WATER – POSTER #47

Modeling Potential Changes in Lake Mead Limnology under Climate Change

Todd Tietjen, Todd.tietjen@snwa.com
Southern Nevada Water Authority

Co-Authors:
Al Preston, Ph.D., P.E., Flow Science Incorporated
E. John List, Ph.D., P.E., Flow Science Incorporated

Lake Mead is an important resource for Nevada and the Southwest but the potential impacts of climate change on the lake are unclear. Climate change is expected to impact the lake directly (changes in air temperatures) and indirectly through changes in the upstream Colorado River (changes in temperatures, volumes and timing of flows). To explore these changes a series of exercises were conducted using the ELCOM/CAEDYM model for Lake Mead. Air temperatures were adjusted to reflect median predictions for the 2050s and 2090s as well as the 90th percentile for the 2090s. In general these manipulations resulted in increases in lake temperatures and loss of water through evaporation. The model output did not suggest significant shifts in the onset of thermal stratification, but did indicate the breakdown may occur up to one month later in the deepest portions of the lake. Dissolved oxygen concentrations in the hypolimnion were predicted to decrease. Algal biomass was strongly influenced under the 2090s 90th percentile scenario and moderately influenced by the 2090s median scenario. There was a shift in the spring chlorophyll peak to earlier in the year and values through the summer months that were below those of recent years. The summer minimum extended later than under current conditions and lead to a slightly larger fall peak in chlorophyll concentrations. These results suggest that the impacts of climate change on Lake Mead will produce incremental shifts in existing patterns that while relatively small, have the potential to alter the operation of the lake.