Water Quality Report Card

North San Francisco Bay Selenium TMDL

Regional Water Board:	**San Francisco Bay, Region 2**
Beneficial Uses Affected:	**EST, RARE, COMM**
Implemented Through:	NPDES Permits
Effective Date:	August 2016
Attainment Date:	ongoing
STATUS	**Conditions Improving**
Pollutant Type:	Point Source, Nonpoint Source, Legacy
Pollutant Source:	Wastewater discharges Naturally occurring

Water Quality Improvement Strategy

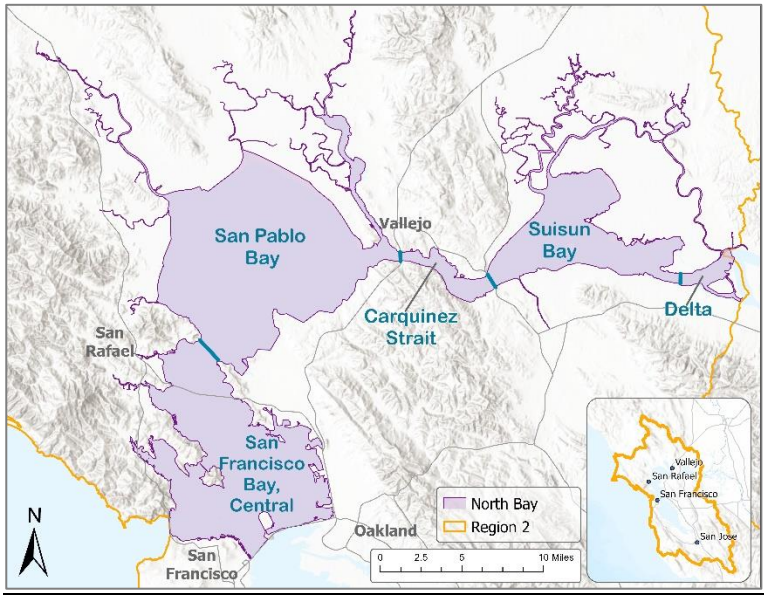
In 2016, the San Francisco Bay Regional Water Quality Control Board adopted a total maximum daily load (TMDL) for selenium in North San Francisco Bay. This area includes San Francisco Bay Central and San Pablo Bays; and extends eastward through Carquinez Strait to Suisun Bay, ending at the Delta. Selenium, an essential micronutrient at low concentrations, can cause reproductive impacts in fish at slightly higher levels. The primary source of selenium toxicity in fish is the consumption of the invasive clam, *Potamocorbula amurensis.* This clam's spread and efficient selenium uptake have led to accelerated bioaccumulation in fish that feed on clams, such as white sturgeon, a species particularly susceptible to selenium. The numeric targets for the TMDL are expressed as fish tissue concentrations, following the USEPA chronic criteria protective of sturgeon, and allowable water column concentrations derived from the fish tissue targets.

The largest sources of selenium loading to the North Bay are the Sacramento and San Joaquin Rivers (Central Valley watershed) and discharges from petroleum refineries. The TMDL caps selenium loads at current levels and does not call for load reductions. Instead, the implementation plan requires maintaining the current selenium load into the future with ongoing monitoring of selenium levels in fish, especially sturgeon. To ensure compliance with TMDL requirements, a comprehensive water and clam monitoring strategy was developed, along with non-lethal monitoring of muscle plugs from sturgeon. This strategy emphasizes detecting changes to enable prompt and effective preventive management actions.

TMDL Waste Load Allocations/Load Allocations

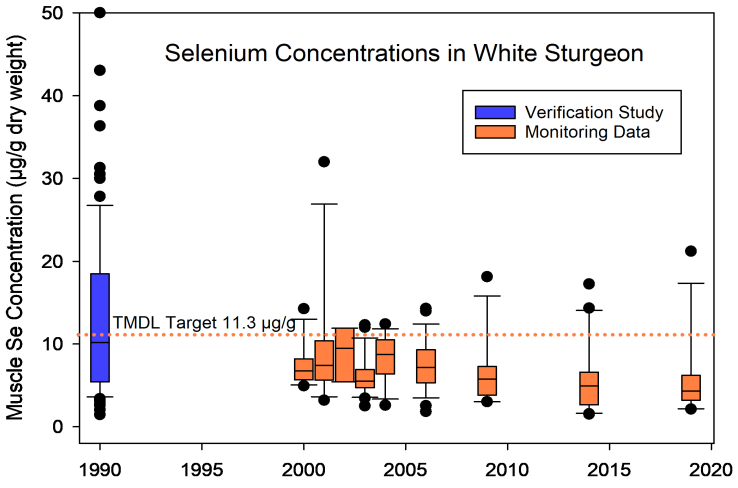
Source	Allocations (kg/year)
Central Valley	4,070
Local Creeks	520
Petroleum Refineries	570
Municipal/Industrial Wastewater	117
Atmospheric Deposition	30

North San Francisco Bay TMDL



Water Quality Outcomes

- *From the 1990's to present, selenium loads from petroleum refineries into North Bay were reduced from almost 2500 kg/yr to 570 kg/yr).*
- *Se concentrations in sturgeon remain largely below the TMDL target of 11.3 µg/g dw.*
- *Water column concentrations do not exceed 0.2 µg/L and are well below the TMDL target of 0.5 µg/L.*
- *Loads from San Joaquin River continue to decrease due to long-term efforts to divert and recycle selenium from agricultural drainage in Central Valley.*



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