Section 319
NONPOINT SOURCE PROGRAM SUCCESS STORY
California

Watershed Restoration Efforts Improve Dissolved Oxygen Levels

Waterbody Improved

Excess nutrients from urban and agricultural runoff in the Chorro Creek watershed contributed to the growth of nuisance algae. The breakdown of the algae caused dissolved oxygen levels in Chorro Creek to decline, preventing the creek from supporting its cold freshwater habitat designated use. As a result, California's Central Coast Regional Water Quality Control Board (CCRWQCB) added 14 miles of Chorro Creek to California's 1998 Clean Water Act (CWA) section 303(d) list of impaired waters for dissolved oxygen. Public and private landowners implemented a variety of water quality restoration efforts to reduce nutrients, including upgrading a wastewater treatment plant, restoring wetlands and stream channels, removing livestock grazing from riparian areas, and controlling erosion. Water quality improved, and the CCRWQCB has proposed removal of Chorro Creek from the state's 2008 CWA section 303 (d) list of impaired waters for dissolved oxygen.

Problem

Chorro Creek drains into the Morro Bay Estuary (an estuary of national significance) and is on central California's coast in northern San Luis Obispo County, northwest of the city of San Luis Obispo. Chorro Creek is designated as a critical coastal area along the central coast of California: for more information, see www.coastal.ca.gov/nps/Web/cca _ morro.htm.

Nutrients (nitrogen and phosphorus) and elevated temperatures in Chorro Creek fuel the growth of nuisance algae, which decrease dissolved oxygen levels. Sources of nutrients in the creek include land-based nonpoint source runoff, point source discharge and animal waste. The 27,670-acre Chorro Creek watershed is composed mostly of valley grassland, coastal scrub and oak savanna, along with mixed conifer forest and oak woodlands in the upper elevations (Figure 1). The watershed supports agricultural uses, with some low-density residential and commercial areas.

The CCRWQCB first added Chorro Creek to the CWA section 303(d) list in 1998 and identified it as being impaired by nutrients. In 2004/2006 the CCRWQCB also listed Chorro Creek as impaired because of low dissolved oxygen levels. Data show that the water quality objective for the cold freshwater habitat designated use was not being met. The numeric target used to protect the cold freshwater habitat designated use is a minimum concentration of at least 7.0 parts per million (ppm) of dissolved oxygen. This concentration is thought to be adequate to protect the creek's steelhead trout populations.

Figure 1. This fencing and revegetation project occurred along a tributary in Chorro Creek's valley grassland area.

Chorro Creek stakeholders have a long history of actively addressing water quality and ecosystem health in Chorro Creek. The stakeholders' coordinated efforts to monitor and restore the waterway prompted the CCRWQCB and other agencies and organizations to nominate the watershed for the National Estuary Program.

The U.S. Environmental Protection Agency approved the Chorro Creek Nutrients and Dissolved Oxygen TMDL and Implementation Plan on July 19, 2007. The TMDL identifies the main factors influencing dissolved oxygen levels in Chorro Creek as respiration of benthic algae, lack of turbulent flow, loading of nutrients and increases in water temperature.

Project Highlights

Efforts to restore and monitor Chorro Creek have been ongoing since the early 1990s. An estimated 40 to 60 percent of managed public and private lands in the watershed are now operated with water quality management practices in place. Key projects include restoring Chorro Flats floodplain, which is designed to reestablish riparian habitat and trap sediment upstream of Morro Bay. In this project, partners converted approximately 100 acres of agricultural land to a floodplain by realigning the Chorro Creek channel (i.e., removing levees and planting appropriate native riparian vegetation to trap sediments). The project restored approximately 67 acres of riparian and wetland habitat (Figures 2 and 3).

Figure 2. A view of the Chorro Flats floodplain before the restoration.

Figure 3. After restoration, Chorro Flats' channel sinuosity and riparian vegetation has been reestablished. For additional photos, see www.pwa-ltd.com/projects/pr _ res _ chorro _ flats.html.

Other projects included switching from conventional (i.e., free roaming) grazing to intensive rotational grazing with offchannel watering facilities; excluding cattle from the riparian corridor adjacent to upper Chorro Creek and Dairy Creek; and replacing an aging wastewater treatment plant at the California Men's Colony Prison (Figure 4). In addition, the CCRWQCB and the California State Polytechnic University implemented a study comparing Chumash and Walters creeks (tributaries to Chorro Creek) to evaluate and demonstrate how erosion control practices can improve water quality.

Figure 4. Building this new wastewater treatment plant helped remove point source discharges from Chorro Creek.

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

Results

California's Central Coast Ambient Monitoring Program and MBNEP have collected and analyzed water quality samples in Chorro Creek. Data collected since 2002 show that water quality has improved. Dissolved oxygen levels have stabilized above 7.0 ppm and now consistently support the creek's cold freshwater habitat designated use.

On the basis of these data, the CCRWQCB proposed to remove 14 miles of Chorro Creek from California's 2008 CWA section 303(d) list for its dissolved oxygen impairment. While data demonstrate that restoration efforts have restored dissolved oxygen levels, stakeholders will continue to implement practices to address the remaining nutrient impairment.

Partners and Funding

Partners involved in protecting and enhancing 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, San Luis Obispo County, California Men's Colony Prison Water Treatment Plant, Camp San Luis Obispo, U.S. Environmental Protection Agency, CCRWQCB, California State Water Resources Control Board and numerous private landowners.

Over the past 15 years, stakeholders have spent more than $10 million (local, state and federal dollars) to restore the Chorro Creek watershed. Approximately $4 million in CWA section 319 funds have supported planning ($300,000), monitoring ($1 million) and implementation ($2.7 million) activities. Additionally, CWA section 319 funds supported one half-time CCRWQCB staff position to support the Chumash and Walters Paired Watershed Study and the Chorro Flats floodplain and riparian corridor restoration projects.

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For additional information contact:

Howard Kolb
Water Resources Control Engineer
Central Coast Regional Water Quality Control Board
805-549-3332 • Hkolb@waterboards.ca.gov

Katie McNeill
Central Coast Regional Water Quality Control Board
805-549-3147 • Kmcneill@waterboards.ca.gov