Appendix M. Summary of Mercury TMDLs

Summaries of sources and allocations from California mercury Total Maximum Daily Loads included in Table M-1, grouped by Region. Available TMDL progress reports are included at the end.

Table M-1. Allocations and Implementation Plans for Mercury TMDLs

Source	Allocations	Implementation Plan
San Francisco Bay (San Francisco Bay Water Board, 2006)		
Bed erosion	220 kg Hg/yr (53% reduction)	None identified
Central Valley watershed	330 kg Hg/yr (24% reduction)	See Delta TMDL for details
Urban storm water	82 kg Hg/yr (48% reduction)	Monitor MeHg levels and implement source control under watershed permit for large MS4s
Guadalupe River watershed	2 kg Hg/yr (98% reduction)	See Guadalupe River TMDL for details
Atmospheric deposition	27 kg Hg/yr (current)	No mandated actions
Nonurban storm water	25 kg Hg/yr (current)	None identified
Municipal wastewater	11 kg Hg/yr (35% reduction)	Comply with watershed permit (e.g., implement source control and process optimization)
Industrial wastewater	1.3 kg Hg/yr (current)	Comply with watershed permit (e.g., implement source control and process optimization)
Other		Conduct studies to understand mercury bioavailability in dredged sediments; wetland restoration should be done to minimize methylmercury generation; public outreach regarding safe fish consumption.
Guadalupe River Watershed (San Francisco Bay Water Board, 2008a; 2014)		

Table M-1. Allocations and Implementation Plans for Mercury TMDLs

Source	Allocations	Implementation Plan
Mining waste	0.2 mg Hg/kg (dry wt., median) in erodible waste and erodible sediment from depositional areas in creeks that drain mercury mines	Identify potential for mining waste runoff and implement erosion controls
Impoundments	1.5 ng MeHg/L in the hypolimnion of impoundments downstream of mercury mines	Conduct studies on the suppression of mercury methylation in impoundments
Urban storm water	0.2 mg Hg/kg suspended sediment (dry wt., annual median)	Covered under San Francisco Bay watershed permit for MS4s
Nonurban storm water	0.1 mg Hg/kg suspended sediment (dry wt., annual median)	None
Atmospheric deposition	23.2 µg Hg/sm/yr	No mandated actions
Walker Creek (San Francisco Bay Water Board, 2008b)		
Background (areas not near Gambonini Mine)	0.2 mg Hg/kg (sediments)	None
Downstream depositional areas	0.5 mg Hg/kg in suspended particulates (d/s of creekside lands adjacent to Arroyo Sausal, Salmon and Walker creeks)	Dischargers under WDRs or waivers of WDRs to control pathogens, nutrients, or sediments or Section 401 projects must incorporate management practices or provisions that minimize Hg discharges and MeHg production. Comply with conditions of Marin County's Creek Permit Program Update Marin County's Creek Permit Guidance for Unincorporated Areas of Marin to include specific guidance for projects in areas that may contain Hg-enriched sediments

Table M-1. Allocations and Implementation Plans for Mercury TMDLs

Source	Allocations	Implementation Plan
Soulajule Reservoir	0.04 ng dissolved MeHg/L	Submit a monitoring and implementation plan and schedule to characterize fish tissue, water, and suspended sediment Hg concentrations, and develop and implement MeHg production controls necessary to achieve TMDL targets
Gambonini Mine	5 mg Hg/kg suspended sediments	Apply for coverage under the state's Industrial Storm water General Permit Submit to the Water Board for approval a SWPPP, implementation schedule, and monitoring plan
Clear Creek and Hernandez Reservoir (Central Coast Water Board, 2004)		
Clear Creek	236 g Hg/yr	Removal and/or entombment of mining wastes Capping of residual material with clean soil Revegetation of disturbed areas
Hernandez Reservoir	1015 g Hg/yr	Load reductions in Clear Creek are expected to reduce loads in Hernandez Reservoir to meet allocations

Table M-1. Allocations and Implementation Plans for Mercury TMDLs

Source	Allocations	Implementation Plan
Las Tablas Creek and Lake Nacimiento **(Central Coast Water Board, 2002)** (Postponed since Buena Vista mine became a superfund site.)		
General soils	7.67 kg Hg/yr (current loads)	None
Roads	0 kg Hg/yr (100% reduction)	San Luis Obispo County will pave road segment of Cypress Mountain road or will conduct equivalent actions to eliminate mercury runoff
Mines	4.52 kg Hg/yr (88.2% reduction)	Buena Vista Mine was added to National Priorities List. U.S. EPA planning to remediate.
El Dorado Park Lakes **(U.S. EPA, 2012)**		
Northern Lake System		
Supplemental Water Additions (ground water and potable water)	0.00962 kg Hg/yr (48% reduction)	To be determined
Runoff (nonpoint source)	0.0000057 kg Hg/yr (48% reduction)	To be determined
Parkland Irrigation	0.0000193 kg Hg/yr (48% reduction)	To be determined
Atmospheric deposition (to the lake surface)	0.00338 kg Hg/yr (48% reduction)	To be determined
Southern Lake System		
Supplemental Water Additions (ground water and potable water)	0.000368 kg Hg/yr (current)	To be determined
Runoff (nonpoint source)	0.00000199 kg Hg/yr (current)	To be determined

Table M-1. Allocations and Implementation Plans for Mercury TMDLs

Source	Allocations	Implementation Plan
Parkland Irrigation	0.0000458 kg Hg/yr (current)	To be determined
Atmospheric deposition (to the lake surface)	0.00112 kg Hg/yr (current)	To be determined

Table M-1. Allocations and Implementation Plans for Mercury TMDLs

Source	Allocations	Implementation Plan
Puddingstone Reservoir (U.S. EPA, 2012)		
Atmospheric deposition	0.0018 kg Hg/yr (47% reduction)	To be determined
Tributaries and storm drains	0.000976 kg Hg/yr (47% reduction)	To be determined
Irrigation of surrounding parklands	0.00243 kg Hg/yr (47% reduction)	To be determined
Storm water (MS4s, construction, industrial, Caltrans)	0.0166 kg Hg/yr (47% reduction)	To be determined
Lake Sherwood (U.S. EPA, 2012)		
Storm water (MS4s, Caltrans)	0.00979 kg Hg/yr (70% reduction)	To be determined
Runoff (nonpoint source)	0.00095 kg Hg/yr (70% reduction)	To be determined
Atmospheric deposition	0.00156 kg Hg/yr (70% reduction)	To be determined
Calleguas Creek/Mugu Lagoon (Los Angeles Water Board, 2007)		
Urban runoff	Suspended sediment Hg load that is dependent on flow through water body (80% reduction)	Best management practices by employed by municipal separate storm sewer systems (MS4s), Caltrans, general industrial and construction storm water permits, and Naval Air Weapons Station Point Mugu.

Table M-1. Allocations and Implementation Plans for Mercury TMDLs

Source	Allocations	Implementation Plan
Agricultural runoff, open space	Suspended sediment Hg load that is dependent on flow through water body (80% reduction)	Implemented through the State's Nonpoint Source Pollution Control Program (NPSPCP) and Conditional Waiver for Discharges from Irrigated Lands using studies and best management practices (BMPs) to control erosion and sediment discharges
POTW effluent	0.37 kg Hg/yr (current)	Limitations in permits
Consolidated Slip and Fish Harbor, Los Angeles-Long Beach Harbor (Los Angeles Water Board and U.S. EPA, 2011)		
Historically deposited pollutants in sediments, including military facilities, manufacturing, fish processing plants, wastewater treatment plants, oil production facilities, and shipbuilding or repair yards	0.15 mg Hg/kg dry sediment (86% reduction)	Remove the contaminated sediment in the harbor. Future action to be determined

Table M-1. Allocations and Implementation Plans for Mercury TMDLs

Source	Allocations	Implementation Plan
Cache Creek **(Central Valley Water Board, 2004a; 2005)**		
Mines	Bear Creek: 5% of existing Hg loads (Rathburn, Petray North and South, and Rathburn-Petray) Harley Gulch: 5% of existing Hg loads (Abbott and Turkey Run) Sulphur Creek: 30% of existing Hg loads (geothermal springs, soil erosion, mines, streambeds, and atmospheric deposition) Cache Creek at Yolo: 66 g MeHg/yr (46% reduction) Settling Basin: 34.7 g MeHg/yr (60% reduction) Bear Creek at gauge: 3.2 g MeHg/yr (85% reduction)	Public outreach regarding the levels of safe fish consumption and monitoring; Remediation of inactive mines; Control of erosion in mercury-enriched upland areas and in floodplains downstream of the mines and in the lower watershed; Conducting feasibility studies and evaluating possible remediation at the Harley Gulch delta; Identifying sites and projects to remediate or remove floodplain sediments containing mercury and implement feasible projects; Addressing methylmercury reductions through studies of sources and possible controls in Bear Creek and Anderson Marsh, controlling inputs from new impoundments, wetlands restoration projects, or geothermal spring development
Clear Lake **(Central Valley Water Board, 2002a; 2002b)**		
Atmospheric Deposition	2 kg Hg/yr (max load estimated)	None
Tributaries and Surface Water Runoff	90% of existing Hg input (about 16 kg Hg/yr)	Reduce transport of contaminated sediments from Oaks Arm into the rest of lake

Table M-1. Allocations and Implementation Plans for Mercury TMDLs

Source	Allocations	Implementation Plan
Sulphur Bank Mine	Active sediment Hg contribution reduced by 49% (about 340 kg Hg/yr)	Control and possible treatment of surface water runoff from mine; Control of groundwater flow into Clear Lake from mine; Capping of waste rock mine dam; Eliminating contributions to surficial sediment layer previously deposited due to mine related processes (e.g., dredge contaminated sediment, cap with clean sediments, or natural burial of contaminated sediments)
Sacramento-San Joaquin Delta **(Central Valley Water Board, 2010)**		
Tributaries (57%), Wetlands (19%), Open water sediment flux (17%), Municipal wastewater (4%), Ag return flows (2%), Atmospheric deposition (0.4%), Urban runoff (0.3 %)	Central Delta: 668 g/yr MeHg (current load) Marsh Creek: 1.6 g/yr MeHg (73% reduction) Mokelumne/Cosumnes Rivers: 53 g/yr MeHg (64% reduction) Sacramento River: 1,385 g/yr MeHg (44% reduction) San Joaquin River: 195 g/yr MeHg (63% reduction) West Delta: 330 g/yr MeHg (current load) Yolo Bypass: 235 g/yr MeHg (78% reduction)[1]	Special studies to reduce sediment bound mercury in wetlands, irrigated lands, open water, and reduce methylmercury generation, including in the Cache Creek Settling Basin. Best management practices (BMPs) to control erosion and sediment discharges; reductions from NPDES point sources and storm water. Future TMDLs for tributaries. Public outreach regarding safe fish consumption.
Rhine Channel, Newport Bay **(U.S. EPA Region 9, 2002; Anchor Environmental, 2005)**		
Storm water	0.0171 kg Hg/yr	None specified
Caltrans	0.0027 k Hg/yr	None specified

Table M-1. Allocations and Implementation Plans for Mercury TMDLs

Source	Allocations	Implementation Plan
Boatyards	0 kg Hg/yr	None specified
Other NPDES	0.0027 kg Hg/yr	None specified
Existing sediment	0.063 kg Hg/yr	Dredge sediment and dewater prior to transporting to an approved off-site upland disposal facility; or Dredge sediment and place within an off-site nearshore confined disposal facility; or Dredge sediment and dispose of within a confined aquatic disposal area excavated near channel mouth
Undefined sources	0.0045 kg Hg	None specified

Hg = Inorganic mercury

MeHg = Methylmercury

MS4 = Municipal Separate Storm Sewer System

TMDL = Total maximum daily load

WDR = Waste Discharge Requirements

1. Allocations by subarea of Delta, not by source.

M.1 TMDL Progress Reports

Progress reports were available for several of the TMDLs summarized in the previous table, and they are included in the following pages. These progress reports are available from the Water Boards website on performance reports:

www.waterboards.ca.gov/about_us/performance_report_1415/plan_assess/11112_tmdl_outcomes.shtml

Guadalupe River Watershed

www.waterboards.ca.gov/about_us/performance_report_1213/plan_assess/docs/fy1213/11112_r2_guadaluperiver_mercury.pdf

Walker Creek

www.waterboards.ca.gov/about_us/performance_report_1213/plan_assess/docs/fy1213/11112_r2_walkercreek_mercury.pdf

Clear Creek and Hernandez Reservoir

www.waterboards.ca.gov/about_us/performance_report_1213/plan_assess/docs/fy1213/11112_r3_clearcreek_mercury.pdf

Calleguas Creek/Mugu Lagoon

www.waterboards.ca.gov/about_us/performance_report_1213/plan_assess/docs/fy1213/11112_r4_calleguascreek_metals.pdf

Cache Creek

www.waterboards.ca.gov/about_us/performance_report_1213/plan_assess/docs/fy1213/11112_r5_cachecreek_mercury.pdf

Sacramento-San Joaquin Delta

www.waterboards.ca.gov/about_us/performance_report_1415/plan_assess/docs/fy1314/11112_r5_delta_mercury.pdf

Rhine Channel, Newport Bay

www.waterboards.ca.gov/about_us/performance_report_1213/plan_assess/docs/fy1213/11112_r8_rhinechannel_metals_organics.pdf

Total Maximum Daily Load Progress Report		Guadalupe River Watershed Mercury TMDL
Regional Water Board	**San Francisco Bay, Region 2**	
Beneficial uses affected:	REC-1, RARE, WILD	
Pollutant(s) addressed:	Mercury	
Implemented through:	CWC §13267, CWC §13304	
Approval date:	June 1, 2010	

STATUS

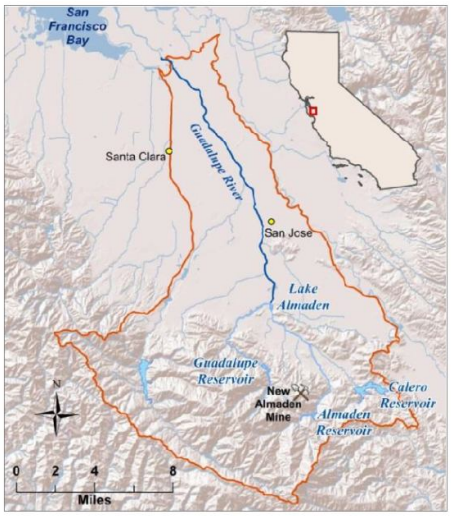
- ☐ Conditions Improving
- ☐ Data Inconclusive
- ☑ **Improvement Needed**
- ☐ TMDL Achieved/Water Body Delisted

TMDL Summary

Areas of the Guadalupe River Watershed downstream from the New Almaden Mine, the largest-producing mercury mine in North America, are impaired by mercury. Fish in these waters have extremely high mercury concentrations that greatly exceed the target set to protect human health. To address the high mercury levels the San Francisco Bay Regional Water Board developed the Guadalupe River Watershed Mercury TMDL, which was approved by the U.S. EPA in June 2010.

The TMDL established mercury load reductions from mine activities and aqueous methylmercury allocations for reservoirs and lakes to achieve fish tissue objectives. Phase I of TMDL implementation focused efforts at the top of the watershed; mercury mine site owners are taking actions to reduce discharges (typically involving stabilization of mercury mining wastes) and the local water district has pilot studies underway to reduce methylation of mercury in reservoirs. Phase II of TMDL implementation will address downstream areas. The TMDL calls for targets to be attained before 2029. As of September 2013, monitoring data collected by the responsible parties is thus far inconclusive regarding changes in mercury concentrations.

Guadalupe River Watershed



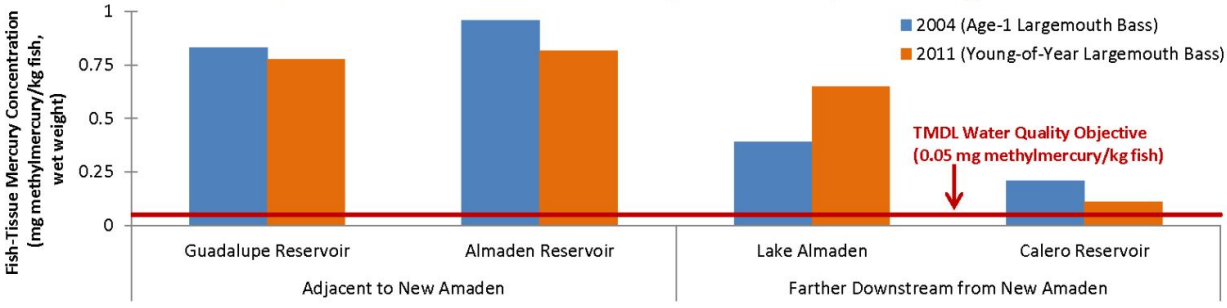
TMDL Water Quality Objectives

Fish Size	TMDL Fish-Tissue Water Quality Objectives
Whole fish, trophic level 3 5-15cm long	0.05 mg methylmercury/kg fish (wet weight, average)
Whole fish, trophic level 3 15-35 cm long	0.1 mg methylmercury/kg fish (wet weight, average)

Water Quality Outcomes

- *Implementation actions have yet to result in significant improvement in fish mercury concentrations.*
- *Water quality data show exceedances of TMDL water quality objectives; reservoirs adjacent to New Almaden Mine show highest fish-tissue mercury concentration levels.*
- *Responsible parties established a coordinated water quality monitoring program.*
- *Santa Clara Valley Water District is continuing voluntary methylmercury production and control studies; solar-powered circulators have been effective in suppressing methylmercury production at Lake Almaden but not in the Almaden or Guadalupe reservoirs.*
- *Mine property owners will continue clean-up actions to prevent mercury from eroding into surface waters.*

Guadalupe River Watershed Fish-Tissue Mercury Concentrations, 5-15 cm Long Fish



More information on 2011 Coordinated Monitoring Program efforts is available in the 2012 Annual Data Report.

Updated September 2013

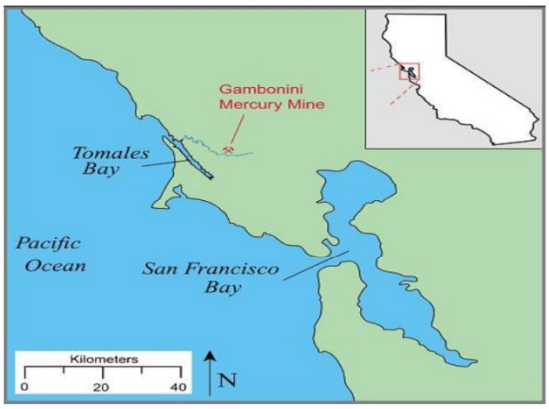
Total Maximum Daily Load Progress Report		Walker Creek Watershed Mercury TMDL
Regional Water Board	**San Francisco Bay, Region 2**	**STATUS** ☑ Conditions Improving ☐ Data Inconclusive ☐ Improvement Needed ☐ TMDL Achieved/Waterbody Delisted
Beneficial uses affected:	COLD, RARE, REC-1, SPAWN, WILD	
Pollutants addressed:	Mercury	
Implemented through:	NPDES Permits, Waiver of WDRs, CWC §13267 Requirements, 319(h) Grants, Cleanup & Abatement	
Approval date:	September 29, 2008	

TMDL Summary

The Walker Creek Mercury TMDL addresses mercury in the creek, its floodplain, and the Soulajule Reservoir, which drains into the creek. Mercury sources in the watershed include the Gambonini Mine site, where mercury was mined beginning in the 1960's, and two former mercury mines in the Soulajule Reservoir sub-watershed. Mercury was mined in the Walker Creek watershed from the 1960s through the early 1970s. In 1982, a tailings dam at Gambonini failed catastrophically, sending large quantities of mercury-laden sediment downstream into Walker Creek and out into Tomales Bay. Discharges of mercury from the mine to Walker Creek continued until 1998-2000, when the mine site was remediated by stabilizing the waste pile, revegetation with native plants, and storm water diversion. Although the primary mine source of mercury has been cut off, there remains in-stream storage of mercury-bound sediments along Walker Creek.

The goal of the TMDL is to reduce mercury levels in Walker Creek and Soulajule Reservoir so that fish-eating wildlife and humans who consume local sport fish are protected from this bio-accumulative pollutant. The TMDL allocates discharges of mercury-laden sediment and methylmercury production to sources in the watershed.

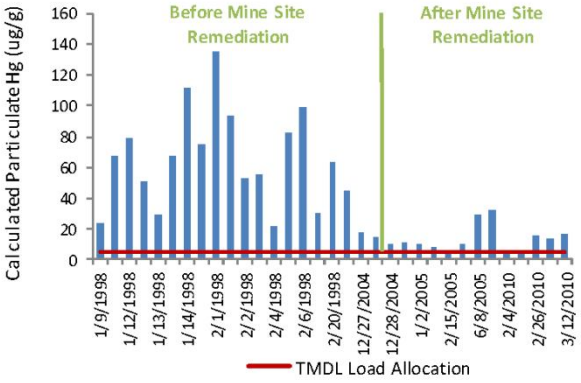
Walker Creek Watershed Map



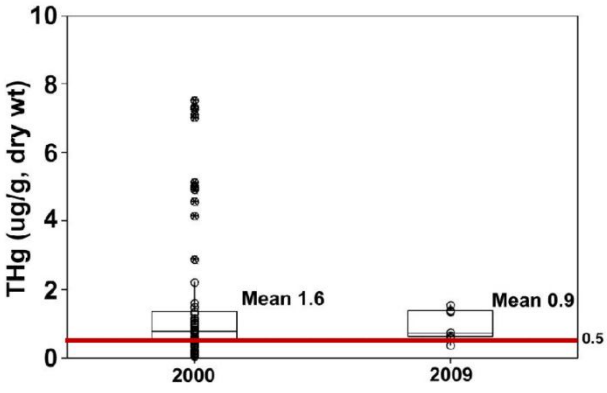
Water Quality Outcomes

- *Mercury and sediment loads to Walker Creek have been significantly reduced by mine cleanup.*
- *Inorganic mercury concentrations in sediment at the mouth of Walker Creek have also declined significantly.*
- *Grazing management practices (e.g., streambank stabilization, fencing, etc.) required under a Waiver of Waste Discharge Requirements should further limit remobilization of mercury-laden sediments along Walker Creek.*

Gambonini Mine Runoff Mercury Concentrations and TMDL Allocation



Comparison of 2000 and 2009 Mercury Concentrations at Mouth of Walker Creek



Updated March 2012

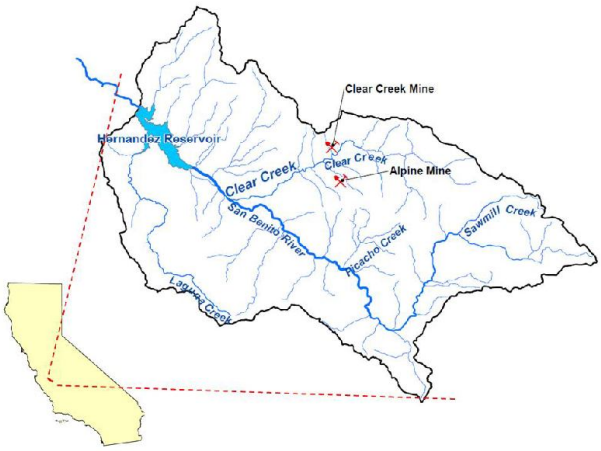
Total Maximum Daily Load Progress Report		Clear Creek and Hernandez Reservoir Mercury
Regional Water Board	Central Coast, Region 3	**STATUS** ☑ Conditions Improving ☐ Data Inconclusive ☐ Improvement Needed ☐ TMDL Achieved/Waterbody Delisted
Beneficial uses affected:	COLD, MUN, WARM	
Pollutant(s) addressed:	Mercury	
Implemented through:	Non-regulatory Action	
Approval date:	June 21, 2004	

TMDL Summary

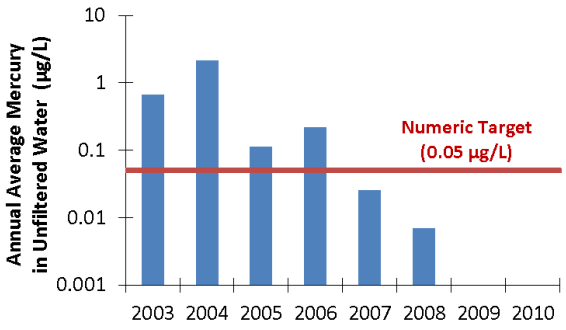
Clear Creek and Hernandez Reservoir are on California's 1998 Clean Water Act section 303(d) List as impaired by mercury. Elevated levels of mercury in the water column exceed water quality objectives for the municipal (MUN) beneficial use designation. Fish tissue from Hernandez Reservoir contains mercury at levels considered unsafe for consumption. The primary source of the mercury loading is abandoned mines managed by the United States Bureau of Land Management (USBLM). The Central Coast Regional Water Board developed the Clear Creek and Hernandez Reservoir Mercury TMDL and implementation plan, which was approved by U.S. EPA in June 2004.The TMDL is implemented through non-regulatory measures by USBLM. USBLM has implemented erosion control and other measures to reduce mercury loading from the abandoned mine sites. USBLM actions include:

1) Removal and/or entombment of mining wastes;
2) Capping of residual material with clean, native (non-mercury ore) soil; and
3) Re-vegetation of disturbed areas

Clear Creek Watershed



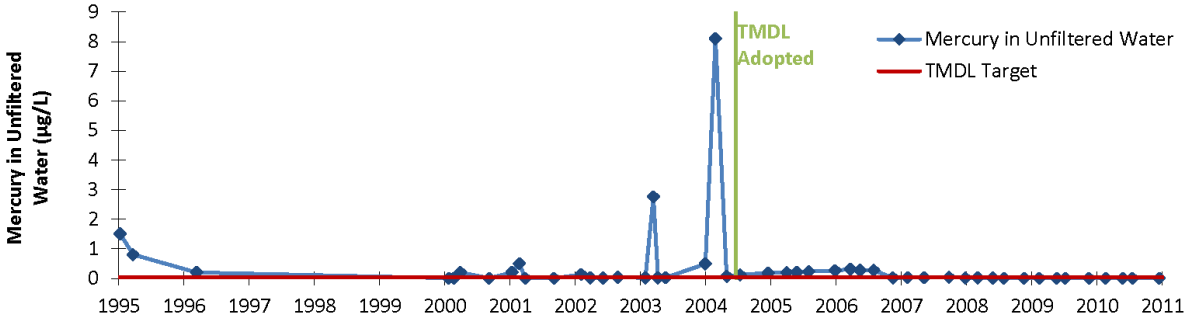
TMDL Waste Load Allocations/Load Allocations



Water Quality Outcomes

- *Clear Creek is currently meeting water quality objectives for mercury.*
- *Since mid-2007 the total mercury in Clear Creek (annual average) achieves the numeric target of 0.050 µg/L.*
- *The data also indicate that Hernandez Reservoir is currently meeting water column objectives for mercury; however, the most recent fish tissue sampled from the reservoir (2008) exceeds the TMDL numeric target of 0.3 mg/kg methylmercury in certain species.*
- *Seventeen consecutive quarterly samples achieve the water column numeric target. Twenty eight samples are required to show compliance with the numeric target to support delisting. Additional samples are being collected and delisting Clear Creek will be evaluated.*

Clear Creek Water Quality



Updated September 2011

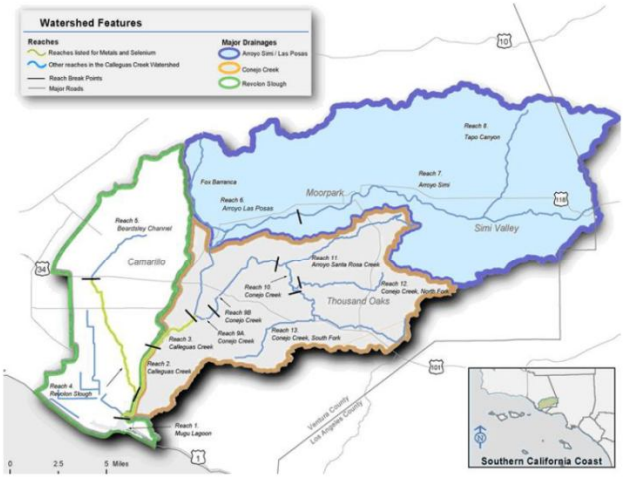
Total Maximum Daily Load Progress Report		Calleguas Creek Watershed Metals and Selenium TMDL
Regional Water Board	**Los Angeles, Region 4**	
Beneficial uses affected:	RARE, WARM, WET, WILD	
Pollutant(s) addressed:	Metals and Selenium	
Implemented through:	NDPES Permits, MS4 Permits, Agricultural Conditional Waiver	**STATUS** ☑ Conditions Improving ☐ Data Inconclusive ☐ Improvement Needed ☐ TMDL Achieved/Waterbody Delisted
Approval date:	March 26, 2007	

TMDL Summary

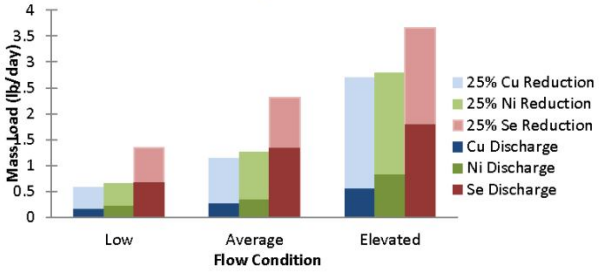
The goal of the Calleguas Creek Watershed Metals TMDL is to address water quality impairments in the Calleguas Creek Watershed due to elevated levels of metals (copper, nickel, and mercury) and selenium in water. Elevated metal and selenium levels endanger aquatic organisms and cause impairment of habitat. The TMDL was developed by the Los Angeles Regional Water Quality Board, and approved by the U.S. EPA March 26, 2007.

The TMDL requires water treatment plants, stormwater, and agricultural dischargers to reduce discharge metals and selenium loadings. TMDL implementation calls for water treatment plants to reduce loadings by 50% of the difference between current loading and target loading by March 2015 while agricultural and urban dischargers must meet 25% and 50% reductions by March 2012 and 2017, respectively. The TMDL implementation schedule called for compliance with final allocations for water treatment plants by March 2017 and for agricultural and urban dischargers by March 2022.

Calleguas Creek Watershed



Agricultural/Urban Discharge and Required Discharge Reductions[a]

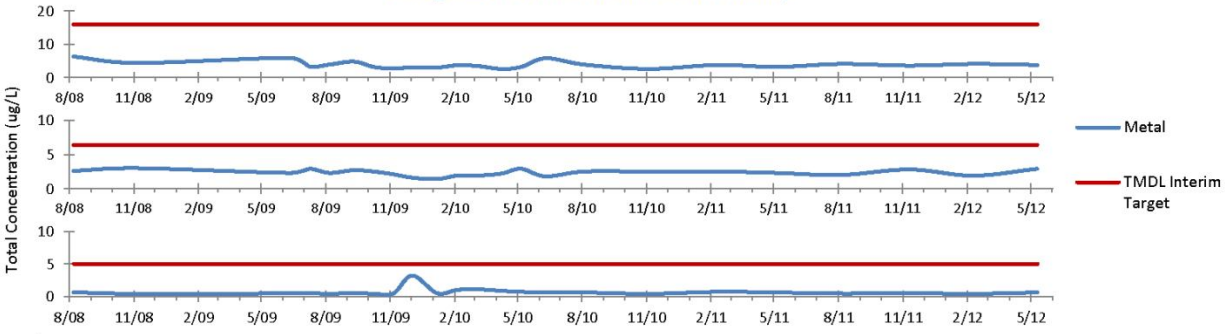


[a] At Revolon Slough. For more information on agricultural and urban discharge performance, see: 42 Cities' Annual Reports, 2010-2011 pursuant to Part 7.

Water Quality Outcomes

- *Based on 2009-2012 annual monitoring reports, metal and selenium concentration in POTWs' discharges are well below the required interim WLAs.*
- *All POTWs are on progress meeting final WLAs by March 2017.*
- *Metals concentration at most receiving water site for urban and agricultural discharges are incompliance with the interim WLAs and LAs.*
- *The required reduction of 25% by March 2012 for agricultural and urban discharges was met in receiving water.*
- *There are ongoing exceedances of selenium in Revolon Slough due to high selenium concentration in groundwater.*

Callegulas Creek Watershed Water Quality[b]



[b] Interim load allocation targets and metal concentrations at Hill Canyon Wastewater Treatment Plant. Similar interim metal and selenium concentrations are being seen at other POTWs, including Camarillo WRP and Simi Valley WQCP. For more information on POTW performance, see: Calleguas Creek Watershed TMDLs Annual Reports, 2009-2013.

Updated September 2013

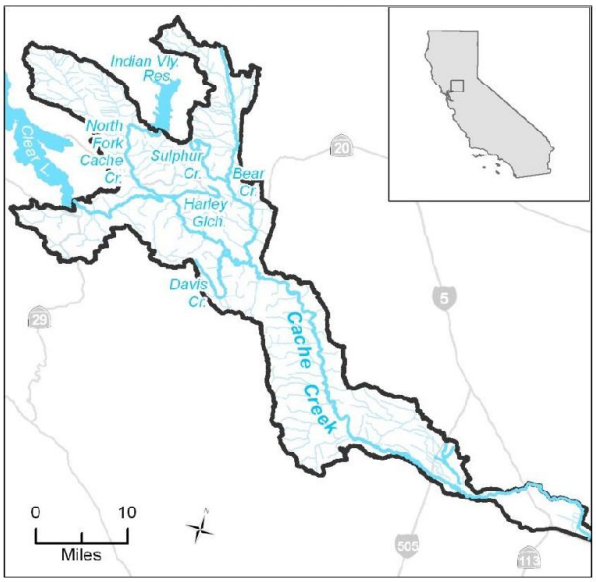
Total Maximum Daily Load Progress Report		Cache Creek Watershed Mercury TMDL
Regional Water Board	**Central Valley, Region 5**	
Beneficial uses affected:	COMM, REC-1, WILD	
Pollutant(s) addressed:	Methylmercury and mercury	
Implemented through:	13267 Orders for Technical Reports, 401 Certifications, Cleanup and Abatement Orders, EPA Removal Action	**STATUS** ☐ Conditions Improving ☑ **Data Inconclusive** ☐ Improvement Needed ☐ TMDL Achieved/Water Body Delisted
Approval date:	February 7, 2007	

TMDL Summary

Cache Creek and three of its tributaries (Bear Creek, Sulphur Creek, and Harley Gulch) are impaired by mercury because concentrations of mercury in fish exceed levels safe for consumption by humans and wildlife species that eat the fish. Sources of mercury are 14 inactive mercury/gold mines, naturally mercury-enriched soil, springs, and deposition of mercury transported in air. The Cache Creek Watershed Mercury TMDL establishes aqueous methylmercury allocations in Cache Creek, Bear Creek and in Harley Gulch calculated to achieve fish tissue objectives and requires load reductions from inactive mines.

The TMDL requires mine owners to submit cleanup plans and requires land managers, landowners, Caltrans, and other road managers to control and reduce erosion of mercury-contaminated soil. Entities that operate or construct impoundments and wetlands must minimize methylmercury discharges to the creeks and set erosion control requirements for work within floodplains.

Cache Creek Watershed



TMDL Remediation Goals

Methylmercury Load Reduction (as % of existing annual load)	
Cache Creek u/s North Fork confluence	30%
Harley Gulch	4%
Davis Creek	50%
Sulphur Creek	10%
Bear Creek	15%
Cache Creek at Yolo	54%

Mercury Load Reduction (as % of existing, average annual load from mining and anthropogenic activities)	
Inactive Mine Sites	95%

Water Quality Outcomes

- *Cleanup actions at the inactive Abbott and Turkey Run mercury mines controlled the most significant sources of mercury entering Harley Gulch.*
- *Central Valley Water Board issued Orders for characterization and cleanup of inactive mines in the Sulphur and Bear Creek watersheds.*
- *Colusa County Resource Conservation District and U.S. Bureau of Land Management received a 319(h) grant to prepare for stabilization of mercury-laden material that is eroding into Bear Creek. Shovel-ready design plans and environmental documentation will be completed by 2013.*
- *Central Valley Water Board staff completed an inventory of mercury in sediment in the Cache and Bear Creek canyons.*
- *Caltrans monitored mercury in soil and employed stringent sediment management practices at projects within the watershed.*

Cache Creek Watershed Water Quality

- Limited water quality data are available.
- Mercury load reductions are expected near the projects sites, but have not been fully quantified.
- For the mine sites that have been cleaned-up, vegetation is established over previously barren waste piles and observations confirm a reduction in erosion of mercury-contaminated soils into nearby water courses.

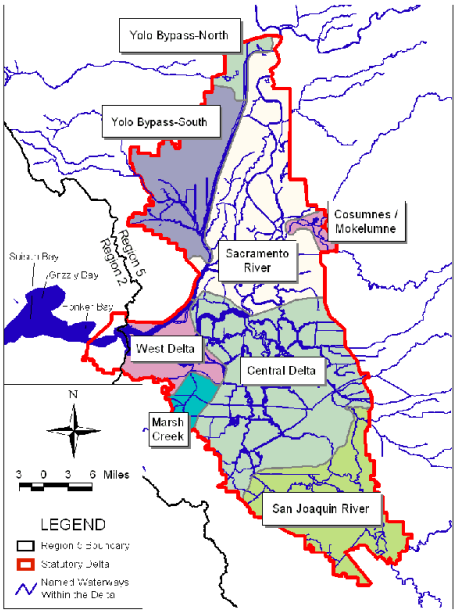
Updated June 2012

Water Quality Report Card		Methylmercury and Mercury in the Sacramento-San Joaquin Delta
Regional Water Board:	**Central Valley, Region 5**	**STATUS** ☐ Conditions Improving ☐ Data Inconclusive ☑ **Improvement Needed** ☐ Targets Achieved/Waterbody Delisted
Beneficial Uses Affected:	REC-1, COMM, WILD	
Implemented Through:	NPDES Permit, WDR, Grant, 401 Certification, Stakeholder Action	
Effective Date:	October 20, 2011	
Attainment Date:	2030	**Pollutant Type:** ☑ Point Source ☑ Nonpoint Source ☑ Legacy

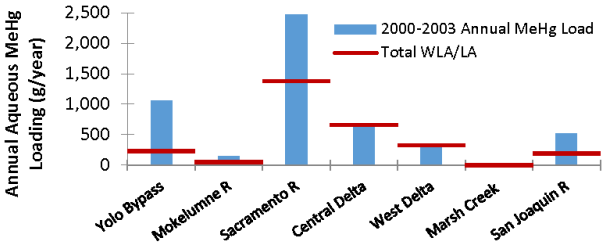
Water Quality Improvement Strategy

The Sacramento-San Joaquin Delta and Yolo Bypass are impaired due to elevated levels of mercury in some fish. Sources of mercury include legacy of the State's gold and mercury mines, naturally-enriched soil, deposition from air, springs, urban runoff, and wastewater. Methylmercury (MeHg), which accumulates in fish, is made in wet, oxygen-depleted environments. Sources of MeHg include wetlands, tributaries, Delta channel sediments, and point sources. To address the impairment, Region 5 adopted the Sacramento-San Joaquin Delta Methylmercury TMDL in 2011. The TMDL is intended to reduce concentrations of MeHg in fish by controlling sources of both MeHg and total mercury. Because MeHg levels in fish are strongly correlated with those in water, load and wasteload allocations (LA/WLA) are in the form of annual aqueous MeHg loads. The TMDL is proceeding in two phases. Major Phase 1 (2011-2020) activities are: (1) studies to develop and evaluate MeHg control measures; (2) mercury pollution prevention by municipal wastewater and storm water permittees, and development of upstream mercury TMDLs; and (3) a mercury exposure reduction program to protect people eating Delta fish. At the end of Phase 1, Region 5 will review the TMDL and adjust based on the MeHg control studies. During Phase 2 (2020-2030), dischargers must meet allocations.

Delta and Yolo Bypass



Delta and Yolo Bypass Loading Allocations[a, b]

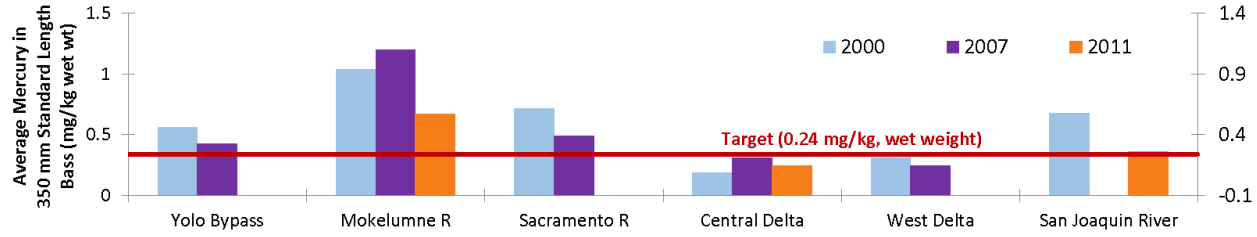


[a] Allocations apply within the legal Delta boundary and the Yolo Bypass.
[b] Wastewater treatment facilities that have done major process changes are now close to meeting facility-specific WLA.

Water Quality Outcomes

- *Monitoring data demonstrate that there are no significant trends in concentrations of mercury in fish sampled before (2000 and 2007), and since (2011), the TMDL was adopted.*
- *Studies to improve MeHg control are underway for all major source types, including managed and tidal wetlands.*
- *Hydrodynamic models are being developed that will predict the effects of flow changes and large restorations on MeHg.*
- *Significant MeHg controls within the Delta are not expected until after the 2020 TMDL review. Major tributaries (which contribute 60 percent of MeHg loads) will be addressed by the Statewide Mercury Control Program, and in future TMDLs.*

Mercury in Bass, by Subareas in Delta and Yolo Bypass[c]



[c] Recent data are available on the "Are Fish Safe to Eat" portal.

Publications relating to TMDL implementation activities:

Alpers, C.N., et al. 2013. Mercury cycling in agricultural and managed wetlands, Yolo Bypass, California: Spatial and seasonal variations in water quality. Sci Total Environ.

Eagles-Smith, C.A., et al. 2014. Wetland management and rice farming strategies to decrease methylmercury bioaccumulation and loads from the Cosumnes River Preserve, California. U.S. Geological Survey Open-File Report 2014-1172, 42 p.

Released October 2014

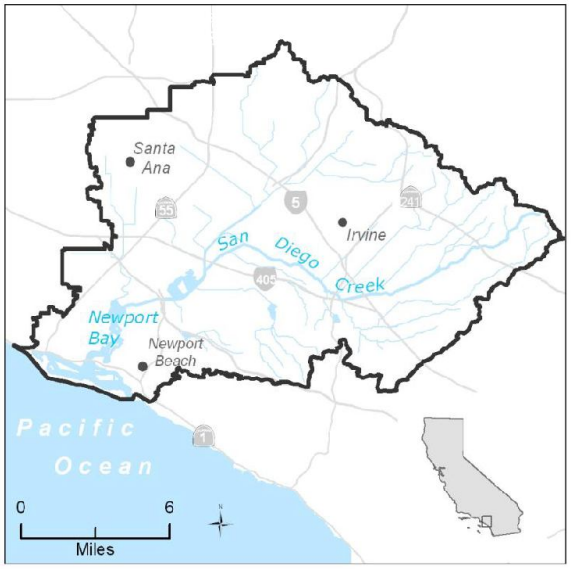
Total Maximum Daily Load Progress Report		Rhine Channel (Lower Newport Bay) Metals-Organics TMDL
Regional Water Board	**Santa Ana, Region 8**	
Beneficial uses affected:	COMM, MAR, NAV, RARE, REC-1, REC-2, SHEL, SPWN, WILD	**STATUS** ☑ Conditions Improving ☐ Data Inconclusive ☐ Improvement Needed ☐ TMDL Achieved/Waterbody Delisted
Pollutant(s) addressed:	Metals, Organics	
Implemented through:	Non-regulatory Action	
Approval date:	June 14, 2002	

TMDL Summary

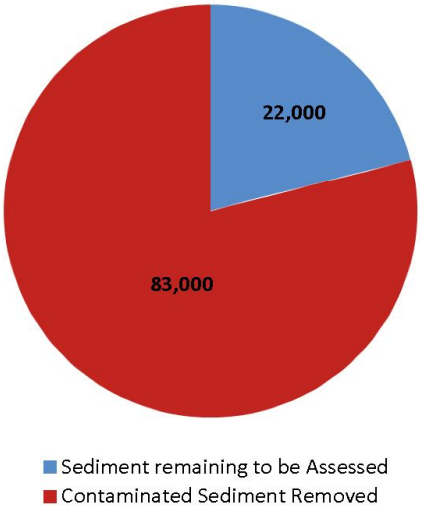
The Rhine Channel segment of Lower Newport Bay was listed impaired for organics and metals on the 1998 CWA Section 303(d) list. The pollutant levels in channel sediments and water have caused persistent sediment toxicity that exceed standards for human health protection, and are associated with bioaccumulative effects in the food web. The primary sources are historical discharges of storm water runoff and wastewater that started in the 1920s. In June 2002, the U.S. Environmental Protection Agency established TMDLs for toxic pollutants (copper, lead, zinc, chromium, mercury, chlordane, dieldrin, PCBs, DDT and selenium).

Regional Board staff determined that the channel's unique geographic configuration allowed for site-specific options to remediate the contaminated sediment and restoration of water quality standards. Although a 2006 State-funded report to investigate cleanup options for the Rhine concluded that "dredging with upland landfill disposal" costing $18.3 million would be the most feasible alternative, an opportunity to dispose of the contaminated sediments through use of a Port of Long Beach confined facility became available in 2010. A strict timeline to place the sediment spurred the City of Newport Beach, Santa Ana Water Board, and other coordinating agencies to quickly permit the project and implement dredging. One final task is to establish a new water quality baseline for the Channel.

Rhine Channel, Lower Newport Bay Watershed



Rhine Channel TMDL Compliance Dredging (cubic yards)



Water Quality Outcomes

- *Initiated spring 2010, the Rhine Channel Contaminated Sediment Cleanup Project successfully dredged the channel in November 2011.*
- *More than 100,000 cubic yards of contaminated sediment, at least 80% of the total amount, were removed.*
- *The jointly-coordinated project was a voluntary implementation effort by the City of Newport Beach, with cooperation from the Santa Ana Regional Board, CA Coastal Commission, US Army Corps of Engineers and other agencies.*
- *The sediment removal was fully funded by the City of Newport Beach in the amount of $4 million. Orange County Coastkeeper, a local non-profit organization, pushed the cleanup effort.*
- *A post-dredge monitoring program has been prepared and will soon be executed to establish a new baseline of water quality in water and sediment.*

Updated September 2012

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