SWAMP
Surface Water
Ambient Monitoring
Program

NAPA RIVER AND SONOMA CREEK NUTRIENT AND ALGAE STUDY 2011-2012

What is it?

This study was designed to examine the aquatic and riparian conditions of the mainstem Napa River and Sonoma Creek, and their tributaries, over a period of two years. The Napa River and Sonoma Creek watersheds encompass nearly 600 square miles in the northern San Francisco Bay Area. The watersheds have a Mediterranean climate with most rainfall occurring in the cooler winter months, resulting in naturally lower flows and warmer temperatures in the summer. Dominant land uses are forests, grasslands, agriculture (predominately vineyards), and pockets of urban areas.

The purpose of this study was to:

- **confirm** if nutrient, algae, and dissolved oxygen water quality objectives are currently being met and if aquatic life and recreational beneficial uses are supported;
- **identify** potential water quality targets for nutrients as part of the Napa River and Sonoma Creek Nutrient Total Maximum Daily Loads (TMDLs);
- **test** the applicability of the Water Board's Ecoregion 6 Nutrient Numeric Endpoints model.

Regional SWAMP staff collected 35 algae bioassessment samples spatially distributed throughout both watersheds between 2011 and 2012. Sampling occurred in the late summer (August – September) to capture maximum annual algae growth. Particular analytes included water chemistry parameters (e.g., nitrogen and phosphorous), in-stream and riparian physical habitat conditions (e.g., canopy cover, water temperature, and stream flow), and benthic algae levels (e.g., Chlorophyll-a, ash-free dry mass, and percent cover). Because algae blooms can lower nighttime oxygen levels, we deployed continuous monitoring equipment to measure dissolved oxygen at approximately 5 sites each year.

Why is it important?

In 1988, Sonoma Creek and Napa River were placed on the US Environmental Protection Agency (EPA) 303(d) list of impaired water bodies for nutrients due to eutrophic conditions, which were identified by large algae (periphyton) blooms. Excessive amounts of algae growth impair beneficial uses such as water contact recreation (REC1) and noncontact water recreation (REC2), as well as cold (COLD) and warm (WARM) freshwater habitat. Eutrophic conditions can also reduce dissolved oxygen concentrations, which can result in fish kills.

Left photo: high attached algae levels in an area of the Napa River with an open canopy and warm, shallow waters. *Right photo:* typical algae levels in an area of the Napa River with moderate canopy cover, deeper waters, and high in-stream habitat complexity.

The Napa and Sonoma stream networks are vital habitats for salmonids in the Bay Area. For example, the EPA and the San Francisco Bay Regional Water Quality Control Board determined that the Napa watershed was a high-priority region for water quality control projects in addition to stream and riparian habitat restoration activities. Sonoma Creek and Napa River support viable runs of protected fish species such as steelhead trout (*Oncorhynchus mykiss*) and Chinook salmon (*Oncorhynchus tshawytscha*). These streams also support commercial and sport fishing, while both surface and groundwater resources support municipal and agricultural beneficial uses; thus, clean water is of economic importance as well.

This monitoring project will benefit the public by providing information regarding ways to reduce nuisance algae, which has created undesirable conditions for swimming, fishing, and stream recreation. If eutrophic conditions are observed, information from this study will provide a basis for identifying nutrient concentrations that can be interpreted using the nutrient numeric endpoint model to prevent conditions that lead to algae blooms.

How will this information be used?

Information collected during this study will be used to determine if Sonoma Creek and Napa River are currently impaired for nutrients. If conditions have improved since 1988 due to successful implementation of permits, waste discharge requirements, conditional waivers of waste discharge requirements, and restoration projects, these data could result in de-listing one or both waterbodies; however, if the water quality is poor and the beneficial uses are still impaired, the Clean Water Act requires the Water Board to develop TMDLs to reduce pollutant inputs so that federal and state water quality criteria and objectives are met. Under that example, these data would be used to help develop the TMDL and associated implementation plan. Furthermore, lessons learned from this study may help interpret nutrient problems and provide feedback to the nutrient numeric endpoint process.

For more information, visit the San Francisco Bay Regional Water Quality Control Board website.