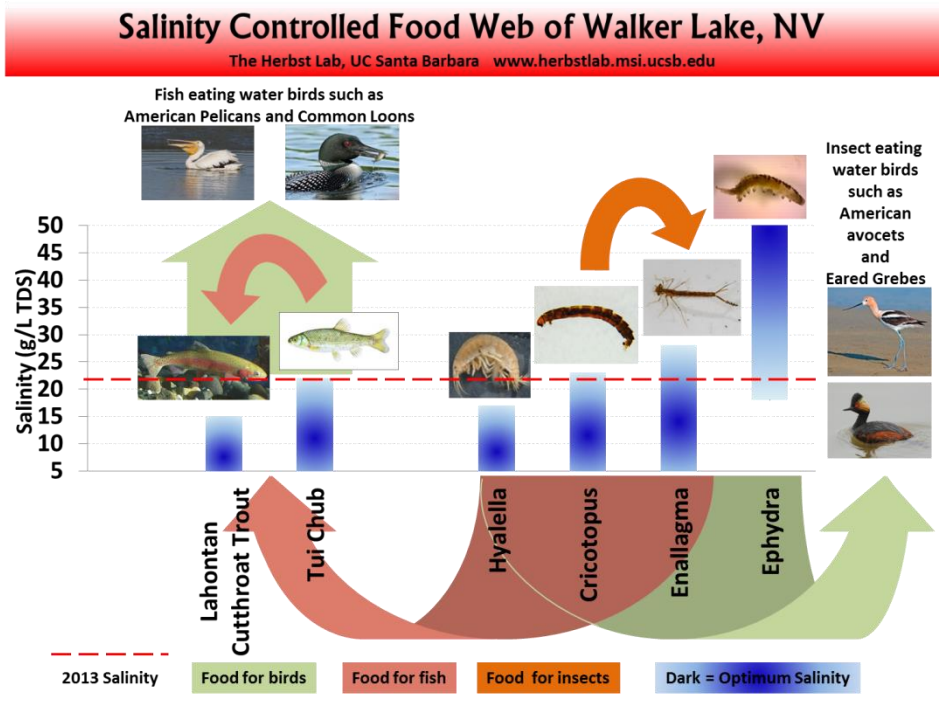
Salinity limits on the aquatic invertebrate life of Walker Lake



Funded by
the U.S. Fish and Wildlife Service

Walker Lake, Nevada, is a saline desert lake that has lost 150 vertical feet of water over the last century due to agricultural diversions and thus has become saltier over that time. Many species of fish and visiting birds depend on the productive invertebrate life in the lake as a food resource. Our research has focused on how falling lake level and rising salinity at Walker Lake affects the presence and abundance of lake invertebrates.

Three species dominate Walker Lake, the midges *Cricotopus ornatus* and *Tanytus grodhausi*, and the damselfly *Enallagma clausum*. By exposing these organisms to various salt concentrations in the lab and documenting their numbers in the lake as salinities increase, we found that salinities in the range of 20-25 g/L present either lethal limits or sublethal inhibitions to survival and growth. These higher salinities will likely eliminate or substantially reduce the abundance of invertebrates in Walker Lake.



All species survived best at salinities below current levels, suggesting these populations are already under stress.

Salinity bioassays used mixed size and age classes to test tolerance of invertebrates to higher salinity concentrations of lake water. The limits shown by these tests may be best case scenarios however as the younger and smaller stages are more sensitive to higher salinities. The inability of this smallest life stage to survive will be a hindrance to development of the population as a whole.



A conservation level for Walker lake that incorporates survival and recovery of native fish (Tui chub and Lahontan cutthroat trout) and sustains the viability and abundance of invertebrate life requires that the lake return to a level where salinity is brought into a range of 10 to 15 g/L total dissolved solutes. The lake salinity was about 20 g/L as of June 2013.