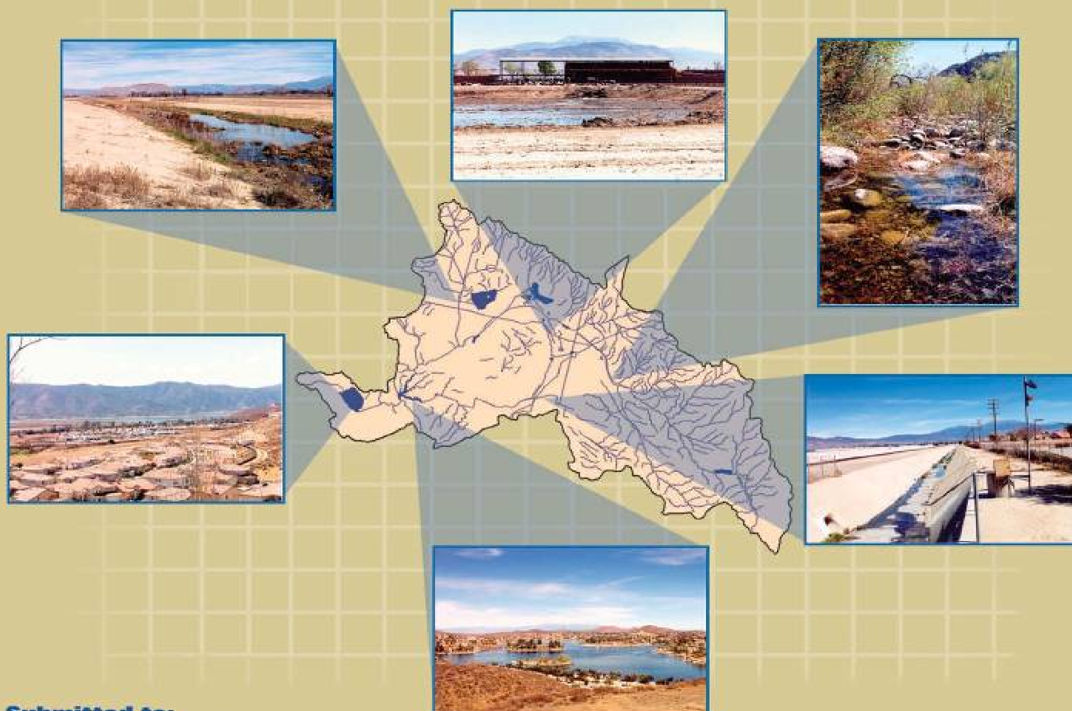
Lake Elsinore and Canyon Lake Nutrient Source Assessment

FINAL REPORT



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The objective of this project was to assess nutrient loadings contributed to Lake Elsinore and Canyon Lake by the San Jacinto River Basin, which encompasses a 770-square-mile area extending from the San Jacinto Mountains to Elsinore Valley. Both Lake Elsinore and Canyon Lake were included by the Santa Ana Regional Water Quality Control Board (RWQCB) on the 1998 Clean Water Act Section 303(d) list as impaired waterbodies for nutrients, unknown toxicity, low dissolved oxygen, turbidity, and pathogens. To support the assessment effort and the RWQCB's Total Maximum Daily Load (TMDL) development effort, a comprehensive modeling system of the San Jacinto River watershed was developed. The model provides a framework for nutrient source assessment through representation of contributing landuses in a subwatershed network and subsequent determination of required nutrient load reductions and allocations to meet TMDL objectives. In addition, the modeling system will provide guidance on and facilitate testing of alternative management scenarios for design of a watershed management plan to achieve water quality objectives and goals.

The San Jacinto River Basin is composed primarily of shrublands in the headwaters, while downstream portions consist of an urban and agricultural mix. Land around both Canyon Lake and Lake Elsinore is highly urbanized. Key nutrient sources throughout the watershed include dairy farm runoff, runoff from cropland and pasture, urban area runoff, contributions from septic systems, and background/non-anthropogenic loads. Due to the ephemeral nature of the San Jacinto River system, the location of key sources plays a critical role in ultimate nutrient contributions to the lakes. Urban development and agricultural land practices in the lower portion of the San Jacinto River watershed below Mystic Lake (including Perris Valley and Salt Creek) have the greatest impact on water quality in Canyon Lake, especially under average rainfall conditions. However, during periods of torrential rains and extended periods of rainfall, the storage capacity of Mystic Lake is exceeded and surface flow from the headwaters, including shrubland, urban runoff from the City of Hemet, and agricultural runoff upstream of Mystic Lake, reaches Canyon Lake and sometimes overflows into Lake Elsinore. Other than overflows of the Canyon Lake dam during extreme rain events, pollutant loads to Lake Elsinore are dominated by nonpoint sources downstream of Canyon Lake.

The modeling system was designed to represent all known sources in the watershed and to provide a quantitative tool for predicting nutrient load contributions to Canyon Lake and Lake Elsinore. It is composed of two linked models developed in parallel: a watershed model of the entire basin and a receiving waterbody model of Canyon Lake. U.S. EPA's Loading Simulation Program C++ (LSPC) was selected as the watershed model platform, and it simulates all nonpoint sources in the watershed and routes flow and water quality through stream networks to Canyon Lake and Lake Elsinore. U.S. EPA's Environmental Fluid Dynamics Code (EFDC) was selected as the basis for the Canyon Lake model. EFDC simulates hydrodynamics and simplified nutrient processes in the lake to predict overflows to Lake Elsinore and corresponding nutrient contributions.