

Fresno

Watershed Monitoring and Hydrologic Simulation using GIS

CSU Fresno faculty and students are leading a study to identify nutrient sources impacting the upper Fresno River and Hensley Lake in Madera County. The reservoir has a storage capacity of 90,000 acre-feet (0.11 km³) and a water surface area of about 1,500 acres (600 ha) and was created for flood control, irrigation, resource management, and recreation. In recent years, excessive nutrient loading in the watershed led to massive algae blooms in the reservoir, causing public concerns over continued beneficial uses of Fresno River and Hensley Lake.

Supported by a grant from the U.S. Environmental Protection Agency that is being administered through the State Water Resources Control Board, the research team seeks to identify nutrient sources impacting the watershed and to monitor water quantity and quality in the Fresno River, its major tributaries, and Hensley Lake. Six sampling events at 24 sampling sites were conducted during the 2003–04 water year. Past and current land-use patterns, residential development, and the big storm events, were analyzed to determine the sources of nutrient loading.

The field monitoring and hydrologic modeling involved a combined use of GIS, GPS and hydrologic simulation programs. The simulation results were calibrated using the monitored data. The results indicated that: (1) the annual contribution of river water to the lake was significantly decreased after the year 2000 as a result of residential development; (2) the dissolved oxygen in the river was at critical (near-minimum) levels for potential beneficial uses (such as swimming and aquatic life); (3) nutrient concentrations in the river were always lower than in the lake during the low flow period, suggesting that the river water is diluting the lake, with large amount of nutrients probably coming from big-storm events in the watershed; and (4) high bacteria (total coliform and E. coli) numbers prevailed in the middle and downstream reaches of the river, documenting the contribution of disease-causing bacteria from the watershed.

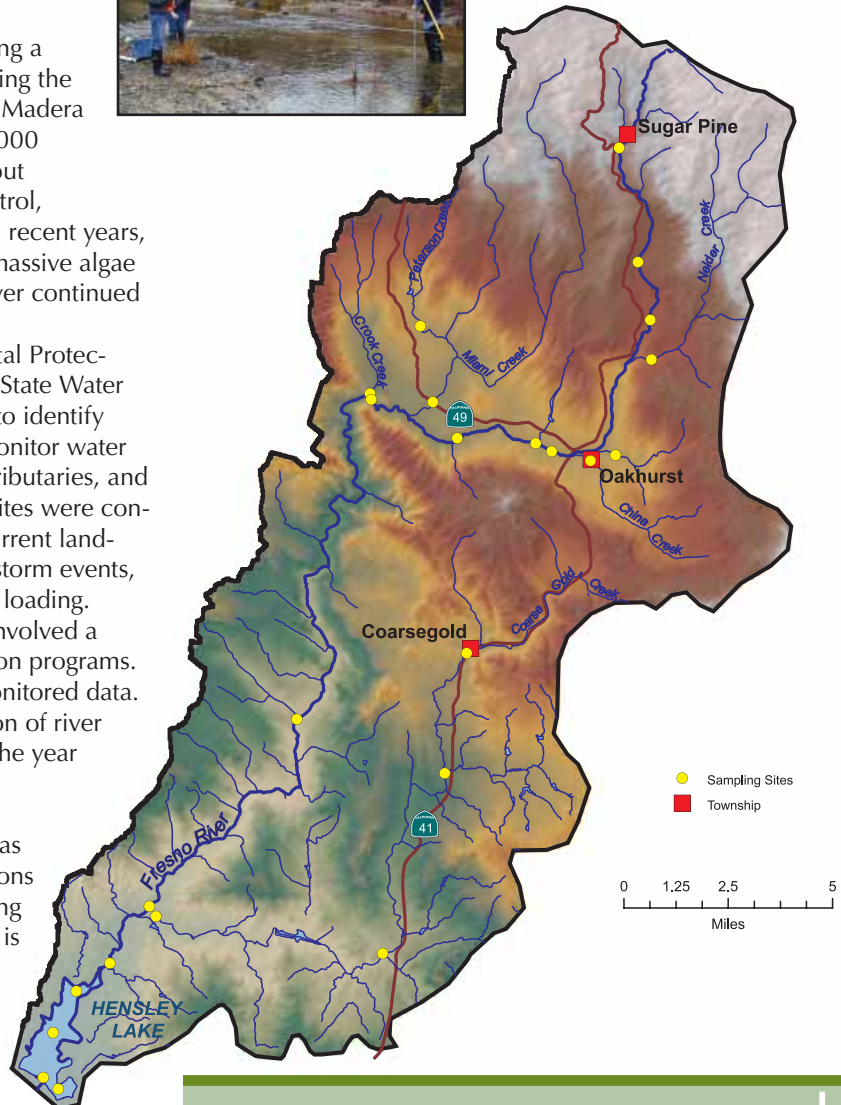
These results are being used to recommend restoration measures by land managers (county, state, federal) and property owners throughout the drainage area. While this watershed, like many others in the foothills of the Sierra Nevada, will never be restored to pristine conditions, efforts such as water conservation, land use and waste management, will hopefully restore the water quality condition to be above the critical levels designed for recreation and other beneficial uses.

MORE INFORMATION:

Zhi Wang, Ph.D., Department of Earth and Environmental Sciences, California State University, Fresno, zwang@csufresno.edu



Fresno River and Hensley Lake Water Quality Monitoring Project



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