



NONPOINT SOURCE SUCCESS STORY

California

Watershed Restoration Reduces Selenium Levels in the Grasslands Watershed's Camp 13 and Agatha Canals

Waterbody Improved

The Grassland Marshes, within the 370,000-acre Grasslands Watershed on the west side of the San Joaquin River Basin, exceed selenium water quality objectives. With the start of the Grassland Bypass Project in 1996, all tile drainage from a 97,000-acre area known as the Grassland Drainage Project Area was consolidated and conveyed to the downstream end of the watershed through San Luis Drain to Mud Slough. Discharges of drainage water are diverted away from Camp 13 Canal and Agatha Canal, which are water supply channels that feed the Grassland Marshes. Since 2011, these canals have not exceeded selenium water quality objectives, building upon previously reported water quality improvements in Salt Slough downstream of the Grassland Marshes and in reaches of the San Joaquin River.

Problem

The Grassland Marshes are within the 370,000-acre Grasslands Watershed on the west side of the San Joaquin River Basin in central California (Figure 1). In 1988, as part of the water quality assessment and Clean Water Act (CWA) section 303(d) listing of impaired waters, 8,224 acres of marshes were identified as impaired for exceeding selenium water quality objectives. Selenium is a highly bioaccumulative trace element that, under certain conditions, can move through the food chain and cause acute and chronic toxicity to fish and wildlife. Until 1996, the wetland water supply conveyance channels received agricultural drainage water in addition to high-quality-wetland supply water. As a result, the supply channels periodically conveyed agricultural drainage that contained elevated concentrations of selenium to the Grasslands Marshes, Salt Slough and San Joaquin River. The largest source of selenium was agricultural subsurface tile drainage.

In 1996, the Central Valley Regional Water Quality Control Board (CV-RWQCB) re-evaluated the extent of selenium impairment, determining that the Grassland Marshes include approximately 75 miles of wetland water supply conveyance channels and 61,810 acres of wetland marshes. In 2000, the CV-RWQCB updated the Selenium Total Maximum Daily Load (TMDL) for Grassland Marshes to reflect the findings of this evaluation.

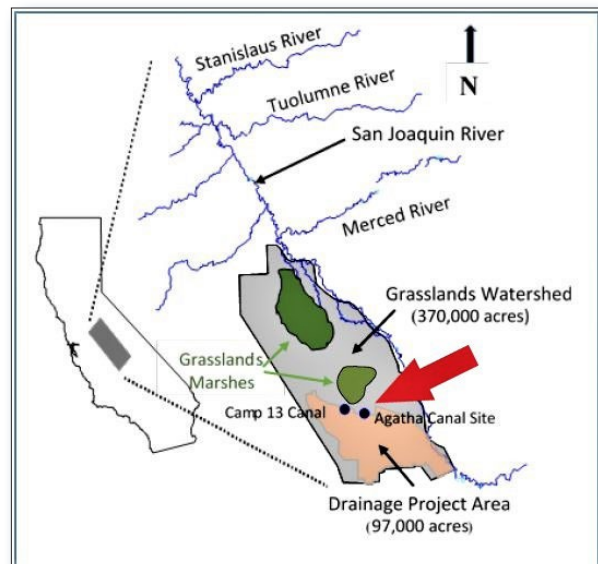


Figure 1. The Grassland Watershed is in central California.

Story Highlights

With the start of the Grassland Bypass Project in 1996, all tile drainage from a 97,000-acre area known as the Grassland Drainage Project Area is consolidated and conveyed to the downstream end of the watershed through San Luis Drain to Mud Slough. Discharges of drainage water are diverted away from Camp 13 Canal and Agatha Canal, which are water supply channels that feed the Grassland Marshes.

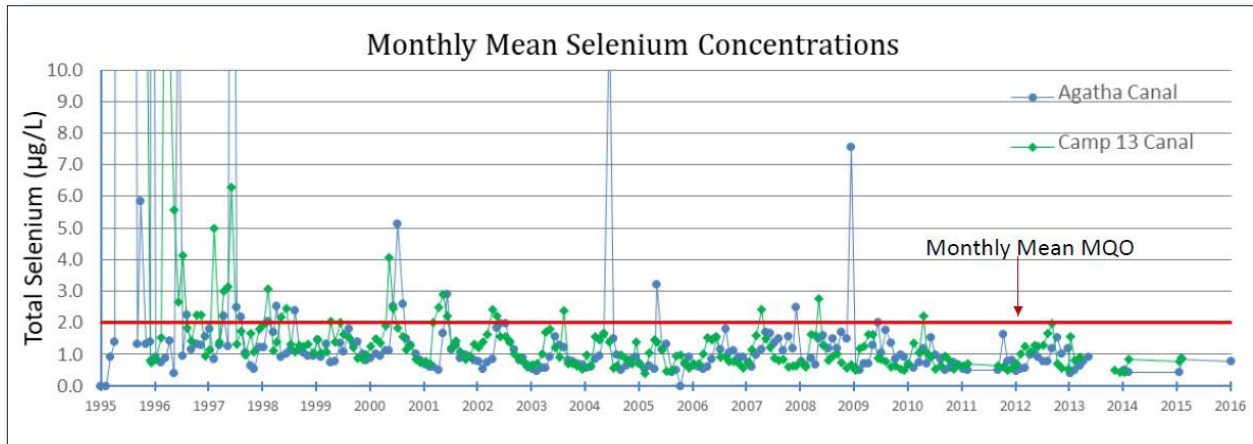


Figure 2. Selenium concentrations in the Camp 13 and Agatha canals meet the measurement quality objective.

Since the initiation of the Grassland Bypass Project, the selenium load discharged from the Drainage Project Area into the Grassland Marshes has been reduced 61 percent, leading to improved habitat for wildlife that use these sensitive resources. The Grassland Bypass Project is a multi-partner project leveraging the collective resources of the CV-RWQCB, California Department of Fish and Wildlife, San Francisco Estuary Institute, the U.S. Geological Survey, the U.S. Environmental Protection Agency, U.S. Bureau of Reclamation, and the San Luis & Delta-Mendota Water Authority. Water quality monitoring has demonstrated no selenium water quality standard exceedances since 2011.

The CV-RWQCB issued a Waste Discharge Requirement that specified the maximum monthly and annual loads of selenium that the project may discharge into Mud Slough and the San Joaquin River. In 2016, the CV-RWQCB issued waste discharge requirements for growers in the Grassland Drainage Area to regulate selenium discharges to groundwater.

Results

Beginning in 1996, the Grassland Bypass Project separated the Grassland Watershed wetland water supply conveyance channels from the largest selenium source: the 97,000-acre Drainage Project Area.

Diverting Drainage Project Area discharges away from the water supply channels that supply the Grassland Marshes has reduced the load of selenium discharged from the Grassland Drainage Project Area by 61 percent (from 9,600 pounds [lbs] to 3,700 lbs), and the load of salts has been reduced by 39 percent (from 187,300 tons to 113,600 tons).

The concentration-based TMDL (20 micrograms per liter [µg/L] maximum; 2 µg/L monthly mean) measured in wetland water supply conveyance channels has not been exceeded since February 2011 (Figure 2). Weekly selenium sampling at the Camp 13 Canal and Agatha Canal monitoring sites was required through 2015; currently, only storm event sampling is required.

Partners and Funding

The Grassland Bypass Project is operated by the U.S. Bureau of Reclamation and the San Luis & Delta-Mendota Water Authority. The San Francisco Estuary Institute monitors impacts of the use of a portion of the San Luis Drain for conveyance of agricultural discharges for the Grassland Bypass Project. Samples of the agricultural drainage water collected from the Grassland Bypass Project are sent to the California Department of Fish and Wildlife Office of Spill Prevention and Response laboratories to be analyzed for selenium concentration.



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