



California Regional Water Quality Control Board Central Valley Region

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LOWER AMERICAN RIVER AND LAKE NATOMA MERCURY TMDL INFORMATION SHEET

Watershed Characteristics

Lake Natoma and the lower American River (LAR) flow from Folsom Dam, approximately 30 miles east of Sacramento, California, through the greater Sacramento area to its confluence with the Sacramento River, near downtown Sacramento. Extensive historic gold mining (dredging) operations conducted in the watershed discharged mercury into Lake Natoma and the lower American River.

Water Quality Objectives Not Attained

The narrative objective for toxicity is not being attained in Lake Natoma and the LAR. The narrative toxicity objective in the Basin Plan states, in part, "All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life." The narrative toxicity objective further states that "The Regional Water Board will also consider ... numerical criteria and guidelines for toxic substances developed by the State Water Board, the California Office of Environmental Health Hazard Assessment, the California Department of Health Services, the U.S. Food and Drug Administration, the National Academy of Sciences, the U.S. Environmental Protection Agency, and other appropriate organizations to evaluate compliance with this objective." (CVRWQCB, 1998).

The toxicity objective was evaluated for Lake Natoma and the lower American River by comparing mercury concentrations measured in fish collected in Lake Natoma and the LAR to freshwater fish and marine organism guidelines and criteria that have been developed for both human health and wildlife protection. The United States Food and Drug Administration (USFDA) action level of 1.0 ug/g (ppm) (USFDA, 1984) applies to the edible portion of commercially caught freshwater and marine fish. The United States Environmental Protection Agency (USEPA) established a criterion of 0.3 ppm methylmercury in the edible portions of fish for human health protection (USEPA, 2001). The USEPA has also established wildlife criteria in the Great Lakes Water Quality Initiative (USEPA, 1995) and the Mercury Study Report to Congress (USEPA, 1997). These criteria suggest that concentrations of mercury in fish tissue of 0.08 ppm for trophic level 3 [TL3] fish and 0.35 ppm for trophic level 4 [TL4] fish should be protective of wildlife (USEPA, 1997). Since wildlife generally consumes lower trophic level (and smaller) fish than humans, the human health and wildlife criteria are not directly comparable.

Evidence of Impairment

The California Office of Environmental Health Hazard Assessment issued a fish consumption advisory for the LAR and Lake Natoma in 2004 (OEHHA) and updated the safe eating guidance for Lake Natoma and the LAR in 2008 and 2009, respectively.

Fish tissue data has been collected from the LAR from 1970 to 2008 (n = 215) and Lake Natoma from 1991 to 2005 (n = 258) (CDFG, 1973; ICEM, 1971; SFEI, 2001; CALFED, 2007a and 2007b; LWA, 2001, 2002, 2003, and 2004; SRWP, 2005; SWRCB-DWQ, 2002; Domagalski, 2000; Saiki, 2004; CVRWQCB, 2008). Thirty-three percent and 21% of all fish regardless of trophic level in the LAR and Lake Natoma, respectively, exceed the USEPA criterion of 0.3 ppm methylmercury for the protection of human health. Additionally, 4% and 6% of collected fish exceed the USFDA action level of 1.0 ppm in

fish tissue in the LAR and Lake Natoma, respectively. The fish mercury data is summarized in Table 1.

Table 1. Summary of Mercury Concentrations in Fish Tissue Samples Collected from the Lower American River and Lake Natoma.

Waterbody	Fish Trophic Level	# of Samples	Average Mercury Concentration (ppm)	Range of Mercury Concentrations (ppm)	% of Samples Exceeding Mercury Criteria			
					Human Criteria		Wildlife Criteria	
					USEPA Criterion (0.3 ppm)	USFDA Action Level (1.0 ppm)	USEPA TL3 Criteria (0.08 ppm)	USEPA TL4 Criteria (0.35 ppm)
Lower American River	3	112	0.14	0.029 - 0.75	8%	0%	63%	-
	4	103	0.48	0.062 - 1.43	60%	9%	-	56%
Lake Natoma	3	144	0.12	0.02 - 1.95	5%	1%	52%	-
	4	114	0.46	0.069 - 1.98	42%	12%	-	39%

Possible Fish Tissue Numeric Targets

Staff calculated a possible range of fish tissue numeric targets that could protect human and wildlife health using available fish tissue mercury concentration data sampled from the American River at Discovery Park:

- To protect wildlife health:
 - 0.08 ppm in large (150-350 mm) TL3 fish, and
 - 0.27 ppm in large (>150 mm) TL4 fish.
- To protect human health:
 - Consumers of one 8-ounce locally caught fish meal per week in addition to commercially acquired fish.
 - 0.09 ppm in large (150-500 mm) TL3 fish, and
 - 0.23 ppm in large (150-500 mm) TL4 fish, or
 - Consumers of four to five locally caught fish meals per week.
 - 0.03 ppm in large (150-500 mm) TL3 fish, and
 - 0.07 ppm in large (150-500 mm) TL4 fish.

The numeric target for wildlife health is protective of the most sensitive species of piscivorous wildlife (e.g., bald eagle, grebe, osprey, and river otter). A range of numeric fish targets is presented to protect human health. The high estimate would be protective of human consumers that eat one meal a week of locally caught fish in addition to eating non-local fish acquired commercially. The low estimate would be protective of human consumers that eat four to five meals of locally caught fish per week. Consequently, fish tissue mercury concentrations will likely have to be reduced by approximately 50 to 80% of the current average concentrations

Mercury Control Program Implementation Actions

The mercury control program would likely focus on reducing sources of both methylmercury and inorganic mercury. The proposed implementation program focuses on methylmercury because studies conducted in California and elsewhere in the United States indicate that reducing methylmercury levels in ambient water should result in the reduction of fish methylmercury levels. The program also addresses inorganic mercury because: methylmercury production is a function of the inorganic mercury content of sediment; the implementation program for the LAR and Lake Natoma must maintain compliance with the USEPA's CTR criterion for total recoverable mercury; and the proposed mercury control program for Sacramento-San Joaquin River Delta assigns load reductions to upstream tributaries.

The mercury control program will likely employ an adaptive management approach. This phased approach will allow the modification of methyl- and total mercury goals, objectives, allocations, and/or

compliance dates to ensure that the policy is continually improved by the knowledge of the outcomes from the implementation and monitoring programs and future scientific information.

Possible methylmercury and inorganic mercury sources that could be required to meet load allocations include, but are not limited to, upstream releases from Folsom Reservoir, inputs from small creeks and streams, storm water runoff (urban and non-urban runoff), industrial wastewater, historic dredge mine tailings, flux from sediments in wetlands and open-water habitats located within Lake Natoma or the American River, drainage from adjoining open spaces or floodplains, agricultural drainage, and atmospheric deposition.

Possible means of compliance to meet allocations could include, but are not be limited to:

- Conduct studies to determine sources of methylmercury production;
- Conduct studies or develop controls and best management practices to reduce methyl- and/or inorganic mercury discharges;
- Reduce methyl- and/or inorganic mercury sources;
- Reduce inorganic mercury in sediment, where methylmercury can be produced;
- Modify water management operations to minimize methyl- and/or inorganic mercury discharges; and
- Reduce methylmercury exposure to the fish eating public by developing or expanding outreach, education, and/or exposure reduction programs.

303(d) Listing/TMDL Information

Waterbody Name	Lake Natoma and American River, Lower	Pollutants/Stressors	Mercury
Hydrologic Unit	519.21	Sources	To be determined
Total Length	30 miles	Extent of Impairment	From Folsom Dam to the Sacramento River
Upstream Extent Latitude	38.70726	Upstream Extent Longitude	-121.1567143
Downstream Extent Latitude	38.596095	Downstream Extent Longitude	-121.507464

References

References can be found on a separate sheet on the Central Valley Water Boards website at: http://www.waterboards.ca.gov/centralvalley/water_issues/tmdl/central_valley_projects/american_river_hg/index.shtml

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