



NONPOINT SOURCE SUCCESS STORY

California

Implementing Agricultural Best Management Practices Reduces Nutrients in 23 miles of Sonoma Creek

Waterbody Improved

Nonpoint source-related nutrient loading from onsite wastewater treatment systems and agricultural lands contributed to high nutrient levels in Sonoma Creek. As a result of these conditions, the main stem of Sonoma Creek was added to the state's 1986 Clean Water Act (CWA) section 303(d) list due to excess nitrates and phosphorus nutrients. Since that time, landowners, local watershed organizations and many federal, state and local government agencies have collaborated to implement nonpoint and point source control measures to reduce nutrient loading to the creek. Due to these efforts, nutrient levels have decreased, and the non-tidal portion (23 miles) of Sonoma Creek has been recommended by the Regional Water Quality Control Board 2 (RWQCB-2) for removal from the 2016 CWA section 303(d) list.

Problem

The Sonoma Creek watershed is in the California Coast Ranges north of San Pablo Bay and San Francisco Bay, and covers an area of approximately 165 square miles (Figure 1). The creek flows approximately 30 miles in a southeasterly direction through the Sonoma Valley before discharging to San Pablo Bay. The watershed provides habitat for several native threatened or endanger species of concern, including steelhead trout, Chinook salmon, and California freshwater shrimp.

Historical sources of nutrients dating back to the 1970s in the watershed included cattle grazing (probably with direct access to streams and tributaries), dairies and confined animal feeding operations, and rudimentary public wastewater treatment. In 1986 the creek was identified on California's CWA section 303(d) list as impaired by nutrients resulting in eutrophication. Excessive levels of nutrients can alter dissolved oxygen levels and pH, and impact beneficial uses including cold freshwater habitat, warm freshwater habitat, agricultural supply, municipal and domestic supply, water contact recreation and noncontact water recreation.

Sonoma Creek was also listed as impaired by pathogens and sediment in 1998. RWQCB-2 developed total maximum daily loads (TMDLs) for these parameters (pathogens in 2008 and sediment in 2010). Although the mechanisms by which nutrients, pathogens and sediment are transported differ, they share some common sources. Therefore, implementing the two TMDLs was expected to help reduce nutrient loadings concurrently.

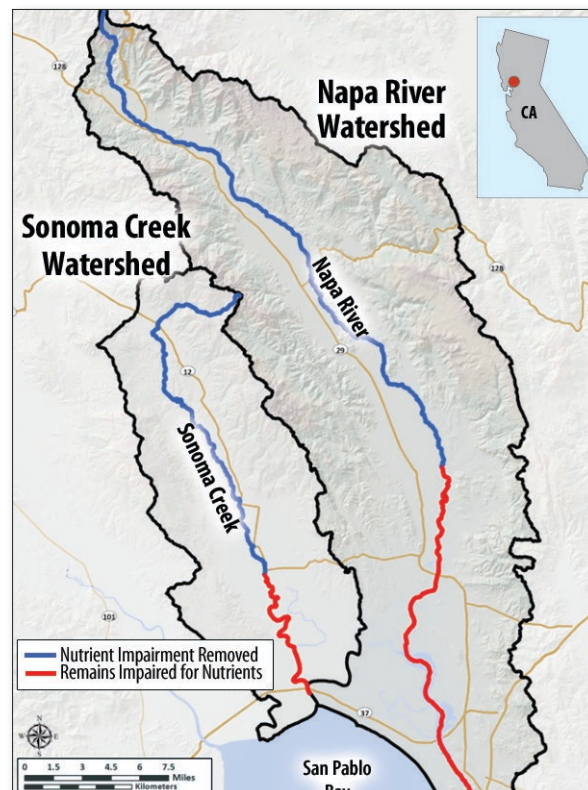


Figure 1. The Sonoma Creek and Napa River watersheds are on the California coast. California will recommend removal of the nutrient impairment from the 23-mile-long non-tidal portion of Sonoma Creek from its list of impaired waters in the upcoming cycle.

Project Highlights

Major actions that contributed to reductions in nutrient loading to the creek since the 1986 listing have included National Pollutant Discharge Elimination System (NPDES) permit restrictions on wastewater discharges, changes in land use, and the implementation of improved dairy, cattle grazing and agricultural best management practices (BMPs). Some specific practices include:

- Prohibitions on the discharge from municipal wastewater treatment during the “dry season,” when the minimum 10:1 creek water to discharge dilution ratio could not be achieved as dictated by the 1982 Basin Plan.
- Implementation of RWQCB-2 pathogen and sediment TMDLs for the Sonoma Creek watershed, which serve the dual purpose of reducing nutrient loading.
- Issuance of the 2003 general Waste Discharge Requirements (WDRs) (currently under revision).
- Issuance of the 2011 waiver of WDRs for grazing operations in the watershed.
- Renewal of conditional waivers of WDRs for existing dairies in 2015.
- Shifts in agricultural practices, including reductions in the amount of land available for grazing and the number of confined animal facilities.

In addition, RWQCB-2 is developing permits and regulations to ensure that confined animal facilities and vineyards in the watershed do not cause future nutrient impairments.

Results

As a result of the above restoration work, data collected between 2002 and 2012 show that nutrient-related numeric and narrative Water Quality Objectives are being met, and that impacted beneficial uses are supported in this waterbody. The eight lines of evidence did not show exceedances beyond what is allowed in the Water Quality Control Policy for Developing California’s Clean Water Act Section 303(d) List (Table 1). On the basis of these data, it is anticipated that the State Board will recommend removal of the non-tidal portion (23 miles) of the creek from the state’s list of impaired waters for nutrients in the next listing cycle. The original 30-mile-long segment is being split into two segments: a 23-mile-long non-tidal segment and a 7-mile-long tidally influenced segment.

Partners and Funding

Overall, increased water quality regulation, controls on municipal wastewater discharges, changes in land use and implementation of BMPs have contributed to reductions in nutrient inputs and improvement in water quality. Guidance provided by the U.S. Department of Agriculture National Resources Conservation Service and by local resource conservation districts has led to the use of improved agricultural BMPs for grazing animals and confined animal facilities.

To date, California has invested at least \$950,391 of CWA section 319(h) funds in a total of five projects to support watershed coordination and agricultural BMPs in the watershed. California Nonpoint Source Program San Francisco Regional Board staff members responsible for program implementation were also supported with CWA section 319 grant funding.

Table 1. Sonoma Creek, Summary of Line of Evidence and Exceedances of Evaluation Guidelines

Line of Evidence	Analyte	Numeric Evaluation Guideline ¹	Number of Exceedances Per Total Samples	Evaluation Metric ²
1	Benthic biomass chlorophyll <i>a</i>	< 150 mg/m ²	1 of 18	Evaluation Guideline (a)
2	Percent macroalgae cover	30%	0 of 18	Evaluation Guideline (a)
4	Water column chlorophyll <i>a</i>	15 µg/L	0 of 25	Evaluation Guideline (a)
5	Nitrate + Nitrite	10 mg/L	0 of 86	Water Quality Objective (b)
6	Ammonia, un-ionized	0.025 mg/L	0 of 6	Water Quality Objective (b)
7	Ammonia, total	0.1–2.8 mg/L	0 of 86	U.S. EPA Criterion (b)
8	pH	6.5–8.5 units	0 of 27	Water Quality Objective (b)

Notes:

¹ mg/m² = milligrams per square meter; µg/L = micrograms per liter; mg/L = milligrams per liter

² (a) = Listing Factor 4.11, weight of evidence (b) = Listing Factor 4.1, toxicant

(Listing Factor Source: http://www.waterboards.ca.gov/water_issues/programs/tmdl/docs/ffed_303d_listingpolicy093004.pdf)



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