

I. TITLE

Addressing DO impairments to restore cold freshwater habitat in Chorro Creek.

II. WATERBODY IMPROVED

Chorro Creek is a tributary to Morro Bay (Figure 1). Chorro Creek watershed drains into the Morro Bay Estuary ([an estuary of national significance](#)) and is located in northern San Luis Obispo County, north-west of the City of San Luis Obispo (Assembly District 33 and Senate District 15).



Figure 1. Chorro Creek is a Critical Coastal Area (CCA) along the Central Coast of California, for more visit http://www.coastal.ca.gov/nps/Web/cca_morro.htm

Nutrients (nitrates and phosphates) and sunlight mix in Chorro Creek to contribute to the growth of nuisance algae which decreases dissolved oxygen levels. Sources of nutrients include septic systems, fertilizers, urban runoff and animal waste. Since 1993, public and private land owners implemented a variety of water quality restoration efforts to reduce nutrient loading into Chorro Creek, such as a wastewater treatment plant upgrade, wetland and stream channel restoration, removal of livestock grazing from riparian areas, and erosion control. Shading of Chorro Creek was increased due to riparian vegetation re-establishment. Collectively, these efforts have restored cold freshwater habitat necessary to promote healthy steelhead populations.

III. PROBLEM

Chorro Creek watershed is approximately 27,670 acres (Figure 2). The majority of the lower watershed is comprised of valley grassland, coastal scrub, and oak savanna. The upper elevations of the watershed are comprised of mixed conifer forest, oak woodlands, and agriculture, with some low-density residential and commercial areas.

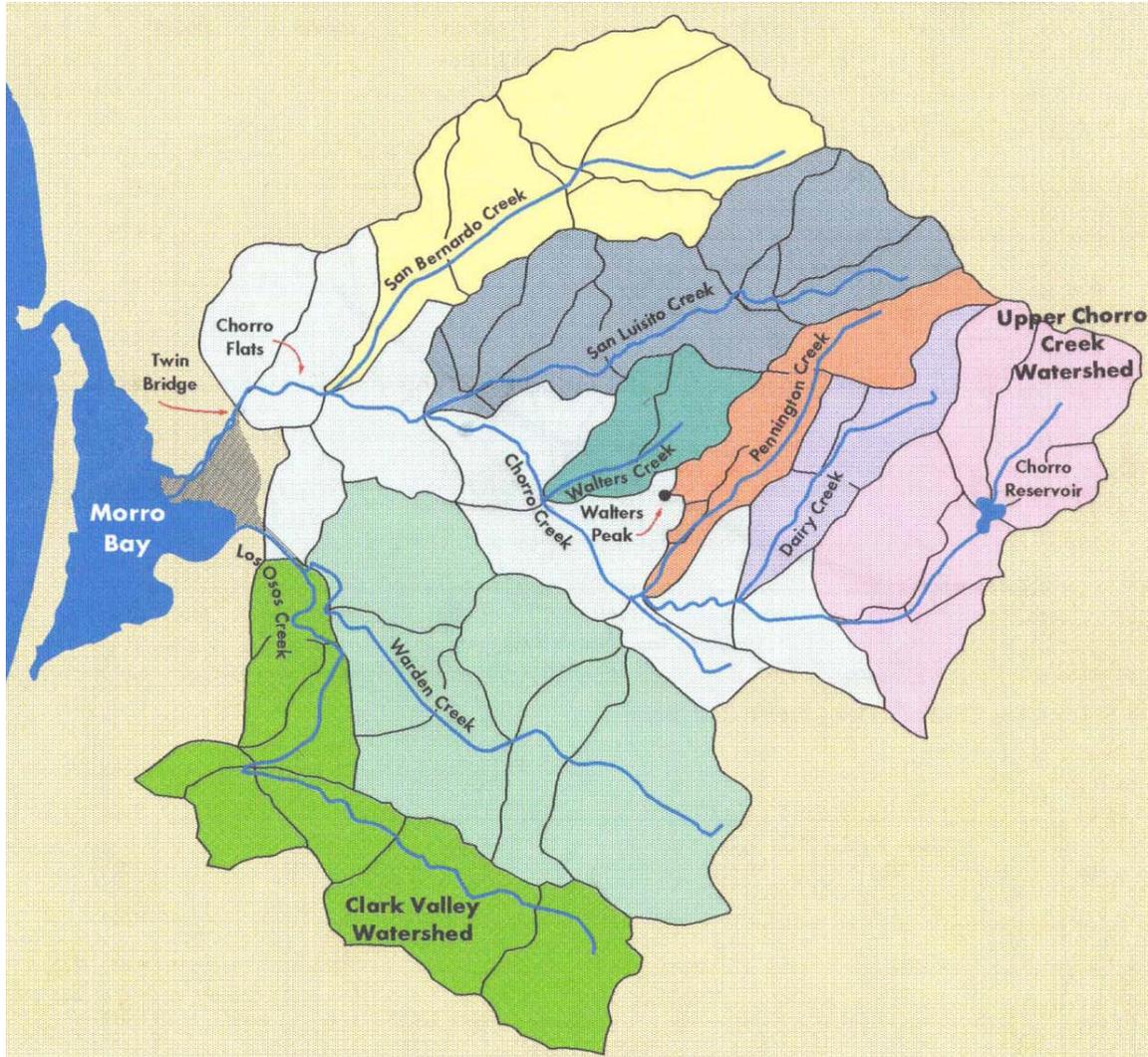


Figure 2. Subwatersheds of Morro Bay (TetraTech, 1998)

Chorro Creek is on the 2006 Clean Water Act (CWA) section 303(d)-list for both nutrients and dissolved oxygen. Dissolved oxygen concentrations in the lower reaches of Chorro Creek are not within the range protective of cold freshwater habitat (COLD), as described in the Central Coast Regional Water Quality Control Plan. The [Chorro Creek Nutrients and Dissolved Oxygen Total Maximum Daily Load and Implementation Plan \(TMDL\)](#) was approved July 19, 2007 by USEPA. The numeric target used to protect the COLD beneficial use is a concentration of 7.0 ppm or more of dissolved oxygen. Various factors influence dissolved oxygen levels in Chorro Creek, they include: respiration of benthic algae, lack of turbulent flow, loading of salts, and increase in water temperature.

IV. PROJECTS HIGHLIGHTS

Since 1993, public and private land owners have implemented a variety of protection efforts to improve water quality and associated beneficial uses. Although difficult to fully assess, it is estimated that between 40 to 60 percent of managed public and private lands in the Chorro Creek watershed have implemented appropriate management practices. Some key projects include:

- Chumash and Walters Creeks (tributaries to Chorro Creek) were used in a comparison study to evaluate and demonstrate improvements to water quality resulting from the implementation of erosion control management practices.
- Exclusion of cattle from the riparian corridor adjacent to upper Chorro Creek and Dairy Creek.
- Maino Ranch switched from conventional (i.e. free roaming) grazing to intensive rotational grazing with off-channel watering facilities.
- The Coastal San Luis Resource Conservation District worked with property owners, and local and state agencies to provide technical assistance and oversee the restoration of Chorro Flats floodplain. The Chorro Flats floodplain restoration project was designed to re-establish riparian habitat and trap sediment upstream of Morro Bay. Approximately 100-acres of agricultural land were converted to a floodplain by realigning Chorro Creek channel (i.e. removing levees and planting appropriate native riparian vegetation to trap sediments). Approximately 67 acres of riparian and wetland habitat were restored.
- Replacement of an aging wastewater treatment plant.

Actions implemented in the Chorro Creek watershed are consistent with the [Comprehensive Conservation and Management Plan \(CCMP\) for Morro Bay](#). The CCMP is a state and federally approved plan that guides the work for the Morro Bay National Estuary Program (MBNEP).

V. RESULTS

The basis of the original dissolved oxygen listing, was that five (5) out of ten (10) samples were below the water quality objective of 7.0 ppm dissolved oxygen. Since the original listing, more than one hundred additional samples have been collected and analyzed by the [Central Coast Ambient Monitoring Program](#) (CCAMP). These data conclude that nine (9) of the 111 samples did not meet the dissolved oxygen water quality objective for the COLD beneficial use (i.e. were below 7.0 ppm). Independent of the CCAMP effort, MBNEP has collected and analyzed 67 different samples (Figure 3). Similar to the CCAMP data, MBNEP data shows that since 2002, only two (2) of 67 samples did not meet the dissolved oxygen water quality objective for the COLD beneficial use. In conclusion, these data meet the COLD beneficial use water quality objective and are sufficient justification to remove the dissolved oxygen CWA section 303(d) listing for Chorro Creek. However, Chorro Creek is still impaired by nutrients, and therefore is only partially restored.

VI. PARTNERS and FUNDING

Partners involved in the protection and enhancement of the Chorro Creek watershed include the Natural Resources Conservation Service, Coastal San Luis Resource Conservation District, California Coastal Conservancy, MBNEP, Farm Bureau, Bay Foundation of Morro Bay, Friends of the Estuary, San Luis Obispo County, California

Men's Colony Water Treatment Plant, Camp San Luis Obispo, United States Environmental Protection Agency, Central Coast Regional Water Quality Control Board, State Water Resources Control Board, and numerous private land owners.

Over the last 15 years approximately \$7,500,000 to \$15,000,000 dollars (local, state, and federal dollars) have been spent in the Chorro Creek watershed. CWA section 319(h) dollars dedicated to various projects is approximately \$4,000,000 dollars. The money has been distributed as follows:

- Planning = \$300,000
- Monitoring = \$1,000,000
- Implementation = \$2,700,000

Additionally, from 1990 to 2002, CWA section 319(h) dollars have funded one half-time position at the Central Coast Regional Board. Staff time was spent on the Chumash and Walters Paired Watershed Study, and the Chorro Flats floodplain and riparian corridor restoration project.

PHOTOS

Photos from the Chorro Flats floodplain and riparian corridor restoration project, courtesy of Phillip Williams & Associates, LTD, see the project website at http://www.pwa-ltd.com/projects/pr_res_chorro_flats.html.



Photo 1. Pre-Project



Chorro Creek, Nov. 1991 following implementation: Channel restored to original location
Photo 2. After project implementation.



Photo 3. Riparian vegetation has been re-established.

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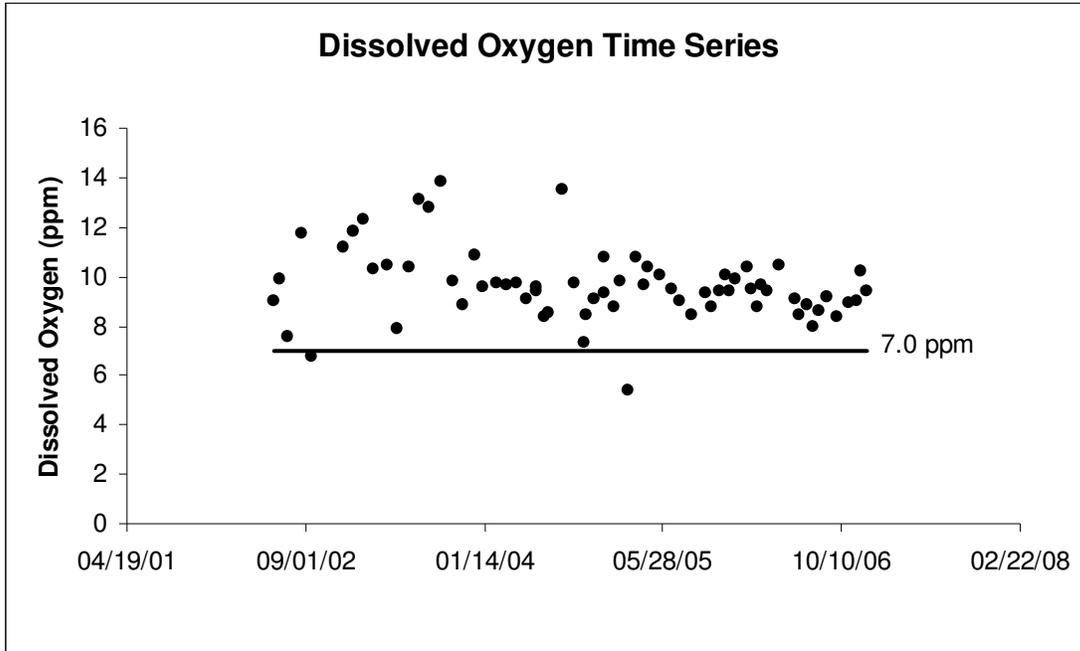


Figure 3. Dissolved Oxygen Time Series, samples collected and analyzed by Morro Bay National Estuary Program

CONTACT INFORMATION:

Howard Kolb
Water Resources Control Engineer
895 Aerovista Place, Suite 101
San Luis Obispo, CA 93401-7906
Office Phone 805-549-3332
Office Fax 805-788-3545
Email Hkolb@waterboards.ca.gov

Reference:

Tetra Tech, Inc. 1998. *Morro Bay Estuary Program Sediment Loading Study.*