DRAFT STAFF REPORT, INCLUDING SUBSTITUTE ENVIRONMENTAL DOCUMENTATION

FOR

PART 2 OF THE WATER QUALITY CONTROL PLAN FOR INLAND SURFACE WATERS, ENCLOSED BAYS, AND ESTUARIES OF CALIFORNIA—TRIBAL AND SUBSISTENCE FISHING BENEFICIAL USES AND MERCURY PROVISIONS

JANUARY 3, 2017

DIVISION OF WATER QUALITY

STATE WATER RESOURCES CONTROL BOARD

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

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Executive Summary

Introduction

The State Water Resources Control Board is proposing *Part 2 of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California—Tribal and Subsistence Fishing Beneficial Uses and Mercury Provisions* (referred to as the Provisions throughout the Staff Report). The Provisions would establish the following elements: (1) three beneficial uses pertaining to tribal traditional and cultural use, tribal subsistence fishing use, and subsistence fishing use by other cultures or individuals; (2) one narrative and four numeric mercury water quality objectives to protect numerous beneficial uses of water involving human health and aquatic dependent wildlife; and (3) a program of implementation to control mercury discharges.

California currently has no statewide water quality objectives to protect wildlife. Although some of the Regional Water Quality Control Boards have developed regional and site-specific numeric mercury water quality objectives to protect wildlife, these objectives are not consistent across the state. Therefore, new statewide numeric mercury water quality objectives are needed. Also, new statewide mercury water quality objectives for human health are needed to update the level of protection for consumers of fish. The Provisions are needed to align California with the most recent guidance from the U.S. Environmental Protection Agency (U.S. EPA 2001) and to include protections for Native American tribes and other subsistence fishers. The new water quality objectives would replace the mercury criteria for human health established by the California Toxics Rule (40 C.F.R. § 131.38).

The Clean Water Act considers mercury as a priority toxic pollutant in water, although it is methylmercury that is the highly toxic form of mercury in the environment. The main route through which humans and wildlife are at risk for methylmercury toxicity from water is through the consumption of methylmercury contaminated fish and shellfish. Consequently, the U.S. Environmental Protection Agency established the latest recommended mercury ambient water quality criterion, in accordance with the Clean Water Act section 304(a), for the protection of human health in the form of a methylmercury fish tissue criterion. Controlling and monitoring the methylmercury concentrations in fish tissue provides more direct protection of human health and wildlife, and it is more closely tied to the Clean Water Act goal of protecting public health and wildlife. Therefore, the water quality objectives for mercury were derived as concentrations of methylmercury in fish tissue.

Mercury has multiple forms in water, and all forms of mercury are toxic. Methylmercury is the form that is of the most concern because it is the form that accumulates in fish tissues and it is very toxic to humans and wildlife. Almost all of the mercury in fish is methylmercury. Fish accumulate methylmercury from the water by consuming other organisms that have directly or indirectly accumulated mercury from the water. The organisms that are highest on the food web accumulate the most mercury.

Geographic Scope

The geographic scope of the Provisions is California's inland surface waters, enclosed bays, and estuaries. More specifically, the water quality objectives and associated implementation would apply to inland surface waters, enclosed bays, and estuaries with Commercial and Sport Fishing (COMM), Wildlife Habitat (WILD), Marine Habitat (MAR), Cold Freshwater Habitat (COLD), Warm Freshwater Habitat (WARM), Estuarine Habitat (EST), Inland Saline Water Habitat (SAL), Wetland (WET), Rare, Threatened, or Endangered Species (RARE), Tribal Traditional and Culture (CUL), California Native American Tribal Subsistence Fishing (T-SUB), and Subsistence Fishing (SUB) beneficial uses. However, the water quality objectives would not apply to the waters described above where site-specific mercury water quality objectives are established. The implementation provisions do not apply to discharges to receiving waters for which a mercury total maximum daily load is established.

The beneficial use definitions would be used by the State Water Resources Control Board and the Regional Water Quality Control Boards (collectively, the Water Boards) to the extent that such activities are described in a water quality control plan. The Provisions do not establish any designations of the beneficial uses to any particular waterbody.[1] The Provisions only establish the beneficial use definitions.

Relationship to the Statewide Mercury Control Program for Reservoirs

Concurrent with the development of the Provisions, the State Water Resources Control Board is developing a separate project to establish a program to implement the Provisions' water quality objectives to control mercury in reservoirs in California. The Provisions, described in this Staff Report, are a separate and distinct project from the project to control mercury in reservoirs in California. Although both projects are being developed to control mercury, only the Provisions would establish numeric water quality objectives and new beneficial uses.

Project Elements

Beneficial Uses

Beneficial uses are the cornerstone of water quality protection. Beneficial uses must be established in water quality control plans and designated to applicable water bodies. In 1973, the State Water Resources Control Board provided a uniform list of beneficial uses, including definitions, to the Regional Water Quality Control Boards to designate waters within their respective regions where the use was occurring. The State Water Resources Control Board updated that list in 1996. The updated list of beneficial uses does not contain an explicit beneficial use for tribal traditional, cultural, or subsistence fishing.

[1] Even when a beneficial use category or definition is established, specific waters are not designated with that beneficial use unless a water quality standards action occurs to make the designation, which is typically done through the adoption of a water quality control plan (basin plan) amendment. Generally, the Regional Water Boards designate specific waterbodies within their respective region where the use applies. A Regional Water Board's waterbody-designation would occur through its basin planning process in accordance with Water Code sections 13244 (hearing and notice requirements) and 13245 (approval by the State Water Board).

The Provisions would establish three beneficial use definitions. The first beneficial use is Tribal Tradition and Culture (CUL). This use reflects uses of water that support the cultural, spiritual, and traditional ways of living by California Native American tribes (California tribes). To recognize populations that are assumed to consume more fish than the average recreational angler in California (protected under the Commercial and Sport Fishing (COMM) beneficial use), the Provisions include the two beneficial uses pertaining to Tribal Subsistence Fishing (T-SUB), and Subsistence Fishing by other communities or individuals (SUB).

As discussed below, the Provisions contain two associated mercury water quality objectives that would support the two subsistence beneficial uses (T-SUB and SUB). However, water quality objectives that may be necessary to reasonably protect these two beneficial uses are not limited to the pollutant mercury. Additional water quality objectives for other pollutants could be adopted if new objectives are needed to protect these beneficial uses.

Water Quality Objectives

The Mercury Water Quality Objectives are summarized in Table i and briefly described below. The numeric water quality objectives are expressed in units of milligrams of methylmercury mercury per kilogram of fish tissue (mg/kg).

Table i. Summary of the Mercury Water Quality Objectives

Objective Type	Beneficial Uses	Objective
Sport Fish	Commercial and Sport Fishing; Wildlife Habitat[a]; Marine Habitat	0.2 mg/kg in highest trophic level fish, 150-500 mm (millimeters)
Tribal Subsistence	Tribal Subsistence Fishing	0.04 mg/kg in 70% trophic level 3 fish and 30% trophic level 4 fish, 150-500 mm
Subsistence	Subsistence Fishing	Waters… shall be maintained free of mercury at concentrations which accumulate in fish and cause adverse biological, reproductive, or neurological effects. The fish consumption rate used to evaluate this objective shall be derived from water body and population-specific data and information of the subsistence fishers' rate of and form of (e.g. whole, fillet with skin, skinless fillet) fish consumption
Prey Fish	Wildlife Habitat [a]; Marine Habitat, (where there are no trophic level 4 fish)	0.05 mg/kg in fish 50-150 mm
California Least Tern Prey Fish	Wildlife Habitat [a], Marine Habitat, Rare, Threatened, or Endangered Species (where California least tern habitat	0.03 mg/kg in fish less than 50 mm

	exists) (may be designated for the same beneficial uses as the Prey Fish Objective and Preservation of Rare, Threatened or Endangered Species)	
[a] The objectives may also be applied to Warm Freshwater Habitat, Cold Freshwater Habitat, Estuarine Habitat, and Inland Saline Water Habitat because each of those includes protection of wildlife habitat (see Section 5.1).		

The Sport Fish Water Quality Objective would apply to waterbodies where the highest trophic level fish are present. The highest trophic level is trophic level 4 fish (e.g. bass, large catfish, gopher rockfish). If there are no trophic level 4 fish, then the objective would apply to trophic level 3 fish (e.g. trout, sunfish, perch, and blue rockfish). This objective would apply to four beneficial uses: Commercial and Sport Fishing, Wildlife Habitat, Marine Habitat, and the proposed Tribal Tradition and Cultural Beneficial Use. This objective is based on the method used by the U.S. Environmental Protection Agency for its most recent methylmercury criterion (January 2001). In accordance with that method, the objective is derived from an adjusted consumption rate of one 8 ounce meal per week (224 grams per week or 32 grams per day) of locally caught fish to reflect California recreational fishers, which is higher than the U.S. Environmental Protection Agency criterion (17.5 grams per day) developed under the Clean Water Act, section 304(a).

The second and third water quality objectives, the Tribal Subsistence Fishing Water Quality Objective and the Subsistence Fishing Water Quality Objective, are being established to reasonably protect the two new beneficial uses pertaining to Tribal Subsistence Fishing and Subsistence Fishing (T-SUB and SUB, respectively). These objectives would generally only apply where the corresponding uses are designated. Currently neither of these beneficial uses has been designated to any waters in California. The Tribal Subsistence Fishing Water Quality Objective was derived to protect humans consuming four to five meals per week (142 grams per day) that applies to mostly trophic level 3 fish, based on a survey of fish consumption by California tribes. For subsistence fishing by other individuals, the Subsistence Fishing Water Quality Objective is narrative rather than a numeric to accommodate the wide variation in the amount of fish and types of fish consumed by various members of the population. The two objectives that support the subsistence fishing beneficial uses may be modified by the Water Boards based on site-specific consumption patterns of the particular communities they would protect.

The fourth and fifth water quality objectives, the Prey Fish Water Quality Objective and the California Least Tern Prey Fish Water Quality Objective, were developed to protect wildlife and accommodate situations where measuring the Sport Fish Water Quality Objective cannot ensure protection of all wildlife species. These apply to the smaller size fish that many wildlife species prey upon. The Prey Fish Water Quality Objective would apply to prey fish in waters where trophic level 4 fish are not present. The California Least Tern Prey Fish Water Quality Objective would protect the California least tern (*Sterna antillarum browni*), since it is a very sensitive species that is on the federal list of endangered species. This objective would apply only to the habitat of the California least tern and to the very small fish that the tern preys upon.

Implementation Program to Control Discharges of Mercury
The Porter-Cologne Water Quality Control Act (Wat. Code § 13000 et seq.) requires the establishment of a program of implementation to achieve water quality objectives, which includes a description of actions necessary to achieve the water quality objectives, a time schedule for the actions to be taken, and monitoring to determine compliance with the water quality objectives in accordance with Water Code section 13242.

In general, the principal sources of mercury pollution to the waters within California are historic mines and atmospheric deposition. This mercury is transported to water bodies through discharges of storm water, from historic mines or mine tailings, and from other nonpoint sources (other lands that may experience erosion, especially due to human activity, and the sediments that may be carried in storm water runoff). Since mercury bound to sediments is often transported through the environment, reducing the amount of sediments in discharges also reduces the amount of mercury. Other types of regulated discharges also present potential sources of mercury contamination to waters of the state. Diffuse atomic mercury suspended in air spreads over large areas, accumulates between storm events and during the long dry season, and then is flushed into storm water systems. Mercury is also present (but in smaller absolute amounts) in point-source discharges, due to a wide variety of potential industrial, commercial and residential sources. The Provisions therefore establish mandatory control requirements or provide discretionary control measures applicable to discharges from point sources, storm water sources, and non-point sources.

For municipal wastewater and industrial dischargers regulated through (non-storm water) National Pollutant Discharge Elimination System (NPDES) permits, the Provisions modify the reasonable potential analysis and the approach to determine an effluent limitation contained in the State Water Resources Control Board's Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (generally referred to as the SIP). The Provisions which modify the SIP are exclusive to reasonable potential analyses and effluent limitations for mercury. These modifications do not apply to dischargers to waters that have site-specific mercury water quality objectives or to dischargers that discharge to receiving waters for which a mercury or methylmercury total maximum daily load (TMDL) has been approved. Because the Mercury Water Quality Objectives are fish-tissue based and not water-column based, fish-tissue based water quality objectives were converted to water column values to be used to determine whether a discharge requires an effluent limitation.

Regarding the Sport Fish Water Quality Objective, Prey Fish Water Quality Objective, and California Least Tern Prey Fish Water Quality Objective, which protect recreational consumption of fish and wildlife, for discharges projected to cause or contribute to an excursion above the applicable water quality standard (referred to as having reasonable potential), the effluent limitation would be 12 nanograms per liter (ng/L) total mercury for discharges to flowing water bodies (generally, rivers, creeks and streams) and 4 ng/L for discharges to slow moving water bodies (generally, lagoons and marshes). Regarding the Tribal Subsistence Fishing Water Quality Objective, for discharges with reasonable potential, the effluent limitation would be 4 ng/L total mercury for discharges to flowing water bodies and 1 ng/L for discharges to slow moving water bodies. The same concentration values would be used to determine reasonable potential for non-storm water NPDES discharges for the respective Mercury Water Quality Objectives. These effluent limitations may be modified based on a site-specific bioaccumulation factor. For the narrative Subsistence Fishing Water Quality Objective, the reasonable potential analysis and the effluent limitation would need to be calculated using site-specific information and/or the available bioaccumulation factors and translators.

For discharges of storm water regulated through NPDES permits that apply to Municipal Separate Storm Sewer Systems (Phase I and Phase II MS4s), the Provisions require a set of mercury control measures and give the Water Boards the discretion to substitute additional measures and require best management practices for individual permits. For many MS4s, permits already contain such control measures and best management practices. For areas that are specifically designated as “Areas with Elevated Mercury Concentrations,” the Water Boards would be required to include best management practices for erosion control in MS4 permits. For industrial discharges regulated under the NPDES General Permit for Storm Water Discharges Associated with Industrial Activities, the Provisions require that the permit, upon reissuance, include a revised Numeric Action Level for total mercury, from 1400 ng/L to 300 ng/L.

For dischargers subject to the requirements of Title 27 of the California Code of Regulations, section 22510 (closure and post-closure of mining sites), the Water Boards would continue to use the existing program to control these discharges. The Provisions specify that erosion and sediment control measures are required for mine site remediation in all future permits with Waste Discharge Requirements (WDRs) or waivers of WDRs adopted, and re-issued or modified WDRs. For non-point sources regulated under WDRs or waivers of WDRs, the Water Boards have discretion under existing law to require dischargers to implement erosion and sediment control measures. For discharges relating to dredging activities (including disposal), the Water Boards have discretion under existing law to require total mercury monitoring and procedures to control the disturbance and discharge of mercury contaminated materials. For projects that create or restore wetlands, the Water Boards have the discretion under existing law to require project applicants to include design features or management measures to reduce the production of methylmercury in the wetland, particularly in areas with elevated mercury. For nonpoint source discharges, dredging activities, and wetland projects, the Water Boards should consider requiring the respective measures in areas with elevated mercury concentrations when adopting, re-issuing, or modifying WDRs, waivers of WDRs, or water quality certifications.

1. Introduction

Humans and wildlife are at risk of methylmercury toxicity due to the consumption of fish containing high levels of mercury. New water quality objectives are needed to close a long standing gap in the protection of wildlife, the lack of which has resulted in a lawsuit against the U.S. Environmental Protection Agency (U.S. EPA) and a subsequent consent decree (*Our Children's Earth Foundation and Ecological Rights Foundation vs. U.S. EPA*, No. 3:13-cv-2857-JSW [2014]). Furthermore, new water quality objectives for human health are needed to align California with the most recent Clean Water Act section 304(a) criterion from the U.S. EPA, and to include protection for California Native American tribes (California tribes) and subsistence fishers. In addition, beginning in October 2013, California tribes and environmental justice groups petitioned the State Water Resources Control Board (State Water Board) to consider whether the current beneficial use definitions in the Regional Water Quality Control Plan (basin plans) adequately protect Tribal cultural practices and traditional uses of waters by California tribes, subsistence fishing by California tribes, and subsistence fishing by other communities and individuals. Because these groups are known to consume a greater amount of fish, bioaccumulative contaminants such as mercury are of particular concern.

The State Water Board is therefore proposing to establish Part 2 of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California—Tribal and Subsistence Fishing Beneficial Uses and Mercury Provisions, which this Staff Report will refer to as the Provisions.[2] The Provisions would establish the following elements: (1) three beneficial uses pertaining to tribal traditional and cultural use, tribal subsistence fishing use, and subsistence fishing use by other cultures or individuals; (2) one narrative and four numeric Mercury Water Quality Objectives to protect numerous beneficial uses of water involving human health and aquatic dependent wildlife; and (3) a program of implementation to control mercury discharges.

Mercury is a priority pollutant in water identified by the Clean Water Act (see 40 C.F.R. section 423, Appendix A). Unlike most other priority pollutants, the main route of exposure to humans and wildlife is not through water contact or water ingestion, but through consumption of methylmercury contaminated fish and shellfish. Consequently, the U.S. EPA established a methylmercury fish tissue recommended criterion in their 2001 update, in accordance to section 304(a) of the Clean Water Act. Therefore, the Provisions include water quality objectives in the form of fish tissue objectives.

1.1 Regulatory Authority for the Provisions

Federal Clean Water Act

[2] The Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries (ISWEBE Plan) is not yet adopted.

The Clean Water Act is the primary federal water pollution control statute. The State Water Board is designated as the State Water Pollution Control Agency for all purposes under the Clean Water Act. The Clean Water Act also creates the basic structure under which point source discharges of pollutants are regulated and establishes the statutory basis for the National Pollutant Discharge Elimination System (NPDES) permit program.

Porter-Cologne Water Quality Control Act

In 1969, the Porter-Cologne Water Quality Control Act (Wat. Code § 13000 et seq.) was adopted as the principal law governing water quality in California. The Porter-Cologne Water Quality Control Act established a comprehensive statutory program to protect the quality and "beneficial uses" (or "designated uses" under federal parlance) of waters of the state. Beneficial uses include, but are not limited to, "domestic, municipal, agricultural, and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves" (Wat. Code, § 13050, subd. (f)).

Pursuant to California Water Code section 13241, regulatory protection of beneficial uses is carried out, in part, through water quality objectives established by each of the Regional Water Quality Control Boards (Regional Water Boards) in each of the ten basin plans adopted in California or by the State Water Board in a water quality control plan. Beneficial uses of water bodies, water quality objectives designed to protect those uses, a corresponding implementation program, and an antidegradation policy constitute a complete water quality standard. Basin plans also designate specific waters with corresponding beneficial uses made for their waters.

The State Water Board also adopts water quality control plans for waters of the state. Statewide water quality control plans, when adopted, supersede a basin plan adopted by any Regional Water Board to the extent there is any conflict between the two plans for the same waters (Wat. Code, § 13170). In such circumstances, when the State Water Board adopts a statewide plan, the statewide plan automatically has effect for those waters within the respective Regional Water Board's jurisdiction—without the Regional Water Board having to revise their basin plan. (Throughout the Staff Report the State Water Board and the Regional Water Boards are collectively referred to as the Water Boards.)

1.2 Consent Decree Requiring a Mercury Water Quality Objective to Protect Wildlife

The United States District Court for the Northern District of California issued a consent decree to resolve the dispute in a lawsuit captioned, *Our Children's Earth Foundation and Ecological Rights Foundation vs. U.S. EPA*, No. 3:13-cv-2857-JSW (2014) (order granting stipulation to vacate hearing on U.S. EPA's motion to dismiss and enter consent decree). Pursuant to the consent decree, U.S. EPA is obligated to propose (by publishing in the Federal Register) water quality criteria for wildlife by June 30, 2017, initiate endangered species consultation within nine months of proposal, and finalize the rule within six months of the conclusion of the endangered species consultation between the U.S. EPA and the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS). If the State Water Board adopts the Provisions and U.S. EPA approves it prior to June 30, 2017, U.S. EPA's obligation to establish the water quality criteria for wildlife would be satisfied. If the Provisions are not adopted by the State Water Board and approved by U.S. EPA before that date, U.S. EPA would remain obligated to satisfy its obligations under the consent decree. However, if U.S. EPA approves the State Water Board's submittal after June 30, 2017, but before the federal rule is finalized, U.S. EPA would not be required to finalize the federal rule.

1.3 Purpose of the Staff Report

The purpose of the Staff Report for the Provisions (referred to as the Staff Report) is to provide the supporting information used to develop the Provisions. This includes the need for the Provisions, technical information to support recommended approaches as well as options for each approach, and alternatives considered in accordance with the California Water Code (Wat. Code) and California Environmental Quality Act (CEQA). The Staff Report also provides a record of the process used to develop the Provisions, including the environmental review, early consultation requirements, and the public participation process discussed in section 2.6, the scientific peer review described in Appendix S, and an economic analysis, which is included in Appendix R.

1.4 Intended Use of the Staff Report by Agencies

The State CEQA Guidelines require that the project description include, among other things, a statement briefly describing the intended uses of the Environmental Impact Report (EIR) (Cal. Code Regs., tit. 14, § 15124, subd. (d)). The agencies expected to use this Staff Report in decision making are described below.

The State Water Board will use this Staff Report in determining whether to adopt the Provisions. The State Water Board or any of the Regional Water Boards may use the information contained within this Staff Report for future decision making and/or permitting. Furthermore, implementation procedures have been included in this Staff Report in order to achieve the proposed water quality objectives for the permitted discharges described in the Provisions and in this Staff Report. Therefore, if the Provisions are approved, the following entities, where they are considered public agencies for purposes of CEQA, may be considered responsible agencies and may use the final Staff Report adopted by the State Water Board in their decision making actions to comply with the Provisions:

- Permitted non-storm water dischargers (e.g. publicly owned treatment works, industrial discharges)
- Permitted storm water dischargers
- Dischargers with Waste Discharge Requirements (WDRs) or waivers of WDRs
- The Water Boards

1.5 Note on the Use of the Terms "Mercury" and "Methylmercury" in the Staff Report

Generally the term "mercury" is used to indicate all forms of mercury, including inorganic mercury (elemental mercury, cinnabar) and methylmercury. For analytical measurements, either "methylmercury" or "total mercury" is typically specified. "Total mercury" includes methylmercury and inorganic forms. Mercury in fish tissue is referred to as "methylmercury" since almost all of the mercury in fish is methylmercury (see Section 4.2). However, mercury in fish in often measured as "total mercury" because it is less costly than measuring methylmercury alone.

1.6 Relationship to the Statewide Mercury Control Program for Reservoirs

Concurrent with the development of the Provisions, the State Water Board is developing a separate project, generally referred to as the statewide mercury control program for reservoirs, to establish a program to implement the Provisions' water quality objectives for Commercial and Sport Fishing (COMM), Wildlife Habitat (WILD), and Rare, Threatened, or Endangered Species (RARE) in all California reservoirs impaired by mercury for those uses. (State Water Board 2016, State Water Board 2014). That project is referred to throughout this Staff Report as the Reservoir Program. The Provisions, described in this Staff Report, are a separate and distinct project from the Reservoir Program. The Provisions have independent utility, whether or not the Reservoir Program is ultimately adopted by the State Water Board. If the State Water Board does not adopt a Reservoir Program, the Provisions will be implemented on a case-by-case basis for discharges to reservoirs, as described below in Section 6.13.3.

2. Project Description

The Water Boards' regulations for implementation of CEQA require the Staff Report to include a brief description of the Provisions (Cal. Code Regs., tit. 23, § 3777 subd. (b)(1)). The following Chapter provides information about the Provisions, including (1) the precise location and boundaries of the project; (2) an overview of the goals (i.e., project objectives) of the Provisions; (3) a general description of the project's technical, economic, and environmental characteristics; and (4) contains non-exclusive lists of: (a) the agencies that are expected to use this Staff Report in their decision making and permits, (b) other approvals required to implement the project, and (c) related environmental review and consultation requirements required by federal, state, or local laws, regulations, or policies (as required by the CEQA Guidelines (Cal. Code Regs., tit. 14, § 15124). The complete text of the Provisions is included in this Staff Report as Appendix A.

2.1 Project Title

This project is titled "Part 2 of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California—Tribal and Subsistence Fishing Beneficial uses, Mercury Provisions", and is referred to as the Provisions.

2.2 Project Objectives

The policy objectives of the Provisions are to:

1. Recognize beneficial uses of water made by California Native Americans and subsistence fishers, including fishing, cultural, and ceremonial uses of water;
2. Adopt numeric water quality objectives for mercury to protect piscivorous wildlife from consumption of fish with elevated levels of mercury;
3. Adopt water quality objective(s) for mercury to protect recreational fishers, subsistence fishers, and California tribes from consumption of fish with elevated levels of mercury;
4. Provide a program of implementation to control mercury discharges and achieve the Mercury Water Quality Objectives in California waters; and
5. Provide statewide consistency for objectives 1 through 4.

2.3 Description of the Provisions

2.3.1 Beneficial Uses

The Provisions would establish three new beneficial uses related to: tribal traditional and cultural use, tribal subsistence fishing use, and subsistence fishing. (See Chapter 6, Issue D.) The Provisions would require each of the Regional Water Boards to use the beneficial uses and abbreviations listed below, to the extent it defines such activities in a water quality control plan after the effective date of the Provisions.

To designate the Tribal Tradition and Culture or Tribal Subsistence Fishing beneficial uses in a water quality control plan for a particular waterbody segment and time(s) of year, a California Native American tribe must confirm the designation is appropriate. No confirmation is required to designate the Subsistence Fishing beneficial use in a water quality control plan.

The Tribal Subsistence Fishing and Subsistence Fishing beneficial uses relate to the risks to human health from the consumption of noncommercial fish or shellfish. The two subsistence fishing beneficial uses assume a higher rate of consumption of fish or shellfish than that protected under the Commercial and Sport Fishing and the Tribal Tradition and Culture beneficial uses. The function of the Tribal Subsistence Fishing and Subsistence Fishing beneficial uses is not to protect or enhance fish populations or aquatic habitats. Fish populations and aquatic habitats are protected and enhanced by other beneficial uses, including but not limited to, Aquaculture, Warm Freshwater Habitat, and Cold Freshwater Habitat, that are designed to support aquatic habitats for the reproduction or development of fish.

1) Tribal Tradition and Culture (CUL): Uses of water that support the cultural, spiritual, ceremonial, or traditional rights or lifeways of California Native American Tribes, including, but not limited to: navigation, ceremonies, or fishing, gathering, or consumption of natural aquatic resources, including fish, shellfish, vegetation, and materials.

2) Tribal Subsistence Fishing (T-SUB): Uses of water involving the non-commercial catching or gathering of natural aquatic resources, including fish and shellfish, for consumption by individuals, households, or communities of California Native American Tribes to meet minimal needs for sustenance.

3) Subsistence Fishing (SUB): Uses of water involving the non-commercial catching or gathering of natural aquatic resources, including fish and shellfish, for consumption by individuals, households, or communities, to meet minimal needs for sustenance.

2.3.2 Water Quality Objectives

The Provisions would establish five new water quality objectives for mercury (the Mercury Water Quality Objectives) to protect people and wildlife from consuming fish that contain high levels of mercury. These objectives are named the Sport Fish Water Quality Objective, the Tribal Subsistence Fishing Water Quality Objective, the Subsistence Fishing Water Quality Objective, the Prey Fish Water Quality Objective, and the California Least Tern Prey Fish Water Quality Objective and are collectively referred to as the Mercury Water Quality Objectives. The Mercury Water Quality Objectives protect recreational fishers, California tribes and other subsistence fishers, the endangered California least tern, and other wildlife listed in Table 2.1 (see Appendix A for full details). With the exception of the Subsistence Fishing Water Quality Objective, the Mercury Water Quality Objectives in these Provisions are expressed as concentrations of milligrams of methylmercury per kilogram of fish tissue (mg/kg), since consuming fish is the main route of exposure to harmful levels of mercury in the environment. The Subsistence Fishing Water Quality Objective is a narrative water quality objective.

Since methylmercury accumulates up the food web, the trophic level (the place an organism occupies on the food web) of the fish is an important component in setting a water quality objective for mercury in fish tissue. Trophic level three fish are those that typically feed on plankton and insects (e.g. trout). Trophic level four fish are predators that often feed on trophic level three organisms (e.g. bass). Trophic level four fish typically accumulate much higher methylmercury concentrations than trophic level three fish.

Table 2.1. Summary of the Mercury Water Quality Objectives

Objective Type	**Beneficial Uses**	**Objective**
Sport Fish	Commercial and Sport Fishing; Wildlife Habitat[a]; Marine Habitat	0.2 mg/kg in highest trophic level fish, 150-500 mm
Tribal Subsistence	Tribal subsistence fishing	0.04 mg/kg in 70% trophic level 3 fish and 30% trophic level 4 fish, 150-500 mm
Subsistence	Subsistence fishing	"Waters… *shall be maintained free of mercury at concentrations which accumulate in fish and cause adverse biological, reproductive, or neurological effects…"* (see Provisions, Appendix A)
Prey Fish	Wildlife Habitat [a]; Marine Habitat (where no trophic level 4 fish)	0.05 mg/kg in fish 50-150 mm
California Least Tern Prey Fish	Wildlife Habitat [a], Marine Habitat, Rare, Threatened, or Endangered Species (where California least tern habitat exists) (may be designated for Rare, Threatened, or Endangered Species; Wildlife Habitat; Marine Habitat)	0.03 mg/kg in fish less than 50 mm
[a] The objectives supporting Wildlife Habitat and Marine Habitat may also be applied to Warm Freshwater Habitat, Cold Freshwater Habitat, Estuarine Habitat, and Inland Saline Water Habitat because each of those includes protection of wildlife habitat (see Section 5.1).		

The Sport Fish Water Quality Objective protects California recreational fishers at a consumption rate of one meal per week of sport fish. The Tribal Subsistence Fishing Water Quality Objective is three to four times more stringent than the Sport Fish Water Quality Objective in order to protect tribal communities that consume greater amounts of fish. The Tribal Subsistence Fishing Objective protects tribal fish consumers at a consumption rate of four to five meals of fish per week of mostly lower trophic level fish (e.g., trout and salmon), based on a study of tribal fish consumption. The Subsistence Fishing Objective is a narrative objective and protects other consumers at a rate determined on a site-specific basis, since the consumption rate and species consumed vary, in absence of site-specific information, U.S. EPA guidance may be used. The Prey Fish Water Quality Objective and the California Least Tern Prey Fish Water

Quality Objective protect wildlife that typically consume smaller fish. The Prey Fish Water Quality Objective focuses on sampling smaller trophic level three fish that are shorter lived and thus have not had time to accumulate as much methylmercury as larger sport fish. These fish constitute a significant portion of the diet in smaller piscivorous birds and wildlife. The California Least Tern Prey Fish Water Quality Objective applies to the habitat of the California least tern, since the California least tern is a very sensitive endangered species. The Prey Fish Water Quality Objective is for situations where the Sport Fish Water Quality Objective is measured using trophic level 3 fish, which would not ensure protection of all wildlife species that prey upon smaller fish for food. The details of the development of the Mercury Water Quality Objectives are discussed in Section 6.1 through Section 6.8.

2.3.3 Program of Implementation

The Provisions include a program of implementation to control mercury inputs to water bodies through NPDES permits issued pursuant to section 402 of the Clean Water Act, water quality certifications issued pursuant to section 401 of the Clean Water Act, WDRs, and waivers of WDRs, where any of the five Mercury Water Quality Objectives apply. Permits with the new requirements may be issued to: owners of active and legacy gold and mercury mine sites, dredging activity permittees, wetland project applicants, other nonpoint source dischargers, municipal separate storm sewer systems and other storm water dischargers, and wastewater treatment plants and industrial dischargers, as listed below. For MS4 storm water, point source wastewater and industrial dischargers, and mine site remediation permittees, new requirements are mandatory. For non-point source discharges, wetland projects, and dredging activities, new requirements are at the discretion of the Water Boards under existing law. For some of the discharges, existing management practices may be sufficient to comply with the new requirements. For municipal wastewater treatment systems and non-storm water industrial discharges, a water column translation of the mercury concentration in fish tissue would be used in permitting. A summary of the requirements by discharge type is listed below. For more details see the relevant sections of the Staff Report (indicated below) or the Provisions.

Mine Site Remediation

For discharges subject to California Code of Regulations, title 27, section 22510 (closure and post-closure of mining sites), where mercury was mined or used in the processing ore, erosion and sediment controls are required at a minimum to control mercury in the discharge (see Section 6.9). Since mercury binds to sediments, preventing discharges of sediments also minimizes discharges of mercury.

Additionally, discharges from mine tailings from historic mines may be regulated as Storm Water Discharges (i.e., through Municipal, Construction, or California Department of Transportation storm water permits), Nonpoint Source Discharges, or Dredging Activity Discharges, as described below. Discharges from currently operating mines may be regulated as Waste and Industrial Discharges or as Storm Water Discharges from Industrial Facilities, as described below.

Dredging Activities

The Water Boards have discretion under existing law to require dischargers to implement total mercury monitoring and procedures to control the disturbance and discharge of mercury-contaminated material during dredging and disposal of dredged material. The draft Provisions emphasize that the permitting authority should consider requiring such measures in areas with elevated mercury concentrations (see Section 6.10).

Wetland Projects

Projects that create or restore wetlands will provide valuable wildlife habitat, and the Provisions encourage responsible wetland development. For these projects, the Water Boards would have discretion under existing law to require the project applicant to include design features or management measures to reduce the production of methylmercury in the wetland. The draft Provisions emphasize that the permitting authority should consider requiring such measures in areas with elevated mercury concentrations (see Section 6.10).

Other Nonpoint Source Discharges

Where there are elevated concentrations of mercury in the soil, the Water Boards have discretion under existing law to require dischargers to implement erosion and sediment control measures in WDRs and waivers of WDRs. The draft Provisions emphasize that the permitting authority should consider requiring such measures in areas with elevated mercury concentrations (see Section 6.10).

Storm Water Discharges

Storm Water from Municipal Separate Storm Sewer Systems

While MS4s already conduct pollution prevention and pollution control activities, the Provisions require that all Phase I and Phase II MS4 permits include pollution prevention activities specifically for mercury (e.g., thermometer exchange programs, fluorescent lamp recycling programs, public education and outreach, auto dismantler education, and survey of use, handling, and disposal of mercury-containing products, see Section 6.11).

Storm Water from California Department of Transportation Activities
The Provisions would not impose any new requirements. The existing California Department of Transportation storm water permit provided a sufficient level of baseline controls for mercury in the form of sediment controls (see Section 6.11).

Storm Water from Construction Activities
The Provisions would not impose any new requirements. The existing construction storm water permit provides a sufficient level of baseline controls for mercury in the form of sediment controls (see Section 6.11).

Storm Water from Industrial Activities
The Provisions would not impose any new requirements. The exiting general permit for industrial activities already includes methods to control mercury if the Numeric Action Level for mercury is exceeded. However, the Provisions would update the Numeric Action Level from 1400 nanograms per liter (ng/L) to 300 ng/L (see Section 6.11).

Wastewater and Industrial Discharges
For discharges to waters protected by the Sport Fish Water Quality Objective, the Prey Fish Water Quality Objective, or the California Least Tern Prey Fish Water Quality Objective, discharges to flowing water bodies (rivers, creeks, and streams) that are determined by the Water Boards to have reasonable potential would need to meet an effluent limitation calculated using a water column concentration value for total mercury of 12 ng/L and perform required monitoring of the mercury concentration in the effluent. Discharges to estuaries with slow moving water (lagoons and marshes) that have total mercury concentrations higher than 4 ng/L would need to meet an effluent limitation calculated using the 4 ng/L value. The water column concentrations were derived from bioaccumulation factors (BAFs) and translators (Appendix I, Section 6.12 to 6.13). Rather than applying the above effluent limits, dischargers may determine site-specific BAFs to calculate effluent limits specific to their receiving waters. In addition, Water Boards have the discretion to allow dilution credits where appropriate.

For dischargers to waters protected by the Tribal Subsistence Fishing Water Quality Objective, discharges to flowing water bodies that are determined by the Water Boards to have reasonable potential with total mercury concentrations higher than 4 ng/L would need to meet an effluent limitation calculated using a water column concentration value for total mercury of 4 ng/L and perform required monitoring of the mercury concentration in the effluent. For estuaries with slow moving water, discharges that are determined by the Water Boards to have reasonable potential with total mercury concentrations higher than 1 ng/L would need to meet an effluent limitation calculated using a water column concentration value for total mercury of 1 ng/L. For discharges to waters protected by the Subsistence Fishing Water Quality Objective, effluent limitations would need to be derived on a site-specific basis.

All effluent limitations would be based on an annual average concentration of total mercury. Additional exceptions to these requirements may apply. If the discharge originates from a publicly owned wastewater treatment plant (POTW) that serves a small disadvantaged community or is designated as an insignificant discharge, then the monitoring requirements may be waived (see Section 6.12 to 6.13).

For dischargers that have new requirements under the Provisions, the Provisions would result in additional costs. The costs incurred by different individual dischargers may vary widely, depending on the degree to and the methods by which those dischargers are already currently controlling mercury. The costs are evaluated in Appendix R. For some dischargers, the Provisions would not result in new requirements and those dischargers would not incur additional costs. The Provisions' new requirements imposed on dischargers are discussed in the Staff Report in comparison to existing policy, existing requirements, and where possible, the current performance of discharges in Chapter 6, to anticipate the new costs or new requirements the Provisions may impose on dischargers.

2.3.4 Effective Date of the Provisions and their Implementation

The Provisions would establish new beneficial uses pertaining to tribal traditional and cultural, tribal subsistence fishing, and subsistence fishing. The establishment of the beneficial uses would be effective for purposes of the Clean Water Act upon adoption by the State Water Board and approval by the Office of Administrative Law (OAL) and U.S. EPA. However, the Provisions would not designate these beneficial uses to any specific water body. There is an expectation that the beneficial uses would be designated in the future by Regional Water Boards through the basin plan amendment process (a process that is often a minimum of two years). This process may be initiated at any time by a Regional Water Board, but would depend on the Regional Water Board's other priority projects, input from California tribes or subsistence fishing communities, and the availability of information to support the designation.

Generally, the Mercury Water Quality Objectives would become effective upon adoption by the State Water Board and approval by OAL and U.S. EPA, which typically occurs within a few months after the State Water Board adoption. The Tribal Subsistence Fishing Water Quality Objective and the Subsistence Fishing Water Quality Objectives would only apply to a particular water body after the corresponding beneficial use is designated to a water body. However, either of the objectives may be incorporated into a permit prior to formal designation if the Water Boards determine that tribal subsistence fishing or subsistence fishing is an existing use.

The requirements contained in the Provisions would become effective for a specific discharger once the Water Boards incorporate the mandatory conditions into the discharger's permit. Insofar as the Provisions acknowledge that the Water Boards have discretion to include requirements for particular dischargers, those requirements would also become effective upon inclusion in the applicable permit. This process would generally be done permit-by permit as the permits are issued, modified, or renewed. In the case of NPDES permits regulated by section 402 of the Clean Water Act, the U.S. EPA must approve the Provisions and the final permit for such requirements to be effective. Any new condition or requirement added or amended into a WDR could be implemented upon approval by OAL. The State Water Board has the authority to amend certifications under section 401 of the Clean Water Act pursuant to the Provisions. As a result, new requirements should be incorporated into all existing applicable NPDES permits within 5 to10 years of date of approval by U.S. EPA. New mercury requirements should be included in most other applicable WDRs within 15 years of the date of approval(s). The mercury requirements would also be included in any applicable new permit for new discharges. Timelines for compliance are already established by existing programs and in the State Water Board's *Policy for Compliance Schedules in National Pollutant Discharge Elimination System Permits* (Resolution 2008 – 0025).

2.4 Location and Boundaries of the Provisions and Relationship to Regional Water Quality Control Plans

After the State Water Board adopts and establishes the new beneficial use definitions, to the extent a Regional Water Board defines such activities in its basin plan after the effective date of the Provisions, the Regional Water Board would use the beneficial use definitions and abbreviations contained in the Provisions. Upon being included within their respective basin plans, the Regional Water Boards may designate waters (inland surface waters, enclosed bays, and estuaries of the State (Figure 2-1)) within their respective regions as having one or more of the beneficial uses. Similarly, the State Water Board may designate waters applicable to its water quality control plans.

Of the nine Regional Water Boards, only the North Coast Regional Water Board's basin plan explicitly lists a beneficial use for Native American Culture (which includes subsistence fishing) and a separate Subsistence Fishing beneficial use (North Coast Water Board, 2011, p. 2-3.00). The new beneficial use definitions proposed by the Provisions would not supersede the North Coast Water Board's existing beneficial use definitions for Native American Culture and Subsistence Fishing contained in its basin plan.

The Provisions' Mercury Water Quality Objectives would apply to inland surface waters, enclosed bays, and estuaries in California designated with the corresponding beneficial uses: Commercial and Sport Fishing (COMM); Wildlife Habitat (WILD); Warm Freshwater Habitat (WARM); Cold Freshwater Habitat (COLD); Estuarine Habitat (EST); Inland Saline Water Habitat (SAL); Marine Habitat (MAR); Rare, Threatened, or Endangered Species (RARE); Tribal Traditional and Culture (CUL); Tribal Subsistence Fishing (T-SUB); and Subsistence Fishing (SUB). The Mercury Water Quality Objectives associated with these beneficial uses would not supersede site-specific mercury water quality objectives meant to protect human health or wildlife. (See Figure 2-1 and Section 3.10 for a list of site-specific water quality objectives). Additionally, the Tribal Subsistence Fishing Water Quality Objective would not apply to waters designated by the North Coast Regional Water Board's basin plan with the beneficial uses for Native American Culture (which includes subsistence fishing) (North Coast Water Board, 2011, Table 2-1). State Water Board staff is uncertain what activities within the North Coast Regional Water Board's Native American Culture beneficial use definition supported the designations. Additionally, the beneficial use definitions proposed by the Provisions for CUL and T-SUB, and SUB in some respects are more broad, and in other respects more narrow, than the North Coast Regional Board's beneficial use for Native American Culture. As a result, State Water Board staff is uncertain which waters designated with Native American Culture in the North Coast region would be appropriate to apply the Mercury Water Quality Objectives. In the future, if the North Coast Regional Water Board amends its basin plan with the Provisions' beneficial uses for CUL, T-SUB, and SUB, such designation would determine which of the Mercury Water Quality Objectives would apply. The Provisions' Subsistence Fishing Water Quality Objective would apply to the Subsistence Fishing (FISH) beneficial use contained in the North Coast Regional Water Board basin plan, but no waters in that region have been designated with that use.

The Provisions' program of implementation would apply to the same waters as the Mercury Water Quality Objectives, but the implementation provisions would not apply to dischargers that discharge to receiving waters for which a mercury or methylmercury total maximum daily load (a mercury or methylmercury TMDL) has been approved. See Section 3.10 for a list of TMDLs).

Figure 2-1 Project Boundary and Major Waters Included in the Project. For a list of site-specific objectives see Table 3-2.

2.5 Permits and Other Approvals Required to Implement the Provisions

After adoption by the State Water Board, the Provisions must be submitted to the California Office of Administrative Law for review and approval. Because the Provisions include the adoption of new water quality standards, pursuant to Clean Water Act section 303, subdivision (c), the Provisions' water quality standards must also be submitted to U.S. EPA for review and approval.

Except as may be required by other environmental review and consultation requirements as described below, no other agency approvals are expected to be required to implement the final Provisions. However, governing bodies of NPDES permittees may determine that separate approval actions are necessary to formally approve the approach they would take to comply with permits that implement the final Provisions. Beyond analyzing the reasonably foreseeable methods of compliance, the Staff Report is not required to, and therefore does not analyze the details related to the project specific actions that might be implemented by any particular permittee as a result of the State Water Board's proposed project (see Cal. Code Regs., tit. 23, § 3777, subd. (c); Pub. Resources Code § 21159, subd. (d)).

2.6 Environmental Review and Consultation Requirements

The Staff Report includes the State Water Board's Substitute Environmental Documentation (SED) required to satisfy the provisions of the CEQA, pursuant to Public Resources Code sections 21080.5, 21159 and CEQA Guidelines sections 1520 through 15253, and the State Water Board's Regulations for Implementation of the California Environmental Quality Act of 1970, California Code of Regulations, title 23, sections 3720 through 3781. These requirements are listed below, along with other regulatory process requirements.

2.6.1 California Environmental Quality Act

CEQA authorizes the Secretary for Natural Resources to certify that state regulatory programs meeting certain environmental standards are exempt from many of the procedural requirements of CEQA, including the preparation of a separate EIR, negative declaration, or initial study. (Pub. Resources Code, § 21080.5). The Secretary for Natural Resources has certified as exempt the State Water Board's Basin/208 Planning Program for the protection, maintenance, and enhancement of water quality in California. (Cal. Code Regs., tit. 14, § 15251(g)). Exempt regulatory programs include the Water Boards' adoption or approval of water quality standards and provisions to implement water quality standards, such as the Provisions. (Cal. Code Regs., tit. 23, § 3775-3781). Therefore, the Staff Report includes the Substitute Environmental Documentation required for compliance with CEQA, and a separate CEQA document will not be prepared. The State Water Board must still comply with CEQA's goals and policies, including the policy of avoiding significant adverse effects on the environment where feasible (Cal. Code. Regs., tit. 14, § 15250).

According to the State Water Board regulations for the implementation of CEQA (Cal. Code Regs., tit. 23, § 3777), the Substitute Environmental Documentation shall consist of a written report prepared for the Board containing an environmental analysis of the project; a completed Environmental Checklist (where the issues identified in the checklist must be evaluated in the checklist or elsewhere in the SED); and other documentation as the Board may include. The

SED is required to contain, at a minimum, the following information:

1. A brief description of the proposed project;
2. An identification of any significant or potentially significant adverse environmental impacts of the proposed project;
3. An analysis of reasonable alternatives to the project and mitigation measures to avoid or reduce any significant or potentially significant adverse environmental impacts; and
4. An environmental analysis of the reasonably foreseeable methods of compliance. The environmental analysis shall include, at a minimum, all of the following:
    a. An identification of the reasonably foreseeable methods of compliance with the project;
    b. An analysis of any reasonably foreseeable significant adverse environmental impacts associated with those methods of compliance;
    c. An analysis of reasonably foreseeable alternative methods of compliance that would have less significant adverse environmental impacts; and
    d. An analysis of reasonably foreseeable mitigation measures that would minimize any unavoidable significant adverse environmental impacts of the reasonably foreseeable methods of compliance. (Cal. Code Regs., tit. 23, § 3777, subd. (b)).

Accordingly, these analyses are contained in Chapter 2 and Chapters 7 through 9 of the Staff Report.

2.6.2 Reasonably Foreseeable Methods of Compliance

The State Water Board's Substitute Environmental Documentation for the Provisions is required to include an environmental analysis of the reasonably foreseeable methods of compliance with the Provisions (Cal. Code Regs., tit. 23, § 3777, subd. (b)(4); Pub. Resources Code, § 21159, subd. (a)). In developing the environmental analysis, the State Water Board is not required to conduct a site-specific project level analysis of the methods of compliance, but the environmental analysis shall account for a reasonable range of environmental, economic, and technical factors (Cal. Code Regs., tit. 23, § 3777, subd. (c); Pub. Resources Code, § 21159, subd. (d)). A general description of the reasonably foreseeable methods of compliance is contained in Chapter 7 of the Staff Report and the environmental analysis of the reasonably foreseeable methods of compliance is contained in Chapter 8 of the Staff Report.

2.6.3 Early Public Consultation/Scoping

CEQA requires the State Water Board to seek early public consultation with public agencies and members of the public prior to circulating the draft SED. (Cal. Code Regs., tit. 23, § 3775.5, subd. (a).) The consultation may include one or more scoping meetings to engage the stakeholders and public agencies early in the planning and formulation stages of the project to scope the range of actions, alternatives, reasonably foreseeable methods of compliance, significant impacts, and cumulative impacts, if any, that should be analyzed in the study and mitigation measures that will reduce impacts to a less than significant level, and to eliminate from the project any elements found not to be important (Cal. Code Regs., tit. 23, § 3775.5, subd. (b)). A scoping meeting for the Provisions was held in February 2007 in Sacramento, California. Oral and written comments were received, but development of the Provisions was delayed due to shifting staff resources to other State Water Board priority plans and policies.

2.6.4 Focus Group Meetings

To continue engagement and consultation with interested members of the public, State Water Board staff held nine targeted outreach meetings from June through October of 2014 to discuss and solicit feedback on the Provisions' key elements. These meetings also included discussion on the Reservoir Program (see Section 1.6). Eight meetings were held with representatives from California tribes, industry, municipal governments, environmental interest groups, the Department of Conservation, the Bureau of Land Management (BLM), U.S. Forest Service (USFS), the U. S. Army Corps of Engineers, California Department of Public Health (CDPH) and county health departments (Table 2-1). Participants were provided an issue paper that provided an overview of the fundamentals of the Provisions and 21 key unresolved issues and options to discuss. Documents from these meetings and the 2007 scoping meeting are available at http://www.waterboards.ca.gov/water_issues/programs/mercury/.

Table 2-1. Focus Group Meetings

Group	Location, Date
California Native American Tribes	Sacramento (teleconference), June 27, 2014
Northern California Environmental & Environmental Justice Groups	Sacramento, July 8, 2014
Municipal Wastewater	Sacramento, July 14, 2014
Northern California Municipal Storm Water Agencies	Sacramento, July 25, 2014
Southern California Municipal Storm Water Agencies	Costa Mesa, July 31, 2014
Land Managers/Mining	Sacramento, August 7, 2014
Public Health Departments	Sacramento, September 3, 2014
Industrial Wastewater Dischargers	Sacramento, September 11, 2014
Presentation at U.S. EPA Tribal Conference	Sacramento, October 15, 2016

In formulating the Provisions, State Water Board staff consulted with staff from the Regional Water Boards in a meeting in October 2014. Staff from the San Francisco Bay Water Board and the Central Valley Water Board who are developing the Reservoir Program have been involved in the development of the Provisions. In addition, State Water Board staff has consulted with staff from U.S. EPA and the Office of Environmental Health Hazard Assessment (OEHHA).

2.6.5 Tribal and Subsistence Fishing Beneficial Uses Outreach Meetings
Eleven meetings were held by State Water Board staff with California tribes and other stakeholders as part of staff's efforts to receive input on the proposed beneficial uses (Table 2-2). These focused outreach meetings were held prior to the formal comment period, therefore no formal responses to comments were made. Staff altered the definitions based on input received during these outreach meetings.

Table 2-2. Focus Group Meetings for the Beneficial Uses

Group	Location, Date
Tribal Ad-hoc Committee	Lower Lake, May 5, 2016
Agriculture Representatives	Sacramento, May 12, 2016
Association California Water Agencies	Sacramento, May 13, 2016
Association California Water Agencies	Sacramento (and webcast), June 15, 2016
Southern California Tribal Representatives	Coachella, June 27, 2016
Municipal Storm Water and Wastewater	Sacramento (and webcast), July 12, 2016
Northern California Tribal Representatives	Loleta (Eureka), July 15, 2016
Central California Tribal Representatives	Sacramento (and webcast), July 20, 2016
NGOs and Environmental Justice Groups	Sacramento (and webcast), July 26, 2016
Industry	Sacramento (and webcast), July 26, 2016
Ag, Dairy, Grazers	Sacramento (and webcast), July 27, 2016

2.6.6 Notice to California Native American Tribes of Opportunity for Consultation
AB 52 (Gatto, 2014) established a new category of resources in CEQA called Tribal Cultural Resources:

> 'Tribal cultural resources' are either of the following: (1) Sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe that are either of the following: (A) Included or determined to be eligible for inclusion in the California Register of Historical Resources. (B) Included in a local register of historical resources as defined in subdivision (k) of Section 5020.1. (2) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Section 5024.1. In applying the criteria set forth in subdivision (c) of Section 5024.1 for the purposes of this paragraph, the lead agency shall consider the significance of the resource to a California Native American tribe." (Pub. Resources Code, § 21074)

AB 52 also established a consultation process with all California tribes on the Native American Heritage Commission List. Consultation with a California Native American tribe that has requested such consultation may assist a lead agency in determining whether the project may adversely affect tribal cultural resources, and if so, how such effects may be avoided or mitigated. AB 52 requires formal notice to California tribes of an opportunity to consult with the lead agency prior to the release of a negative declaration, mitigated negative declaration, or environmental impact report if the tribe is traditionally and culturally affiliated with the geographic area of the proposed project.

The requirements to consider tribal cultural resources and to consult with California tribes apply to CEQA projects for which the lead agency issues a notice of preparation or a notice of intent to adopt a negative declaration or mitigated negative declaration on or after July 1, 2015. The State Water Board considers AB 52's requirements as also applying to SED.

In addition to the outreach described above, letters dated May 10, 2016 were sent via certified mail to 14 tribal communities, including all of the California tribes registered at the time to receive AB 52 notices. All delivery receipts were received by the State Water Board by June 17, 2016. The State Water Board received no response to these letters requesting consultation within the 30 days (or at any other time) following the tribes' receipt of the letters.

2.6.7 Consultation with U.S. Fish and Wildlife Service, California Department of Fish and Wildlife and National Marine Fisheries Service

Since the Provisions could affect threatened or endangered species, the California Endangered Species Act of 1984 requires State agencies to consult with the California Department of Fish and Wildlife (CDFW) on State-listed species. Additionally, the Federal Endangered Species Act requires consultation with USFWS and NMFS on federally listed species.

Moreover, because a major impetus of the Provisions is to address concerns raised by USFWS in the 1998 draft Biological Opinion (see Section 3.5), satisfying the concerns of USFWS is critical to the success of the project.

State Water Board staff consulted with staff from USFWS and CDFW in the development of the Mercury Water Quality Objectives for wildlife. A draft was sent to USFWS in March 2014. Meetings were held with representatives from USFWS and U.S. EPA in March 2015 and with representatives from USFWS, U.S. EPA, and National Marine Fisheries Service on December 7, 2015. The CDFW was sent drafts and was invited to the last meeting, but did not attend.

2.6.8 Scientific Peer Review

The California Health and Safety Code section 57004 requires external scientific peer review of the scientific basis for any rule proposed by any board, office, or department within the California Environmental Protection Agency. Scientific peer review is a mechanism for ensuring that the scientific portions of regulatory decisions and initiatives are based on sound science. Scientific peer review also helps strengthen regulatory activities, establishes credibility with stakeholders, and ensures that public resources are managed effectively. The scientific portions of the Provisions underwent external scientific peer review in the summer of 2016. The scientific reviewer's comments, Water Board staff responses, and the resulting changes to the Provisions, are included in Appendix S.

The external peer reviewers prepare a written report that contains an evaluation of the scientific basis of the proposed rule. If a review finds that the State Water Board has failed to demonstrate that the scientific portion of the proposed rule is based upon sound scientific knowledge, methods, and practices, the report shall state that finding, and the reasons explaining the finding (Health & Safety Code, § 57004, subd. (d)(2)). In such a case, if the State Water Board disagrees with any aspect of the finding of the external scientific peer review, it shall explain its disagreement and include as a part of the administrative record for the rule "its basis for arriving at such a determination in the adoption of the final rule, including the reasons why it has determined that the scientific portions of the proposed rule are based on sound scientific knowledge, methods, and practices" (Health & Safety Code, § 57004, subd. (d)(2)). The scientific peer review should be completed and changes to the Provisions should be made, if necessary, before the draft Provisions and Staff Report are distributed for public comment.

2.6.9 Water Code section 13241

In accordance with Water Code section 13241, the Water Boards are required to establish water quality objectives to "ensure the reasonable protection of beneficial uses and the prevention of nuisance." In doing so, the Water Boards shall consider the following factors:

1. Past, present, and probable future beneficial uses of water.
2. Environmental characteristics and water quality of the hydrographic unit under consideration.
3. Water quality conditions that could be reasonably attained through coordinated control of all factors affecting water quality.
4. Economic considerations.
5. The need for developing new housing.
6. The need to develop and use recycled water.

Discussion of the six factors are in Chapter 10, however, several factors (including economic considerations) are also discussed in Chapter 6 (discussion of the policy issues).

2.6.10 Other Requirements

Antidegradation, the Human Right to Water, and climate change are described in Chapter 10.

2.7 Project Contacts

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Program Website
http://www.waterboards.ca.gov/water_issues/programs/mercury/

Updates on the Provisions can be obtained by subscribing to the electronic subscription mailing list (listserv) for the "Mercury - Statewide Provisions", under "Water Quality": http://www.waterboards.ca.gov/resources/email_subscriptions/swrcb_subscribe.shtml.

3. Regulatory Background

3.1 Regulatory History and the Need for New Beneficial Uses

The Federal Water Pollution Control Act of 1972, as amended (33 U.S.C. § 1251 et seq. (Clean Water Act or Act) “is a comprehensive water quality statute designed to restore and maintain the chemical, physical, and biological integrity of the Nation’s waters.” (*PUD No. 1 of Jefferson City v. Washington Dept. of Ecology* (1994) 511 U.S. 700, 704 (internal quotation marks omitted).) The Clean Water Act requires states to adopt new or revise existing water quality standards for all waters within their boundaries. (33 U.S.C. § 1313(a); 40 C.F.R. § 131.4(a).) If a state does not set water quality standards, or if U.S. EPA determines that the state’s standards do not meet the requirements of the Clean Water Act, U.S. EPA promulgates standards for the states. (33 U.S.C. § 1313(b), (c)(3)-(4).) “Water quality standards are to protect the public health or welfare, enhance the quality of water and serve the purposes of the Act.” (40 C.F.R. 131.3(i).) Water quality standards generally consist of three components: designated uses for each water body or segment, water quality criteria for those waters intended to protect the designated uses, and an antidegradation policy (40 C.F.R §131.6(a), (c), and (d); 40 C.F.R. § 131.13). In general, “uses” refer to what a water body is or potentially may be used for (40 C.F.R. § 131.3(f)), either by the public or by plants, fish, and other forms of life, with examples as diverse as use as wildlife and riparian habitat, use of water for industrial production, agricultural supply, or use for recreation due to activities such as fishing and swimming in water bodies (40 C.F.R. 131.10(a)). Most, if not all, water bodies have multiple uses. “Existing uses” are “those uses actually attained in the water body on or after November 28, 1975, whether or not they are included in the water quality standards.” (40 C.F.R. § 131.3(e).) “‘Designated uses’ are those uses specified in water quality standards for each water body or segment whether or not they are being attained.” (40 C.F.R. § 131(f).) “Water quality criteria” are “expressed as constituent concentrations, levels, or narrative statements, representing a quality of water that supports a particular use.” (40 C.F.R. § 131.3(b).) Antidegradation policies generally must provide three levels (tiers) of water quality protection to maintain and protect existing water uses, high quality waters, and outstanding national resource waters, consistent with 40 Code of Federal Regulations section 131.12.

Under the Porter-Cologne Water Quality Control Act (Wat. Code, § 13000 et seq.), California law designates the State Water Board and the nine Regional Water Boards as the principle state agencies for enforcing federal and state water pollution law (Wat. Code, §§ 13140, 13160, 13225, 13240). California law defines “designated uses” and “water quality criteria,” respectively, as “beneficial uses” and “water quality objectives” (Wat. Code, § 13050, subds. (f), (h)). Regional Water Boards are required to establish water quality control plans for all areas within their regions (Wat. Code, §13240), and those water quality control plans must designate or establish, in part, beneficial uses within the areas governed by that plan (Wat. Code § 13050, subd. (j)).

Beneficial uses form the cornerstone of water quality management and protection in California. The Water Boards carry out their water quality protection authority through, among other actions, the adoption of regional water quality control plans (referred to as "basin plans" when adopted by the Regional Water Boards). Through these plans, the Water Boards establish water quality standards, and the Regional Water Boards designate specific waters within their respective regions where the use applies (Wat. Code, §§ 13240, 13050, subd. (j)). Once beneficial uses are designated in basin plans, water quality objectives can be established and programs that maintain or enhance water quality can be implemented to ensure the reasonable protection of beneficial uses (Wat. Code, § 13241) for surface waters, ground water, marshes, wetlands, and other waters of the state. The federal Clean Water act allows states to adopt sub-categories of a use and set the appropriate water quality criteria (objective) to reflect the varying needs of such sub-categories of uses (40 C.F.R. § 131.10(c)). For example water quality criteria should be set to differentiate "fisheries" between cold water and warm water fisheries.

Beginning in 2012, while new statewide water quality objectives for mercury were under development, California tribes began addressing the State Water Board and the U.S. EPA with concerns regarding the lack of consideration of tribal input in water quality decisions made in California. Many California tribes consume much higher amounts of fish for traditional, cultural, and subsistence reasons, meaning that the consumption rates assumed in existing criteria for mercury underestimates use by these groups. U.S. EPA commissioned a study by UC Davis researchers who found, through a survey of 40 California tribes and tribal groups, that fish consumption was approximately 5 to 25 times higher for tribal fishers, greatly increasing the risk of methylmercury exposure. In addition, environmental justice advocacy groups requested that non-tribal subsistence fishers be considered in a mercury rulemaking.

Communication between the State Water Board and several California tribes began in 2013. The Chair of the State Water Board wrote to a tribal ad hoc group in October 2013 and acknowledged "the importance of identifying and describing beneficial uses unique to California tribes, in addition to subsistence fishing by other cultures or individuals." State Water Board staff corresponded and engaged with tribal representatives during 2014 and 2015, as well as with environmental justice representatives, to receive their input concerning matters uniquely within their knowledge, tradition, and practices. During spring 2015, eight tribes submitted resolutions from their respective tribes to the State Water Board which proposed specific language for two beneficial uses pertaining to tribal traditional and cultural use and tribal subsistence fishing. On February 16, 2016, the State Water Board adopted Resolution No. 2016-0011, which directed staff to develop proposed beneficial uses, including definitions "pertaining to tribal traditional and cultural use, tribal subsistence fishing use, and subsistence fishing use by other cultures or individuals." (Resolve Clause No. 1)

Currently, with the exception of beneficial uses that are in effect in the North Coast Regional Water Board's basin plan, these plans do not contain beneficial uses that directly address traditional tribal cultural uses or subsistence fishing uses.

3.2 Statement of Necessity for Beneficial Uses

As stated above, State Water Board Resolution No. 2016-0011 formally directs staff to develop and define proposed beneficial use definitions that pertain “to tribal traditional and cultural use, tribal subsistence fishing use, and subsistence fishing use by other cultures or individuals.” (Resolve Clause No. 1). These beneficial uses are necessary because existing beneficial uses do not take into account the greater consumption of finfish and shellfish by some cultures or individuals.

The State Water Board will consider adopting the beneficial use definitions proposed by staff as part of the Provisions in order “to create a consistent set of beneficial uses to be used” (State Water Board Resolution No. 2016-0011, Resolve Clause 4) by the Regional Water Boards to the extent a Regional Water Board defines such activities in a water quality control plan.

3.3 Existing Beneficial Uses

The Clean Water Act and the Porter-Cologne Water Quality Control Act establish a comprehensive program for the protection of beneficial uses of the waters of the state. California Water Code section 13050, subdivision (f), describes the beneficial uses of surface and ground waters that may be designated by the Water Boards for protection as follows:

> "Beneficial uses” of the waters of the state that may be protected against quality degradation include, but are not necessarily limited to, domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves.

Specific beneficial uses that achieve the above goals are defined in the basin plans of each the nine Regional Water Boards. Most of the Regional Water Boards’ basin plans contain identical beneficial uses and definitions, but in some cases, the basin plans contain different or modified beneficial uses. In general, most Basin Plans use the same beneficial uses, as described in a 2001 document (State Water Resources Control Board, 2001). These uses were:

Municipal and Domestic Supply (MUN) — Uses of water for community, military, or individual water supply systems including, but not limited to, drinking water.

Agricultural supply (AGR) — Uses of water for farming, horticulture or ranching including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.

Industrial Process Supply (PROC) — Uses of water for industrial activities that depend primarily on water quality.

Industrial Service Supply (IND) — Uses of water for industrial activities that do not depend primarily on water quality, including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well re-pressurization.

Groundwater Recharge (GWR) — Uses of water for natural or artificial recharge of groundwater for purposes of future extraction, maintenance of water quality, or halting salt water intrusion into fresh water aquifers.

Fresh Water Replenishment (FRSH) — Uses of water for natural or artificial maintenance of surface water quantity or quality (e.g., salinity).

Navigation (NAV) — Uses of water for shipping, travel, or other transportation by private, military, or commercial vessels.

Hydropower Generation (POW) — Uses of water for hydropower generation.

Water Contact Recreation (REC 1) — Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing, or use of natural hot springs.

Non-Contact Water Recreation (REC 2) — Uses of water for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.

Ocean Commercial and Sport Fishing (COMM) — Uses of water for commercial or recreational collection of fish and shellfish, or other organisms including, but not limited to, uses involving organisms intended for human consumption or bait purposes.

Aquaculture (AQUA) — Uses of water for aquaculture or mariculture operations including, but not limited to, propagation, cultivation, maintenance, or harvesting of aquatic plants and animals for human consumption or bait purposes.

Warm Fresh Water Habitat (WARM) — Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

Cold Fresh Water Habitat (COLD) — Uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

Saline Water Habitat (SAL) — Uses of water that support inland saline water ecosystems including, but not limited to, preservation or enhancement of aquatic saline habitats, vegetation, fish, or wildlife, including invertebrates.

Estuarine Habitat (EST) — Uses of water that support estuarine ecosystems including, but not limited to, preservation or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, shorebirds).

Marine Habitat (MAR) — Uses of water that support marine ecosystems including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, or wildlife (e.g., marine mammals, shorebirds).

Wildlife Habitat (WILD) — Uses of water that support terrestrial ecosystems including, but not limited to, preservation or enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.

Preservation of Biological Habitats of Special Significance (BIOL) — Uses of water that support designated areas or habitats, such as established refuges, parks, sanctuaries, ecological reserves, or Areas of Special Biological Significance (ASBS), where the preservation or enhancement of natural resources requires special protection.

Rare, Threatened, or Endangered Species (RARE) — Uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened or endangered.

Migration of Aquatic Organisms (MIGR) — Uses of water that support habitats necessary for migration or other temporary activities by aquatic organisms, such as anadromous fish.

Spawning, Reproduction, and/or Early Development (SPWN) — Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish.

Shellfish Harvesting (SHELL) — Uses of water that support habitats suitable for the collection of filter-feeding shellfish (e.g., clams, oysters, abalone, and mussels) for human consumption, commercial or sport purposes.

Flood Peak Attenuation/Flood Water Storage (FLD) — Beneficial uses of riparian wetlands in flood plain areas and other wetlands that receive natural surface drainage and buffer its passage to receiving waters.

Water Quality Enhancement (WQE) — Beneficial uses of waters that support natural enhancement or improvement of water quality in or downstream of a water body including, but not limited to, erosion control, filtration and purification of naturally occurring water pollutants, streambank stabilization, maintenance of channel integrity, and siltation control.

Limited Warm Freshwater Habitat (LWRM) — Waters support warm water ecosystems which are severely limited in diversity and abundance as the result of concrete-lined watercourses and low, shallow dry weather flows which result in extreme temperature, pH, and/or dissolved oxygen conditions. Naturally reproducing finfish populations are not expected to occur in LWRM waters.

Many of the beneficial uses listed in this section are not related to this project, which emphasizes consumption of fish by humans and wildlife.

3.4 Regional Water Board Basin Plans

The Clean Water Act and the Porter Cologne Water Quality Control Act require the Water Boards to identify appropriate water uses as well as develop sub-categories of beneficial uses to water quality control plans (40 C.F.R. § 130.10(a), (c); Wat. Code, §§ 13240, 13050, subds. (f), (j)). Beneficial uses identified in basin plans that are in addition to, or significantly different from, the above 2001 standard beneficial uses are listed below by region. Regions that do not have additional beneficial uses are not listed.

<u>North Coast Regional Water Board</u>
Preservation of Areas of Special Biological Significance (ASBS) — Includes marine life refuges, ecological reserves and designated areas of special biological significance, such as areas where kelp propagation and maintenance are features of the marine environment requiring special protection. (This is a modification of BIOL that focuses on marine habitat.)

Wetland Habitat (WET) — Uses of water that support natural and man-made wetland ecosystems, including, but not limited to, preservation or enhancement of unique wetland functions, vegetation, fish, shellfish, invertebrates, insects, and wildlife habitat.

Native American Culture (CUL) — Uses of water that support the cultural and/or traditional rights of indigenous people such as subsistence fishing and shellfish gathering, basket weaving and jewelry material collection, navigation to traditional ceremonial locations, and ceremonial uses.

Subsistence Fishing (FISH) — Uses of water that support subsistence fishing.

<u>San Francisco Bay Regional Water Board</u>
AREAS OF SPECIAL BIOLOGICAL SIGNIFICANCE (ASBS) — These include marine life refuges, ecological reserves, and designated areas where the preservation and enhancement of natural resources requires special protection. In these areas, alteration of natural water quality is undesirable. The areas that have been designated as ASBS in this Region are Bird Rock, Point Reyes Headland Reserve and Extension, Double Point, Duxbury Reef Reserve and Extension, Farallon Islands, and James V. Fitzgerald Marine Reserve, depicted in Figure 2-1 in the San Francisco Bay Regional Water Board's basin plan. The California Ocean Plan prohibits waste discharges into, and requires wastes to be discharged at a sufficient distance from, these areas to assure maintenance of natural water quality conditions. These areas have been designated as a subset of State Water Quality Protection Areas as per the Public Resources Code. These areas are designated by the State Water Board.

Central Coast Regional Water Board
Areas of Special Biological Significance (ASBS) — are those areas designated by the State Water Resources Control Board as requiring protection of species or biological communities to the extent that alteration of natural water quality is undesirable.

Los Angeles Regional Water Board
Limited Water Contact Recreation (LREC-1)) — Uses of water for recreational activities involving body contact with water, where full REC-1 use is limited by physical conditions such as very shallow water depth and restricted access and, as a result, ingestion of water is incidental and infrequent.

High Flow Suspension (Special Requirement for REC-1 and REC-2 Uses)) — The High Flow Suspension shall apply to water contact recreational activities associated with the swimmable goal as expressed in the federal Clean Water Act section 101(a)(2) and regulated under the REC-1 use, non-contact water recreation involving incidental water contact regulated under the REC-2 use, and the associated bacteriological objectives set to protect those activities. Water quality objectives set to protect (1) other recreational uses associated with the fishable goal as expressed in the federal Clean Water Act section 101(a)(2) and regulated under the REC-1 use and (2) other REC-2 uses (e.g., uses involving the aesthetic aspects of water) shall remain in effect at all times for waters where the (av) footnote appears in Table 2-1a (in the Los Angeles Regional Water Quality Control Board's Basin Plan). The High Flow Suspension shall apply on days with rainfall greater than or equal to ½ inch and the 24 hours following the end of the ½-inch or greater rain event, as measured at the nearest local rain gauge, using local Doppler radar, or using widely accepted rainfall estimation methods. The High Flow Suspension only applies to engineered channels, defined as inland, flowing surface water bodies with a box, V-shaped or trapezoidal configuration that have been lined on the sides and/or bottom with concrete. The water bodies to which the High Flow Suspension applies are identified in Table 2-1a in the column labeled "High Flow Suspension".

Santa Ana Regional Water Board
Limited Warm Freshwater Habitat (LWRM) — waters support warm water ecosystems which are severely limited in diversity and abundance as the result of concrete-lined watercourses and low, shallow dry weather flows which result in extreme temperature, pH, and/or dissolved oxygen conditions. Naturally reproducing finfish populations are not expected to occur in LWRM waters.

3.5 Regulatory History and the Need for New Water Quality Objectives

Section 303(c)(2)(B) of the Clean Water Act (33 U.S.C. § 1313) requires states to adopt water quality criteria (i.e., objectives) for all priority pollutants (33 U.S.C. § 1317(a)). However, as a result of litigation that ended with the rescission of the State Water Board's Inland Surface Waters and the Enclosed Bays and Estuaries Plans, California was left without water quality standards for many priority pollutants in 1994. To reestablish water quality criteria for these priority pollutants, and to effectively bring California into compliance with the federal regulations, the U.S. EPA promulgated the California Toxics Rule in May 2000 (40 C.F.R. § 131.38). In 2005, the State Water Board adopted SIP to provide a mechanism to implement the water quality criteria established in the California Toxics Rule.

With the California Toxics Rule, the U.S. EPA promulgated total recoverable mercury criteria for the protection of human health for California waters of 0.050 micrograms per liter (µg/L) for consumption of water and organisms and 0.051 µg/L for consumption of organisms only. The U.S. EPA did not promulgate criteria for the protection of wildlife because USFWS and NMFS had determined that the proposed criteria were not protective of endangered species (USFWS and NMFS 1998). Instead, the U.S. EPA agreed to derive a new human health criterion in the near future that would likely protect wildlife as well. In 2001, pursuant to the Clean Water Act § 304(a), the U.S. EPA published the new recommended human health methylmercury fish tissue criterion of 0.3 mg/kg (U.S. EPA 2001) using a default consumption rate of 17.5 grams per day (g/day) – roughly two fish meals per month. This U.S. EPA criterion is a *recommended* threshold for the nation. To make the criterion enforceable, states must adopt it into their water quality standards.

Rather than a criterion expressed as a mercury concentration in the water, the U.S. EPA concluded that it was more appropriate to derive the criterion for methylmercury in the form of a fish tissue concentration. A fish tissue concentration was more closely tied to the Clean Water Act goal of protecting the public health, because it was based directly on the main route that humans are exposed to harmful levels of methylmercury.

In 2003, the USFWS evaluated the new U.S. EPA methylmercury criterion and found that it was still not protective of two of seven threatened or endangered species evaluated (USFWS 2003), leaving California in need of a modification of the U.S. EPA criterion to protect wildlife. Currently, the U.S. EPA's 2001 fish tissue criterion has not been adopted as an enforceable statewide water quality objective in California, nor has an objective been adopted that is sufficient to protect all wildlife from mercury statewide.

3.6 Statement of Necessity for the Mercury Water Quality Objectives

As described above, several events have left California without numeric water quality objectives to protect wildlife from mercury. Such water quality objectives must be established and are required by the Clean Water Act (33 U.S.C. § 1317(a)).

An environmental organization, Our Children's Earth Foundation, filed a lawsuit against U.S. EPA for the lack of certain criteria to protect wildlife in California. As part of the settlement for that lawsuit, U.S. EPA is required to propose a new mercury criterion to protect wildlife by June 30, 2017. If, however, the State Water Board adopts a protective objective for wildlife, and U.S. EPA approves it before that date, U.S. EPA's obligation from the lawsuit will be satisfied.

Additionally, the statewide human health water quality criterion is outdated. A new water quality objective should be adopted to incorporate the most recent methods used for the U.S. EPA human health criterion for methylmercury (U.S. EPA 2001), and such objective should reflect Californians who consume self-caught fish including California tribes and subsistence fishers. Therefore, the Provisions include the Mercury Water Quality Objectives to protect both wildlife and human health.

3.7 Existing Mercury Objectives

The current regulatory limits that are intended to protect human health from consuming methylmercury contaminated fish in California are discussed below. The relationship between these limits and other limits for mercury in water, such as drinking water guidelines are discussed in the last part of this section.

The California Toxics Rule Criteria (40 C.F.R § 131.38) is currently the only *statewide* regulatory limit for mercury in water meant to protect people from consuming too much mercury/methylmercury from fish they catch and consume on a recreational basis. There is currently no statewide mercury objective (or criterion) for the protection of subsistence fishers. There is currently no statewide mercury objective (or criterion) for the protection of wildlife from consuming too much mercury/methylmercury from eating prey fish in California. The criteria are shown in Table 3-1, along with the U.S. EPA's 2001 fish tissue criterion, which is not an enforceable limit in California because it was never adopted by the State Water Board or promulgated by the U.S. EPA.

Table 3-1. Current Statewide and National Criteria and Guidelines

Agency and Year	Applicability	Criterion or guideline
California Toxics Rule 2000 (40 C.F.R. § 131.38)	Statewide: inland surface water, enclosed bays and estuaries	0.050 µg/L total mercury in water, for consumption of water and aquatic organisms; 0.051 µg/L total mercury in water, for consumption of aquatic organisms only (Criteria are based on a mercury fish tissue concentration of 0.37 mg/kg and a bioconcentration factor of 7345. The criteria do no account for bioaccumulation up the food web.)
National Criterion (U.S. EPA 2001)	Non-enforceable, but has been used to assess narrative objectives	0.3 mg/kg methylmercury in fish tissue
Fish Contaminant Goal, OEHHA (Klasing and Brodberg 2008)	Non-enforceable, but has been used to assess narrative objectives	0.22 mg/kg methylmercury in fish tissue

3.8 Regional Water Board Basin Plans

In addition to the statewide California Toxics Rule criteria, Regional Water Boards may regulate pollutants by establishing numeric or narrative water quality objectives in their basin plans.

The *narrative* objectives are the main methods by which the Regional Water Boards have recently assessed water for possible mercury impairments. All nine Regional Water Boards have a narrative objective for toxicity that are similar to "All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life" (from the Central Valley Regional Water Board's Water Quality Control Plan for the Sacramento and San Joaquin River Basins, p. III-8.01, Central Valley Water Board 2009). To implement this narrative objective, numeric criteria (that are otherwise non-enforceable) are often used as translators. The U.S. EPA fish tissue criteria of 0.3 mg/kg methylmercury in fish tissue, or OEHHA's 1999 Fish Contaminant Goal of 0.3 mg/kg methylmercury in fish tissue (Brodberg and Pollock 1999) have been used to fulfill the narrative toxicity objective in regards to mercury. In 2008, OEHHA revised its Fish Contaminant Goal and lowered it to 0.22 mg/kg based on California fish consumption rates, making it the preferred criterion to fulfill the narrative objective for mercury (Klasing and Brodberg 2008). The 2008 fish contaminant goal has been used for water quality assessment purposes in the statewide integrated report (Clean Water Act § 303(d), 305(b)) since 2012.

The only *numeric* objectives for mercury that are intended to protect human health or wildlife from consuming methylmercury contaminated fish are site-specific objectives that were established in basin plans with mercury/methylmercury TMDLs which are discussed later in this section.

3.9 Water Quality Assessment

Section 303(d) of the Clean Water Act (33 U.S.C. § 1313 (d)) and 40 C.F.R. § 130.7(b) requires states to identify water bodies where technology-based effluent limitations and other required controls fail to meet water quality objectives and are not supporting their beneficial uses (referred to as impaired waters). These substandard or impaired waters are placed on the Clean Water Act section 303(d) List of Water Quality Limited Segments (impaired water bodies).

In the 2012 California Integrated Report (approved by U.S. EPA in July 2015), more than 190 California water bodies are listed as impaired because of elevated mercury concentrations in fish tissue (Figure C-1, list of waterbodies in Appendix C). Many of the listings of impaired water bodies are based on interpretation of the narrative objectives with the 2001 U.S. EPA criterion of 0.3 mg/kg in fish tissue, the 1999 OEHHA guideline of 0.3 mg/kg in fish tissue, or the aqueous California Toxics Rule criterion of 50-51 ng/L. The first time the more recent guideline of 0.2 mg/kg was used for a major statewide assessment was for the 2012 Integrated Report.

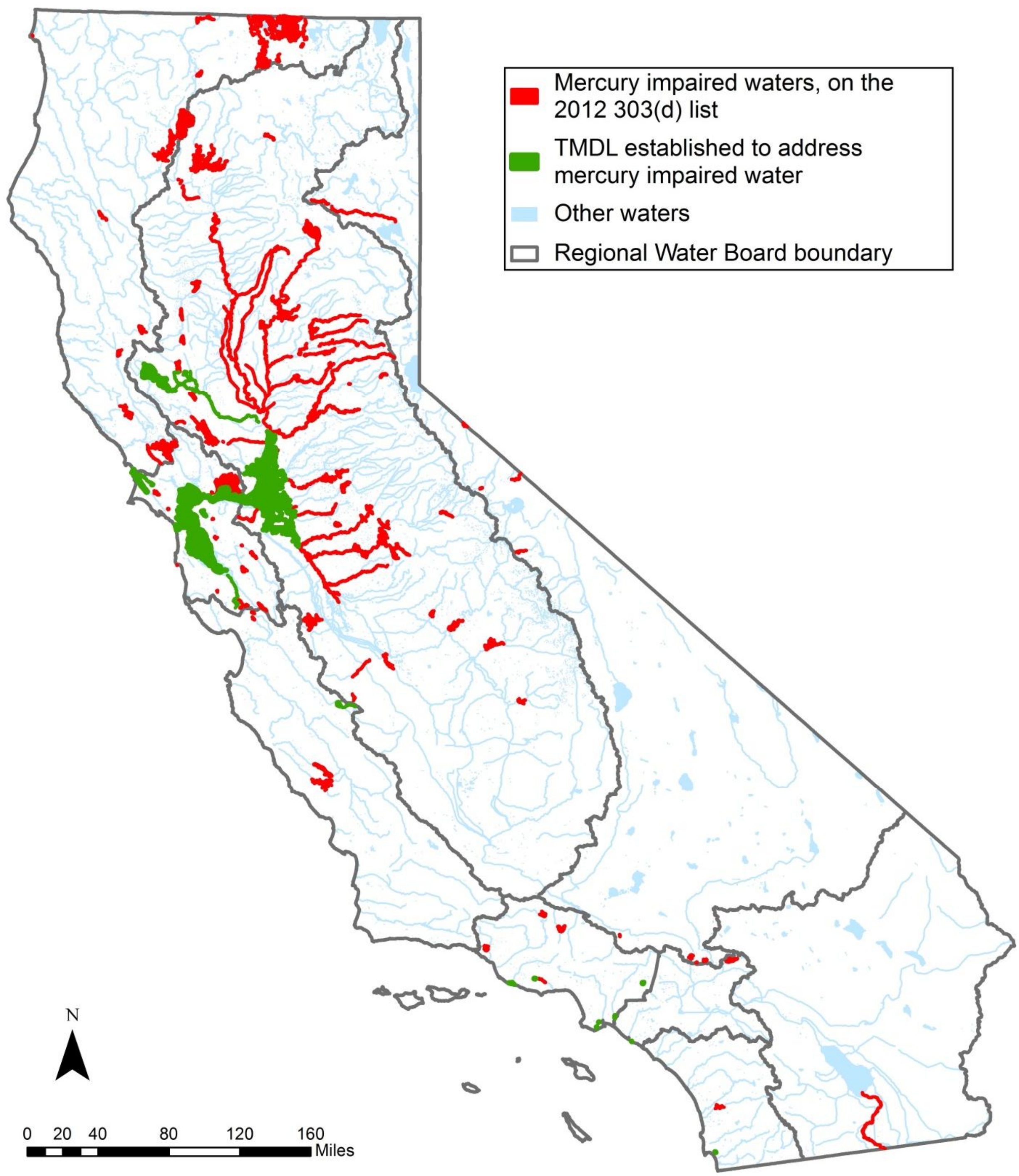

Figure 3-1. Map of mercury impaired waters in California and mercury (or methylmercury) TMDLs.

These mercury impaired water bodies are not attaining the water quality standards for mercury related to fishing and recreational fish consumption (such as the COMM) beneficial use, see Chapter 5 on beneficial uses for a complete list), and therefore, have been placed on the 303(d) list of impaired water bodies. As such, OEHHA has issued advisories warning people about the dangers of eating certain fish (See Appendix E for more details about related programs in other agencies).

3.10 TMDLs and Site-Specific Objectives

For impaired water bodies, federal regulations require the development of a TMDL for each pollutant of concern to reduce the amount of pollution entering the water body and to implement and achieve water quality standards. The TMDL includes a calculation of how much the pollutant loading must be reduced and a plan of action to do so. A TMDL is not self-enforcing, but serves as an informational tool or goal for the establishment of further pollution controls. For most water bodies impaired by mercury, a TMDL has not yet been developed, as seen in Figure 3-1.

When adopting a TMDL for an impaired water body, sometimes numeric objectives can be used as the TMDL target. Often, to comply with the TMDL requirements, the objectives are translated into another measured unit (e.g., a concentration of a chemical in µg/L becomes a daily allowable mass of a chemical in pounds/day) that is amenable to allocating the total load. In the past 10 years, the Regional Water Boards have adopted TMDLs to address several of the major mercury impaired waters. For many of these mercury (or methylmercury) TMDLs, the Regional Water Board chose to establish a new water quality objective that also served as the numeric target of the TMDL. These water quality objectives were adopted as site-specific water quality objectives for the particular water bodies addressed by the TMDL (listed in Table 3-2). More details of all mercury TMDLs in California are included in Appendix M.

These site-specific water quality objectives resolve the need for a new mercury objective for wildlife (a major impetus for the Provisions, as described in Section 3.5), but only for individual water bodies on a case-by-case basis. The site-specific objectives have been calculated using similar methods as the calculation for the objectives for recreational fishing and wildlife in the Provisions, and these objectives provide a similar level of protection. Therefore, the Provisions' mercury objectives for the COMM and WILD beneficial uses do not supersede the site-specific objectives listed in Table 3-2.

Also, each of the site-specific water quality objectives listed in Table 3-2 were adopted through a TMDL and program of implementation. The implementation requirements in the Provisions do not supersede these mercury TMDLs and their programs of implementation because the site-specific water quality objectives are essentially the same as those in the Provisions (as described above). Also, the programs of implementation for TMDLs are designed to restore an impaired water body, so the programs of implementation may be more stringent or may focus on significant sources of mercury to that particular water body (e.g. remediation of a mine). The mercury TMDLs include detailed identification of local sources and tailored site-specific programs of implementation. The implementation requirements in the Provisions are not designed to remedy specific impaired waters but are established to achieve the applicable water quality objectives. (Wat. Code, § 13242.).

Table 3-2. Site-Specific Objectives to Protect Human Health[a] or Wildlife Related to Consuming Fish with Elevated Methylmercury

Regional Water Board	Applicable Water Body(s), (effective date)	Aqueous	Fish Tissue Objective[b]	Hg/ MeHg[c]
San Francisco Bay	San Francisco Bay (2008)		0.2 mg/kg for TL3 and TL4 fish (size specified for certain species), 0.03 mg/kg for 3-5 centimeter (cm) fish	Hg
	Walker Creek, Soulajule Reservoir (2008); Guadalupe River[d] (2010)		0.1 mg/kg for 15-35 cm TL3 fish, 0.05 mg/kg for 5-15 cm TL3 fish	MeHg
Central Valley	Clear Lake (2003)		0.19 mg/kg for 30-40 cm TL4 fish (largemouth bass, catfish, brown bullhead, but 20-30 for crappie), 0.09 mg/kg for TL3 fish (< 30cm for catfish, otherwise no size)	MeHg
	Cache Creek and Bear Creek (2007)		0.23 mg/kg for 25-35 cm TL4 fish, 0.12 mg/kg for 25-35 cm TL3 fish	MeHg
	Harley Gulch (2007)		0.05 mg/kg for 7.5 -10 cm TL2 and TL3 fish	MeHg
	Sulphur Creek (2009)	1,800 ng/L (low flow), 35 mg/kg Hg: suspended sediment ratio (high flow)	[A fish tissue objective was not developed or adopted because the geothermal waters of the creek do not support fish]	Hg
	Sacramento-San Joaquin Delta & Yolo Bypass (2010)		0.24 mg/kg for 15-50 cm TL4 fish, 0.08 mg/kg for 15-50 cm TL3 fish, 0.03 mg/kg in fish < 5 cm	MeHg

[a] Generally applies to the Commercial and Sport Fishing (COMM) beneficial use, although some basin plans do not specify the use.
[b] TL indicates the fish trophic level: TL2 fish are fish that eat plants, TL3 fish eat TL2 organisms, and TL4 fish are top predators that eat TL3 fish.
[c] Indicates that the objective is for mercury (Hg) or methylmercury (MeHg).
[d] Full water body description: Walker Creek, Soulajule Reservoir and tributaries, Guadalupe River Watershed, except Los Gatos Creek and its tributaries upstream of Vasona Dam, Lake Elsman, Lexington Reservoir, and Vasona Lake.

Regional Water Boards have also adopted TMDLs that are based on numeric targets (Table 3-3). The implementation actions required by the Provisions would not apply to dischargers that discharge to receiving waters for which a mercury or methylmercury TMDL has been adopted, and the Provisions would not supersede any part of such TMDLs. (Such “receiving waters” are those for which a mercury or methylmercury TMDL is approved and does not include upstream water bodies even if the TMDL contains waste load allocations for the dischargers to the upstream water bodies to be implemented as effluent limitations to achieve the downstream water quality standard. For such upstream dischargers, the Provisions’ implementation requirements apply. In the case where both the TMDL and application of the implementation provisions requires an effluent limitation, the more stringent requirement shall apply to such upstream discharge(s).) Generally, the proposed Mercury Water Quality Objectives will not significantly vary from existing TMDL numeric target values for mercury or methylmercury, as existing TMDLs have already been designed to protect the beneficial uses of Commercial and Sport Fishing or Wildlife habitat. Although the targets in the existing TMDLS are not always exactly the same as the proposed Sport Fish Water Quality Objective or the Prey Fish Water Quality Objective in the Provisions, they are expected to achieve an appropriate level of protection for humans and wildlife. Some of the TMDLs in Table 3-3 were developed to clean up areas with highly contaminated sediments and were not listed for elevated mercury in fish tissue. In general, the implementation requirements are consistent with the goals of the Provisions.

Table 3-3. TMDL Targets (Not Objectives) to Protect Human Health[a] or Wildlife from Consuming Fish with Elevated Methylmercury

Region	TMDL Name (effective date)	Targets	Implementation /Notes
San Francisco Bay	Tomales Bay (2012)	Fish tissue:0.2 mg/kg methylmercury in legal halibut (55 cm), methylmercury 0.05 mg/kg for 5-15 cm TL3 fish	No actions. Adopted via resolution, as implementation action already taken, and additional actions being implemented under the Walker Creek Mercury TMDL (see Table 3-2) are expected to address impairment. (Walker Creek is upstream of Tomales Bay).
Central Coast	Hernandez Reservoir and Clear Creek (2004)	Aqueous: 0.050 µg/L total mercury (CTR[b]) Fish tissue: 0.3 mg/kg methyl mercury (EPA 2001)	Implemented through non-regulatory action - a U.S. Bureau of Land Management remediated site. No additional action was necessary.
	Lake Nacimiento and Las Tablas Creek (Postponed)	Aqueous: 0.050 µg/L total mercury (CTR), Sediment: 0.486 mg/kg mercury	No actions. The Regional Water Board approved in 2002, but no State Board or U.S. EPA approval. TMDL project indefinitely postponed until U.S. EPA takes further action regarding potential superfund site.

Table 3-3. TMDL Targets (Not Objectives) to Protect Human Health[a] or Wildlife from Consuming Fish with Elevated Methylmercury

Region	TMDL Name (effective date)	Targets	Implementation /Notes
Los Angeles	LA Lakes TMDL: El Dorado Park Lakes, Puddingstone Reservoir and Lake Sherwood (2012)	Aqueous: 0.081 ng/L (dissolved methyl mercury) Fish tissue: 0.22 mg/kg methylmercury in 350 mm largemouth bass	EPA established the TMDL. The TMDL has WLAs[c] and LAs[d], but only recommendations for implementation. Sources are mainly storm water, nonpoint source runoff, and water additions.
	Calleguas Creek Watershed Mugu Lagoon Metals TMDL (2007)	Aqueous: 0.050 µg/L total mercury (CTR), Fish tissue (methylmercury): 0.3 mg/kg 0.1 mg/kg for 15-35 cm TL3 fish, 0.05 mg/kg for 5-15 cm TL3 fish, 0.03 mg/kg in fish < 5 cm, Bird egg: < 0.5 mg/kg mercury	Storm water required to implement BMPs[e] to reduce mercury load in suspended sediments by 80%. Wastewater treatment plants have average monthly mass cap at current monthly median. For other point source dischargers there was limited information, so applied CTR criterion. These WLAs are set to be reevaluated every 5 years, during the 20 year plan.
	Dominguez Channel and Greater Los Angeles and Long Beach Harbor Toxics TMDL (2012)	Aqueous: 0.050 µg/L total mercury (CTR), Marine Sediment: 0.15 mg/kg Hg	Addresses sediment contamination, not fish tissue. Mercury WLAs apply to existing sediment (not discharges) in Consolidated Slip and Fish Harbor. Contaminated sediment to be remediated. Later phases of implementation to be determined and may involve other dischargers. Los Angeles Co., Los Angeles Co. Flood Control District and City of Los Angeles MS4 permittees can do (not required) BMPs to help achieve WLA.
Santa Ana	Toxic Pollutants San Diego Creek and Newport Bay TMDL (2002, U.S. EPA technical TMDL)	Sediment: 0.13 mg/kg dry weight (no observed effect on benthic organisms, see references in TMDL report). Fish tissue: 0.3 mg/kg (U.S. EPA's proposed criteria in 2000)	Addresses sediment contamination, not fish tissue. LAs only, no program of implementation. The existing sediments are the largest sources of mercury in Rhine Channel (not discharges). U.S. EPA recommended continued implementation of an existing sediment reduction plan to reduce loads of the pollutants

Table 3-3. TMDL Targets (Not Objectives) to Protect Human Health[a] or Wildlife from Consuming Fish with Elevated Methylmercury

Region	TMDL Name (effective date)	Targets	Implementation /Notes
			included in this TMDL.
San Diego	Shipyard Sediment Site Cleanup (2012)	Sediment: 0.57 mg/kg, or 0.68 mg/kg if the lower concentration is technologically or economically infeasible	Cleanup and Abatement Order No. R9-2012-0024 (March 14, 2012) (also categorized as a TMDL: "NASSCO and Southwest Marine")

[a] Generally applies to the Commercial and Sport Fishing (COMM) beneficial use, although some basin plans do not specify the use.
[b]CTR: California Toxics Rule
[c]WLA: waste load allocation
[d]LA: Load allocation
[e]BMPs: Best Management Practices

The only exception is the Calleguas Creek TMDL which has effluent limitations for point source discharges that are based on the California Toxics Rule criteria. (The mercury criteria in the California Toxics Rule would be replaced by the objectives in the Provisions.) However, the implementation requirements in the Provisions would not supersede the Calleguas Creek TMDL program of implementation. This is because the Calleguas Creek TMDL has prey fish targets that are equivalent to the Prey Fish Water Quality Objective and the California Least Tern Prey Fish Water Quality Objective in the Provisions. So the TMDL program of implementation should be consistent with meeting the objectives that protect wildlife and recreational fishing in the Provisions. On the other hand, the Provisions do not include a relative load analysis such as that done as part of a TMDL. Also, the Calleguas Creek TMDL includes a reevaluation of waste load allocations every five years. At the next five year review, the Los Angeles Regional Water Board should reevaluate the requirements and revise the effluent limitations if appropriate.

The fish tissue objectives in the basin plans (Table 3-2) and the fish tissue targets associated with the TMDLs (Table 3-3) are all slightly different. There are several reasons for the differences. Some of the objectives or targets are based on values to protect wildlife because the site-specific analysis for that water body suggested that wildlife is more sensitive than humans to mercury contamination (i.e.: Walker Creek & Guadalupe watershed, Clear Lake, Cache Creek, Harley Gulch). When the objectives or targets were derived to protect wildlife, the types and sizes of fish that the objectives were applied to were representative fish that wildlife consume, not the fish caught and consumed by humans. For Sulphur Creek, a fish tissue objective was not developed or adopted because the geothermal waters of the creek do not support fish.

Other mercury objectives and targets in the basin plans (Table 3-2, Table 3-3) were initially derived to protect human health. These human health targets were also found to protect wildlife. Among the objectives and targets based on human health, there are a few more reasons for variations. The San Francisco Bay objective was based on a consumption rate of 32 g/day of trophic level 4 fish, while the U.S. EPA consumption rate of 17.5 g/day was used in the Cache Creek and Clear Lake site-specific objectives. In the Delta TMDL, the objective is also based on a consumption rate of 32 g/day, but the calculation included a mixed consumption of trophic level 3 and trophic level 4 fish, vs. trophic level 4 only. That is why the objective for the Delta is a bit higher than the objective for San Francisco Bay (0.24 vs. 0.2 mg/kg). The Los Angeles Lakes TMDL target is calculated similarly to the San Francisco Bay TMDL, with the exception that there is not a separate consideration for methylmercury exposure from commercially-bought fish as represented by the "relative source contribution" (RSC) in the U.S. EPA's criterion.

Despite all the differences the targets and site-specific objectives (Table 3-2, Table 3-3), they are all still quite similar. Even if the lower level of consumption was used for human health (17.5 g/day), the value used for wildlife required a higher level of protection that was consistent with other TMDLs based on 32 g/day. In addition, many TMDLs have multiple targets. For example, in the Calleguas Creek TMDL, the human health target is based on 17.5 g/day, but there is another target of 0.03 mg/kg in fish less than 50 mm long for the protection of wildlife, which is more protective than the 32 g/day consumption rate for trophic level 4 fish. When the Regional Water Boards revisit these TMDLs, if they used 17.5 g/day as a consumption rate, they should consider updating it to 32g/day. This change should not make a substantial difference in the implementation for the reasons just described, but it would make targets more consistent statewide.

3.11 Other Mercury Water Quality Objectives and Criteria

There are other criteria and water quality objectives for mercury that have different goals than the objectives in the Provisions. Some of these criteria and objectives are described below to distinguish them as not relevant to the Provisions, or to confirm that they not be affected by the Provisions. Some criteria or objectives, on the other hand, have similar purposes and this section describes why they would be superseded.

California Drinking Water Objectives

All basin plans incorporate the maximum contaminant levels (MCLs) specified in the following provisions of Title 22 of the California Code of Regulations to protect MUN beneficial use (Cal. Code Regs., tit. 22, § 64431). The MCL for mercury is 0.002 mg/L. The Mercury Water Quality Objectives would be protective of this beneficial use, but the objectives are much more stringent than necessary to protect this use. Therefore, the Mercury Water Quality Objectives are not recommended to replace objectives for the MUN beneficial use.

California Aquatic Life Objectives

The San Francisco Bay Water Board adopted the U.S. EPA aquatic life criteria as region-wide objectives (San Francisco Bay Water Board 2013). Acute and chronic criteria for freshwater are 2.4 µg/L (1 hour average) and 0.025 µg/L (4 day average). For marine waters, acute and chronic objectives are 2.1 µg/L (1 hour average) and 0.025 µg/L (4 day average). The basis of these national criteria is described below. When the San Francisco Bay Regional Water Board adopted fish tissue water quality objectives for mercury, the board vacated the chronic aquatic life criteria since the fish tissue objectives were meant to protect the same endpoint of fish consumption and the fish tissue objectives were based on newer science. Similarly, the Provisions' water quality objectives for protecting Wildlife Habitat (the Sport Fish Water Quality Objective, the Prey Fish Water Quality Objective, and the California Least Tern Prey Fish Water Quality Objective) would supersede the San Francisco Bay Water Board's chronic mercury aquatic life objective (0.025 µg/L), since the objectives in the Provisions would be protective of aquatic life and wildlife. However, the San Francisco Bay Water Board's objective should be superseded only where it applies to inland surface waters, enclosed bays and estuaries, because the Provisions would apply only to those waters and not marine waters.

The basin plan for the Central Coast Regional Water Board also includes mercury water quality objectives to protect aquatic life (Central Coast Water Board 2011). The objective of 0.2 µg/L is not to be exceeded in freshwater to protect both the COLD and WARM beneficial uses (Table 3-5 in the basin plan). The Central Coast Water Board's basin plan also contains a mercury objective of 0.1 µg/L, not to be exceeded in marine waters to protect the MAR beneficial use (Table 3-6 in the Region 3 basin plan). The objectives in the Provisions for protection of Wildlife Habitat are more stringent that the values for aquatic life habitats (0.2 and 0.1 µg/L), but the objectives in the Provisions act as chronic criteria. The values in the basin plan could be maintained as acute maximums (no averaging period is specified in the basin plan). Although the values (0.2 µg/L and 0.1 µg/L) are not fully evaluated here, these objectives are lower and therefore more protective than the current U.S. EPA national recommended acute criterion (0.77 µg/L).

The Central Coast Regional Water Board's basin plan also stipulates a body burden objective for mercury, or a maximum allowable concentration of mercury in any aquatic organism. The objective is defined as the "maximum acceptable concentration of total mercury in any aquatic organism is a total body burden of 0.5 µg/g wet weight." (Note that typographical errors appearing in the basin plan in the units and "body burden" have been corrected here.) This footnote was based on U.S. EPA's 1972 Water Quality Criteria "Blue Book" document. The tissue concentration could be interpreted to protect birds that eat fish. The Central Coast Regional Water Board mercury objective is less stringent than the objectives in the Provisions for protection of Wildlife Habitat. For clarity, the Provisions' water quality objectives for protecting Wildlife Habitat (the Sport Fish and the prey fish objectives) would supersede the Central Coast Regional Water Board's body burden objective.

National Aquatic Life Criteria

The 1997 U.S. EPA national recommended freshwater aquatic life criteria are an acute criterion of 1.4 µg/L and a chronic criterion of 0.77 µg/L (62 Fed. Reg. 42169 (Aug 5 1997)). These are not used in any basin plan throughout the state of California. These values are designed to protect aquatic life from direct exposure to aqueous inorganic mercury and do not account for uptake via the food web because sufficient data were not available when the criterion was derived. These criteria were determined to not be fully protective of aquatic life (mainly wildlife that consumes fish) when the California Toxics Rule was promulgated by the U.S. EPA, so they were not included in the California Toxics Rule. The mercury objectives for protecting Wildlife Habitat in the Provisions are more protective than the old recommended freshwater aquatic life criteria (1.4 µg/L and 0.77 µg/L) and are intended to protect wildlife from bioaccumulation of methylmercury.

The U.S. EPA also published acute and chronic water quality criteria of 2.4 µg/L and 0.012 µg/L for freshwater and 2.1 µg/L and 0.025 µg/L for saltwater in 1984, and these values were included in the “Gold Book” of water quality criteria (U.S. EPA 1985a, U.S. EPA 1986). The chronic value was designed to protect fish consumption. It was calculated from a Food and Drug Administration Action level and a BAF, but it was derived under the assumption that all mercury in water is methylmercury. This value is in some Regional Water Board basin plans (the San Francisco Bay Water Board’s basin plan, described above), and is still used in some states (i.e., Oregon, Washington and Idaho) because there is no better value to protect aquatic life. The recommended value of 0.012 µg/L is equivalent to the effluent limitation in the Provisions for wastewater and industrial discharges to rivers. The effluent limitation of 0.012 µg/L was derived to protect wildlife (and humans) from bioaccumulation of methylmercury in flowing waters.

4. Environmental Setting

4.1 Forms of Mercury

Mercury can exist in various forms in the environment. Physically, mercury can exist in water in a dissolved, colloidal or particulate bound state. Chemically, mercury can exist in three oxidation states: elemental mercury (Hg^{0}), mercurous ion (monovalent mercury, Hg^{+}), or mercuric ion (divalent mercury, Hg^{+2}). Ionic mercury can react with other chemicals to form inorganic compounds, such as cinnabar (HgS) and it can be converted by sulfate-reducing bacteria to more toxic organic compounds, such as methylmercury (CH_3Hg) or dimethylmercury ($(CH_3)_2Hg$).

Methylmercury is the predominant form of organic mercury present in biological systems, such as the aquatic environment. Methylmercury is the form of mercury that is most readily incorporated into biological tissues and poses the greatest risk to humans and wildlife in the aquatic environment (Agency for Toxic Substances and Disease Registry 1999). The methylation of mercury is generally thought to be a bacterially mediated process. In addition to sulfate-reducing bacteria, there is evidence that iron-reducing bacteria may also play an important role in methylating mercury in some systems (Gilmour et al., 2013; Alpers et al., 2014). The formation of methylmercury is a complex, far from fully understood, biogeochemical process driven by factors that control the activity of methylating bacteria, such as the availability of metabolic electron donors and acceptors, and the availability of aqueous phase mercury complexes (Jonsson et al. 2012).

Numerous environmental factors influence the rates of mercury methylation and the reverse reaction known as demethylation. Important factors controlling the conversion rate of inorganic to organic mercury include temperature, percent organic matter, redox potential, salinity, pH, and mercury concentration. Because dimethylmercury is an unstable compound that dissociates to methylmercury at neutral or acidic pH, it is not a concern in freshwater systems (U.S. EPA 1997a).

4.2 Methylmercury Bioaccumulation

Methylmercury accumulates most efficiently in the aquatic food web. Predatory organisms at the top of the food web, like bald eagles and humans, generally have higher mercury concentrations than organisms lower in the food web. Methylmercury accumulates in organisms because rates of uptake are greater than rates of elimination. Inorganic mercury does not tend to accumulate because it is less efficiently absorbed and more readily eliminated from the body than methylmercury.

The process by which mercury accumulates in organisms is called *bioaccumulation*. Both inorganic and organic mercury can be taken up by aquatic organisms from water, sediments and food. Low trophic level species such as phytoplankton obtain all their mercury directly from the water. Also, biofilms and algae play an important role in providing methylmercury at the base of food webs (Tsui et al. 2012). Zooplankton consumes phytoplankton, and then small fish and invertebrates consume zooplankton and algae. Repeated consumption and accumulation of mercury from contaminated food sources results in tissue concentrations of mercury that are higher in each successive level of the food web. This process is termed *biomagnification*. The proportion of mercury that exists as the methylated form generally increases with increasing levels in the food web. Methylmercury comprises 85% to 100% of the mercury measured in fish (Slotton et al. 2004; U.S. EPA 2010).

Consumption of contaminated, high trophic level fish is the primary route of methylmercury exposure to humans. For example, the aquatic food web provides more than 95% of humans' intake of methylmercury (U.S. EPA 1997a). California wildlife species of potential concern that consume fish and other aquatic organisms include piscivorous birds and wildlife such as, terns, rails, plovers, herons, egrets, mergansers, grebes, bald eagle, kingfisher, peregrine falcon, osprey, mink, raccoon and river otter. Even though the concentrations of mercury in water may be very low and deemed safe for human consumption in drinking water, the methylmercury concentration in some fish inhabiting these waters may reach levels that are considered potentially harmful to humans and fish-eating wildlife.

Another possible exposure route of methylmercury to wildlife is through the consumption of insects. Aquatic insects bioaccumulate methylmercury as they consume plankton and other insects in their aquatic environment. Many aquatic insects spend a portion of their lifecycle in a terrestrial stage, making them available as a viable food source to a wide variety of birds and other wildlife. Insectivorous birds and wildlife can accumulate high levels of methylmercury as they consume aquatic insects or spiders and other predators that consume aquatic insects. Although there is some evidence of methylmercury in insectivorous birds and wildlife, there is a lack of research and information to determine what concentrations of mercury in aquatic insects may result in unsafe levels in birds and wildlife.

Trophic levels are used to describe the hierarchy of an aquatic food web. The U.S. EPA's *Trophic Level and Exposure Analysis for Selected Piscivorous Birds and Mammals* report used the following definitions to designate trophic levels based on an organism's feeding habits (U.S. EPA 1995):

Trophic level 1 (TL1): Phytoplankton and bacteria.
Trophic level 2 (TL2): Zooplankton, benthic invertebrates and some small fish.
Trophic level 3 (TL3): Organisms that consume zooplankton, benthic invertebrates, and other TL2 organisms, such as carp and trout.
Trophic level 4 (TL4): Organisms that consume TL3 organisms, such as bass and catfish.

Since organisms highest on the food web have the highest methylmercury concentrations these trophic levels are used in other sections of this Staff Report to categorize fish by their propensity to accumulate methylmercury.

4.3 Mercury Toxicity

Mercury is a potent neurotoxin. Organic forms of mercury, such as methylmercury, are the most toxic form of this metal. Methylmercury exposure causes multiple effects including: tingling or loss of tactile sensation, loss of muscle control, blindness, paralysis, birth defects and death. Adverse neurological effects in children appear at dose levels five to ten times lower than associated with toxicity in adults (National Research Council 2000). Children may be exposed to methylmercury during fetal development and/or by eating fish. The effects on human health are described in more detail in Section 4.7.

Wildlife species may also experience neurological, reproductive or other detrimental effects from methylmercury exposure. Behavioral effects such as impaired learning, reduced social behavior, and impaired physical abilities have been observed in mice, otter, mink and macaques exposed to methylmercury (Wolfe et al. 1998). Reproductive impairment following mercury exposure has been observed in multiple species, including common loons and western grebe (Wolfe et al. 1998), mink (Dansereau et al. 1999) and fish (Sandheinrich and Wiener 2011; Depew et al. 2012). Effects of mercury on wildlife are described in more detail in Section 4.6 and Appendix J.

4.4 Sources of Mercury

Mercury is a rare, dense metal, slightly more common than gold in the earth's crust. It has unusual properties that have made it valuable in metallurgy, electrical systems and chemical processes. It conducts electricity, forms alloys with other metals, and expands in response to changes in temperature and pressure. It is a liquid at ordinary temperatures and evaporates when exposed to the atmosphere. These unusual physical characteristics, combined with mercury's common use from the beginning of the industrial revolution, have contributed to its widespread dispersion through land, air, and water (U.S. Geological Survey 2005, U.S. Geological Survey 2012).

Mercury is naturally released through erosion, forest fires, and geothermal areas. Mercury is released anthropogenically into the environment through mining activities, activities that lead to soil erosion or disturbance of sediment in water bodies, combustion processes, manufacturing processes, and other sources. These processes are described in more detail in the following sections.

Because of the strong association of mercury and methylmercury with sediment, the movement of natural and anthropogenic mercury through water and over land is closely tied to the movement of soils and sediments (especially fine-grained particles) and organic matter, which are typically transported by precipitation, irrigation runoff, natural and anthropogenic erosional processes. This point is important when considering how certain sources affect water bodies and when choosing effective methods to control mercury.

4.4.1 Mining in California

Mercury is released into the environment through mercury and gold mining. Both mercury and gold have been mined extensively in California. Mercury's discovery in California predates the discovery of gold by several years.

Mercury Minning

The first mercury mines were located in New Almaden, about 10 miles south of present-day San Jose in the Santa Cruz Mountains. The California Coast Ranges, on the west side of California's Central Valley, went on to be among the most productive mercury districts in the world, with major production centers along the ranges, from as far south as New Idria in San Benito County to Clear Lake in the north (U.S. Geological Survey 2005).

Historic mercury production in California between 1850 and 1981 was more than 220 million pounds of elemental mercury (Churchill, 2000). There were few controls on the dispersion of mercury from these operations, leading to significant increases in environmental mercury concentrations in affected soil, sediment, plants, fish, and other animals. Health advisories on fish consumption because of elevated mercury concentrations are widespread in the Coast Ranges, where more than a dozen separate water bodies are affected, including commonly fished areas like San Francisco Bay, Lake Berryessa, and Clear Lake. The location of mercury and gold mines in California is shown in Figure 4-1.

Gold Mining

Although most of the mercury mined in the Coast Ranges was exported, a significant portion (about 12 percent, or 26 million pounds) was used for gold recovery in California (Churchill 2000). Miners used mercury to recover gold at both of the two major types of industrial scale mining in California: placer mines (sand and gravel deposits) and hard rock (lode) mines. The placer mines were mined using a high pressure jet of water to break up the sand and gravel deposits, known as hydraulic mining. The resulting slurry was directed through sluices (a long wooden trough or channel). Hundreds of pounds of liquid mercury (several 76- pound flasks) were added to a sluice, which had an area of several thousand square feet. The gold in the sediments would form an amalgam with the mercury. Because mercury is very dense, the mercury and gold-mercury amalgam would remain at the bottom of the sluice, while the sand and gravel would pass through the sluice. The large volumes of turbulent water flowing through the sluice would cause many of the finer gold and mercury particles to wash through and out of the sluice before they could settle. The gold-mercury amalgam was retrieved from the bottom of the sluice and then heated to vaporize the mercury, leaving the gold behind (Churchill 2000; U.S. Geological Survey 2005). Vaporized mercury and mercury that escaped the sluice contaminated the surrounding environment.

From the 1860s through the early 1900s, hundreds of hydraulic placer-gold mines operated in the Sierra Nevada (Figure 4-1). The total amount of mercury lost to the environment from these operations may have been between three and eight million pounds or more, from estimates by Churchill (2000) that about 26 million pounds of mercury were used in California. Elevated mercury concentrations in present-day mine impacted waters and sediments indicate that hundreds to thousands of pounds of mercury remain at each of the many sites affected by hydraulic mining. Mercury from hydraulic mining was transported with sediments downstream into the Sacramento-San Joaquin Delta estuary and the San Francisco Bay, where it has contributed to elevated mercury concentrations in fish, resulting in additional consumption advisories and regulatory action by the Water Boards through the TMDL process.

However, mining is not the only important source of mercury in California. A separate project that is being developed to address mercury in reservoirs conducted a more detailed analysis of mines as a source of mercury into the reservoirs. The preliminary analysis found that a large fraction of the 303(d)-listed mercury-impaired reservoirs, about 30 percent, have no record of upstream mercury and gold mines (California Water Boards 2013).

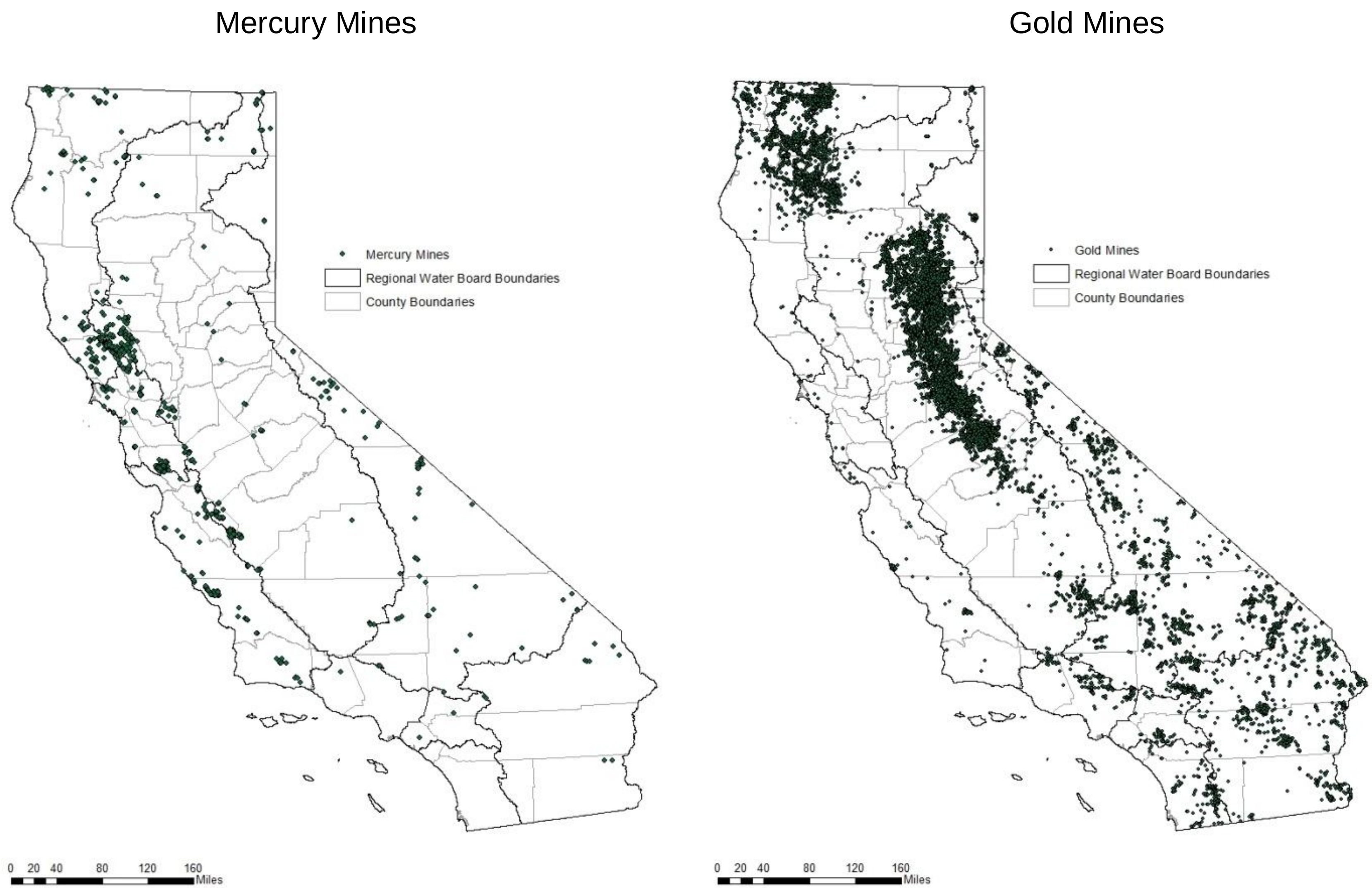

Figure 4-1. Map of mercury and gold mines in California. Data from the U.S. Geological Survey's Mineral Resource Data System (U.S. Geological Survey 2015) where mercury or gold was the primary commodity.

4.4.2 Natural Geology

The Coast Ranges are naturally high in mercury. Mercury has been concentrated extensively in natural hydrothermal systems, including active thermal springs that continue to discharge into streams and lakes, and in fossil (inactive) systems that were the sites of commercial mercury mining. The hydrothermal activity contributes to high natural background levels of mercury in parts of the Coast Ranges (U.S. Geological Survey 2005).

The soils in these areas that are naturally enriched with mercury erode, contributing to the mercury load in waterways. Human activities can increase soil erosion or disturb sediment in water bodies releasing more mercury. The mercury from mine waste, naturally enriched soils, and geothermal springs is a major source of mercury in the Coast Ranges, the Sierra Nevada Mountains, and also downstream in the Sacramento/San Joaquin Delta and San Francisco Bay.

4.4.3 Atmospheric Deposition

Mercury can be released into the atmosphere through combustion processes (burning fuel, waste, wood), heating metals (as in gold production or iron smelting), geothermal vents and other processes. A summary of anthropogenic global sources of mercury emissions is shown in Figure 4-2. Atmospheric mercury can be deposited on land or on the surface of water bodies. Mercury deposited on land can then be washed by storm water into waterways. Atmospheric mercury can travel across continents, but much of it can be deposited locally. Mercury deposition from atmospheric emissions is thought to be the major source of mercury in some Southern California lakes and reservoirs (U.S. EPA 2012, Tetra Tech 2008).

However, in heavily mercury contaminated environments of California (gold mining regions), atmospheric deposition of mercury is unlikely to play an important role in delivering methylmercury to the food web. Recent work has shown that the isotopic signature of methylmercury in food webs of Coast Ranges, Yolo Bypass, and Yuba/Feather Rivers, for example, is similar to that of the mercury stored in sediments deposited during the historical mining period (Gehrke et al., 2011; Donovan et al., 2016a, b). See also Table N-11, on the estimated mercury loadings from the Sacramento-San Joaquin Delta TMDL (Delta) and the San Francisco Bay TMDL.

The U.S. EPA has issued several regulations addressing the major contributors of mercury to the air, including, for example, municipal waste combustors; hospital, medical, and infectious waste incinerators; chlor-alkali plants; and hazardous waste combustors and cement plants. As the result of the U.S. EPA's regulatory efforts, the United States achieved a 58 percent reduction in domestic mercury air emissions between 1990 and 2005 (U.S. EPA 2008a). While coal may be one of the largest sources of mercury in the U.S., California has relatively few coal fired power-plants. A more detailed analysis of mercury from atmospheric deposition in California has been done to support the program being developed to control mercury in reservoirs (California Water Boards 2013).

Direct deposition of mercury to water bodies (vs. deposition on land upstream) has been found to be very important in determining mercury levels in fish. Harris and colleagues applied isotopically labeled mercury (as $HgNO_3$) to a lake and the surrounding watershed. Essentially all of the increase in methylmercury in fish after 3 years was due to the mercury deposited directly to the lake surface. Less than 1 percent of the mercury deposited to the watershed was exported to the lake. This study indicates the importance of direct deposition of inorganic mercury to waters. Furthermore, the results could suggest that controlling emissions that are deposited directly on the water surface may have a rapid effect (few years) on mercury level in fish (Harris et al. 2007).

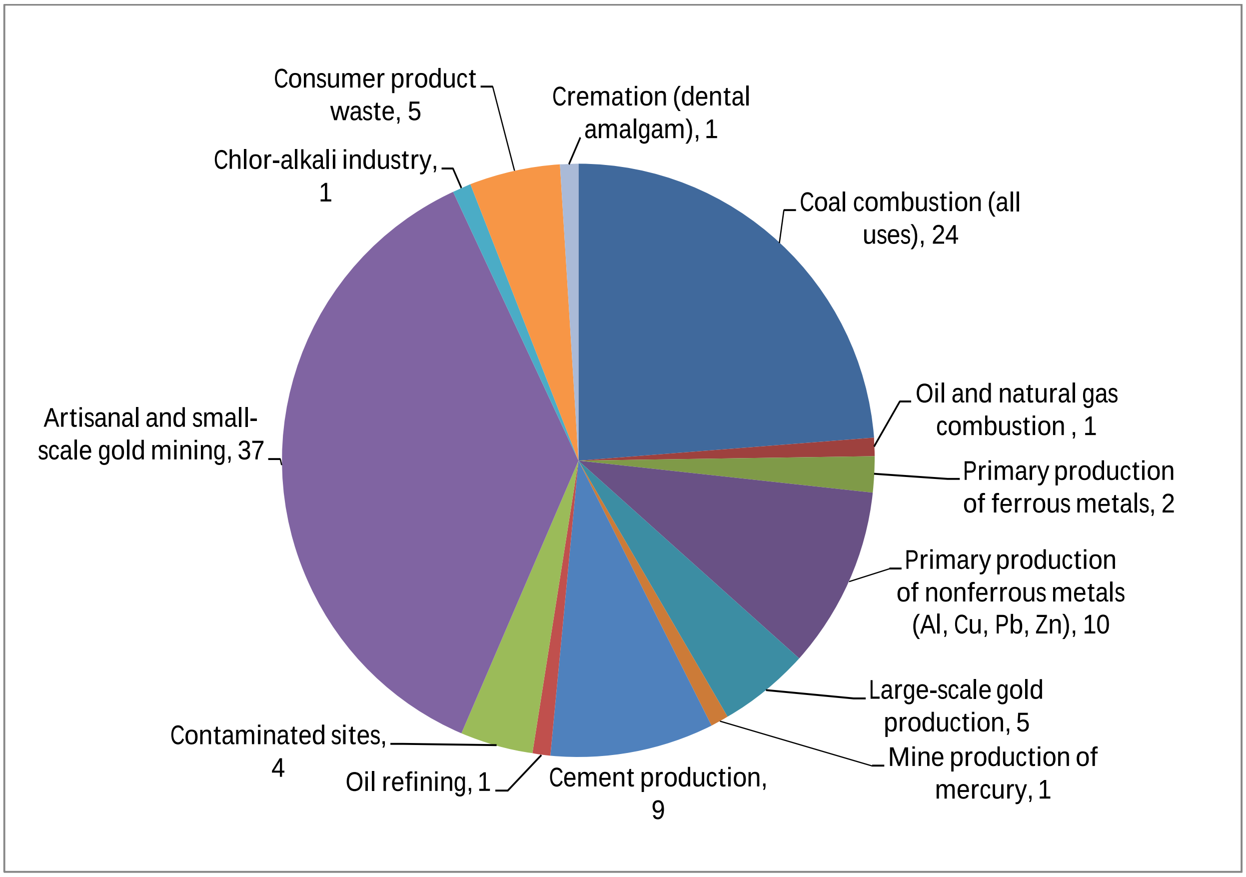

Figure 4-2. Relative contributions to estimated global emissions to air from anthropogenic sources in 2010 (reproduced from United Nations Environment Programme 2013).

Similarly, direct deposition to the Chesapeake Bay was found to contribute more than half the mercury entering the Bay and estimates suggested that most of the mercury deposited to the watershed (90% or greater) is retained in the terrestrial domain (Mason et al. 1997). The fact that the majority of the mercury is retained by the land in the watershed agrees with earlier studies (Johansson et al. 1991; Hurley et al. 1995).

4.4.4 Urban Areas, Consumer Products, and Manufacturing

Mercury in urban runoff can come from local urban sources, consumer products, historical and ongoing industrial activities, native soils and atmospheric deposition. There may be a higher contribution of mercury from atmospheric deposition in urban areas because of local point sources such as air emissions from waste incinerators, power plants, and vehicle exhaust. Mercury is contained in common consumer products, such as batteries, compact fluorescent light bulbs (CFLs), thermostats, and electrical switches. Mercury is no longer used to make paint and household thermometers but these products are still around today. Improper disposal or broken items can release mercury into municipal or industrial wastewaters.

In most California settings, manufacturing is likely a smaller contributor of mercury. Manufacturing processes that can release mercury are: chlor-alkali production using the mercury cell process, pulp and paper manufacturing, instrument (thermometers) manufacturing, secondary mercury production (recycling), electrical apparatus manufacturing, carbon black production, lime manufacturing, primary lead smelting, primary copper smelting, fluorescent lamp recycling, battery production, primary mercury production, mercury compounds production, byproduct coke production, and petroleum refining. Mercury has been recognized as a serious environmental contaminant for many years. As a result, industrial uses have declined significantly over recent decades as effective substitutes have been developed.

Most wastewater treatment plants are efficient at removing mercury. Since mercury tends to adhere to solids, the removal of solid materials also removes the mercury. Major contributors of mercury to municipal wastewater treatment systems are typically dental offices, hospitals, and schools (Larry Walker Associates 2002, U.S. EPA 2004). The original sources may be mercury amalgam dental fillings, broken thermometers, other consumer products and hospital equipment.

Dental Amalgam

Dental offices have been a source of mercury by releasing waste from mercury amalgam fillings into sewer systems. A study funded by the American Dental Association (ADA) published in 2005 estimated that 50 percent of mercury entering municipal wastewater treatment plants was contributed by dental offices (Vandeven and McGinnis, 2005). The U.S. EPA estimates that across the United States, 4.4 tons of mercury from waste dental amalgam are collectively discharged into municipal wastewater treatment plants annually. Much of the mercury in municipal wastewater treatment plants partitions to the sludge, which is the solid material that remains after wastewater is treated. Mercury from amalgam can then make its way into the environment through the incineration, landfilling, or land application of sludge or through surface water discharge. In 2014, the U.S. EPA proposed a rule that would control mercury discharges to municipal wastewater treatment plants by requiring dentists to reduce their discharge of dental amalgam through the use of amalgam separators and BMPs (79 Fed. Reg. 63258 (Oct. 22, 2014); http://water.epa.gov/scitech/wastetech/guide/dental/).

4.4.5 Other Sources

Imported Water

Numerous reservoirs in California receive water imported from outside the reservoir watersheds by state, federal, and other water projects for the purposes of water supply, power production, and other uses. Supplemental water additions of potable water and ground water were one of the sources of mercury in the LA Lakes TMDL (U.S. EPA Region 9 2012).

Historic Use of Pesticides

Widespread use of mercury in agriculture, either as a spray on crops or as a seed preservative, was halted in 1976, when the U.S. EPA banned most uses of mercury in pesticides. Exceptions were initially made for fungicidal uses in paints and outdoor fabrics. Mercury use in paints was discontinued in 1991 under the Federal Insecticide, Fungicide and Rodenticide Act. Since most uses of mercury in pesticides have been discontinued for thirty years and all uses banned for almost ten years, it is unlikely that past uses of mercury significantly contribute to current agricultural runoff. However, mercury-containing chemicals may still be present in soils and in the form of old stocks.

Land Management Practices

Natural and anthropogenic deposits of mercury generally move through watersheds with soil and sediments. Land management that effects erosion can contribute to the transport of mercury to waterways. Forest management activities that affect the movement of sediment during storms could play an important role in mercury transport in many watersheds throughout the state. Forests are the primary land cover in many watersheds of the reservoirs on the 303(d) list due to elevated mercury.

4.4.6 Conversion to Methylmercury as a Source

Most sources release mercury in the form of inorganic mercury. Once in the environment, inorganic mercury can be converted to methylmercury (Section 4.1). Methylmercury is the form most readily incorporated into biological tissues and most toxic to humans and wildlife. Methylmercury is formed from inorganic mercury, usually in conditions with low oxygen and high organic matter. Inorganic mercury is available in most aquatic systems due to widespread atmospheric deposition. Therefore, any anoxic aqueous environment that is rich in organic matter and contains the conditions necessary for conversion of inorganic mercury to methylmercury can be said to be a potential source of methylmercury.

The conditions that favor methylmercury production are typical of wetlands, other flooded areas, or the sediment at the bottom of reservoirs (California Water Boards 2013). Additionally, structural BMPs used to enhance microbial denitrification, such as treatment wetlands, can have anaerobic zones and are rich in organic matter both, factors that promote mercury methylation. Also, storm water catch basins can become anaerobic. Therefore, while these BMPs serve important function in controlling nutrients and possibly other pollutants, these BMPs may also inadvertently incorporate conditions that promote mercury methylation.

Wetlands and reservoirs can often have higher methylmercury concentrations, and tend to be the places where fish have higher concentrations of methylmercury. In a recent review of national data, methylmercury concentrations in aquatic organisms in streams were found to correlate strongly with wetland abundance in stream basins (Wentz et al. 2014). There is some evidence that permanent wetlands may be a sink for methylmercury, while seasonal wetlands, which can be used for agriculture part of the year, are more likely to generate methylmercury (Ackerman & Eagles-Smith 2010; Alpers et al. 2014; Windham-Myers et al. 2014).

Understanding this conversion process is important for identifying both sources and control measures for methylmercury. For instance, methylmercury levels in fish in a particular river with inorganic mercury in the sediments may be relatively low. However, these same mercury rich sediments can be washed downstream into a reservoir, where they begin to accumulate. The reservoir environment with the lower oxygen and a higher concentration of organic matter is much more conducive to converting inorganic mercury to methylmercury. Even if the concentration of inorganic mercury in the sediment is the same in both the river and the reservoir, the concentration of methylmercury in the reservoir tends to be elevated much higher than the levels in the river. The fact that fish in reservoirs will have higher concentrations of mercury is exemplified by the five-fold difference in BAFs for rivers compared to the BAF for lakes and reservoirs (listed in Appendix I). Consequently, the fish living in the reservoir have a greater chance of accumulating methylmercury to levels that are a risk to public health and wildlife.

Another potentially large source of methylated mercury is the landscape downstream from historic mining areas that are contaminated with mercury-laden sediment. This sediment has become part of the landscape and covers large areas to substantial depths (examples are described in Bouse et al., 2010; Donovan et al., 2013; Singer et al., 2013, Donovan et al., 2016a, b). When occasionally flooded, methylmercury is produced, which could drain back into rivers and become available to food webs.

4.4.7 Wetlands

Recent studies required by the Sacramento-San Joaquin Delta methylmercury TMDL are trying to understand the methylmercury contribution of agricultural wetlands. While permanent wetlands may be a sink for methylmercury, seasonal wetlands, which can be used for agriculture part of the year, are more likely to generate methylmercury (Ackerman & Eagles-Smith 2010, Alpers et al. 2014, Windham-Myers et al. 2014).

Alpers et al. 2014 found methylmercury concentrations in the Yolo Bypass that were among the highest ever recorded in wetlands. The highest methylmercury concentrations in unfiltered surface water were observed in drainage from wild rice fields during harvest (September 2007), and in white rice fields with decomposing rice straw during regional flooding (February 2008). However, during the summer growing season, even though the typical anoxic wetland conditions favored for microbial methylmercury production are present, these same fields were not found to discharge methylmercury to surrounding waters. Outflow management during times when methylmercury is high could reduce methylmercury exports (Bachand et al. 2014).

The Central Valley Regional Water Board is currently working with non-point source dischargers and scientists to explore management practices that can reduce mercury methylation in the environment as part of the Sacramento-San Joaquin Delta methylmercury TMDL. Another area of study is the South Bay Salt Ponds Restoration Project in San Francisco Bay. The wetland restoration design for this project is attempting to reduce the potential for mercury methylation and other contaminant problems. New management practices to control methylation in wetlands may be developed in the near future. See Appendix Q for more details.

4.4.8 Bioavailability of Mercury

In the *Mercury Strategy for the Bay-Delta Ecosystem,* the issue of bioavailability is highlighted. "We believe that changes in bioavailability or methylation rates have much greater potential to significantly increase methylmercury exposure in this ecosystem than do changes in the spatial distribution of total (mostly inorganic) mercury" (Wiener et al. 2003, pg. vi). In addition, there is a limited ability to predict how an ecosystem may respond to changes in the various sources of mercury (Hsu-Kim et al. 2013). Evidence suggests some forms or sources of mercury/methylmercury are more likely to enter the food web. The inputs of methylmercury from terrestrial and atmospheric sources have been found to bioaccumulate to a substantially greater extent than methylmercury formed *in situ* in sediment (Jonsson et al. 2012, Jonsson et al. 2014). Additionally, preliminarily results with isotopically labeled mercury indicate that the mercury that is taken up into food webs comes from mercury that is dissolved in the water column, rather than the mercury associated with the bottom sediments in a water body (Fleck et al. 2014). This is not surprising because for mercury to be methylated, it must first be available in the dissolved form through solubilization from inorganic particles and remineralization from organic particles (Henry et al. 1995, Paquette and Helz 1997, Benoit et al. 1999).

4.4.9 Sources of Mercury Identified in TMDLs

The sources of mercury determined for California mercury TMDLs along with progress reports for TMDLs, are included in Appendix M and the sources are also briefly summarized here. The sources of mercury vary by TMDL, but more than half focus on historic mines (Guadalupe River, Walker Creek, Cache Creek, Clear Lake, Clear Creek and Hernandez Reservoir). The historic mining legacy is also the major source in two other mercury TMDLs: the San Francisco Bay TMDL and the Sacramento-San Joaquin Delta TMDL. These two TMDLs also include minor contributions from atmospheric deposition and points sources.

Mines were not identified as a source of mercury in the TMDLs in Southern California. Two of the Southern California TMDLs have other historical mercury sources: the Rhine Channel of Newport Bay; and Los Angeles/Long Beach Harbor. In the latter TMDL, the sources included historic manufacturing, military facilities, fish processing plants, wastewater treatment plants, oil production facilities, and shipbuilding or repair yards in the ports.

Mercury deposited from atmospheric emissions was a more important source in two other TMDLs in Southern California. In the Calleguas Creek/Mugu Lagoon TMDL, sources are atmospheric deposition and runoff from agriculture and open space. It is not clear what the original source of mercury is in the runoff. It could be atmospheric, historic pesticides, naturally enriched sediments, imported water from Northern California or another source. Atmospheric deposition, run off, ground water pumping and imported water are described as sources in the Los Angeles area Lakes TMDLs.

4.4.10 The Effects of Climate Change on Fish Mercury Levels

Climate change is expected to exacerbate the problem of elevated mercury in fish. Climate change is expected to increase average temperatures in California, including in the inland surface waters. Elevated water temperatures could lead to higher concentrations of methylmercury in fish and mammals. This is related to an increase in metabolic rates and increased mercury uptake at higher water temperatures (Booth and Zeller 2005; Dijkstra et al. 2013; Pack et al. 2014).

A second aspect of climate change to consider is the increased frequency and strength of storms. A great deal of mercury remains stored away in sediment fans from historic hydraulic gold mining. While these sediments may seem currently out of reach of flood waters, the increased frequency of larger flood events that is expected to accompany global warming could liberate this stored mercury (Singer et al. 2013). Increased frequency and strength of storms is related to increasing frequency and duration of inundation of areas that contain high mercury inventories over multiple meters of depth from the historic mining legacy (Singer et al. 2016). This increase in flooding will enable higher methylmercury production in these mercury contaminated areas. Such areas may be important locations of methylmercury production and uptake into food webs (Donovan et al. 2016a, b).

One of the major sources of climate change is also a major source of mercury. The burning of fossil fuels, such as coal, is a main source of greenhouse gases. Coal burning is also one of the major sources of atmospheric mercury. California does not burn very much coal relative to other states and countries, but about 60% of the atmospheric mercury deposited in California is estimated to come from outside of California, including global sources (California Water Boards 2013). Global efforts to decrease greenhouse gases will likely help control mercury.

4.5 Current Levels of Mercury in the Environment

Current levels of mercury in the environment in California are described in the following section to provide an understanding of the magnitude of the mercury contamination. Also the mercury levels in the environment are compared with current human health guidelines and the water quality objectives in the Provisions. For a description of the geography and waterbodies in the nine regions of California, see Appendix D.

4.5.1 Mercury Levels in Surface Water

The Surface Water Ambient Monitoring Program (SWAMP) and regional monitoring programs (RMP) have been measuring mercury and methylmercury in water and fish tissues for years.

This section briefly summarizes the most recent data, from 2000 - 2013, which is obtainable from the State Water Board's California Environmental Data Exchange Network (CEDEN) public database (www.ceden.org). The concentrations of mercury in surface water from all over the state (Table 4-1) are generally less than the water quality criteria from the California Toxics Rule of 50 and 51 ng/L. However, much of the data was from areas with elevated mercury such as San Francisco Bay. See Figure N-4, in Appendix N, for the spatial distribution of samples.

Table 4-1. Mercury concentrations (ng/L) in surface water 2004 – 2012

	Hg total	Hg dissolved	MeHg total	MeHg dissolved
Median	2.0	0.82	0.053	0.017
Mean (Average)	4.7	1.4	0.062	0.024
95th percentile	16.1	4.1	0.15	0.061
5th percentile	0.43	0.1	0.019	0.0050
Standard deviation	11	1.9	0.040	0.024
Max	283	24	0.23	0.21
Min	ND (0.15-1.3)	ND (0.13-0.41)	ND (0.01-0.03)	ND (0.01-0.03)
Number of samples	1120	424	154	155

ND indicates non-detect with a range of the accompanying detection limits given in ng/L. For the other statistics, if the sample was non-detect then a value of one half of the detection limit was used.

4.5.2 Methylmercury Levels in Sport Fish

Fish methylmercury data are summarized in the graphs within this section, particularly in context to the Mercury Water Quality Objectives. Also, the State Water Board hosts an interactive map on the internet to inform the public on methylmercury levels in fish. This website allows the user to enter any threshold, select the fish species, and see the results on a statewide map: http://www.mywaterquality.ca.gov/safe_to_eat/data_and_trends.

Although the mercury concentrations in the water throughout the state are generally below the California Toxics Rule criteria (Table 4-1), the concentrations in many fish throughout the state are above the U.S. EPA human health criteria of 0.3 mg/kg and OEHHA's more recent Fish Contaminant Goal of 0.22 mg/kg (Figure 4-3). Fish tissue data from the past 12 years are compiled in the following figures and compared with the recommended mercury objective for sport fish of 0.2 mg/kg and the default translation of the narrative objective for subsistence fishing of 0.05 mg/kg (the tribal subsistence objective is similar, 0.04 mg/kg). The Sport Fish Water Quality Objective is very similar to the Fish Contaminant Goal of 0.22 mg/kg which suggests that many of these fish are not safe to eat on a consistent basis.

The Sport Fish Water Quality Objective and the Subsistence Fishing Water Quality Objective would apply to trophic level 4 fish, while the Tribal Subsistence Fishing Water Quality Objective would apply to mostly trophic level 3 fish. Recall from Section 4.2 that trophic level 4 fish (such as bass) accumulate more methylmercury than trophic level 3 fish (such as carp, perch and trout). Both trophic level 4 fish and trophic level 3 fish are some of the most common fish that recreational anglers catch and consume. Trophic level 4 fish will have the highest methylmercury concentrations of all fish because they are highest on the food web. Figure 4-3 shows that methylmercury concentrations in the majority of the trophic level 4 fish sampled in 2000-2011 are higher than the Sport Fish Water Quality Objective, while Figure 4-4 shows that the methylmercury concentrations in the majority of trophic level 3 fish sampled over that same time period are below the Sport Fish Water Quality Objective. The methylmercury concentration in fish tissue is often directly related to fish length. The objective to protect human health would apply to fish 150-500 millimeters (mm), so this subset of trophic level 4 and trophic level 3 fish data is also shown in Figures 4-3 and 4-4.

Trout and other land-locked (non-migratory) salmonids are mostly considered trophic level 3, although some are considered trophic level 4. Data from trout or related species were compiled separately because these fish have different feeding habits that result in lower methylmercury concentrations in their tissues. The methylmercury concentrations in trout (Figure 4-5) are considerably different than the methylmercury concentrations in other trophic level 3 fish (Figure 4-4). Very few trout have tissue methylmercury levels that exceed the Sport Fish Water Quality Objective. These figures show how the particular species of fish that a person eats greatly affects that person's exposure to methylmercury.

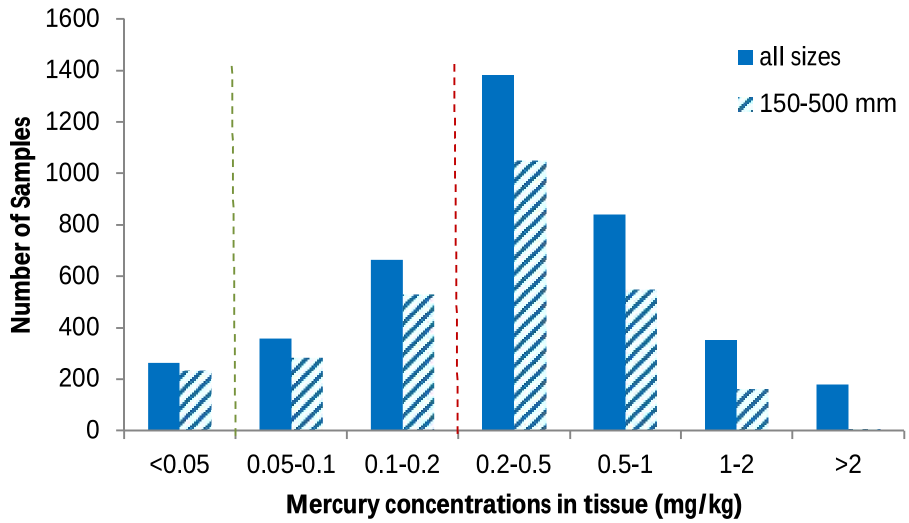

Figure 4-3. Methylmercury concentrations in trophic level 4 fish (highest on the food web) from 2000-2011. Data were from common trophic level 4 fish species: largemouth bass, small mouth bass, spotted bass, white catfish, channel catfish, Sacramento pike minnow, crappie, and black crappie (total lengths: 100 – 800 mm). The recommended Sport Fish Water Quality Objective (red-dashed line) and a subsistence objective (green-dashed line) are also shown. "All sizes" includes additional concentration data for which the length of the fish was not reported.

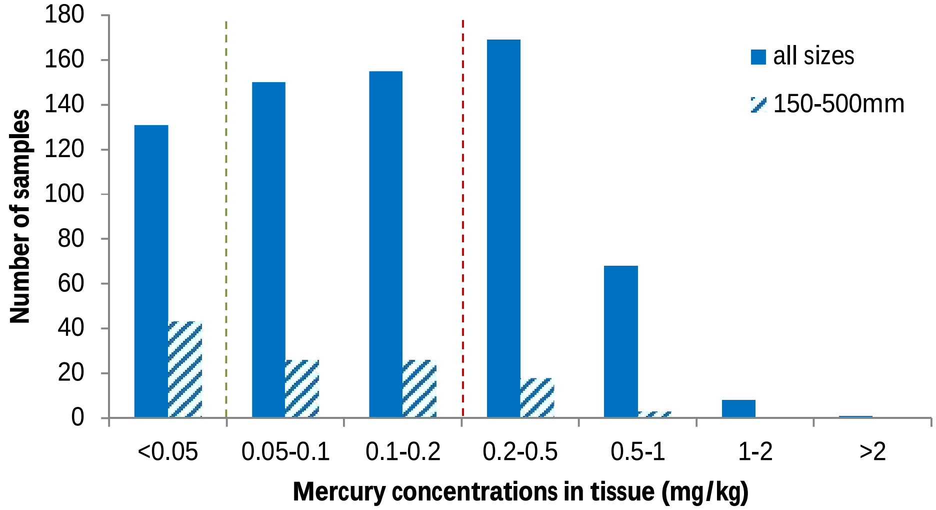

Figure 4-4. Methylmercury concentrations in trophic level 3 fish (second highest on the food web), excluding trout, from 2000 – 2011. Species were bluegill, common carp, golden shiner, redear sunfish, yellowfin goby, black bull head, brown bullhead (total lengths: 100 – 820 mm). The recommended Sport Fish Water Quality Objective (red-dashed line) and a subsistence objective (green-dashed line) are also shown. "All sizes" includes additional concentration data for which the length of the fish was not reported.

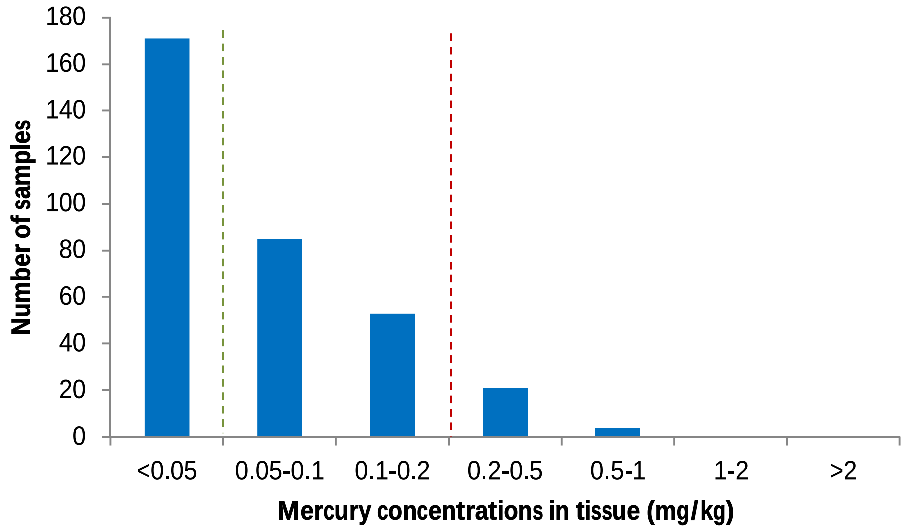

Figure 4-5. Methylmercury concentrations in trout, which are also trophic level 3 fish, from 2000-2011. Species were brown trout, brook trout, lake trout, rainbow trout, eagle lake trout, kokanee, (total lengths: 200 – 605 mm). The recommended Sport Fish Water Quality Objective (red-dashed line) and a subsistence objective (green-dashed line) are also shown.

Striped bass and Chinook salmon are also popular among anglers, and the methylmercury levels in these fish are shown in the next two figures. These are anadromous fish species, and their methylmercury exposure changes as they migrate and their food sources change in the different habitats. Striped bass are a trophic level 4 fish and prey on other fish, which typically results in higher concentrations of methylmercury (Figure 4-6). Anadromous salmon, such as Chinook salmon are generally a trophic level 3 fish and have lower mercury concentrations because they consume organisms that are lower on the food web (Figure 4-7). Landlocked salmon can have higher mercury concentrations than the anadromous salmon (Figure 4-7).

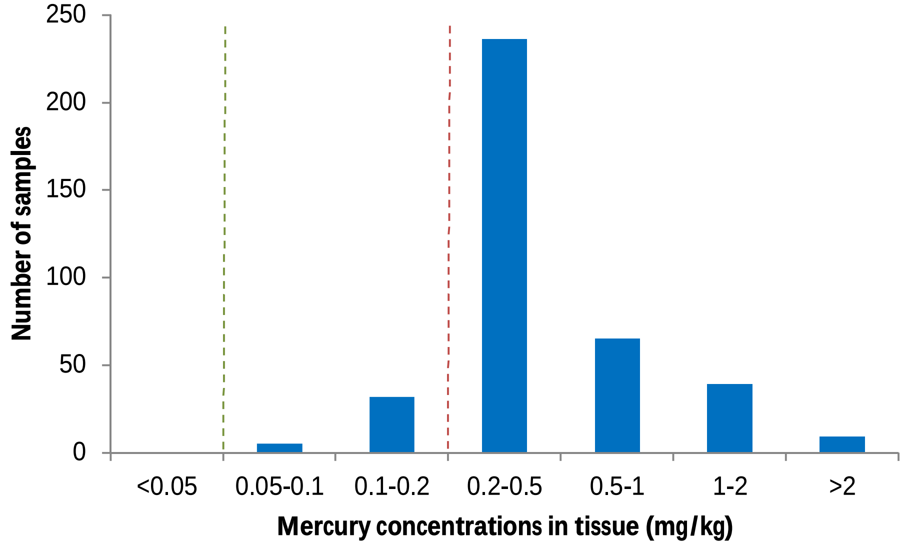

Figure 4-6. Methylmercury concentrations in striped bass, from 2000 – 2011. The recommended Sport Fish Water Quality Objective (red-dashed line) and a subsistence objective (green-dashed line) are also shown.

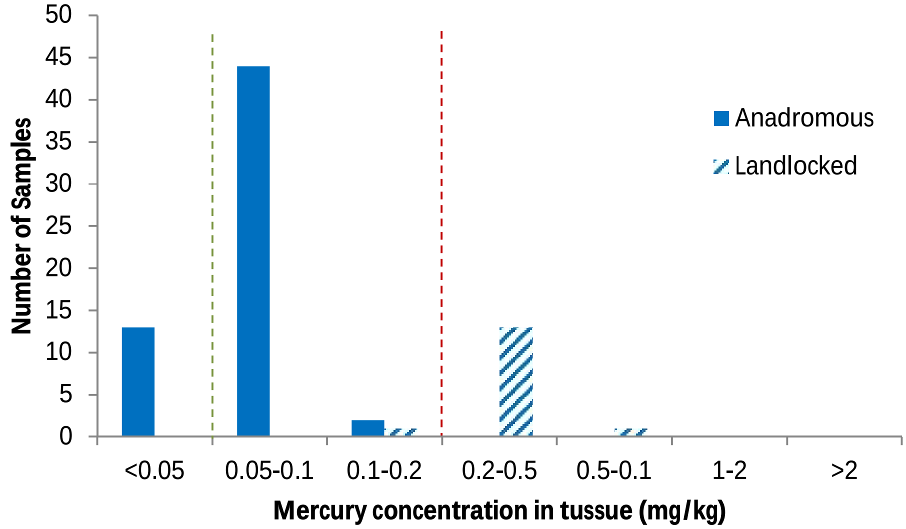

Figure 4-7. Methylmercury concentrations in Chinook salmon, from 2000 – 2011. The recommended Sport Fish Water Quality Objective (red-dashed line) and a subsistence objective (green-dashed line) are also shown.

4.5.3 Methylmercury Levels in Prey Fish

The Provisions contain the Prey Fish Water Quality Objective to protect wildlife that prey on smaller lower trophic level fish. This objective is intended to fill a gap in protection when the Sport Fish Water Quality Objective cannot be assessed in trophic level 4 fish, for example in trout dominated waters (see Chapter 5 issue G). The objective of 0.05 mg/kg in whole fish samples would apply to prey fish that are 50 – 150 mm. A similar water quality objective was adopted for Walker Creek, Soulajule Reservoir and the Guadalupe River (see Table 2-2). Available mercury concentration data in whole prey fish (wet weight) are summarized by geographic regions where the fish were collected, in Figure 4-8 and Figure 4-9 below. Data were obtained from CEDEN and are fairly limited. Many of the data were from a recent study that found that about one third of the grebes sampled in California have an elevated risk of mercury toxicity (Ackerman et al. 2015a, b).

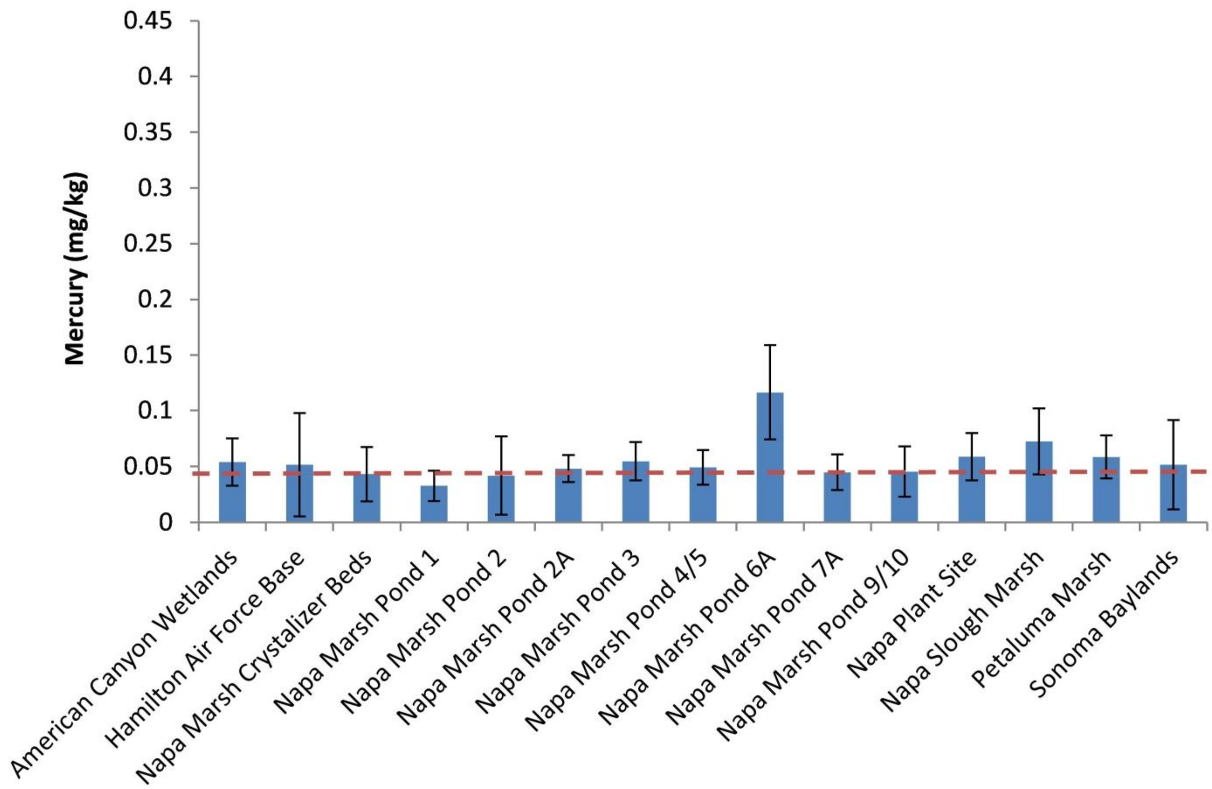

Figure 4-8. Mercury concentration data in prey fish (50 – 150 mm) from sites in the San Francisco Bay Region. The red dashed line shows the Prey Fish Water Quality Objective of 0.05 mg/kg.

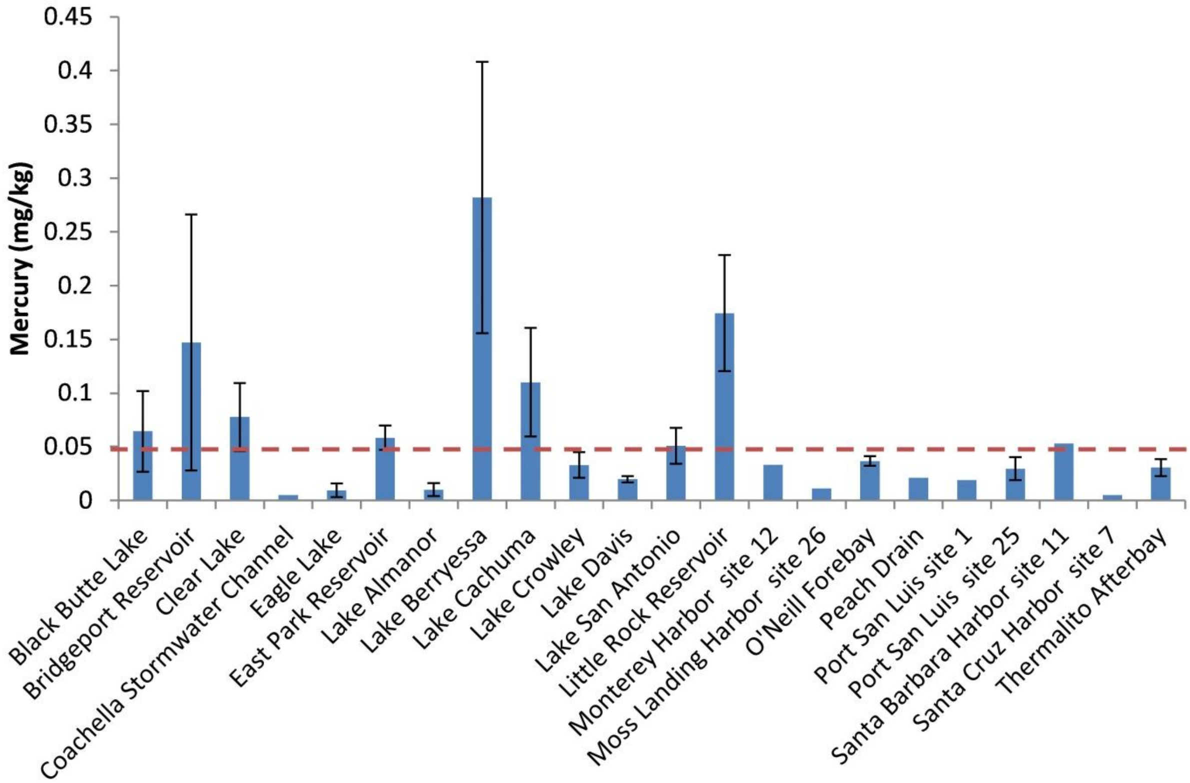

Figure 4-9. Mercury concentration data in prey fish (50 – 150 mm) from sites in the Central Coast Region, Central Valley Region, Lahontan Region, and Colorado River Basin Region. The red dashed line shows the Prey Fish Water Quality Objective of 0.05 mg/kg.

4.5.4 Methylmercury Levels in Small Prey Fish

The Provisions also contain the California Least Tern Prey Fish Water Quality Objective to protect threatened and endangered birds. The species of greatest concern is the California least tern (*Sterna antillarum browni*). The objective of 0.03 mg/kg in whole fish samples would apply to small prey fish that are less than 50 mm, which is typical of the fish that the tern prey on. This objective has already been adopted in San Francisco Bay and the Sacramento–San Joaquin Delta to protect the California least tern. Methylmercury concentration data in these size fish in the environment are limited. Data in fish less than 50 mm were only available for San Francisco Bay (Greenfield et al. 2013, data can also be found at www.ceden.org). Figure 4-10 shows that most small fish in the Bay are above the mercury objective of 0.03 mg/kg that has already been adopted there. However, these fish are from an area that is heavily impacted by mercury mining. The Lower South Bay (Figure 4-11a), which is downstream of the historic New Almaden mining district, has the highest fish methylmercury concentrations, while further away in Suisun Bay (Figure 4-11b) fish methylmercury concentrations are closer to the objective.

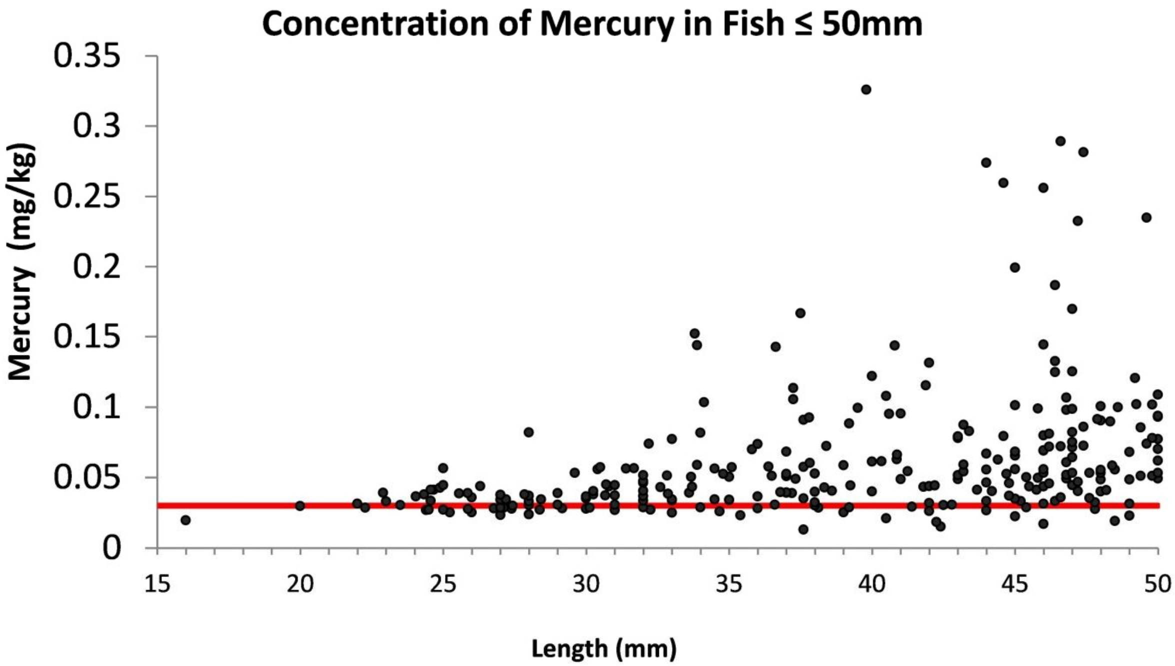

Figure 4-10. Methylmercury concentrations in fish ≤ 50mm compared to fish length. Samples collected in the San Francisco Bay from 2008 – 2010, including South bay, Lower South Bay, Central bay, San Pablo Bay and Suisun Bay. The red line shows the California Least Tern Prey Fish Objective of 0.03 mg/kg.

These small fish have also been used as mercury "biosentinels" since they provide a sensitive measure of methylmercury uptake (Eagles-Smith and Ackerman 2010). Compared to larger fish that accumulate methylmercury over a long period of time, these fish more directly reflect recent methylmercury concentrations since they consume species that readily absorb methylmercury. Figure 4-10 shows the relationship between the mercury concentration and the length of the fish.

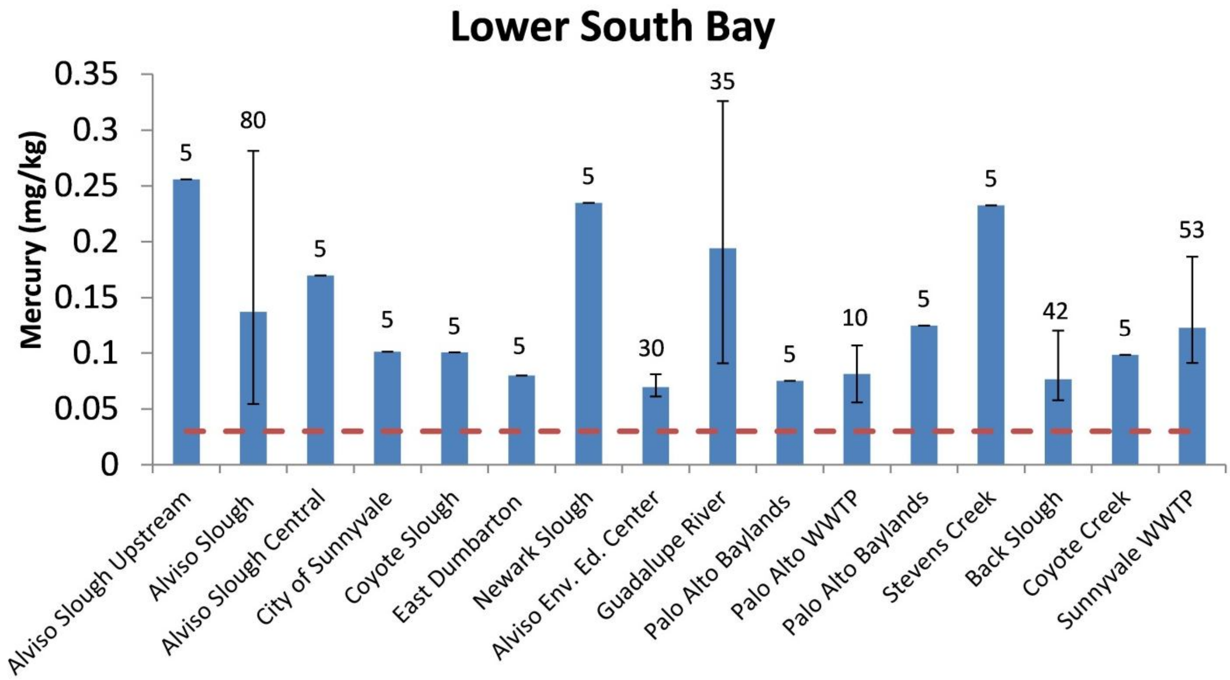

Figure 4-11a. Average methylmercury concentration in fish ≤ 50mm in Lower South Bay. The average concentration is shown with the minimum and maximum (error bars) and the number of samples. The red line shows the California Least Tern Prey Fish Objective of 0.03 mg/kg.

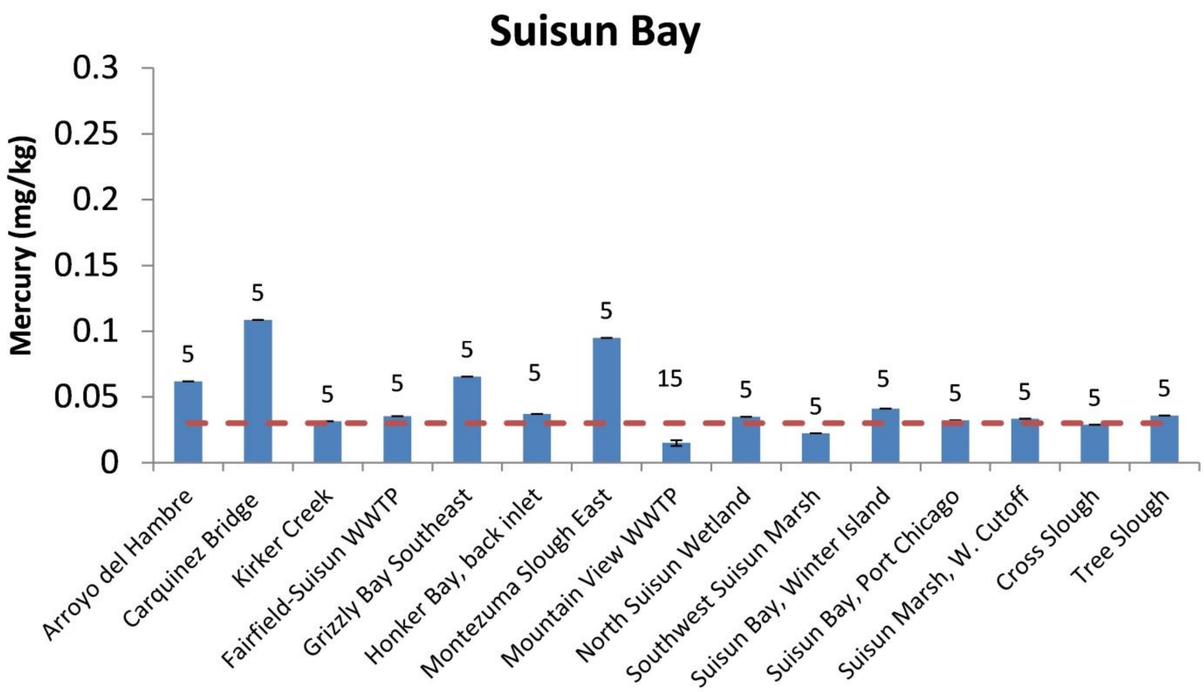

Figure 4-11b. Average methylmercury concentration in fish ≤ 50mm in Suisun Bay. The average concentration is shown with the minimum and maximum (error bars) and the number of samples. The red line shows the California Least Tern Prey Fish Objective of 0.03 mg/kg.

4.5.5 Mercury Levels in Sediment

A survey of sediment mercury concentrations in the Cache Creek Canyon provides an idea of background concentrations compared to typical concentration areas enriched with mercury or where mercury was mined. The Cache Creek watershed is naturally enriched in mercury and includes portions of three historic mercury mining districts, one of which is the Sulphur Bank Mine in Clear Lake which is now a U.S. EPA superfund site. The *Mercury Inventory in the Cache Creek Canyon* found that the upstream background mercury concentrations in sediment in the Cache Creek watershed averaged 0.06, 0.10, and 0.09 mg/kg total mercury, in silt, sand and gravel sized material, respectively. Meanwhile, the average mercury concentration in 78 sediment samples collected in a segment of Cache Creek that is downstream of historic mines, between Harley Gulch and Bear Creek, was 0.98, 0.77 and 0.89 mg/kg in silt, sand, and gravel sized material, respectively. In an area closer to two mines, the Harley Gulch Delta, mercury concentrations in silt and sand sized material, averaged 4.83 and 4.20 mg/kg (Central Valley Water Board 2008). This indicated that the two mines upstream of the Harley Gulch Delta were a significant contributor to the elevated mercury in Cache Creek downstream of Harley Gulch.

Additionally, several studies in the San Francisco Bay suggest that the threshold for background mercury (total mercury) in various parts of the basin is about 0.08 mg/kg (Domagalski, 2001; Domagalski et al. 2004; Bouse et al., 2010; Donovan et al. 2013; Singer et al. 2013; Donovan et al. 2016a, b), similar to the findings for Cache Creek. Furthermore, these studies document mercury concentrations that are an order of magnitude higher or more in many locations (including river floodplains, bypasses, and Bay-Delta bottom sediments), for example 3 to 10 mg/kg in the Yuba River (Singer et al. 2013).

4.6 Methylmercury Effects on Wildlife

Appendix J contains a review of effects on wildlife and the effects are briefly summarized here. The species most at risk for methylmercury toxicity are generally piscivorous (fish-eating) wildlife, because methylmercury tends to accumulate to very high concentrations in the aquatic food web (USFWS 2003). However, recently some terrestrial songbirds have been found with higher mercury levels than fish eating birds because they feed on predatory invertebrates, like spiders, which lengthens their food web and increases the bioaccumulation of methylmercury (Cristol et al. 2008). Methylmercury is also toxic to the fish themselves and can impair reproduction in fish. Methylmercury toxicity in mammals, such as mink and otter, is primarily manifested as central nervous system damage; including sensory and motor deficits and behavioral impairment (Wolfe et al. 1998, Scheuhammer et al. 2007).

Methylmercury has been found to impair the ability of birds to fly and also alter their songs (Hallinger et al. 2010; Carlson et al. 2014). In great white herons, liver mercury contamination (6 mg/kg) correlated with mortality from chronic diseases in southern Florida (Spalding et al. 1994). Weight loss, neurologic, and immunologic effects were observed in captive great egrets fed a diet with 0.5 mg/kg methylmercury (Spalding 2000a, Spalding 2000b). Reproduction is one of the most sensitive endpoints to methylmercury toxicity, and effects in birds include reduced hatching due to early mortality of embryos, fewer eggs laid, changes in pairing behavior and territorial behavior (Heinz 1979; Barr 1986; Wolfe et al. 1998; Frederick and Jayasena 2011). A recent study found that almost one third of the grebes sampled in 25 lakes throughout California during the spring and summer of 2012 and 2013 had mercury levels in the blood that put them at an elevated risk of methylmercury toxicity (>1 mg/kg wet weight, Ackerman et al. 2015a,b).

Appendix J also contains suggested dietary methylmercury thresholds from peer reviewed literature that were derived from both control experiments and field studies (Tables J-1 and J-2).

4.7 Methylmercury Effects on Human Health

Methylmercury is a "highly toxic substance" (U.S. EPA 1987). Toxicity to the developing nervous system of the fetus is considered the most critical endpoint. The water quality objectives were derived from the U.S. EPA reference dose, which was based on protecting the developing fetus. However, subsequent evidence suggests that cardiovascular effects can occur in adults at comparably low doses (U.S. EPA 2001). Methylmercury may also be immunotoxic and genotoxic as well (Agency for Toxic Substances and Disease Registry 1999).

Methylmercury has long been known as a potent neurotoxicant, particularly due to incidents of acute and high-level exposures such as the poisoning of many in Minamata, Japan, when pregnant women consumed seafood highly contaminated with methylmercury, up to 40 mg/kg (Iyengar and Rapp 2001). This resulted in extreme fetal abnormalities and neurotoxicity (i.e., microcephaly, blindness, severe mental and physical developmental retardation) even among infants born to mothers with minimal symptoms (Harada 1995).

Since then, more subtle neurodevelopmental effects have been observed in populations with moderate methylmercury exposures from regular consumption of fish and/or marine mammals. A well-designed cohort study in the Faroe Islands found that prenatal exposure to organic methylmercury from maternal fish and pilot whale consumption during pregnancy was associated with subtle neurodevelopmental deficits in children, such as poorer performance on tests of attention, fine motor function, language, visual-spatial abilities, and verbal memory (Grandjean et al. 2001, Debes et al. 2006). In a cohort from the Seychelles, however, investigators did not find evidence for a neurodevelopmental risk from prenatal methylmercury exposure resulting from ocean fish consumption (Myers et al. 2003). The Faroe Islands study was used by the U.S. EPA to develop the fish tissue criterion of 0.3 mg/kg (U.S. EPA 2001).

In the Faroe Islands, the primary source of mercury exposure in the study population was through the traditional consumption of whale meat, not fish, and co-exposure to other contaminants such as polychlorinated bi-phenyls (PCBs) that are of concern. However, in California, PCBs are also contaminants in fish tissue at levels that limit the advised consumption amount (Davis et al. 2010, Davis et al. 2012). One hypothesis as to why adverse effects of mercury were not found in the Republic of Seychelles, but adverse effects were found in the Faroe Islands, is that there are other neuroprotective nutrients in seafood, such as selenium and iodine, and long chain polyunsaturated fatty acids (Oken 2012, Meyers 2009). Freshwater fish do not have these nutrients in the same amounts as marine fish (Steffens 1997; Haldimann et al. 2005; Steffens 2006), and many California are exposed to mercury by consuming freshwater fish. While many people in the Faroe Islands and the Republic of Seychelles ate fish several times a week, in the Faroe Islands most of the methylmercury exposure was from infrequent (twice a month) consumption of pilot whale meat (Dourson 2001). Recreational fishers in California may also have infrequent high methylmercury exposure from weekend fishing trips, along with a steady methylmercury exposure from regularly purchased commercial fish. There are other theories as to why the two studies found conflicting results, such as study design (Debes et al. 2006; Oken et al. 2008). Ultimately, mercury is a known neurotoxin and the Faroe Islands study provides data to support a reference dose.

Epidemiologic studies continue to find harmful effects of methylmercury on humans in the U.S. and other countries, including neurological effects in children and effects on cardiovascular disease (Jedrychowski et al. 2006; Oken et al. 2005, 2008, Suzuki et al. 2010; Murata et al. 2011). However, other studies in the Republic of Seychelles (van Wijngaarden et al. 2006; Strain et al. 2015), United States (Oken et al. 2016), the United Kingdom (Daniels et al. 2004), and Spain (Llop et al. 2012) have found no consistent evidence of adverse consequences of prenatal methylmercury exposure from fish consumption on children's development. Some studies suggest a range of health effects in adults and children may result from methylmercury exposures at levels lower than previously observed (Lynch et al. 2010; Mergler et al. 2007, Oken et al. 2008). At the same time, these studies also show a beneficial effect of eating fish. Oken and colleagues discusses the wide range of trade-offs facing fish consumers and the difficulties in evaluating current fish consumption advice (Oken et al. 2008). Consumers need to consider not only the contaminant concentrations in fish but also their nutritional value, the sustainability of the fishery, and the cost of different fish choices.

Recent national data on blood mercury concentrations in women of childbearing age (16 - 49), suggest that most people in the U.S. are at low risk for methylmercury toxicity (U.S. EPA 2013). Generally most people eat commercial fish that are from the ocean, but the sources of fish in this study were not reported. The geometric mean blood total mercury concentration for 2009-2010 was 0.9 µg/L, which is below the suggested threshold of 5.8 µg/L blood mercury, a concentration associated with neurologic effects on the fetus (National Research Council 2000). The study authors found a significant relationship between mercury intake from fish consumption and blood mercury. Also in the last decade, the mean blood mercury concentration has slightly decreased, but the analysis showed few changes in fish consumption and mercury intake over the study period (1999 – 2010). This is consistent with women shifting their consumption to fish with lower methylmercury concentrations. Demographic characteristics associated with blood mercury concentrations were: higher concentrations observed with increasing age and income; higher concentrations observed in the "other" race category; and lower concentrations observed in Mexican Americans.

Blood mercury levels in frequent consumers of fish can be dramatically higher than the national average. Patients at a general internal medicine practice in San Francisco, whose dietary history suggested their methylmercury intake was high, were asked to be screened with a whole blood mercury test (Hightower and Moore 2003). Only consumption of commercial fish was considered in this study. Mercury levels ranged from 2.0 to 89.5 µg/L for the 89 subjects. The mean for 66 women was 15 µg/L (standard deviation of 15), and for 23 men was 13 µg/L (standard deviation of 5). These values are well above the thresholds suggested by the National Research Council in 2000, indicating higher risks for negative health effects from methylmercury. Knobeloch and colleagues examined 14 individuals in Wisconsin who consumed commercial or locally caught fish twice a week or more. Blood mercury levels ranged from < 5 µg/L to 58 µg/L and most of the study participants had blood mercury concentrations above 20 µg/L (Knobeloch et al. 2006). These values show that majority of the study participants had blood mercury levels more than three times higher than the suggested mercury threshold.

4.8 Interactions of Selenium and Mercury

Selenium is an element that functions as a micronutrient for plant and animal life. However, in concentrations beyond the very small amounts required for some biological functions, selenium is toxic to animal life. When selenium is present in the same environment as mercury or methylmercury, complex interactions involving the toxicity of both pollutants occur. Selenium appears to counteract or even protect against the toxic effects of methylmercury, but the relationship is not well understood, and regulatory measures that would adjust limits based on the presence of both pollutants simultaneously are not possible. These interactions are described in detail in this section.

4.8.1 Selenium is an Essential Nutrient and a Toxin

Selenium is essential for many functions in our bodies. Selenium fosters growth and development, has powerful antioxidant and cancer prevention properties, and is essential for normal thyroid hormone homeostasis and immunity. Studies indicate that selenium is especially important for the brain, heart, and immune systems. Ocean fish are among the richest sources of nutritional selenium in the American diet. On the other hand, the selenium in freshwater fish is more variable and may be limited in certain regions. The selenium levels in lake fish reflect the regional selenium levels in the soils. Selenium is thought to reduce the bioaccumulation of methylmercury, and methylmercury concentrations are higher in fish living in lakes where selenium availability is limited (Energy & Environmental Research Center 2011).

Selenium can also be toxic at high doses. In vertebrates, selenium is toxic to the reproductive system. Egg laying vertebrates such as birds and fish seem to have substantially lower thresholds for reproductive toxicity than placental vertebrates (mammals). In fish, effects may occur at 2 µg/L in water or 2 mg/kg in fish (U.S. Department of the Interior 1998). An important feature of selenium ecotoxicity is the narrow margin between nutritionally optimal and potentially toxic dietary exposers for vertebrate animals. Nutritionally optimal dietary selenium exposure is generally reported as 0.1 – 0.3 mg/kg. Thresholds for dietary toxicity in animals are generally reported as 2 – 5 mg/kg. (U.S. Department of the Interior 1998 and references within). In July 2016, U.S. EPA established new national Clean Water Act 304(a) freshwater aquatic life water quality criteria for selenium, including a Whole Body value of 8.5 mg/kg dry weight and a water concentration ranging from 1.5 – 3.1 µg/L (U.S. EPA 2016). U.S. EPA also proposed a new fish tissue-based (whole body) selenium criterion of 8.5 micrograms per gram (µg/g) dry weight, a dissolved water column criterion of 0.2 µg/L, and a proposed particulate (i.e., sediment-bound) water column criterion of 1 µg/L for the San Francisco Bay and Delta (81 FR 46030, July 15, 2016).

4.8.2 Does Selenium Completely Counteract the Effects of Mercury?

If selenium clearly countered the toxic effects of methylmercury in every study, this fact could eliminate the need for mercury remediation. However, the mercury selenium interaction does not appear to be a simple relationship that works in all situations. In fact, waters in California that contain high levels of selenium also have high levels of methylmercury. Waters that are on the 303(d) list due to high levels of both selenium and mercury include Central San Francisco Bay, San Pablo Bay, Suisun Bay, and portions of the San Joaquin River watershed. The high levels of selenium are apparently not preventing methylmercury from accumulating to high levels in fish in these waters.

Most studies that indicate the protective effect of selenium do not show full reversal of toxicity. No evidence has been found to suggest that selenium can fully counteract toxic effects of methylmercury in the human population. The protective effect of selenium likely depends on the ratio of methylmercury to selenium, concentrations of methylmercury and selenium, the speciation and bioavailability of methylmercury and selenium, the presence of other toxic compounds or nutrients, and the anti-oxidant systems/metabolism of the species in question. A protective effect that is highly situation dependent will be very difficult to incorporate into a methylmercury guideline. Overall, the state of the science on selenium–mercury interaction is not close to a point at which it could be incorporated into regulatory limits for mercury. Studies on the selenium-mercury interactions are summarized below.

4.8.3 Selenium and Mercury Interactions

Selenium has long been known to interact with mercury and reduce the toxic effects of methylmercury. The interaction gained attention after Ganther and colleagues showed that quail that were also fed selenium did not have the same methylmercury induced growth inhibition as when they were fed methylmercury alone (Ganther et al. 1972). The protective effects seem to occur through formation of a mercury-selenium complex that is not bioavailable (Kahn and Wang 2009, Raymond and Ralston 2004).

The interaction with selenium offers possible insight into the mechanism of methylmercury toxicity itself because the mechanism of methylmercury toxicity is still unknown. Although methylmercury has long been known to cause damage to the nervous system, it remains unclear how the effects occur. Selenium is a key component in some proteins, and if the selenium is bound to mercury it could cause the function of the selenoprotein to be compromised. It is thus possible that the observed toxicity of methylmercury is at least in part caused by mercury-induced selenium deficiency (Raymond and Ralston 2004, Khan and Wang 2009).

A handful of subsequent studies in rats or mice have also shown protective effects of selenium (Watanabe et al. 1999a, Watanabe et al. 1999b, Ralston 2007, Ralston et al. 2008, Sakamoto et al. 2013). However the effects monitored in these studies were generally acute effects from high doses of methylmercury, such as changes in growth and death. These observations may not reflect the effect of selenium on methylmercury toxicity at concentrations that induce chronic effects such as cognitive impairments. Such chronic effects of methylmercury are really the concern for human health. Sakamoto and colleagues acknowledged the need to study effects at environmentally relevant concentrations (Sakamoto et al. 2013). Meanwhile, other studies do not find any interaction between mercury and selenium. Reed and colleagues used low-level methylmercury and nutritionally relevant dietary selenium and did not find that selenium was able to reverse the behavior impairment from methylmercury (Reed et al. 2006).

Although several studies report protective effects of selenium, some studies also report detrimental effects on other endpoints measured. For example, Hoffman and Heinz found selenium reduced methylmercury induced mortality in adult males, yet deformities in embryos of the offspring were worse in combined selenium and methylmercury treatment than in either treatment alone (Hoffman and Heinz 1998). Again, an important characteristic of selenium is that it is toxic at doses that are not that much higher than the dose that provides nutritional benefit. Also, recently Sakamoto and colleagues found selenium protected against neuronal degeneration from mercury exposure in rats, but there were still differences from control in other endpoints measured (body weight and organ weight, Sakamoto et al. 2013). Ganther and colleagues (2007) dosed cats with methylmercury and selenium and found that selenium delayed methylmercury toxicity by months. However, most of the cats still died by the end of the experiment (Ganther et al. 2007). The authors concluded that it is likely that selenium is a major protective factor in marine fish, but it may not be the only factor.

Another complication in the selenium-mercury story is that the effects may vary by species. Scheuhammer and colleagues found in a comparison of the brains of bald eagles and common loons that bald eagles displayed a greater apparent ability to demethylate methylmercury (Scheuhammer et al. 2008). These interspecies differences may influence relative susceptibility to methylmercury toxicity.

4.8.4 Selenium Dosing of Lakes to Reduce Fish Methylmercury

Selenium was added to Lake Oltertjarn in Sweden for the purpose of reducing fish methylmercury levels. It was noted above that fish generally have higher methylmercury in soils with low selenium. If the selenium will bind to the mercury in an organism, and increases the elimination of methylmercury, then it should also reduce the methylmercury bioaccumulations up the food web. The treatment in Lake Oltertjarn did reduce the methylmercury levels in perch more than 75 percent (Paulsson and Lundbergh 1989, 1991). Just after that, in 1987, 11 additional lakes were treated with a similar or lower level of selenium (to achieve 1-5 µg /L Selenium) to reduce methylmercury. However, two years later, researches were unable to find any perch in five of the lakes. Selenium is also a well-known reproductive toxin and mostly likely caused a collapse of the perch populations in these lakes (Skorupa 1998). Reproductive toxicity has been found in other lakes, including in California (e.g. Kesterson Reservoir, Tulare Basin, and Slaton Sea), with similar concentrations of selenium (Skorupa 1998).

4.9 Human Fish Consumption Rates

The amount of fish that people consume is a critical variable in calculating a protective limit of methylmercury. This variable is shown in the equation that U.S. EPA used for calculating the fish tissue criterion (U.S. EPA 2001), which was also used to calculate the Mercury Water Quality Objectives to protect human heath, below:

$$FTC = \frac{BW * (RfD - RSC)}{FI}$$

where,

FTC = a fish tissue concentration in milligrams (mg) methylmercury (MeHg) per kilogram (kg) fish. <u>The FTC will be used as the methylmercury water quality objective.</u>

BW = human body weight, default value of 70 kg

RfD = reference dose of 0.0001 mg MeHg/kg body weight-day. The value was derived from a study of mothers and their children in the Faroe Islands, where fish and whale is a large part of the diet, and blood mercury concentrations were correlated to cognitive effects in the children.

RSC = relative source contribution, estimated at 2.7×10^{-5} mg MeHg/kg body weight-day. This value is subtracted from the reference dose to account for other sources (e.g., marine fish).

FI = human fish intake (consumption rate, kg fish/day).

Since the fish consumption rate is such a critical variable, this section briefly summarizes fish consumption rates from various sources. Table 4-2 shows fish consumptions rates used by the U.S. EPA and rates used in California. Also included in Table 4-2 is Oregon's recently established rate, which is a much higher fish consumption rate than many states have used. The U.S. EPA derived the recommended methylmercury water quality criterion on the basis of a default fish intake rate for the general population of 17.5 grams/day (U.S. EPA 2001). The 17.5 g/day used by U.S. EPA was the rate for average U.S. consumption (90^{th} percentile) for people who do and do not eat fish. The U.S. EPA default subsistence rate of 142 g/day is also shown in Table 4-2.

Of all fish consumption surveys in California, the San Francisco Bay Seafood Consumption Study (San Francisco Estuary Institute 2000), included in Table 4-2, is recognized as one of the best studies to date. The fish consumption rate (32 g/day) from this study has been used as the basis of fish consumption advisory issued by OEHHA (see Appendix E for more details) and this rate (32 g/day) has also been used to establish site-specific water quality objective for San Francisco Bay and the Sacramento-San Joaquin Delta.

Table 4-2. Selected National and California Fish Consumption Surveys

Type/ Source	Fish Consumption Rate (g/d)	Equivalent 8 oz Meals per Week	Type of Estimate Used to Derive Rate
General U.S. population (U.S. EPA 2000)	17.5 g/d	0.5*	90^{th} percentile
Subsistence, U.S. population (U.S. EPA 2000)	142 g/d	4.3	99^{th} percentile
San Francisco Bay, California (San Francisco Estuary Institute 2000),	32 g/d	1*	95^{th} percentile
Subsistence, Sacramento-San Joaquin Delta, California (Shilling 2009, Shilling et al. 2010)	127 g/d	3.9*	95^{th} percentile
Oregon, including Tribes of the Columbia River (ODEQ 2011)	175 g/d	5-6	95^{th} percentile
Promulgated by U.S. EPA for Washington State (81 FR 85417, November 28, 2016)	175 g/d	5-6	95^{th} percentile
Proposed by U.S. EPA for Maine (81 FR 23239, April 20, 2016)	286 g/d**	9	NA***
California Tribes - contemporary (Shilling 2014)	142 g/d	4.4*	95^{th} percentile
California Tribes – two generations ago (Shilling 2014)	223 g/d	7	95^{th} percentile

*The reference shows that the population consumes an additional, but smaller proportion of store bought fish, so this should be included in the relative source contribution part of the equation (see equation at the beginning of Section 4.9)

**U.S. EPA proposed to use trophic-specific fish consumption rates of 103 g/day (trophic level 2), 114 g/day (trophic level 3), and 68.6 g/day (trophic level 4).

***Estimates were based on a general consideration of resources present and reported to be used combined with nutritional information, but are not derived as statistically-derived calculations with ranges because that level of precision would not be warranted (Haper & Ranco 2009).

Two California subsistence rates are included in Table 4-2. Shilling's 2009 survey of subsistence fishers in the Sacramento-San Joaquin Delta was contracted to provide information for the methylmercury TMDL for the Delta (subsequently published as Shilling et al. 2010). Shilling's 2014 report on California tribes was specifically contracted to provide information for the Provisions.

The fish consumption rate use by the Oregon Department of Environmental Quality (ODEQ) is much higher than the national default rate of 17.5 g/day, but the rate is in part based on the same data set. A focus group of scientists (Cirone et al. 2008) reviewed the same national data (also used by U.S. EPA 2000) and recommended that ODEQ use rates that only included people who ate fish ("consumer only," shown in italics in Table 4-3) and not use rates based on data from people who do not eat any fish. ODEQ also included marine and freshwater fish recognizing the importance of salmon to the diet of many people in the state. And, ODEQ considered tribal consumption rates, many of which were actually lower than the fish "consumer only" rates from the national dataset (e.g. 176 g/day Columbia River Tribes 95th percentile vs. 334 g/d national data "consumer only").

Table 4-3. U.S. General Population Consumption Rates in grams per day

Population	**Consumption Habit**	**Fish type**	**Mean**	**Median**	**90th centile**	**95th centile**	**99th centile**
U.S. Adults	Consumer & Non-consumer	Freshwater	8	0	**17**	50	143
U.S. Adults	Consumer & Non-consumer	All Fish	20	0	75	111	216
U.S. Adults	*Consumer ONLY*	*All Fish*	*127*	*99*	*248*	*334*	*519*
U.S. Adults	Consumer ONLY	Freshwater	81	47	199	278	505
U.S. Women	Consumer ONLY	All Fish	108	77	221	315	494
U.S. Women	Consumer ONLY	Freshwater	75	36	172	273	502

Notes: Data from U.S. EPA 2002 and some of this data was summarized earlier by U.S. EPA 2000. "Freshwater" includes freshwater and estuarine finfish and shellfish, and "All fish" includes anadromous and marine. "Women" were 15-44 years old, while, "Adults" were 18 years and older. Non-consumers reported eating 0 g fish/day. The national default rate is shown in bold (17g/day). Numbers in italics were considered in part for ODEQ's 175 g/day rate.

The "consumer only" U.S. general population data (Table 4-3) should be used with caution because they probably over estimate true rates. The reported estimates were calculated using data from the combined 1994-1996 and 1998 Continuing Survey of Food Intakes by Individuals (CSFII), conducted annually by the United States Department of Agriculture (U.S. EPA 2002). This study asked participants to recall what they ate over two days. To separate "consumers" from "non-consumers", data from those who reported eating no fish during the two day period were eliminated. Then, the fish consumption rates from those individuals who did eat fish over the two days were divided by two to derive the daily rate. This is misleading because this approach used only data from people who happen to eat fish on those two days and made that consumption the daily consumption rate. The people who happened to eat fish on those two days may not actually eat fish that often.

Appendix G summarizes other fish consumption studies conducted in California. Roughly 22 documented fish consumption studies are included. The studies vary in methodology, including the survey approaches used (phone interview vs. surveying anglers while fishing), the number and type of people surveyed and the resulting statistics presented and adjustments for bias. Not all studies calculated a fish consumption rate that could be equated to a rate in g/day. Of the studies that reported rates, the mean consumption rates ranged from 3 to 60 g/day and high end rates (e.g. 90th or 95th percentile) ranged from 32 to 225 g/day.

The State Water Board has considered additional California-only studies in order to determine subsistence fishing rates within the state. There are several studies, listed in Table 4-4, that provide information regarding subsistence fishing in California. Overall, the studies in Table 4-4 show that the amount of fish consumed and the type of fish consumed (classified here as “high mercury” versus “low mercury”) vary by geographic region. Seven of the studies in Table 4-4 support a subsistence fish consumption rate of four to five meals per week or more for the 95th percentile of the surveyed populations, but the remaining studies either found a rate of consumption less than four meals per week or were inconclusive.

One of the issues in endeavoring to derive a numeric water quality objective for the SUB beneficial use is that it is not clear which studies or consumption rates represent subsistence fishing versus those that represent recreational fishing. For example, in the San Francisco Bay study (Table 4-4) it is not clear that one subset of the data by ethnicity better represents subsistence versus the whole study. If the “Asian” subgroup is chosen, the fish consumption rate is not different than the result from all participants. If the subgroup with the highest rate is used (Pacific Islander and “Other”), the data considered is narrowed down to only 19 responses out of 1152 responses from anglers who ate their catch, and still the consumption rate is only two meals per week. Data from the San Francisco Bay study was also broken down by other demographic information, but for example, income was not a good predictor of the fish consumption rate (on the whole, respondents with higher incomes were eating the same amount as people with lower incomes). Overall, for the San Francisco Bay study, it is not clear how a separate rate for subsistence fishers versus recreational fishers would be chosen.

To derive a numeric water quality objective for the T-SUB beneficial use, however, the California Tribes Fish-Use study provides a significant summary of statewide fish consumption by California tribes (Shilling et al. 2014). While the Tribes Fish Use study includes data from 40 tribes throughout the state, the study cannot be assumed to represent every tribe, since there are many other tribes in California. There are 109 tribes that are recognized by the federal government and 72 more communities are petitioning for recognition (California Environmental Protection Agency 2009). This study was somewhat unique in that study participants were volunteers, which may result in biased fish intake estimates. One obvious source of bias could be that people who eat large amounts could be more motivated to participate in the study.

However, the study authors list reasons why some tribe members would not participate, including resistance to governmental intrusion, and knowledge of past failure of government to act to protect tribal interests (Shilling et al. 2014). These concerns may be more significant for a person for whom fish use is very important (and frequently eats fish), resulting in underrepresentation of those who eat large amounts of fish. The effects of various sources of bias are complex and difficult to predict. Nevertheless, the rate of 142 g/day for contemporary fish consumption for California tribes (Shilling et al. 2014) matches the US. EPA recommended subsistence rate of 142 g/day (U.S. EPA 2002).

To derive water quality objectives pertaining to the recreational and subsistence fishing beneficial uses contained in the Provisions, several possible options were developed based on the studies described in this section. The options for the water quality objectives are described in Section 6.2, Section 6.5, and Section 6.6 including the policy issues associated with each option. Appendix H provides details of the calculations for each of the options for the recreational and subsistence fishing objectives.

Table 4-4. California Fish Consumption Data Related to Subsistence Fishing[1]

Geographic Area	Group/ Subgroup	Number of Respondents	Meals per week (95th percentile)	Fish type[2]
San Francisco Bay (San Francisco Estuary Institute 2000)	Pacific Islander and "Other"	19	2	Mixed
	Asian	190	< 1	Mixed
	All participants (60% non-white)	1331	1	High Mercury
Sacramento- San Joaquin Delta (Shilling 2009, Shilling et al. 2010)	South East Asian	286	4	High mercury
	All participants (85% non-white)	373	4	High mercury
Gold Country (Sierra Nevada Mountains and foothills) (Sierra Fund 2011)	All participants (authors sought to include locations used by low income anglers)	159	1 (mean value, so a 95th percentile is presumably higher)	Mixed
Ventura County & LA County (coastal & inland waters) (Allen et al. 2008)	African American	27	3	Low mercury
	"No data"[3]	7	9	Low mercury
	All participants	495	2	Low mercury
Santa Monica Bay (Allen et al. 1996)	Asian	122	4	Mixed
	"Other"	14	5	(Not reported)
	All participants	1243	2.5	High mercury
California Tribes (statewide) (Shilling et al. 2014)	Contemporary	580	4.4	Low mercury
	Two generations ago	216	7	Low mercury

[1]The overall results for each study are also provided for comparison, even if not related to subsistence. See Appendix G for complete study results.

[2]"Fish Type" is a rough indicator of the type of fish most frequently consumed: "High mercury" indicates trophic level 4 fish, which tend to have higher levels of mercury. "Low mercury" indicates trophic level 3 fish, which tend to have lower levels of mercury (see Section 4.2). Some studies provided information on fish type for the demographic subgroups (Table K40, San Francisco Estuary Institute; Table 2, Shilling et al. 2010; Table 5, Allen et al. 1996). Otherwise, the details of the fish type consumed is shown in Appendix G.

[3]"No data" indicates respondents declined to state and ethnicity.

4.10 Uses of Water by California Native American Tribes

California has the second largest number of federally-recognized Native American Tribes and, according to the 2000 U.S. Census, the largest Native American population in the United States. In California, there are 109 Native American Tribes that are recognized by the federal government and 72 more communities are petitioning for recognition (California Environmental Protection Agency 2009).

The diversity of traditional cultures and lifeways within the boundaries of present-day California is enormous, by any measure. Linguistically, at least 80 distinct native languages were spoken in California at the beginning of the 19th century (http://linguistics.berkeley.edu/). As a point of reference, there are today merely 24 "official" languages in the European Union, a landmass approximately ten times the size of California. There are, at a minimum, 50 traditional tribal areas within the state where ethnically similar groups were once widespread (Castillo, 1998). Descriptions of California Native American tribal communities, culture and traditions are the subject of hundreds of volumes of scholarship and historical records. A complete description of these traditional lifeways is therefore beyond the scope of this report. However, several examples of California tribal traditional uses of water for illustrative purposes are provided, but this report in no way limits definitions of uses of water that support the cultural, spiritual, ceremonial, or traditional rights or lifeways of California tribes to these examples. .

Many traditions and lifeways are closely linked to natural resources available in the traditional tribal areas. For example, "Northwest" tribes, as described by Castillo, live in the temperate rainforest and have historically had access to navigable waterways as well as well as robust lumber resources (ibid.) The Yurok tribe maintains the tradition of *yoch* (redwood dugout canoe) building, which is essential for navigating rivers, streams and coastal waters; the *yoch* itself is part of the White Deerskin Dance, a ceremony that is still observed by the Yurok tribe, as a conveyance for the festival members (http://www.yuroktribe.org/culture/culture.htm).

In many cases, water bodies themselves provide building materials. A freshwater marsh plant called the *tule* (*Schoenoplectus actus*) has been immensely important in California native material culture. Many tribes, such as the Clear Lake Pomo, utilized tules to build large houses as well as canoes (Jones, 1998). This technology is still used today, and is now exhibited annually at the an inter-tribal competition, the Tule Boat Festival, at Clear Lake http://www.lakeconews.com/ Tules have also been used for construction of myriad goods by tribes throughout the state, including baskets and sleeping mats, and as components for houses.

Perhaps the most prevalent use of water by California tribes was as a food source, especially from salmon runs. Tribes and tribal groups with access to salmon runs established managed fisheries. Given salmon's importance, cultural and ceremonial traditions that honored salmon, especially the First Salmon Ceremony, are prevalent among not just California tribes but Native American tribes along much of the west coast of North America. The Karuk tribe's First Salmon Ceremony is briefly described as "a ritual thanksgiving held in spring, which marked the end of wither and the start of the fishing season." (McCarthy, 1998). However, an early 20th century ethnography of elderly Karuk tribe members details the complexity of the ceremony, which included ritual immersion in water, declaration of the arrival of the salmon run, a ritual first catch of the run, followed by preservation, preparation and sharing of the first catch (Roberts, 1932).

Recently, 40 California tribes were surveyed on how they fish and use California's waters (Shilling et al. 2014). Figure 6-1 below shows the areas fished by survey participants within the 30 days preceding the interview. Extrapolation of those results from those 40 tribes to all California tribes suggests that tribes may be fishing in a majority of waters in the state, rather than a few isolated locations.

A) **B)**

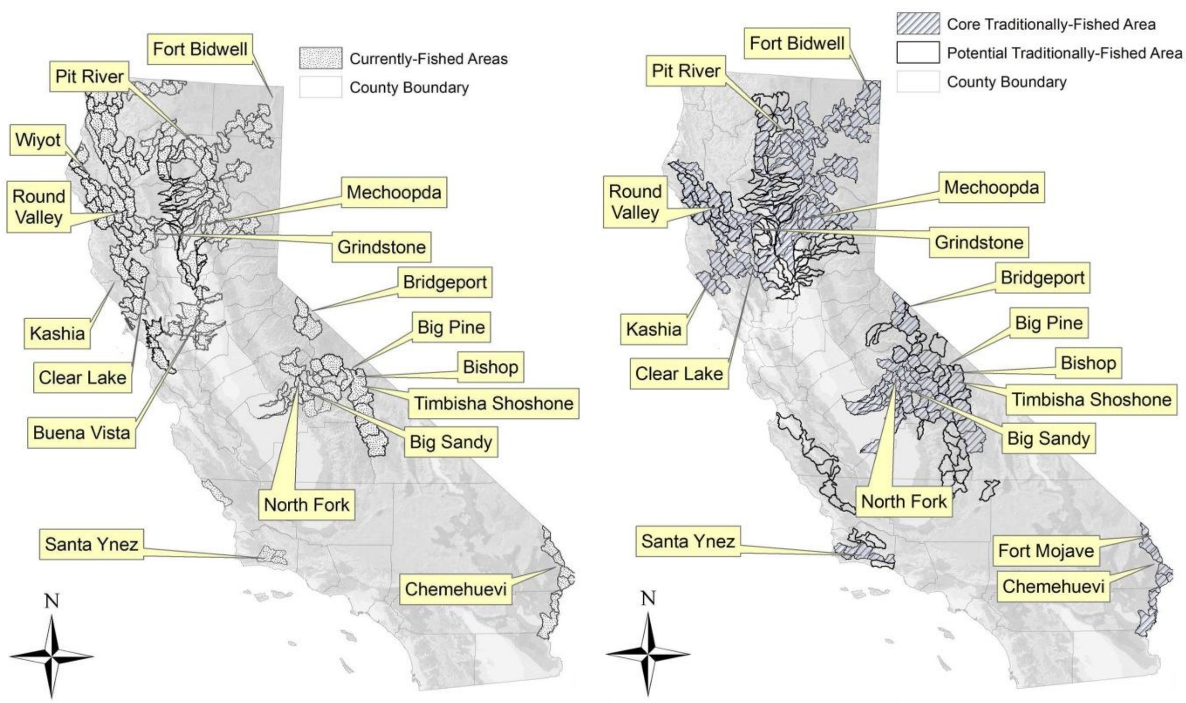

Figure 6-1. Waters used by some California tribes (Shilling et al. 2014). A) Currently-fished watersheds (hydrologic unit code HUC-10). Areas with darker color outlines represent areas where fishing areas of more than one tribe overlapped. B) Traditionally-fished watersheds (hydrologic unit code HUC-10). Areas with darker color represent areas where fishing areas of more than one tribe overlapped.

5. Beneficial Uses Impacted by Mercury

This section identifies which beneficial uses would be protected by the Provisions' five Mercury Water Quality Objectives. Regional Water Board basin plans define about 26 beneficial uses that can be applied to surface waters in California. The uses that the Mercury Water Quality Objectives would apply to are listed below, as well as the inapplicable beneficial uses. With the exception of the three beneficial uses the Provisions would define (CUL, T-SUB, and SUB), to aid the following discussion, this Chapter utilizes the beneficial use definitions contained in the Central Valley Regional Water Board's basin plan (Central Valley Water Board 2009) and the Continuing Planning Process Report (State Water Board 2001).

The Mercury Water Quality Objectives were derived to protect uses related to humans or wildlife that eat fish from water bodies in California. Although the objectives are derived using fish consumption rates, none of the objectives in the Provisions are designed to ensure that fish can be caught in an abundance to sustain that consumption rate. Uses pertaining to fish consumption are the most sensitive uses related to mercury because of the bioaccumulation of methylmercury in the food web. By protecting these uses, other aquatic life that is exposed to mercury through contact with water or via ingestion of food lower in the food web (by consuming insects or algae) would be protected as well.

The Mercury Water Quality Objectives are intended to protect the applicable beneficial uses discussed in this Chapter in all waters where they are designated in water quality control plans or where the use exists (see also section 2.4). Pursuant to federal regulations, existing uses must be protected – even if they have not been designated to specific waters in water quality control plans (40 C.F.R § 131.12(a)(1)). U.S. EPA's regulations implementing the Clean Water Act defines "existing uses" as "those uses actually attained in the water body on or after November 28, 1975, whether or not they are included in the water quality standards" (40 C.F.R. § 131.3(e)). U.S. EPA explains in its summary to the revised water quality standards regulations (80 Fed. Reg. 51027 (Aug. 21, 2015): "[E]xisting uses are known to be 'actually attained' when the use has actually occurred *and* the water quality necessary to support the use has been attained. U.S. EPA recognizes, however, that all the necessary data may not be available to determine whether the use actually occurred or the water quality to support the use has been attained." Additionally, the objectives would apply to waters for which a water quality control plan has expressly designated specific waters with the applicable beneficial uses (and, typically, when that occurs the use is designated as an existing or probable future use).

In some waters, the uses may be seasonal or intermittent. The Mercury Water Quality Objectives are intended to protect seasonal and intermittent uses in addition to year-round uses.

Table 5.1 identifies the Mercury Water Quality Objectives, the beneficial uses applicable to each, and the applicable numeric concentration in fish tissue (see Appendix A for full details). As described in sections 5.1 and 5.5, the Sport Fish Water Quality Objective and the Prey Fish

Water Quality Objective may be utilized for additional beneficial uses pertaining to wildlife and marine habitat.

Table 5.1. Summary of the Mercury Water Quality Objectives

Objective Type	Beneficial Uses	Objective
Sport Fish	Commercial and Sport Fishing; Wildlife Habitat; Marine Habitat	0.2 mg/kg in highest trophic level fish, 150-500 mm, skinless fillet
Tribal Subsistence	Tribal subsistence fishing	0.04 mg/kg in 70% trophic level 3 fish and 30% trophic level 4 fish, 150-500 mm, skinless fillet
Subsistence	Subsistence fishing	Waters …shall be maintained free of mercury at concentrations which accumulate in fish and cause adverse biological, reproductive, or neurological effects. The fish consumption rate used to evaluate this objective shall be derived from water body and population-specific data and information of the subsistence fishers' rate of and form of (e.g. whole, fillet with skin, skinless fillet) fish consumption
Prey Fish	Wildlife Habitat; Marine Habitat (no trophic level 4 fish)	0.05 mg/kg in whole fish 50-150 mm
Prey Fish for the California Least Tern	Wildlife Habitat, Marine Habitat, Rare, Threatened, or Endangered Species (Where California least tern habitat exists)	0.03 mg/kg in whole fish less than 50 mm

5.1 Applicable Uses – Sport Fish Water Quality Objective

The Sport Fish Water Quality Objective is intended to protect recreational fishers from eating fish with elevated levels of mercury. This objective is also protective of many wildlife species that eat fish (e.g. bald eagle, osprey), so the Sport Fish Water Quality Objective should be applied to waters with existing or designated wildlife beneficial uses. The Sport Fish Water Quality Objective applies to the following beneficial uses:

> ***Commercial and Sport Fishing (COMM)*** *- Uses of water for commercial or recreational collection of fish and shellfish, or other organisms including, but not limited to, uses involving organisms intended for human consumption or bait purposes.*
>
> ***Wildlife Habitat (WILD)*** *- Uses of water that support terrestrial ecosystems including, but not limited to, preservation or enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources).*

> ***Marine Habitat (MAR****)* - *Uses of water that support marine ecosystems including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, or wildlife (e.g., marine mammals, shorebirds).*
>
> ***Tribal Tradition and Culture (CUL)*** - *Uses of water that support the cultural, spiritual, ceremonial, or traditional rights or lifeways of California Native American Tribes, including, but not limited to: navigational activities, ceremonial activities, and fishing, gathering, or consumption of natural aquatic resources, including fish, shellfish, vegetation, and materials*.

At the time of the development of the Provisions, not all of the basin plans for the nine Regional Water Boards had expressly designated waters within the regions with COMM where the use is known to exist and water quality supports the use. Historically, the Regional Water Boards associated human consumption of fish with the REC-1 beneficial use category because the REC-1 definition includes the activity "fishing," rather than COMM, which includes the activity "consumption of fish." As a result, numerous basin plans appear to have designated waters with REC-1 to reflect consumption of fish. In instances where the use associated with consumption of fish utilizes the REC-1 designation, rather than the COMM designation, many waters are identified on the 303(d) list as impaired for the REC-1 beneficial use due to *elevated levels of mercury in fish tissue*. Establishing corrected COMM designations in the applicable basin plans would make it clear that the applicable Sport Fish Water Quality Objective and related mercury control program applies. Additionally, the Water Boards may specify the correct beneficial use during the listing cycles for the 303(d) list of impaired water bodies.

The MAR beneficial use is included because the geographic scope of the Sport Fish Water Quality Objective includes enclosed bays and estuaries, and some of these waters have been designated with the MAR beneficial use. WILD is designated for almost all inland surface waters, but WILD is often not used for enclosed bays and estuaries, whereas MAR is designated for those waters and MAR includes uses of water that support wildlife and marine habitat.

All aquatic life is susceptible to toxic effects from mercury, not just piscivorous wildlife. However, fish and other organisms lower on the food web are much less sensitive than piscivorous wildlife. Chronic toxicity values for invertebrates to inorganic mercury tend to be on the order of 1 µg/L (U.S. EPA 1985a), which is 100 to 250 times higher than the proposed water column concentrations consistent with achieving the objectives (4 to 12 µg/L, Appendix I). In current basin plans, the use of WILD is more prevalent than the designations for both the WARM and COLD beneficial uses combined. In fact, most of the State's inland surface waters, enclosed bays, and estuaries are designated with either WILD or MAR. Therefore, applying the objective to WILD and MAR would effectively protect other aquatic life uses, including:

Warm Fresh Water Habitat (WARM*) - Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.*

Cold Fresh Water Habitat (COLD*) - Uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.*

Saline Water Habitat (SAL*) - Uses of water that support inland saline water ecosystems including, but not limited to, preservation or enhancement of aquatic saline habitats, vegetation, fish, or wildlife, including invertebrates.*

Estuarine Habitat (EST*) - Uses of water that support estuarine ecosystems including, but not limited to, preservation or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, shorebirds).*

The Sport Fish Water Quality Objective would be applied where waters are designated with RARE for the species listed below. However, these waters should already be designated with WILD or MAR, to which the objective applies.

Rare, Threatened, or Endangered Species (RARE*) - Uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened or endangered.*

The following list of applicable threatened and endangered species is from the USFWS analysis (USFWS 2003):

California Ridgway's rail (*Rallus obsoletus*)
Light-Footed Ridgway's rail (*Rallus obsoletus levipes*)
Yuma Ridgway's rail (*Rallus obsoletus yumanensis*)
Western snowy plover (*Charadrius alexandrinus nivosus*)
Southern sea otter (*Enhydra lutris nereis*)

These species were the focus of the USFWS analyses related to the Draft Jeopardy Ruling and Final Biological Opinion on the California Toxics Rule (USFWS & NMFS 2000). Many of the species above do not prey on top predator fish, but maintaining the mercury concentrations in the top trophic level fish at the level specified by the water quality objectives should achieve sufficiently low mercury concentrations in lower trophic level fish that are eaten by the threatened and endangered species. A prey fish-based water quality objective designed to protect the endangered California least tern is addressed later in Section 5.4.

5.2 Applicable Uses – Tribal Subsistence Fishing Water Quality Objective

The Tribal Subsistence Fishing Water Quality Objective would apply to protect the corresponding Tribal Subsistence Fishing (T-SUB) beneficial use that the Provisions would establish. (See Section 6.4). Also, the Tribal Subsistence Fishing Water Quality Objective could apply to the following use that is contained in the North Coast Regional Water Board's basin plan:

> ***Native American Culture (CUL) -*** *Uses of water that support the cultural and/or traditional rights of indigenous people such as subsistence fishing, basket weaving and jewelry material collection, navigation to traditional ceremonial locations, and ceremonial uses.*

However, as discussed in section 2.4, it is uncertain if the waters designated with the Native American Culture beneficial use in the North Coast Regional Water Board's basin plan were designated based on the tribal subsistence fishing activity contained within that beneficial use. As a result, it would be inappropriate to apply the Tribal Subsistence Fishing Water Quality Objective to waters in the North Coast region designated with the Native American Culture beneficial use. If, after the effective date of the Provisions, the North Coast Regional Water Board amends its basin plan with the Provisions' CUL and T-SUB beneficial uses, to replace the region's Native American Culture beneficial use, and performs corresponding designations, such amendment would determine whether the Tribal Subsistence Fishing Water Quality Objective would apply. Alternatively, the North Coast Regional Water Board could amend its basin plan to specify that the Tribal Subsistence Fishing Water Quality Objective applies to all or some of the water bodies designated with Native American Culture beneficial use.

5.3 Applicable Uses – Subsistence Fishing Water Quality Objective

The Subsistence Fishing Water Quality Objective is a narrative water quality objective for subsistence fishing that would be used to protect the corresponding SUB beneficial use definition that the Provisions would establish (see Section 6.4). As discussed in section 2.4, the Subsistence Fishing Water Quality Objective would apply to the following beneficial use contained in the North Coast Regional Water Board's basin plan (although no water in that region has yet been designated with that use):

> ***Subsistence Fishing (FISH) -*** *Uses of water that support subsistence fishing*.

5.4 Applicable Uses – Prey Fish Water Quality Objective

The Prey Fish Water Quality Objective would apply to water bodies designated with WILD or MAR to protect wildlife, in waters that do not support trophic level 4 fish. This objective ensures protection of piscivorous birds that feed on trophic level 3 fish, such as kingfisher, merganser, osprey and grebe. This would also be protective of other aquatic life that is less sensitive to mercury (see section 5.1).

5.5 Applicable Uses – California Least Tern Prey Fish Water Quality Objective

The California Least Tern Prey Fish Water Quality Objective would apply to the list of Waters for the Least Tern Prey Fish Water Quality Objective and the Corresponding Regional Water Board (Appendix K, Table K-5). The list is comprised of water bodies within USFWS management areas for the California least tern, based on the most recent USFWS 5-year review of the California least tern's endangered species status (USFWS, 2006). These waters are already designated with RARE, WILD or MAR, to which the Sport Fish Water Quality Objective would apply. Additional water bodies would likely be added to this list as new information becomes available regarding the extent of habitat of the California least tern. Regional Water Boards may establish or add waterbodies to this list at a regional level through the basin planning amendment process.

5.6 Inapplicable Uses

This section identifies the beneficial uses to which the Mercury Water Quality Objectives do not apply.

The Sport Fish Water Quality Objectives are not being developed to apply to any of the beneficial uses listed in this section.

> ***Water Contact Recreation (REC-1***) - *Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing, or use of natural hot springs.*

Many basin plans utilize theREC-1beneficial use to reflect activities associated with fishing and eating the fish, even though the definition does not explicitly describe consumption of fish as does the definition for the COMM beneficial use. The Sport Fish Water Quality Objective protects the consumption of fish, and not the activity of fishing. The act of fishing is distinct from the consumption of fish. Beneficial uses involving body contact with water pertaining to the act of fishing include REC-1 and CUL. Beneficial uses involving the consumption of fish include COMM, CUL, T-SUB, and SUB. Notice that CUL beneficial use includes both the act of fishing (body contact with water) and the consumption of fish. Waters with the existing or probable beneficial use regarding recreational human consumption of fish should be designated with COMM, see section 5.1. Until then, where fish consumption is an existing use, but COMM is not designated, the Sport Fish Water Quality Objective should apply, and the Sport Fish Water Quality Objective should not be linked to REC-1.

> ***Municipal and Domestic Supply (MUN)*** - *Uses of water for community, military, or individual water supply systems including, but not limited to, drinking water.*

The Sport Fish Water Quality Objective would protect uses involving drinking water or ingestion of water, but this objective is much more stringent than necessary to protect the MUN beneficial use. Basin plans already include human health objectives for drinking water that are used for waters designated with the MUN beneficial use. The Mercury Water Quality Objectives should not be applied to the MUN beneficial use.

> ***Non-Contact Water Recreation (REC-2****)* - *Uses of water for recreational activities involving proximity to water, but where there is generally no body contact with water, nor any likelihood of ingestion of water. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.*

The Sport Fish Water Quality Objective would not apply because REC-2 does not include the activity of consuming fish.

> ***Shellfish Harvesting (SHELL****)* - *Uses of water that support habitats suitable for the collection of filter-feeding shellfish (e.g., clams, oysters, abalone, and mussels) for human consumption, commercial or sport purposes.*

None of the Mercury Water Quality Objectives would apply to the SHELL beneficial use. The Mercury Water Quality Objectives are derived from data from consumption of finfish, not shellfish, and the definitions of each objective require that the objective be based on fish tissue. Although the COMM, EST, MAR, and proposed T-SUB beneficial uses explicitly include "shellfish" in their definitions, the State Water Board has not developed shellfish-specific mercury water quality objectives. However, shellfish are lower trophic level species which, in general, have lower concentrations of methylmercury. Applying the corresponding objectives to water bodies where finfish are present should maintain lower methylmercury concentrations in lower trophic level organisms including shellfish.

> ***Aquaculture (AQUA****)* - *Uses of water for aquaculture or mariculture operations including, but not limited to, propagation, cultivation, maintenance, or harvesting of aquatic plants and animals for human consumption or bait purposes.*

The Mercury Water Quality Objectives do not apply to the AQUA beneficial use. The objectives are meant to be applied to finfish, not shellfish. Finfish aquaculture generally utilizes a commercial pelleted feed, instead of a "free range" diet of smaller live organisms. Methylmercury bioaccumulates in finfish because of consumption of smaller organisms. Those smaller organisms are linked to anaerobic bacteria at the bottom of the food web of the local ecosystem, which is the main biological source of methylmercury production. Therefore, methylmercury in the tissues of aquaculture finfish would not reflect the ambient water quality.

Limited Warm Freshwater Habitat (LWRM) *- Waters [that] support warm water ecosystems which are severely limited in diversity and abundance as the result of concrete-lined watercourses and low, shallow dry weather flows which result in extreme temperature, pH, and/or dissolved oxygen conditions. Naturally reproducing finfish populations are not expected to occur in LWRM waters.*

The LWRM beneficial use is meant to protect limited ecosystems that survive in inhospitable hydrological or geomorphic conditions. Waters such as these are not able to support aquatic life above very low trophic levels. Sustainable populations of finish do not exist in these ecosystems, and catching of fish for any type of consumption is not feasible in LWRM-designated waters. The Tribal Subsistence Water Quality Objective and the Subsistence Fishing Water Quality Objective would therefore not apply to the LWRM beneficial use, as those objectives are linked specifically to the activity of human consumption of fish. Furthermore, because the ecology of LWRM-designated waters is not known to support robust food webs or any fish in general, the presence of mercury in this type of waterbody is not expected to bioaccumulate into higher trophic levels (i.e., TL 3 and TL 4 fish). Mercury would therefore not impair this specific use in the context of the Sport Fish Water Quality Objective, the Prey Fish Water Quality Objective and the California Least Tern Prey Fish Water Quality Objective would not apply to LWRM. In addition, if fish were to exist in areas designated as LWRM, they would be protected by WILD.

Preservation of Biological Habitats of Special Significance (BIOL*)* *- Uses of water that support designated areas or habitats, such as established refuges, parks, sanctuaries, ecological reserves, or Areas of Special Biological significance (ASBS), where the preservation or enhancement of natural resources requires special protection.*

The five Mercury Water Quality Objectives would not apply to the BIOL beneficial use because the protection of wildlife and people consuming fish in areas designated as BIOL would be protected under either WILD, MAR or COMM.

Migration of Aquatic Organisms (MIGR*)* *- Uses of water that support habitats necessary for migration or other temporary activities by aquatic organisms, such as anadromous fish.*

The Tribal Subsistence Water Quality Objective and the Subsistence Fishing Water Quality Objective would not apply to the MIGR beneficial use, as those objectives are linked specifically to the activity of human consumption of fish. Sport Fish Water Quality Objective, the Prey Fish Water Quality Objective and the California Least Tern Prey Fish Water Quality Objective Mercury Water Quality Objectives would not apply because mercury does not impede migration. Fish would be protected through other beneficial uses.

Spawning, Reproduction, an/or Early Development (SPWN*)* *- Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish.*

The SPWN beneficial use is intended for special conditions necessary for spawning that do not apply elsewhere. The Mercury Water Quality Objectives do protect reproduction in fish, but should already be applied to fish habitat through the WILD beneficial use, or the COLD and WARM beneficial uses where WILD is not designated. Protective mercury thresholds for reproduction in fish are not that much higher than thresholds for other wildlife (e.g. 0.3 mg/kg, in the whole body, see Appendix J).

Additionally, the Mercury Water Quality Objectives do not apply to the following uses:

> ***Agricultural supply (AGR)*** - *Uses of water for farming, horticulture or ranching including, but not limited to, irrigation (including leaching of salts), stock watering, or support of vegetation for range grazing.*
>
> ***Industrial Process Supply (PROC)*** - *Uses of water for industrial activities that depend primarily on water quality.*
>
> ***Industrial Service Supply (IND)*** - *Uses of water for industrial activities that do not depend primarily on water quality, including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well repressurization.*
>
> ***Fresh Water Replenishment (FRSH)*** - *Uses of water for natural or artificial maintenance of surface water quantity or quality (e.g., salinity).*
>
> ***Groundwater Recharge (GWR)*** - *Uses of water for natural or artificial recharge of groundwater for purposes of future extraction, maintenance of water quality, or halting salt water intrusion into fresh water aquifers.*
>
> ***Navigation (NAV)*** - *Uses of water for shipping, travel, or other transportation by private, military, or commercial vessels.*
>
> ***Hydropower Generation (POW)*** - *Uses of water for hydropower generation.*
>
> ***Flood Peak Attenuation/Flood Water Storage (FLD)*** - *Beneficial uses of riparian wetlands in flood plain areas and other wetlands that receive natural surface drainage and buffer its passage to receiving waters.*
>
> ***Water Quality Enhancement (WQE)*** - *Beneficial uses of waters that support natural enhancement or improvement of water quality in or downstream of a water body including, but not limited to, erosion control, filtration and purification of naturally occurring water pollutants, streambank stabilization, maintenance of channel integrity, and siltation control.*

6. Issues Analysis (Project Options)

This Chapter discusses the significant issues related to the Provisions. For each issue, several options are provided and for each option, advantages and disadvantages are described. A rationale is provided to support the State Water Board's recommended option. The basic framework and geographic scope of the Provisions is described in Chapter 2.

6.1 Issue A. What type of water quality objectives should be adopted: numeric water column objectives, numeric fish tissue objectives, numeric sediment objectives, or narrative objectives?

6.1.1 Current Conditions

The statewide regulatory limit for mercury in water meant to protect human consumption of fish is the California Toxics Rule criteria of 50 and 51 ng/L[3] in the water column. There are no statewide criteria (or objectives) for mercury to protect aquatic dependent wildlife. The California Toxics Rule criteria are meant to protect human health only, but these criteria do not reflect the most recent Clean Water Act 304(a) recommended human health criterion developed by the U.S. EPA. This criterion recommends a fish tissue criterion for methylmercury of 0.3 mg/kg in total fish, given a consumption rate of fish of 17.5 g/day. Because the California Toxics Rule criteria are under-protective for human health, the Water Boards currently use narrative toxicity water quality objectives together with more recent Clean Water Act section 304(a) recommended criteria, as well as OEHHA fish advisory levels (that are otherwise non-enforceable) to assess waters for possible impairment of beneficial uses related to fish consumption due to mercury.

The numeric criteria that have been used to implement the narrative toxicity objectives include the U.S. EPA fish tissue criteria of 0.3 mg/kg methylmercury in fish tissue and OEHHA's Fish Contaminant Goal of 0.3 mg/kg methylmercury in fish tissue. In 2008, OEHHA revised their Fish Contaminant Goal to 0.22 mg/kg based on California fish consumption rates, making it the preferred criteria to fulfill the narrative toxicity objective for assessing mercury data. Exceptions occur where site-specific water quality objectives for mercury / methylmercury have been adopted. These waters include San Francisco Bay, the Sacramento-San Joaquin Delta, Clear Lake, Cache Creek and others, for which site-specific objectives have been adopted in conjunction with TMDLs. These water quality objectives reflect the most recent guidance from the U.S. EPA and provide protection for wildlife (U.S. EPA 2001). They are also primarily expressed as fish tissue concentration of methylmercury.

For the majority of waters in California, the implementation requirements for mercury, such as water quality based effluent limits, are still based on the outdated California Toxics Rule criteria,

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[3] The California Toxics Rule mercury criteria protect human health. The criterion of 50 ng/L protects consumption of water and aquatic organisms, and 51 ng/L protects consumption of aquatic organisms only (40 C.F.R. § 131.38).

except, for example, where site-specific objectives for mercury or methylmercury have been adopted in conjunction with TMDLs.

6.1.2 Issue Description

Section 303(c)(2)(B) of the Clean Water Act (33 U.S.C. § 1313) requires states to adopt numeric water quality criteria for all priority pollutants established in Clean Water Act section 307(a) (33 U.S.C. § 1317). The State Water Board is authorized to adopt water quality control plans for waters for which the Clean Water Act requires water quality standards. Pursuant to California Water Code section 13241, regulatory protection of beneficial uses is carried out, in part, through the adoption of water quality objectives.

The USFWS determined that the mercury criteria in the California Toxics Rule would not be protective of threatened and endangered species. As a result of that determination, California was left without mercury criteria for protection of wildlife. Currently U.S. EPA's 2001 fish tissue criterion has not been adopted as an enforceable water quality objective in California, nor has an objective been adopted statewide that is sufficient to protect all wildlife from mercury (see Section 3.5 for more details).

In 2013, an environmental organization, Our Children's Earth Foundation, filed a lawsuit against the U.S. EPA for the lack criteria to protect wildlife in California from mercury and a few other pollutants. As part of the settlement for that lawsuit, the U.S. EPA is required to propose a new mercury criterion by June 30, 2017. However, if the State Water Board adopts a protective objective before then and U.S. EPA approves the objective, then U.S. EPA's obligation with respect to criteria to protect wildlife in California from mercury under the settlement would be satisfied. As a result, California must adopt a statewide mercury water quality objective that will adequately protect wildlife, or the U.S. EPA will be required to promulgate a new wildlife mercury criterion for California.

Additionally, a new water quality objective should be adopted to incorporate the most recent U.S. EPA human health criterion for methylmercury, published in 2001, and adjusted using appropriate fish consumption data.

Mercury or methylmercury water quality criteria and objectives have either been expressed as a numeric concentration in the water column or as a numeric concentration in fish tissue. A typical water quality objective is expressed as a numeric concentration of the contaminant in water because toxicity is usually the result of drinking the pollutant in the water or exposure to the pollutant in the water. On the other hand, while methylmercury is a chemical that is present as a pollutant in water, it is not until the methylmercury bioaccumulates to high concentrations in fish that it becomes hazardous to the organisms that consume the fish.

6.1.3 Options

Option 1: No Action

The no action alternative would continue to leave a significant gap in the protection of wildlife. The U.S. Fish and Wildlife Service has determined that the California Toxics

Rule is not protective of threatened and endangered species. As part of a lawsuit settlement the U.S. EPA agreed to propose a new mercury criterion by June 30, 2017, and would be required to do so if it does not approve an objective established by the State Water Board before then. Therefore, no State Water Board action would require the U.S. EPA to propose and promulgate new mercury criteria for wildlife.

Alternatively, under the no action alternative, the Regional Water Boards could derive water body specific objectives before the U.S. EPA promulgates criteria for wildlife. This option would require staff time and cost to evaluate each water body on a case-by-case basis and would not have the advantage of harmonizing the statewide effort to control mercury, as intended with the Provisions.

Option 2 (RECOMMENDED): Numeric Fish Tissue Objectives
This option would establish the objectives as numeric methylmercury concentrations in fish tissue. Fish tissue concentrations are already used for monitoring and as the basis for 303(d) listings. The methylmercury in fish tissue is the cause of toxicity to wildlife and humans who eat the fish. This is the primary exposure route for humans (in terms of environmental exposure to mercury) and the exposure with the highest risk of toxicity for wildlife.

The advantage of this option is that fish tissue objectives directly address this cause of toxicity. This option also avoids some of the uncertainty and controversy in deriving corresponding water column concentrations, which depends on many site-specific factors. The U.S. EPA used the fish tissue approach in developing its recommended criteria, and Regional Water Boards have adopted site-specific mercury or methylmercury objectives as fish tissue objectives. Therefore this option would provide statewide consistency throughout California. The implementation of this objective would also continue to provide monitoring data on mercury in fish tissue and provide information on health risks of eating contaminated fish.

The disadvantage of this option is that it does not utilize measurement of concentrations of pollutants in water, which is the most widely-used method to develop reasonable potential analyses and final effluent limitations for discharges, and monitoring and reporting requirements for both discharges and receiving water bodies. For most discharges, permit requirements typically rely on numeric water column concentration measurements. This difference can be addressed by providing a water column translator for determining when effluent limits are needed and for setting effluent limits (see Section 6.13). Another disadvantage to this option is that assessment of fish tissue objectives is more complicated and requires more resources than assessment of water column objectives because representative sampling of fish tissue requires careful capture and analysis of the correct size and trophic level fish.

Option 3: Numeric Water Column Objectives

This option would establish the objectives as numeric mercury water column concentrations. The calculation of a mercury concentration in the water that would equate to a target level of mercury in fish tissue requires a model or extrapolation procedure. An extrapolation factor known as bioaccumulation factor (BAF) could be used. The U.S. EPA derived national BAFs in the U.S. EPA 2001 human health criteria for mercury, but favors the use of site-specific BAFs because the degree of methylmercury bioaccumulation varies greatly depending on site-specific factors. Based on the recommended meal per week consumption rate (Section 6.2) and the available BAFs, water column concentrations that could be used as the objective are 4 or 12 ng/L total mercury (see Appendix I for calculations).

The advantage of a water column concentration is ease of implementation for wastewater and industrial discharges. A disadvantage of this option is that the water column based objective would have more uncertainty and is more likely to be either over-protective or under-protective in different water bodies. Also, the resulting threshold may be so low that current wastewater treatment technology will not be able to remove enough mercury from discharges to be able to achieve this level of mercury. Depending on the value selected, this option is potentially very expensive, and the environmental benefit is uncertain. On the other hand, if a high value is selected it may not be protective enough because a water column concentration is an indirect measure of whether or not fish are safe to eat.

Option 4: Numeric Sediment Objective

This option would establish the objective as a numeric concentration in sediment. A sediment objective could address some of the original sources of mercury. Sediments from mines and naturally enriched soils are thought to be a major source of mercury in many areas of California. Mercury is also often transported with sediments because mercury binds to sediments.

However, sediments are not a major source of mercury for all water bodies. There are several other potential sources including atmospheric deposition, which is likely the largest source of mercury in some water bodies. This biggest disadvantage with this approach is that it would be much harder to determine appropriate sediment concentration since sediment mercury concentrations are not very well correlated to mercury fish tissue concentrations.

Option 5 (Recommended for SUB): Narrative Objectives

This option would establish the objective as a narrative objective. This option would not contain numeric limits for mercury based on measurable concentrations. The objective could state: "Mercury shall not be present in the water in amounts that are toxic to humans or aquatic dependent wildlife."

To some extent, this option is similar to "option 1: No action." Section 303(c)(2)(B) of the Clean Water Act states that: "criteria shall be specific *numerical* criteria" where available for all priority pollutants, such as mercury (emphasis added); therefore, narrative objectives would still leave California out of compliance with the Clean water Act and the U.S. EPA would likely promulgate criteria for wildlife and human health.

Additionally, this option would not establish a consumption rate to protect the COMM beneficial use. The objectives would need to be implemented on a permit-by-permit basis. If the permit writer must establish a numeric threshold in the permit, the permit writer would first need to find the appropriate fish consumption rate to represent local fishers. The consumption rate would be used to derive a threshold in fish tissue. Then the permit writer would need to make a conversion to a water column concentration of mercury. This option could not be used to promote statewide consistency (one of the objectives of the Provisions). However, in situations where there is a wide range of consumption rates and patterns of fish consumption it may be appropriate to adopt a narrative objective that would allow the water boards to apply site specific consumption rates. The use of a narrative objective to protect subsistence fishers, where there is a wide range of fish species consumed and varying amounts of fish consumed would avoid setting overly protective, or under protective objectives. Region-wide or site-specific fish consumption data could be used to set objectives that are most appropriate to water bodies or regions. For areas and water bodies where local fish consumption data is not available statewide or national consumption data could be used, but is not considered ideal.

6.1.4 Recommendation

Option 2 and 5: Adopt a numeric water quality objectives based on fish tissue and adopt a narrative objective to protect the SUB beneficial use which contains a consumption rate to be used in the absence of site-specific consumption information.

6.2 Issue B. What fish consumption rate should be used to calculate the Sport Fish Water Quality Objective to protect human health?

6.2.1 Current Conditions

There is not one clearly established statewide policy regarding consumption rates to calculate fish tissue water quality objectives for recreational consumption of fish. The U.S. EPA has provided an equation to derive a protective concentration of methylmercury in fish for a given population using a known fish consumption rate (U.S. EPA 2001). The U.S. EPA recommends adjusting the fish consumption rate when deriving water quality criteria for individual states. The U.S. EPA "strongly believes that States and authorized Tribes should develop criteria, on a site-specific basis, that provide additional protection appropriate for highly exposed populations" (U.S. EPA 2000). The consumption rate reflects only locally caught freshwater or estuarine fish. A moderate amount of mercury exposure from store-bought fish is accounted for as a separate parameter in the U.S. EPA's equation.

Although there is not currently a statewide policy to establish the appropriate consumption rate for humans, precedent has been set by several projects. Consumption rates for fish are typically referred to as "meals", but the amount of fish in a "meal" varies from study to study. The Water Boards and other California state agencies have used a consumption rate of one eight-ounce meal of fish per week, which is equivalent to consumption rate of 32 g/day. The most recent 303(d) assessments for the 2012 California Integrated Report have been made using OEHHA's Fish Contaminant Goal of 0.22 mg/kg mercury. This value was based on a rate of one meal per week (32 g/day), derived from a survey of anglers in San Francisco Bay (San Francisco Estuary Institute 2000). Site-specific objectives for mercury and methylmercury have been based on the same rate of one meal per week, including those for San Francisco Bay and the Sacramento-San Joaquin Delta (Section 3.10). On the other hand, site-specific objectives for Clear Lake and Cache Creek were based on a consumption rate of one meal every other week (17.5 g/day) the same rates as used by U.S. EPA to derive their 2001 national recommended fish tissue criterion of 0.3 mg/kg methylmercury in fish tissue (Section 3.10). However, in order to protect wildlife, they adopted a more stringent water quality objective that is closer to those that were derived based on one meal per week.

6.2.2 Issue Description

Porter Cologne requires that water quality objectives shall be established that "will ensure the reasonable protection of beneficial uses and the prevention of nuisance" (Wat. Code, § 13241). Pertinent here, when establishing water quality objectives, Porter Cologne also requires consideration of several factors, including: past, present, and probable future beneficial uses of water, environmental characteristics of the hydrographic unit at issue, water quality conditions that could reasonably be achieved, and economic considerations. (Ibid., § 13241, subds. (a)-(d).) While these factors must be considered the Water Boards are not required to develop formal analysis, such as a cost benefit analysis or a use attainability analysis. (The "13241 factors" are evaluated at Chapter 10 and sections referred to therein. Appendix R contains the economic considerations).

The issue in this section is which fish consumption rate should be used to derive the water quality objective to protect human health. Section 4.9 of the Staff Report summarizes several fish consumption studies, and Appendix G contains a more comprehensive list of fish consumptions studies from California. These studies demonstrate the beneficial use (fish consumption) and justify the need to protect the use.

However, any of the fish consumption rates proposed for the below-evaluated water quality objective options will not be easily achievable in the near future for many waters. Many waters currently have fish that exceed the mercury concentrations being considered for the water quality objectives to protect human health, for sport and subsistence fishing (see Section 4.5). Mercury does not break down in the environment, and methylmercury is slow to leave the tissues of living organisms, so even with remediation, decreases of methylmercury in fish tissue are very slow.

This issue contains a few options for the consumption rate, based on human fish consumption rates, to be used to calculate the Sport Fish Water Quality Objective. However, because wildlife that consumes fish must also be protected, some of the options below also discuss human consumption rates of fish that would also be protective of wildlife. Additional objectives are considered in Issue F and Issue G for certain situations where more protection is needed for wildlife.

6.2.3 Options

Option 1: Adopt a Sport Fish Water Quality Objective based on a fish consumption rate of one meal ever two weeks

In this option a statewide objective of **0.3 mg/kg** methylmercury in fish tissue would be used to calculate the Sport Fish Water Quality Objective. This objective would protect consumption of roughly one fish meal (8 oz.) every two weeks of California freshwater/estuarine fish and a small amount of store bought fish. This objective would be equivalent to U.S. EPA's 2001 human health criterion, protecting nationwide average consumption. This option would be inconsistent with OEHHAs Fish Contaminant Goals, which use a consumption rate of 32 g/day. This option is unlikely to fully protect all wildlife species, see Section 6.8.

Option 2 (RECOMMENDED): Adopt a Sport Fish Water Quality Objective based on a fish consumption rate of one meal per week

In this option, a statewide objective of **0.2 mg/kg** methylmercury in fish tissue would be used to calculate the Sport Fish Water Quality Objective. This objective would protect consumption of one fish meal (8 oz.) per week of California freshwater/estuarine fish and a small amount of store bought fish. This rate was derived from a survey of anglers in San Francisco Bay (San Francisco Estuary Institute 2000). The rate was the 95th percentile of consumption rates from anglers who reported ever eating fish. This consumption rate has also been used in adopted water quality objectives and by OEHHA to develop fish contaminant goals. This option would protect most wildlife species, see Section 6.8.

About two thirds of current monitoring data from all types of bass exceed 0.2 mg/kg (see Section 4.5.2), so it would be difficult to have all waters achieve this objective. Also, there have been doubts expressed that this rate does not represent fishing in inland waters in Southern California, but a survey of inland waters in Ventura and Los Angeles Counties found that one meal week was the average fish consumption rate (Allen et al. 2008).

The objective would be applied to the fillet as a conservative approach for anglers who consume only the fillet as well as anglers who eat more than just the fillet, because the fillets have higher mercury concentrations than whole fish. The objective would be expressed with an averaging period of a calendar year. For information on the calculations and averaging period, see Appendix H.

Option 3: Adopt a Sport Fish Water Quality Objective based on a fish consumption rate of five meals a week

In this option a statewide objective of **0.05 mg/kg** methylmercury in fish tissue would be used to calculate the Sport Fish Water Quality Objective. This objective would protect consumption of four to five fish meals a week for people who *only* consume California freshwater/estuarine fish and *no* store bought fish. This option would protect all wildlife species (see Section 6.8).

This objective would be intended to protect all people who eat fish, including those who eat more locally caught fish than the average fisher, such as subsistence fishers, including California tribal communities. This consumption rate is from a recommended subsistence consumption rate calculated by U.S. EPA from national data. This objective would be nearly consistent with the current daily consumption rates from a recent statewide survey of California tribes (Shilling et al. 2014). Also, many other studies in California show fish consumption rates higher than one meal per week in various locations (See Appendix G for more details). When taken all together, it may be that high rates of fish consumption by California tribes or other communities take place in a majority of waters in the state, not just a few select locations (see also Section 6.4).

Oregon recently adopted human health consumption rate of five meals per week and a mercury standard of 0.04 mg/kg based partly on the consumption rate of Native American tribes, but also other groups who eat larger amounts of locally caught fish. U.S. EPA has developed for Washington State and proposed for Maine the use of a consumption rate of five and nine meals per week for deriving water quality standards, respectively (81 Fed Reg. 85417 (Nov, 28, 2016); 81 Fed. Reg 23239 (April 20, 2016)).

This option may only be achievable in small fraction of California bass dominated waters or where other large trophic level 3 and trophic level 4 fish are the dominate fish.

Currently few of the monitored waters meet this threshold (or a small fraction of fish, see graphs in Section 4.5.2). This raises concerns about devoting a large amount of limited public resources towards this effort. However, there are fish populations – including rainbow trout and anadromous salmonids that are safe to eat in larger quantities.

Finally, the Provisions propose two new beneficial uses pertaining to subsistence fishing. As a result, consumption rates for subsistence fishing would be developed as part of the objectives to protect the separate subsistence fishing beneficial uses. That is, the Sport Fish Water Quality Objective should be developed to protect recreational fishing consumption under the COMM beneficial use, and would not also protect higher consumption rates by subsistence fishers. As a result, the concentration of 0.05 mg/kg methylmercury in fish tissue would be more stringent than is reasonably necessary to protect consumption of fish by recreational fishers.

Option 4: Phased Approach
In this approach the State Water Board would start with a low consumption rate, that is more readily achievable, such as in option 1 or option 2 (0.3 or 0.2 mg/kg in fish tissue) in the near future. If successful after several decades, then the State Water Board could try to establish a concentration that would achieve an ultimate consumption rate that should also be protective of sub-populations of people that consume large quantities of fish, which could be five meals a week (e.g. 0.05 mg/kg). This approach may be advantageous because there is great deal of uncertainty in the effectiveness of mercury control programs. The uncertainty has created apprehension to committing to a goal that may be difficult to achieve in the near future even at great cost, because of widespread legacy contamination and global atmospheric emissions. On the other hand, if in the very long term progress can be made, a goal that better represents the use of the waters by all people should be set. As part of this program, the state could include information on which fish are safe to eat in larger quantities – such as trout and anadromous salmon.

This option could be used in conjunction with a long compliance schedule while implementation actions are being taken to achieve the less stringent objective. Alternatively, this option could be part of a statewide mercury variance.

Additionally, as with Option 3, the Provisions propose two new beneficial uses pertaining to subsistence fishing. As a result, consumption rates for subsistence fishing would be developed as part of the objectives to protect the separate subsistence fishing beneficial uses. That is, the Sport Fish Water Quality Objective should be developed to protect recreational fishing consumption under the COMM beneficial use, and would not also protect higher consumption rates by subsistence fishers.

6.2.4 Recommendation

Option 2: The fish consumption rate of one meal per week should be utilized to calculate the Sport Fish Water Quality Objective to protect human health, resulting in an objective with a concentration of 0.2 mg/kg methylmercury in fish tissue.

6.3 Issue C. To which fish species should the Sport Fish Water Quality Objective apply?

6.3.1 Current Conditions

There is no existing statewide policy on the fish species to which the water quality objective should apply. Several site-specific water quality objectives have been developed for mercury or methylmercury in fish. These objectives have taken different approaches to this issue depending on consumption information for the respective water body/ watershed. The site-specific objectives for the Sacramento-San Joaquin Delta were derived by applying the selected consumption rate to 50:50 mixture of trophic level 3 and 4 fish (Central Valley Water Board 2010b). The San Francisco Bay human health objective applies to four trophic level 4 species and one trophic level 3 species (San Francisco Bay Board 2006). For Cache Creek and Clear Lake site-specific objectives were derived to protect wildlife, since wildlife was more sensitive, but these Cache Creek and Clear Lake objectives also protect roughly one meal every week of trophic level 4 fish for human health (Section 3.10, Central Valley Water Board 2002b, 2005).

Nationwide, top predator fish have been the most common fish targeted by monitoring programs (mainly bass, walleye, and northern pike). There is a large body of monitoring data for black bass. Species of bass work well in California because they are common in many of our water bodies. Bass are efficient at bioaccumulating methylmercury and thus would provide a measure of safety to people who eat a mixture of fish species. Since bass are prevalent in California, they provide a measure that can be compared across water bodies. Additionally, trend analysis would be easier using methylmercury concentrations in bass, to determine if actions designed to reduce mercury are effective, or if the global problem of atmospheric mercury emissions is having a significant impact.

6.3.2 Issue Description

Since methylmercury accumulates up the food web, fish that are highest on the food web have the highest concentrations of mercury. Therefore, the particular position in the food web of the fish species that the objective is applied to will affect the stringency of the objective and the protection provided to humans and wildlife.

Fish species can be categorized by trophic level, which is the organism's place in the food web. Freshwater trophic level 3 fish include species such as bluegill, sunfish, carp, rainbow trout, and tilapia. Trophic level 3 fish generally have lower concentrations of mercury than trophic level 4 fish. Trophic level 4 is the highest level in fish and includes top predator fish such as striped bass, black bass, large catfish, and crappie. The highest concentrations of methylmercury are usually found in large, long living fish such as bass, which eat mostly smaller fish.

6.3.3 Options

Option 1 (RECOMMENDED): Apply the Sport Fish Water Quality Objective to top trophic level fish (trophic level 4 fish)

This option would apply the selected consumption rate to calculate the objective (evaluated in Section 6.2 above) to fish that are highest in the food web (top predator fish that tend have highest levels of mercury, e.g. striped bass, black bass, large catfish). That is, the objective would be measured using trophic level 3 or trophic level 4 fish, whichever is the highest in the water body. If the objective for a water body is not measured using trophic level 4 fish, then the objective would be applied to the next highest trophic level of fish (trophic level 3 fish: e.g. rainbow trout, carp). In other words, in waters where trophic level 4 fish are not measured, the mercury concentrations in trophic level 3 fish must meet the same numeric threshold (methylmercury concentration in fish tissue) as applied to trophic level 4 fish. This option is more conservative then the second option.

This option protects people who consume predominantly trophic level 4 fish, at the selected consumption rates. This is recommended if many people consume fish primarily from trophic level 4. Additionally, since trophic level 3 fish have two to four times lower mercury concentrations than trophic level 4 fish, this option would allow people who consume only trophic level 3 fish to consume two to four times[4] more fish than the selected consumption rates. This option is also more protective of wildlife than the other options.

While some anglers catch and release bass, several studies show that bass are also commonly consumed. Black bass have been found to be commonly consumed in the Delta (Shilling et al. 2010, California Department of Health Services *unpublished*), Contra Costa County (Contra Costa County Public Works Department 2005, Ma'at Youth Academy (no date)), and Clear Lake (Harnly et al. 1997). Black bass have also been found to be a popular species for eating in the Sierra Nevada (Sierra Fund 2011), but not as popular as trout. Other commonly consumed trophic level 4 species are crappie, large white catfish, large channel catfish, sturgeon, and large brown trout. Studies have shown that trophic level 4 species are more commonly consumed than trophic level 3 species, in the Delta and San Francisco Bay, and Clear Lake (ibid., see Appendix G for details). Marine or estuarine trophic level 4 species were most commonly consumed in Santa Monica Bay (Allen et al. 1996).

This option could encourage monitoring resources to be focused on bass for inland waters and rockfish for coastal waters, since these are good sentinel species for detecting differences between water bodies and differences over time. However, the disadvantage of this option is that it does not encourage data collection on a wide range of species across trophic levels. More data from different species would be beneficial for producing public health advisories and ensuring protection for wildlife (many wildlife feed on trophic level 3 fish).

[4] To estimate evaluated consumption rates in lower trophic level fish. The consumption rates were multiplied by the national default food web multiplier of 4 (US. EPA 2001) and statewide TLR of 2 from Appendix L.

Option 2: Apply the Sport Fish Water Quality Objective to a 50:50 mixture of trophic level 3 and 4 fish.
This option would apply the selected consumption rate to calculate the objective (evaluated in Section 6.2 above) to a mixture of trophic level 3 and trophic level 4 fish. If people eat a mixture of trophic level 3 and trophic level 4 fish, this option is more realistic, whereas option 1 would be conservative. In trout dominated waters, this option is more representative as seen from consumption surveys in the Sierra Nevada, in Ventura County and Los Angeles County (Sierra Fund 2011, Allen et al. 2008, see Appendix G).

Fish lower on the food web tend to have lower mercury concentrations, making this option less stringent than option 1. For example, if the selected consumption rate is one meal per week (option 2 from the previous issue, Section 6.2) and if this option is chosen then the objective would protect one meal per week that is comprised of 50% trophic level 3 fish and 50% trophic level 4 fish. If a person consumes *only* trophic level 4 fish this objective would support eating only about ¾ a meal per week. The 50:50 mixture could be applied in a few different ways which are explored in Appendix H.

The advantage of this option is that the water quality objective would be easier to achieve since this is a less stringent application of the objective. This mixed fish consumption likely reflects human consumption patterns in many areas, so it would be protective of human health in those areas.

However, this approach may not be fully protective of wildlife because this option is less stringent than option 1. (This depends on the option chosen for the Sport Fish Water Quality Objective in Section 6.2.) To maintain protection for all wildlife, a mercury level of 0.2 mg/kg or less should be maintained for trophic level 4 fish according to calculations in Appendix K. If this option is chosen, a separate objective for wildlife should be adopted. The objective to protect wildlife could be 0.05 mg/kg methylmercury in fish trophic level 3 fish that are 50-150 mm long. This objective would ensure protection of belted kingfisher, mergansers, grebes and ensures protection for other species such as otters (See Section 6.8, Appendix K).

Such wildlife objective would likely be more stringent than the Sport Fish Water Quality Objective, and the overall achievability of the objectives may not be greater than option 1. Therefore, this option is unlikely to provide much advantage, at least on a statewide basis. If site-specific data are available, this approach may prove useful on a site-specific basis.

Another disadvantage of this option is that it would require more monitoring resources to be able to measure compliance, since there are more species to monitor. However, this extra data would be beneficial for advisories and in ensuring protection for people and wildlife.

Option 3: Apply the Sport Fish Water Quality Objective to only native species, not to bass.
This option would apply the selected consumption rate to calculate the objective (evaluated in Section 6.2 above) to only native species and not bass. Bass are non-native to California and they accumulate much more methylmercury than native fishes, because they are a higher trophic level fish. Any policy or action that primarily supports native fish would likely also pertain to fish with lower mercury. The major disadvantage with this option is that both people and wildlife are likely to continue to eat non-native species.

This option may only be an effective option if bass were eradicated, but eradication of bass would be strongly opposed by many people. Bass sport fishing is a multi-million dollar industry in California. For example, California striped bass sport fishery alone had an estimated annual economic value of more than $45 million dollars, in 2001 (California Department of Fish and Wildlife 2001).

Salmon are native species and have lower mercury concentrations than bass. Bass are an invasive species that have a negative impact on native fishes such as salmon, by preying on young fish. Readily available estimates of the economic value of California's salmon fishery are hard to find. Most estimates focus on ocean fish, not inland fish. The total West Coast income impacts associated with recreational and commercial ocean salmon fisheries for all three states (Oregon, Washington, and California) combined in 2013 were estimated at $79.3 million (Pacific Fishery Management Council 2014). Both commercial and recreational fisheries have suffered substantial declines relative to harvest levels of the 1980s. The preliminary exvessel value of Chinook and coho landed in the treaty Native American ocean troll fishery was $6.4 million in 2013 (*Ibid.*). In addition to the commercial Native American fisheries, fish are taken in Native American fisheries each year for ceremonial and subsistence purposes (*Ibid.*).

There is less information on the value of California's river salmon. It has been suggested that these are California's most valuable salmon. On a per fish basis, recreational river salmon have been estimated to be more than twice as valuable as striped bass, at $1,176 economic impact per fish vs. $494 per fish. In the same comparison, recreational ocean salmon and commercial ocean salmon were valued at $281 and $49 per fish, respectively (FishBio 2014). These economic impacts are a result of expenditures on any number of the following: fees/licenses, boat maintenance, fuel, bait/tackle, food/beverage, travel costs, lodging, and any other associated goods and services used by recreational anglers. A 1985 economic analysis estimated that steelhead fishing in the Sacramento River and tributaries directly generated around 7.2 million dollars (California Department of Fish and Wildlife 2001).

6.3.4 Recommendation
Option 1: Apply the Sport Fish Water Quality Objective to top trophic level fish (trophic level 4 fish).

6.4 Issue D. Should the beneficial uses for tribal traditional and cultural, tribal subsistence fishing, and subsistence fishing be established as beneficial uses?

6.4.1 Current Conditions

In 1973, the State Water Board provided a uniform list of beneficial uses, including definitions, to the Regional Water Boards to use to subsequently designate waters within their respective regions. The State Water Board updated that list in 1996. The State Water Board's updated list of beneficial uses does not contain an explicit beneficial use for tribal traditional, cultural, or subsistence fishing. No statewide water quality control policy or plan has been adopted to address tribal traditional and cultural, tribal subsistence fishing, and subsistence fishing uses.

On February 16, 2016, the State Water Board adopted Resolution No. 2016-0011, directing staff to develop, as a part of the Provisions, three beneficial uses, including 1) tribal traditional and cultural use, 2) tribal subsistence fishing use, and 3) subsistence fishing use by other cultures or individuals. The beneficial uses the State Water Board directed staff to develop are for purposes of the Porter-Cologne Act, and may also serve as designated uses under the Clean Water Act. Beneficial uses under the Porter-Cologne Act are distinct from the statutory and common law beneficial uses applicable to appropriative water rights.

Resolution No. 2016-0011 included an attachment (Attachment A) which contained language suggested by a small number of tribes, tribal representatives, and environmental justice groups, as being representative of the three proposed definitions:

> ***California Indian Tribal Traditional and Cultural Use****: Uses of water that support the cultural, spiritual and traditional rights and lifeways of California Indian Tribes. This includes but is not limited to: fishing, gathering, and safe consumption of traditional foods and materials, as defined by California Indian Tribes, for subsistence, cultural, spiritual, ceremonial and navigational activities associated with such uses.*
>
> ***California Indian Tribal Subsistence Fishing Use****: Uses of water that support the gathering and distribution of natural aquatic resources, including fish and shellfish, to meet traditional food needs of California Tribal individuals, households and communities for personal, family and community consumption, and for traditional and/or ceremonial purposes.*
>
> ***Subsistence Fishing****: Uses of water that support the non-commercial catching or gathering of natural aquatic resources, including fish and shellfish, by individuals for the personal consumption by individuals and their households or communities, to meet fundamental needs for sustenance due to cultural tradition, lack of personal economic resources, or both.*

In addition to the beneficial uses the State Water Board identified on the statewide list, the Regional Water Boards have developed additional beneficial uses to be applied to waters within their respective region. One regional board, the North Coast Regional Water Board, adopted beneficial uses similar to the uses identified in Resolution No. 2016-0011in their water quality control plan (North Coast Water Board 2011):

> ***Native American Culture (CUL)****: Uses of water that support the cultural and/or traditional rights of indigenous people such as subsistence fishing and shellfish gathering, basket weaving and jewelry material collection, navigation to traditional ceremonial locations, and ceremonial use.*
>
> ***Subsistence Fishing (FISH)****: Uses of water that support subsistence fishing*.

As of February 2016, the Native American Culture beneficial use has been designated to 28 waters in the North Coast Region (North Coast Water Board 2011, Table 2-1), while the Subsistence Fishing beneficial use has not yet been designated to any water body in the region. No other Regional Water Board has adopted the above or similar beneficial uses. The North Coast Regional Water Board has not adopted water quality objectives unique to the above-noted uses.

The Governor's Executive Order, No. B-10-11 (Sept. 19, 2011), acknowledges that the State "is home to many Native American Tribes with whom the State of California has an important relationship" as affirmed by state and federal laws and provides that every state agency is encouraged to communicate and consult with tribes. The California Environmental Protection Agency's "Policy for Working with California Indian Tribes" (Oct. 19, 2009) sets forth a commitment to improve California Environmental Protection Agencies' (including its Boards, Departments, and Offices) understanding of and connection to California Indian Tribes, and a commitment to work together to resolve mutual interests of concern. The policy provides (at p. 2):

> California has the second largest number of federally-recognized tribes and, according to the 2000 U.S. Census, the largest Native American population in the United States. In California, there are 109 tribes that are recognized by the federal government. There are also indigenous communities which, although they existed prior to the formation of the United States, are not currently recognized as sovereigns by the federal government. At this time, there are 89 non-federally recognized California Indian Tribes of which 72 are engaged in seeking federal recognition. All California Indian Tribes, whether officially recognized by the federal government or not, may have environmental, economic, and public health concerns that are different from the concerns of other Tribes or from the general public. These differences may exist due to subsistence lifestyles, unique cultural beliefs and traditions, and/or specific connections to areas of California that are their ancestral homelands.

6.4.2 Issue Description

Because beneficial uses pertaining to tribal traditional and cultural use and subsistence fishing uses have not been established as beneficial uses statewide, California tribes have commented that their traditional and cultural uses of water are not adequately described by other beneficial uses and, therefore may not always be protected. For instance, Water Contact Recreation (REC-1) and Commercial and Sport Fishing (COMM) may encompass some or part of uses made by tribes, but do not adequately account for all of the uses tribes make on waters within the state. For example, the new beneficial uses would include ceremonial and traditional activities, such as fishing, emersion in water for ceremonies, and contact with water for activities such as the gathering and use of traditional plants and materials for activities like basket weaving. In many cases, these activities are practiced at specific times in specific places, generally at waterbodies on or near lands belonging to individual tribes. Such a practice is distinct from recreational uses of fishing or swimming which reflect leisure activities, in terms of discretionary time in which people engage in certain activities for enjoyment and pleasure, rather than such use being tied to traditional, ceremonial, and/or spiritual practices. The activities that the tribal traditional and cultural uses would protect are religious or traditional and essential to the tribal lifeways, and do not fall within a "recreational" meaning or category. Therefore, REC-1 and COMM may not be adequately protective of tribal and cultural uses.

A water quality objective for one beneficial use may be sufficiently protective of other beneficial uses. As a result, even when new beneficial uses are designated for a water body, new designations do not necessarily mean that additional water quality objectives, restrictions on waste discharges, or other new or different actions will be necessary. Existing water quality objectives for an existing beneficial use may be sufficient to protect the newly added beneficial uses. In instances where water quality objectives for existing beneficial uses are not protective of newly added beneficial uses, new water quality objectives may need to be developed. On the other hand, even when a new beneficial use is designated for a water body, the designation does not necessarily mean that an additional water quality objective, restriction on waste discharges, or other new or different action would be necessary to protect those uses. Existing water quality objectives for an existing beneficial use may be sufficient to protect the newly added beneficial uses.

For example, fish consumption associated with the subsistence uses (SUB and T-SUB) generally includes lager amounts and/or different species than normally consumed by recreational fishers in California. In some waters containing species of bass, subsistence fishers may be predominantly catching and eating trout or perch or another species of TL3 fish. If the COMM objective is applied to recreational fishers consuming bass the objective may be sufficiently protective of subsistence fishers in the same water body eating predominantly perch. For the CUL beneficial use, objectives designed to protect recreational swimmers may be sufficiently protective of many tribal traditional and cultural activities involving contact with water. However, other activities in the water pertaining to tribal traditional and cultural uses may present a higher chance of ingesting water, or a greater exposure to toxins or bacteria, placing people at a higher risk to illness. This is because some of the traditional and cultural practices involve people spending a longer time in the water or in contact with the water. For example, basket weaving involves placing reeds in water then in the mouth repeatedly. Other factors increase the potential exposure to contaminants in the water, such as the particular type of activity (e.g. whole body emersion), and locations that have rugged conditions which can make minor skin abrasions or cuts more likely.

U.S. EPA's regulations implementing the Clean Water Act provide, "A water quality standard defines the water quality goals of a water body, or portion thereof, by designating the use or uses to be made of the water and by setting criteria necessary to protect the uses." (40 C.F.R. § 131.2.) States may adopt "sub-categories" of a use "to reflect the varying needs of such sub-categories of uses […]." (40 C.F.R. § 131.10(c).) For subsistence fishing by communities other than tribes, environmental justice groups have commented that consumption assumptions associated with the COMM beneficial use are not protective of the subsistence uses. Subsistence fishing is also not adequately described by the term "recreation," which is used to define the COMM beneficial use. Fishing by some communities is an innate part of the culture of that community and such communities place a more meaningful significance on the activity than that which is connoted by the term "recreation." Subsistence fishing may also be driven by economic need. In either case, the fishing rate is not optional or elective as the recreational term connotes, and the amount of fish consumed can be greater than that consumed by recreational fishers.

The consumption rate of one meal per week is recommended to use to calculate the water quality objective to support the commercial and sport fishing beneficial use (Section 6.2). A large body of evidence confirms that certain communities eat more than one meal per week of locally caught fish in various locations throughout the state, which justifies the need for the subsistence-type beneficial uses. The California Tribes Fish-Use study confirmed that tribes eat more than one meal per week of fish (Shilling et al. 2014). Several other California fish consumption studies show that some populations, in addition to California tribes, eat more than one meal per week. U.S. EPA recommends the use of the 90^{th} or 95^{th} percentile of the consumption rates for deriving criteria, rather than an average consumption rate (U.S. EPA 2000). In the Delta, the 95^{th} percentile rate for anglers was four meals a week, and for some subgroups it was 10 meals a week (Shilling et al. 2010). In Santa Monica Bay, Asian and "other" subgroups were eating up to three to five meals a week (90^{th} percentiles, Allen et al. 1996). In Ventura County and Los Angeles Country all anglers surveyed were eating up to two meals a week, and the African American /black group was eating up to three meals a week (90^{th} percentiles, Allen et al. 2008). In San Diego Bay, 25 percent of the surveyed anglers reported that they ate fish at a rate of four to seven days per week (Environmental Health Coalition, 2005). In Los Angles, the Asian /Samoan groups were eating two fish meals a week on average (Puffer et al. 1982). See Appendix G for more details.

Establishing the three beneficial uses, California Indian Tribal Traditional and CUL, T-SUB and SUB (identified and defined in Section 2.3.1; for examples of traditional uses of water by California tribes, see Section 4.10) would be in alignment with the above-noted executive order, the goals of California Environmental Protection Agency's policy on Consultation with California

Native American Tribes, and the goals of California Environmental Protection Agency's Intra-Agency Environmental Justice Strategy.

These beneficial uses are also consistent with Executive Order 12898, issued in 1994 by President Clinton to address environmental justice in minority and low-income populations, which established federal executive policy on environmental justice (Exec. Order No. 12829, 59 Fed. Reg. 7629 (Fe.16, 1994)). The order directs federal agencies to address the disproportionately high and adverse human health or environmental effects of their actions on minority and low-income populations. Mercury in fish tissue would have a greater effect on those who consume large quantities of fish for subsistence, compared to recreational fishers who occasionally consume fish. Many subsistence fishers are low income and minority populations. While the Water Boards are not a federal agency, the Water Boards fulfill federal mandates including the Clean Water Act. Additionally, the beneficial uses are consistent with the principles and values described in the Water Board's *Strategic Plan Update* (commitment to environmental justice and collaboration with tribes (State Water Board 2008)).

On the other hand, although the issue here is limited to evaluating whether the beneficial uses should be established and defined, designating and protecting these uses will come with challenges. There are a few contaminants, including mercury and PCBs, that accumulate in fish tissue and can prevent many water bodies from supporting a subsistence level of fish consumption in California. These contaminants are generally very persistent in the environment. Even if all sources of the contaminants are eliminated, the contaminants are likely to remain high for decades, because either they do not degrade or they degrade very slowly. Much of the mercury in fish today is thought to be from historic mining in the late 19th century and early 20th century. Further, current sources may not be directly regulated by water boards (e.g. atmospheric emissions, naturally occurring in soils, or geothermal sources).

An important distinction to emphasize regarding the issue of developing new beneficial uses (relating to tribal traditional and cultural, tribal subsistence fishing, and subsistence fishing) is that water rights and water quality regulations both utilize terms called "beneficial uses," but the terms are distinct as used in their respective contexts. With respect to water rights, waters of the state must be put to reasonable and beneficial use to the fullest extent capable (Wat. Code § 100). By comparison, the beneficial uses the State Water Board directed staff to develop are for purposes of the Porter-Cologne Act, and may also serve as designated uses under the Federal Water Pollution Control Act (33 U.S.C. § 1251 et seq.) (Clean Water Act). These uses are intended to protect against water quality degradation (Wat. Code § 13050(f)). Beneficial uses under the Porter-Cologne Act are distinct from the statutory and common law beneficial uses applicable to appropriative water rights.

6.4.3 Options

Option 1: No action.

With this option, the Provisions would not include new beneficial uses pertaining to tribal traditional and culture and subsistence fishing. Under this option, the Regional Water Boards could still adopt the beneficial uses and definitions, or something similar.

Establishing the uses, by themselves, is not intended to set or reorganize Regional Water Board priorities. The uses would be established by the Provisions, which is separate from actual designations. The Regional Water Boards have discretion to set priorities for amending their basin plans during the triennial reviews. The designation of these beneficial uses may require angler surveys or other analyses. In any case, it will be up to the Regional Water Boards to designate the uses to waters within their regions.

Additionally, statewide consistency would be lost and trust from tribe and environmental justice groups could be diminished because of the change in direction.

Option 2 (RECOMMENDED): Establish beneficial uses for tribal traditional and cultural, tribal subsistence fishing, and subsistence fishing.

In this option, the Tribal Traditional and Culture beneficial use (CUL) and the two subsistence fishing uses (Tribal Subsistence Fishing (T-SUB) and Subsistence Fishing (SUB) would be adopted as a part of a statewide water quality control plan.
The definitions from the North Coast Water Board and those suggested by tribes and environmental justice groups (Resolution No. 2016-0011) were used as the basis for the proposed definitions after receiving input from all interested parties.

See Appendix A and Section 2.3.1 for the exact wording of the beneficial uses. See also "Frequently Asked Questions" at Appendix T pertaining to the development of the beneficial uses (which discusses the goals, necessity, specific language, application, and manner for designation).

The beneficial uses established by the Provisions would establish the use categories and provide consistent definitions for use by the Water Boards. Establishing the new beneficial uses, including their definitions, would not operate to designate those uses to any water body. Designation of the uses to specific water bodies would primarily remain the responsibility of the Regional Water Boards through their respective basin planning process. Generally, the Regional Water Boards designate specific waterbodies within their respective region where the use applies. A Regional Water Board's waterbody-designation would occur through its basin planning process in accordance with Water Code sections 13244 (hearing and notice requirements) and 13245 (approval by the State Water Board).

Designation of a new beneficial use is required to be done through the public process. The Water Boards will consider all of the evidence in the record when determining what designations to make. The Water Boards generally considers prioritizing designation of waters during their triennial review process. In addition, the Water Boards could consider designation during another basin planning activity such as the development of a total maximum daily load. The need for a designation may be brought to the attention of the particular Regional Water Board with a request that a beneficial use be designated to a water body. If the Regional Water Board declines to designate a water body, tribes or others may request the State Water Board to consider the designation. The Water Boards may consider whether the beneficial use is existing or a probable future use to determine whether to designate.

The beneficial uses would be established as water quality beneficial uses which are distinct from beneficial uses used in water rights. Pursuant to the Porter-Cologne Water Quality Control Act (Wat. Code, § 13000 et seq.), "beneficial uses" are defined, in part, as the uses "of the waters of the state that may be protected against quality degradation" and include agricultural and industrial supply, recreation, preservation of fish and wildlife, navigation, and other uses. (Wat. Code, § 13050, subd. (f).)

The State Water Board may develop a flow objective if the flow objective is necessary for the reasonable protection of a beneficial use. However, it is not anticipated that flow objectives would be developed to support the activities contained in the Tribal Traditional & Cultural beneficial use definition.

Such activities, including navigation, and to a lesser extent, ceremonial and spiritual activities, are similar to existing beneficial uses which have not required the development of flow objectives. For example, the Navigation Beneficial Use ("Uses of water for shipping, travel, or other transportation by private, military, or commercial vessels") (NAV) has been designated to numerous waterbodies throughout the State, and no flow objective has been established for NAV.

When the State Water Board is acting on applications to appropriate water, it is required to consider water quality control plans and may subject appropriations to conditions the board deems necessary to carry out the plans. (Wat. Code, § 1258.) Finally, when acting on Clean Water Act section 401 water quality certifications, the State Water Board must include conditions deemed necessary to carry out the goals of water quality standards during the term of the permit.

For the subsistence beneficial uses (T-SUB and SUB), evidence could include an angler or community consumption study, preferably peer reviewed, that demonstrates a population or group that consumes fish at a higher rate than the average consumer. Consideration should be made on both the amount of fish eaten, the type of fish (TL3 vs TL4), as well as the location. For the CUL beneficial use the Water Boards can consider evidence from tribal communities on locations and timing of ceremonial and cultural activities on a water body. Activities could include ceremonial immersion, fishing (both the act of fishing and the ceremonial consumption of fish), basket weaving, and the gathering of aquatic vegetation for medicinal or ceremonial and cultural purposes. For

Tribal uses, the Water Boards should consider both current and documented past practices, especially in areas where tribal practices have been limited due to lack of access. The Water Boards should not rely solely upon anecdotal evidence in designating beneficial uses.

Again, the designation does not require that the beneficial use be attained at the time a water body is designated. There is no requirement or threshold of use that the Water Boards must consider when determining beneficial use designations. However, it may not be reasonable to designate a beneficial use, and by extension apply applicable water quality objectives, if only one individual is using the water in a way that would meet the beneficial use definition

U.S. EPA's regulations implementing the Clean Water Act provide, "A water quality standard defines the water quality goals of a water body, or portion thereof, by designating the use or uses to be made of the water and by setting criteria necessary to protect the uses." (40 C.F.R. § 131.2.) States may adopt "sub-categories" of a use "to reflect the varying needs of such sub-categories of uses […]." (40 C.F.R. § 131.10(c).) "Designated uses" are those uses that are specified in a water quality control plan whether they are "existing" uses or not. (See 40 C.F.R. 131.3(f).) For example, a water body may be designated by state regulations for 'aquatic life support' even though it might not contain a healthy aquatic ecosystem now." (U.S. EPA 2016b). Designated uses answer the policy question of "what do we want to use this water body for?" as well as for recognizing present or existing uses. "Existing uses" are defined as "those uses actually attained in the water body on or after November 28, 1975, whether or not they are included in the water quality standards" (40 C.F.R. § 131.3(e)). U.S. EPA explains in its summary to the revised water quality standards regulations (80 Fed. Reg. 51027 (Aug. 21, 2015): "[E]xisting uses are known to be 'actually attained' when the use has actually occurred *and* the water quality necessary to support the use has been attained. U.S. EPA recognizes, however, that all the necessary data may not be available to determine whether the use actually occurred or the water quality to support the use has been attained." When determining an existing use, U.S. EPA provides substantial flexibility to states and authorized tribes to evaluate the strength of the available data and information where data may be limited, inconclusive, or insufficient regarding whether the use has occurred and the water quality necessary to support the use has been attained. In this instance, states and authorized tribes may decide that based on such information, the use is indeed existing." Therefore, it may be possible to designate uses in water quality control plans as an existing use, even if water quality is not currently being attained for one particular contaminant or where information or data is insufficient or lacking regarding whether the use has occurred and the water quality necessary to support the use has been attained. Additionally, beneficial uses may be designated as a goal use (or a probable future use in Porter-Cologne parlance) where neither the water quality is currently being attained or the use is actually occurring, but there is evidence to indicate that the use would be a probable future use.

An advantage of establishing beneficial uses for subsistence fishers separate from the COMM beneficial use pertaining to recreational fishers is that the it would allow the Water Boards to separately designate the subsistence use, which is expected to require an objective with a higher level of protection of human health due to fish consumption, in a site-specific manner (i.e., to individual sites or water bodies). By comparison, if the Water Boards construed subsistence fishing to come within the COMM designation, then the subsistence use and its associated water quality objectives would apply to all COMM designations, which could be inappropriate in many instances where subsistence fishing is not occurring. Establishing a beneficial use specific to subsistence fishing could focus resources on areas where there is the greatest need for the more stringent objective or it could focus resources on maintaining high quality waters.

Pursuant to the Porter-Cologne Act, the Water Boards are required to establish water quality control plans and the plans must conform to the Porter-Cologne Act. (Wat. Code, § 13240.) Water Code section 13050, subdivision (j), defines water quality control plans as "consist[ing] of a designation or establishment for the waters within a specified area of all of the following: (1) Beneficial uses to be protected. (2) Water quality objectives. (3) A program of implementation needed for achieving water quality objectives." When setting objectives, the Water Boards consider the "[p]ast, present, and probable future beneficial" uses of the waters (Wat. Code, § 13241). The Regional Water Boards solicit information on priorities for amending their basin plans – which could include the designation or refining of the list of beneficial uses for any water – during their triennial review.

When designating the beneficial use, the Water Boards generally determine if the use is an existing use under the Clean Water Act (defined as "those uses actually attained in the water body on or after November 28, 1975, whether or not they are included in the water quality standards" (40 C.F.R. § 131.3(e)) or if it is a past, present or probable future use under the Porter Cologne Act. There is no specific threshold for determining when a use is an existing or when a use is a past use. The Water Boards rely on the total body of evidence in the record, and the quality of the waters to be protected for use and enjoyment by the people of the state (Wat. Code, § 13000). The Water Boards consider various factors including the physical, chemical, and biological health of the waters, and may also consider other factors, both tangible and intangible. The legislative findings for the Porter-Cologne Act provide, "activities and factors which may affect the quality of the waters of the state shall be regulated to attain the highest water quality which is reasonable, considering all demands being made and to be made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible." (Ibid.)

The advantage of adopting these beneficial uses is that such adoption would clearly signal that these uses are made on some water bodies in California and could be designated where they are demonstrated to exist or where the Water Boards determine they should be set as a "goal use" so that they may be protected. Having the uses in a statewide water quality control plan would allow tribal and subsistence communities to request that the Water Boards recognize the uses, and thus protect the uses.

A disadvantage of establishing the beneficial uses, and subsequently designating waters with the uses, is that it may raise somewhat false expectations that the certain objectives (e.g. water quality objectives for mercury, PCBs and others) that may support the fish consumption within the beneficial uses can be readily achievable. This may not be possible in some waters for many decades because the level of persistent pollutants is high.

Option 3: Establish the three new beneficial uses and include formal guidance on the manner in which the Water Boards would designate the uses.
This option is similar to option 2, except that along with establishing the beneficial uses and definitions, the Provisions would also contain guidance for the Water Boards on how, or under what circumstances, the beneficial uses should be designated to water bodies. The guidance would clarify the type, quality, or quantity of data or information that should be used support the designation of the beneficial use. This information might be fish consumption surveys or other information from tribes or environmental justice advocates.

The advantage of this option is that this may enable designation of the uses sooner than option 2. Guidance should facilitate the designation process and make it clear what information would be needed. Therefore, when a Water Board begins to designate one of the uses, the process should experience fewer delays, if the guidance is followed. The disadvantage is that the development of the guidance would increase the scope of the Provisions. Such guidance would need to be developed in collaboration with tribes, environmental justice advocates, the State Water Boards Office of Public Participation and Regional Water Boards. Additionally, option 3 refers to U.S. EPA's framework for designating uses as existing uses or goal uses.

6.4.4 Recommendation
Option 2: Establish the beneficial uses for tribal traditional and culture, tribal subsistence fishing and subsistence fishing.

6.5 Issue E. What water quality objective (s) should be adopted for subsistence fishing by tribes (T-SUB) and other subsistence fishers (SUB)?

6.5.1 Current Conditions
Neither the State Water Board nor the Regional Water Boards have developed water quality objectives to protect subsistence fishing or tribal subsistence fishing. Although the North Coast Regional Water Board has adopted Native American Culture (which include subsistence fishing) and Subsistence Fishing beneficial uses, no water quality objectives for any contaminants have been derived to protect these uses.

As described in U.S. EPA's human health criteria methodology (U.S. EPA 2000), the level of fish consumption in highly exposed populations varies by geographical location. Therefore, U.S. EPA suggests a four preference hierarchy for states and authorized tribes that encourages use of the best local, state, or regional data available to derive fish consumption rates. U.S. EPA recommends that states and authorized tribes consider developing criteria to protect highly exposed population groups and use local or regional data in place of a default value as more representative of their target population group(s). The preferred hierarchy is: (1) use of local data; (2) use of data reflecting similar geography/ population groups; (3) use of data from national surveys; and (4) use of U.S. EPA's default consumption rates. The U.S. EPA recently published guidance on conducting fish consumption surveys (U.S. EPA 2016c), which is an update to the 1998 guidance (U.S. EPA 1998). The new guidance includes information on gathering data on subsistence fishing.

6.5.2 Issue Description

Since the fish consumption rate of one meal per week is recommended to protect the Commercial and Sport Fishing beneficial use (Section 6.2), a separate objective for subsistence fishing and tribal fishing would be needed. California tribes and environmental justice advocates have voiced concerns that an assumed consumption rate of one meal per week for all Californians is not protective of the cultural and subsistence uses. The information needed to calculate such an objective was not available until recently. The California Tribes Fish-Use study confirmed that tribes eat much more than one meal per week of fish (Shilling et al. 2014). Those results can be used to derive an objective for tribal subsistence fishing. Several other California fish consumption studies show that some populations, in addition to tribes, eat more than one meal per week (see Section 6.4.2 above or see Appendix G for more details).

However, there is not a similar statewide study that addresses subsistence fishing by non-tribal communities. Interpreting information in existing fish consumption studies in regards to subsistence fishing is not straightforward. It is not obvious which data represents subsistence fishers vs. recreational fishers. The data is limited and the consumption rates and fish species consumed vary widely by geographic area (Table 4-4). Therefore, it is not clear what consumption rate and fish species should be used to derive a water quality objective to protect subsistence fishing by non-tribal communities.

The Porter Cologne Act requires that water quality objectives shall be established that "will ensure the reasonable protection of beneficial uses and the prevention of nuisance" (Wat. Code §13241). Porter Cologne also requires the Water Boards to consider "Past, present, and probable future beneficial uses of water" (ibid.) when establishing objectives. Certainly tribal subsistence fishing is a past use of some of California's waters, as well as a present and probable future use. Subsistence fishing by other communities is also a present and probable future use of some of California's waters.

When establishing water quality objectives to reasonably protect beneficial uses, the Porter-Cologne Act requires consideration of the "Water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area"

(Wat. Code, § 13241). Only a fraction of waters would be able to currently support fish that meet a subsistence-type water quality objective when applied to TL4 fish (see Section 4.5.2 mercury levels in sport fish). In fact, many waters do not have fish that would meet the water quality objective for recreational fishers (see Section 6.2). The objectives listed below for subsistence fishing and tribal subsistence fishing objectives in options 2 and 3 are roughly three to four times more stringent that the objective to protect recreational fishing. Another complication is that the attainability of a subsistence objective would depend on the levels of other contaminants in the fish tissue, not just mercury. Some waters in the Sierra Nevada Mountains have elevated levels of dieldrin and PCBs (Davis 2010, Davis et al. 2013), which may prevent attainment of a subsistence-type objective even if the mercury concentrations are low enough.

The Porter Cologne Act also requires consideration of "economic considerations" when establishing water quality objectives and waste discharge requirements (Wat. Code, §§ 13241, 13263). Dischargers may strongly oppose such objectives because of the costs of the requirements that could result from such objectives for some dischargers.

6.5.3 Options

Option 1: No action.

This option would mean no water quality objective would be established pertaining to the SUB or T-SUB beneficial uses. The disadvantage of this option is that the development of any type of subsistence objective would be delayed. The Water Boards are required to establish water quality control plans which consist of beneficial uses of waters, water quality objectives to reasonably protect uses, and programs to implement objectives (Wat. Code, §§ 13050, subd.(j), 13240, 13241, 23142.)

This option may not have a significant impact on the amount of time it will take before such objectives are effective for specific waters. Typically, before the water quality objectives can take effect, the specific waters would need to be designated with the appropriate beneficial use category (e.g. tribal subsistence fishing or subsistence fishing). No waters would be designated with the beneficial uses as part of the Provisions. The designation would be done by the Regional Water Board through the basin plan amendment process (see Section 6.4.1 and Section 6.4.3 option 2). This work is generally a multi-year process, including regulatory and environmental analyses, and public participation.

The advantage of this option is that the scope of the Provisions would be smaller and less complex. This could enable faster adoption of a baseline statewide mercury program, and the required actions to control mercury could be started sooner, which are actions that lend themselves to obtaining the more stringent objective pertaining to higher fish consumers. To fulfill the project goals, the Provisions must be adopted and approved by U.S. EPA by June 30, 2017. This deadline is the result of a lawsuit settlement over the lack of protection for wildlife (see Section 3.5).

A disadvantage of this option is that it would create two projects, assuming that the objectives would be developed at a later date by one or more Water Boards. Splitting the work into two or more projects may not result is a net savings of time and resources.

Another disadvantage of this option is that U.S. EPA in Washington State and Maine (U.S. EPA, Regions 10 and 1, respectively) have recently disapproved state proposed water quality standards because they were not protective of tribal treaty or other reserved fishing rights, which includes rights to fish for subsistence purpose and promulgated and propose new objectives for all waters to be protective of tribal fish consumption rates (81 Fed. Reg. 85417 (Nov. 28, 2016); 81 Fed. Reg. 23239 (April 20, 2016)). Failure to include objectives to protect tribal uses may result in disapproval by U.S. EPA and promulgation of criteria to protect tribal uses.

Option 2 (RECOMMENDED): Adopt a numeric water quality objective for tribal subsistence fishing (T-SUB).

This option means the Provisions would contain a numeric water quality objective for tribal subsistence fishing (T-SUB). (To address subsistence fishing for other individuals (SUB), option 3, option 4, or option 5 could be adopted.)

For tribal subsistence fishing, the objective would be a fish mercury concentration of 0.04 mg/kg. This is based on the contemporary consumption rate for tribes of four to five meals a week from the recent Tribes Fish Use study (Shilling et al. 2014). (This also includes a moderate amount of store bought fish, see Appendix H for calculations.) This rate happens to be the same as the U.S. EPA recommended rate for subsistence (142 g/day, U.S. EPA 2000). The objective (0.04 mg/kg) would be applied as a mixture of 70 percent trophic level 3 (TL3) fish and 30% trophic level 4 (TL4) fish (see Appendix H for example calculations) based on the tribes study (Shilling et al. 2014).

The tribes study (Shilling et al. 2014) includes 40 California tribes, while there are more than 100 federally recognized tribes in California and other non-federally recognized tribes in California (see Section 4.10). If site-specific fish consumption information suggests that a different consumption pattern would better reflect the tribes in a certain area, the Regional Water Board should establish a modified water quality objective. This information would be determined by a suitable angler survey. The study could be done in conjunction with the designation of beneficial use of tribal subsistence fishing. Site-specific information may be available for some tribes in the Tribes Fish Use study (Shilling et al. 2014) or by contacting the author of the study.

The advantage of this option is that it does more to fulfill the Water Boards' mandate to protect beneficial uses of water as compared to option 1 or option 3. This option better achieves the principles and values described in the Water Board's *Strategic Plan Update* (commitment to environmental justice and collaboration with tribes (State Water Board 2008)). Another advantage is that if a water body can achieve objectives pertaining to subsistence or tribal subsistence fishing, such objectives would help to maintain high quality water.

A disadvantage of this option is that it cannot be guaranteed that the water quality objective will be able to bring about a significant improvement (or protection) of the environment. This may produce a false impression that subsistence fishing is safe in places where is it is not, even though, a water body not meeting standards could be on the 303(d) list of impaired waters. The achievability of such objective, when applied to trophic level 4 fish in bass dominated waters, may be difficult due to the persistent nature of the contaminants in fish tissue. This objective, however, could be achievable in some trout dominated waters (see Section 4.5.2 on mercury levels in fish, or for an interactive map of fish mercury data, see www.mywaterquality.ca.gov/safe_to_eat/data_and_trends/).

Option 3: Adopt a numeric water quality objective for subsistence fishing.
This option means the Provisions would contain a water quality objective for subsistence fishing (SUB) of 0.05 mg/kg in top trophic level fish. This is based on a consumption rate of approximately four and a half meals per week, derived from U.S. EPA nationwide subsistence fishing studies (see Appendix H for calculations). This objective should also be modified based on site-specific information, if available. This objective was derived using the national default fish consumption rate of four to five meals per week (142 g/day, U.S. EPA 2000) and is protective of all subsistence related studies listed in Table 4-4, including the study of the Sacramento-San Joaquin Delta (Shilling et al. 2010). However, such a numeric objective may be overprotective of some populations of subsistence fishers that don't eat such a high quantity of fish.

The advantage of this approach is that if water body can achieve this objective, such an objective would help to maintain high quality water.

One disadvantage is that this option could result in overly stringent requirements for dischargers, since the available data suggests that the subsistence objective may be overly protective for many areas. Also, the objective may be criticized as under-protective based on other studies. Available data on subsistence fishing is somewhat subjective to interpretation and the current data indicates that the use is fairly variable. For example, one of the largest studies, the San Francisco Bay study, does not support a consumption rate of four to five meals per week. Instead, it suggests a fish consumption rate of one or maybe two meals per week is protective (see Table 4-4 and Section 4.9). There is also a study currently being conducted in San Diego Bay that aims to include subsistence fishing. To address this issue, each Regional Water Board would be encouraged to evaluate site-specific data and information and develop site-specific objectives that would be tailored to the consumption rates and types of fish at particular waterbodies.

Option 4: Provide guidance for the Water Boards to develop a site-specific objective for other subsistence fishers (SUB) and provide direction to develop the objective upon water body designation.
In this option for SUB, the Water Boards would be directed to develop the water quality objective when the use is designated. The advantage to this option is that the limited data available indicate that the use is variable by water body with respect to the amount and type of fish consumed (see Table 4-4 and Section 4.9). A water quality objective to reasonably protect the use necessarily should be correlated to the amount and type of fish consumed. The use of local data is preferred by U.S. EPA rather than using national default values (see Section 6.5.1, U.S. EPA 2000), lending itself well to the development of a site-specific water quality objective rather than an objective established for statewide use to support the SUB beneficial use.

There is no statewide fish consumption study on subsistence fishing by communities other than tribes, but there are regional studies that included information on subsistence fishing that might be useful for deriving a water quality objective, for example, a San Diego Bay fish consumption was initiated in 2014 which may provide additional data on subsistence fishing in the near future (see Table 4-4 and Appendix G). Also, the information used to designate the subsistence fishing use to the particular water body could be useful for developing an objective for the same water body. If site-specific information is not available, it is recommended that a fish consumption study be conducted to provide data for the objective. In the absence of site-specific information, the Water Boards should consider using the national subsistence consumption rate of four to five meals per week (142 g/day, US EPA 2000) to calculate the objective.

An advantage of this option over option 3, is that it promotes the use of site-specific information for the subsistence objective. Site-specific data would provide a sound justification for the designation of the use and for the calculation of the water quality objective, which would facilitate the regulatory adoption process. The objective would be more stringent or less stringent as supported by data representing the specific population of fish consumers at the particular water body. Without the supporting evidence, the water quality objective would be less supported, making it more difficult for the Water Boards to adopt. A data-driven water quality objective more appropriately provides for the reasonable protection of the use and would be easier to justify and defend.

The lack of statewide numeric water quality objective to support SUB is a disadvantage of this approach compared to option 3. Environmental justice advocacy groups may oppose the Provisions based on the lack of parity between the Provisions establishing an objective for T-SUB (as recommended), but not SUB. On the other hand, this option would provide more certainty than option 5 in terms of ensuring the objective established by the Regional Water Boards would be catered to region-wide or water-body specific consumption rates and species.

Option 5 (RECOMMENDED): Adopt a narrative water quality objective for subsistence fishing (SUB).

This option means the Provisions would establish a statewide narrative water quality objective to support SUB.

The narrative water quality objective contained in the Provisions is:

> *Waters with the Subsistence Fishing (SUB) beneficial use shall be maintained free of mercury at concentrations which accumulate in fish and cause adverse biological, reproductive, or neurological effects. The fish consumption rate used to evaluate this objective shall be derived from water body and population-specific data and information of the subsistence fishers' rate of and form of (e.g. whole, fillet with skin, skinless fillet) fish consumption.*
>
> *When a water quality control plan designates a water body, or segment, with the Subsistence Fishing (SUB) beneficial use, development of a region-wide or site-*

specific numeric fish tissue mercury water quality objective is recommended to account for the wide variation in this use.

The Provisions also contain a footnote correlated with the narrative objective:

The United States Environmental Protection Agency (U.S. EPA) recommended national subsistence fishing consumption rate of 142 grams per day (four to five meals per week, U.S. EPA 2000) shall be used to translate the narrative objective unless a site-specific numeric water quality objective is developed or an external peer-reviewed consumption study uses a methodology to translate the narrative water quality objective.

The advantage of this option is that is more flexible and can be easily tailored to a water body. Since the data on subsistence fishing indicate that the use is variable around the state (as described in option 3), this option may be the best way to accommodate that variability, rather than proposing one set numeric objective for all of California's waters, as in option 3. The use of local data is preferred by U.S. EPA rather than using national default values (see Section 6.5.1, U.S. EPA 2000).

With a narrative water quality objective, effluent limitations contained in permits would be determined on a case-by-case basis, therefore, the effluent limitation could be developed considering site-specific factors, such as the discharger's relative contribution of mercury compared to other mercury sources. Another site-specific factor to consider is the species of fish in the waterbody. If no trophic level 4 fish are present in the water body, then the effluent limitation would not need to be as stringent compared to where trophic level 4 fish are present. The advantage of the narrative water quality objective is that these site-specific considerations could be taken into account without the lengthy regulatory process of adopting a site-specific water quality objective.

The disadvantage is that the objective may be interpreted in different ways, making the implementation of the objective inconsistent. Such objective would be implemented on a regulatory action-by-regulatory action basis. The objective could be interpreted differently as each permit is adopted or upon each assessment of whether the water body is meeting the objective. For instance, the objective could be interpreted in eight different ways in eight different permits, resulting in eight different effluent limitations. Lack of a clear numeric threshold may prompt criticism that this objective would be both under protective and over protective, because the actual level of protection is unknown. This is a disadvantage compared to option 3 and option 4.

6.5.4 Recommendation

Options 2 and 5: Adopt a numeric water quality objective for subsistence fishing by tribes (T-SUB) of 0.04 mg/kg as a mixture of 70 percent trophic level 3 (TL3) fish and 30 percent trophic level 4 (TL4) fish (to protect consumption of four to five meals a week); and adopt a narrative water quality objective for subsistence fishing (SUB) and direct the use of national subsistence fishing consumption rate of 142 g/day (four to five meals per week), unless site-specific information indicates otherwise.

6.6 Issue F. What mercury water quality objective should be adopted to protect the Tribal Tradition and Culture (T-SUB) beneficial use?

6.6.1 Current Conditions

With one exception, there are presently no beneficial uses defined in the state that address California Native American tribal traditional, cultural, or ceremonial uses of water. The exception is in the North Coast Regional Water Quality Control Board's basin plan, which explicitly defines a beneficial use for Native American Culture, CUL, which is defined in Section 3.4 of this report. The North Coast Regional Water Board has designated this use as an existing use for 27 individual water bodies or hydrologic areas and as a potential use for one hydrologic area (North Coast Water Board, 2011. Pp. 2-5.00 – 2.12.00). However, although the North Coast Regional Water Board has applied CUL and FISH for at least one permit, it has used the out-of-date CTR water column-based human health criterion of 50 ng/L for its reasonable potential analysis. (North Coast Water Board, 2013). The North Coast Regional Water Board has not established mercury effluent limitations for either of these uses in its NPDES permits.

6.6.2 Issue Description

When existing or past, present, or potential future beneficial uses are designated, water quality objectives are applied to the beneficial use in order to protect that use. These Provisions propose the adoption of a statewide Tribal Tradition and Culture use. However, the use is purposely defined to encompass the great variety of California Native American cultural, ceremonial and traditional uses of waters of the state. In terms of California's water quality regulatory system, this means that setting accurate objectives for any pollutant would require detailed study of the specific Tribe's use or uses of the waterbody wherever CUL may be designated. For the purposes of the proposed Provisions, the options discussed and the action taken by the State Water Board would apply to mercury objectives.

6.6.3 Options

Option 1: No action.

In this option, the State Water Board would make no requirements that any of the proposed Mercury Water Quality Objectives would be applicable to water bodies that are designated with the CUL beneficial use. This would place the requirement of developing or selecting appropriate mercury water quality objectives for CUL-designated water bodies to the Regional Water Boards. Under this scenario, it is possible that some Regional Water Boards would develop their own region-wide water quality objectives for mercury, or develop or endorse site-specific studies for a mercury objective for the designated water body. A disadvantage is that in not determining which mercury objectives should be used to protect the "fishing" use within the CUL beneficial use, the Provisions would leave a regulatory gap.

Option 2: Allow Regional Water Boards to choose a mercury objective applicable to CUL, given appropriate consideration of consumption patterns of the cultural

uses of a particular water and particular California Native American Tribal Community.

In this option the Provisions could require that the rate of consumption – if any – that is associated with the CUL beneficial use be determined when the water is designated using a peer reviewed consumption study. A benefit to this option is that it would set site-specific and appropriately protective objectives on a case by case basis. A disadvantage is that it may be difficult to determine the difference between consumption that is ceremonial versus consumption related to the T-SUB beneficial use. Another disadvantage is that doing the site-specific consumption sturdy could delay designation of the CUL use and lead to a lack of recognition or protection for other, non-fish consumption, cultural uses,

Option 3 (RECOMMENDED): Use the Sport Fish Water Quality Objective that applies to COMM as the water quality objective to protect the consumption of fish contained in the CUL beneficial use.

In this option, the Water Boards would use the same consumption rate of one meal per week to protect the consumption of fish under the CUL use as used in the Sports Fish Water Quality Objective. An advantage to this option is that there would be a uniform application of a mercury objective to protect the fishing use recognizing that higher consumption rates are recognized in the T-SUB and SUB beneficial uses. Another advantage is that there would be no delay of the designation for the CUL beneficial use while a consumption study, specific to cultural and ceremonial uses, is conducted. A disadvantage to this option is that it could lead to overly-stringent or under-protective mercury objectives. However, it is anticipated that any water that is designated for CUL would also most likely be designated for COMM and WILD so the Sport Fish Water Quality Objective would already apply. Additionally, the Regional Water Boards may develop site-specific objectives to cater the consumption rate and species to the precise waters at issue, which could recognize any higher consumption rate associated with cultural or ceremonial fish consumption.

6.7 Issue G. What water quality objective should be adopted to protect sensitive endangered species (the RARE beneficial use) and to what waters should the objective apply?

6.7.1 Current Conditions

There are currently no statewide objectives or criteria to protect wildlife from mercury in California. In 2000, the USFWS issued its final opinion that the California Toxics Rule criteria for mercury would not protect several threatened and endangered species (USFWS 2000). This gap in protection remains in California's statewide water quality criteria. However, protections for wildlife have been established regionally as mercury /methylmercury site-specific objectives that have been adopted with several TMDLs. To protect a very sensitive endangered species, the California least tern, an objective of 0.03 mg/kg in fish 50 mm long (~2 inches) was adopted for the Sacramento-San Joaquin Delta and San Francisco Bay.

6.7.2 Issue Description

The California least tern is particularly sensitive to methylmercury because of its small size and its diet comprised almost exclusively of fish. This issue considers if a special water quality objective for the California least tern should be adopted, and if so, where the objective should apply. The objective would be 0.03 mg/kg methylmercury in fish less than 50 mm long as recommend by the USFWS (USFWS 2003, USFWS 2004). The very small size of the fish (less than 50 mm) is typical of the fish the tern typically preys upon. The habitat of the California least tern covers only a small fraction of California, including the coast from the San Francisco Bay area down to the Mexican border. The USFWS recommended adoption of a similar site-specific objective (0.03 mg/kg in fish less than 50 mm) for the Sacramento-San Joaquin Delta and the San Francisco Bay, because this species was unlikely to be protected by the Sport Fish Water Quality Objective adopted for those waters.

Although the Prey Fish Water Quality Objective is thought to be more protective than the recommended Sport Fish Water Quality Objective (0.2 mg/kg in sport fish), an objective of 0.03 mg/kg in 50 mm (2 inches) fish is *not* 10 times more stringent compared to an objective of 0.3 mg/kg in 350 mm (14 inches) fish. This is due to the bioaccumulative properties of methylmercury. Small prey fish are lower on the food web, and therefore generally have much less methylmercury in their tissue than the larger fish people typically eat. Because there is little data on methylmercury accumulation in small prey fish, it is difficult to determine the relationship between methylmercury concentrations in small prey fish (2”) and sport fish (e.g. 14”). In some waters, 0.2 mg/kg in sport fish may be consistent with 0.03 mg/kg in small prey fish. Based on data from slightly larger prey fish, it appears that the relationship will depend on the water body (Ackerman et al. 2015a).

The California least tern feeds primarily in near shore ocean waters and in shallow estuaries and lagoons. After breeding, family groups regularly occur in lakes or lake-like waters near the coast of southern California (USFWS 2006, California Department of Fish and Wildlife 1990). The tern plunges for fish near the surface, including anchovy (Engraulis sp.), silversides (Atherinops sp.) and shiner surfperch (*Cymatogaster aggregate*, *ibid.*). In addition to being on the federal list of endangered species, the California least tern is on California’s list of endangered species and is fully protected under the California Endangered Species Act of 1984. This legislation requires State agencies to consult with the CDFW on activities that may affect a State-listed species.

The Yuma Ridgway’s rail (*Rallus obsoletus yumanensis*, formerly known as the Yuma Clapper rail) is another sensitive bird species on the federal endangered species list that may warrant extra protection. This species could be protected by the objective suggested in Section 6.8. Otherwise the Prey Fish Water Quality Objective suggested below should be used to protect the habitat of the Yuma Ridgway’s rail.

6.7.3 Options

Option 1: No action.

In this option, no separate objective would be adopted to protect the California least tern. One of the primary drivers for developing the Provisions is the lack of protection for threatened and endangered species identified by the USFWS. The no action alternative would not resolve this issue and would not accomplish the goals of the Provisions. This option could accomplish the goals of the Provisions if the most stringent alternative for the Sport Fish Water Quality Objective is adopted (0.05 mg/kg in large fish, the subsistence–type option). The subsistence–type objective would be stringent enough to protect wildlife, including the California least tern.

Option 2: Apply the California Least Tern Water Quality Objective statewide

In this option, a separate objective would be adopted to protect the California least tern and other sensitive wildlife species. This objective would apply to all inland surface waters and enclosed bays and estuaries with the wildlife beneficial use. Applying this objective statewide would ensure complete protection of the California least tern as well as protection of many other wildlife species. This objective (0.03 mg/kg methylmercury in small prey fish) could be more stringent than 0.2 mg/kg methylmercury in large fish. Currently, the relationship is unclear.

The advantage of this option is that it would help ensure protection for all other sensitive wildlife. The disadvantage of this option is that it would require more resources for the statewide monitoring effort. This may be unnecessary, since the main sensitive species of concern has a limited habit range in California. Also, most wildlife species considered during the development of the Provisions (see appendix K) do not prey on fish this small. Therefore, these small prey fish are not the best indicator of protecting other wildlife species statewide.

Option 3 (RECOMMENDED): Apply the California Least Tern Prey Fish Water Quality Objective to waters based on United States Fish and Wildlife Service management areas for the species.

In this option, a separate objective would be adopted to protect the California least tern that would apply only to the habitat of the tern, since the California least tern only lives in a small part of the state. An advantage of using this alternative would be that it saves monitoring resources by limiting the geographic scope of the more stringent water quality objective. A disadvantage of this alternative is that other small birds sensitive to mercury could remain at risk, if no other objective is adopted to protect wildlife (see Section 6.8).

For a list of waters where protections for the least tern would apply, see Table K-5, Appendix K, which includes waters on or near the coast, from the San Francisco Bay area down to the Tijuana River. This list is based on the management areas in the USFWS recovery plan. There is no official critical habitat for the California least tern (USFWS 2006).

No change to any Regional Water Board basin plan is necessary for these protections to take effect, because upon adoption of the Provisions, the objective would be effective in the specified waters. The basin plans include the RARE to protect habitat for such species. RARE has already been designated by Regional Water Boards to all the relevant waters (listed Table K-5, Appendix K).

If information becomes available at a later date to indicate that the California Least Tern Prey Fish Objective should be applied to other waters, then Regional Water Board could make findings that the use is an existing use and apply the objective to those waters.

If no other objective is adopted to protect wildlife statewide (see discussion in Section 6.8) then this option should include the Salton Sea and Colorado River to protect Yuma Ridgway's rail, which inhabit these waters. The Yuma Ridgway's rail is another sensitive species on the federal list of endangered species. This species was second most sensitive next to the California least tern in the USFWS analysis of the national methylmercury criterion (USFWS 2003).

In addition to providing habitat for the Yuma Ridgway's rail, the Salton Sea provides habitat for a great number of bird species. It is a major resting stop in a common migratory path for birds known as the Pacific Flyway. The Salton Sea has no top predatory fish because of the high salinity, so the objective for sport fish (0.2 mg/kg) would be applied to lower trophic level fish, which would be less protective for wildlife. The limited data available provide little assurance that 0.2 mg/kg in sport fish would correspond to a sufficiently protective mercury concentration in the prey of the Yuma Ridgway's rail.

6.7.4 Recommendation

Option 3. Adopt the small prey fish tissue objective (0.03 mg/kg in fish < 50 mm) for waters located within USFWS management areas for the California least tern.

6.8 Issue H. Should a water quality objective be adopted that is specifically for the protection of wildlife statewide?

6.8.1 Current Conditions

There are currently no statewide objectives or criteria to protect wildlife from mercury in California, although site-specific objectives have been adopted for several waters including the Sacramento-San Joaquin Delta, San Francisco Bay, Clear Lake, Cache Creek, and the Guadalupe River watershed. Because of the long standing lack of protections for wildlife, a lawsuit was filed against U.S. EPA. As a result, U.S. EPA is obligated to propose methylmercury water quality criteria to protect aquatic life and aquatic-dependent wildlife by June 30, 2017. This applies to waters where U.S. EPA has not already approved water quality objectives for mercury submitted by the State (Consent Decree: *Our Children's Earth Foundation and Ecological Rights Foundation vs. U.S. EPA*, No. 3:13-cv-2857-JSW (N.D. Cal., Aug 25 2014)).

6.8.2 Issue Description

A separate wildlife objective may be needed if the options selected for sport fish and the least tern (discussed in Issues B, C, and G) do not provide adequate protections for all threatened and endangered species and other wildlife in California, such as osprey, bald eagle, belted king fisher, grebe and merganser.

Some of the options being considered for the Sport Fish Water Quality Objective to protect the related human health beneficial use (i.e., COMM) are known to be inadequate to protect wildlife. If chosen for adoption, these options would necessitate an additional objective for wildlife. For example, the USFWS found that an objective of 0.3 mg/kg in sport fish (Option 1 in Issue B, in Section 6.2.3) would be inadequate protection for two to four threatened and endangered species. Conversely, the 0.2 mg/kg objective (ibid., Option 2) in trophic level 4 fish (Option 1 in Issue C, in Section 6.3.3) should reasonably protect most threatened endangered species and other piscivorous wildlife, with the exception of the California least tern. However, many waters in California do not support trophic level 4 fish, but are inhabited primarily by trout. This is especially true in the Sierra Nevada Mountains. If the objective of 0.2 mg/kg is applied to trout, it is not clear if wildlife that eats lower trophic level fish would be protected. This issue is described in more detail in Appendix K. An objective that applies directly to the smaller fish that many wildlife species prey on would more obviously protect wildlife.

If the option of the objective of 0.05 mg/kg (Option 3 of Issue B in Section 6.2.3) was chosen for the Sport Fish Water Quality Objective; or if the least tern objective is applied statewide (Option 2 of Issue G, in Section 6.7.3) then no other protection for wildlife would be needed. Other option combinations may need a more thorough evaluation.

6.8.3 Options

Option 1: No action, and rely on the Sport Fish Water Quality Objective to protect wildlife.

The recommend option for the Sport Fish Water Quality Objective (one meal per week consumption rate) equates to approximately the same required level of protection for most aquatic dependent wildlife. Therefore, this option should protect most wildlife. The advantage of this option is that it would require fewer resources than implementing two objectives statewide: one for sport fish and one for wildlife. The California Least Tern Prey Fish Water Quality Objective (Section 6.7) would still be needed in any case, at minimum in the tern's habitat.

The disadvantage is the objective that applies to large sport fish is not clearly protective of wildlife that prey on smaller fish such as grebe, merganser, and belted kingfisher in all cases. Existing data are limited, but this option does not seem thoroughly protective in freshwater ecosystems which lack trophic level 4 fish (e.g. bass, see Appendix K). It is also very likely the relationship between mercury concentrations in sport fish and mercury concentrations in prey fish is water body specific. Therefore, protecting wildlife indirectly through an objective for sport fish would not necessarily provide full protection of wildlife in all cases. This uncertainty may result in U.S. EPA promulgating a separate objective for wildlife for California (as in option 2 below), since U.S. EPA is being held responsible for mercury water quality criteria that protect wildlife as a result of the lawsuit.

Option 2 (RECOMMENDED): Adopt the Prey Fish Water Quality Objective for wildlife.

A water quality objective to protect aquatic dependent wildlife could be adopted statewide, in addition to the Sport Fish Water Quality Objective. This objective would be 0.05 mg/kg methylmercury for trophic level 3 prey fish (50-150 mm (2-6 inches)), and is based on the wildlife target for belted kingfisher (see Appendix K) and is consistent with achieving targets for merganser, grebe, osprey and Yuma Ridgway's rail, albeit in somewhat larger fish or crayfish (Appendix K). This objective is also based on a recent study in grebes, which suggested that 0.05 mg/kg methylmercury in prey fish corresponds to a benchmark between low and elevated risk of toxicity (Ackerman et al. 2015a, fish 21 -146 mm were included in the study).

The advantage of this additional prey fish objective is that it would more clearly protect wildlife, by applying the objectives to the type of fish many wildlife species prey upon instead of applying it to the larger type fish that are more typically eaten by recreational fishers. This objective would also fill a gap in protection where there are no trophic level 4 fish (see Appendix K). The disadvantage of this additional prey fish objective is the increase of statewide monitoring needs, compared to having only one objective statewide. However, statewide monitoring programs have already monitored this size of prey fish (50-150 mm) to check for effects on aquatic dependent wildlife, particularly grebes (Ackerman et al. 2015a). Since this objective is mostly needed to fill a gap in protection for waters without trophic level fish then the monitoring for 50-150 mm prey fish could be prioritized to waters where there are no trophic level 4 fish. Monitoring for 50-150 mm prey fish could be a lower priority where sport fish monitoring applies to trophic level 4 fish. Also, this objective need not apply where the California Least Tern Prey Fish Water Quality Objective protects the California least tern (Section 6.7). The recommended California Least Tern Prey Fish Water Quality Objective (0.03 mg/kg in fish less than 50 mm, Section 6.7) would still be needed in any case, at minimum in the tern's habitat.

6.8.4 Recommendation

Option 2. Adopt a separate trophic level 3 objective, the Prey Fish Water Quality Objective, for wildlife for waters without trophic level 4 fish.

6.9 Issue I. How should legacy mine sites and mining wastes be addressed?

6.9.1 Current Conditions

For any type of mine, not just legacy or abandoned mines, Water Boards may issue cleanup orders and permits (e.g. waste discharge requirements) to mine owners to address discharges from mine sites and mining waste that discharge mercury to surface waters.

Mine sites that do not discharge directly to surface water may be issued waste discharge requirements under the land disposal program. The Water Boards are authorized to regulate discharges of non-hazardous waste to land under Title 27 of the California Code of Regulations. This regulation includes active, inactive closed or abandoned mines. The Porter-Cologne Act (Wat. Code § 13260 et seq.) and State Water Board Resolution 92-49 (as amended on April 21, 1994 and October 2, 1996) (Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304) provide the Water Boards with the authority to require measures to control pollution discharge from a mine site. Regional Water Boards use this authority to require “remediation plans” from mine owners. Mines may also be regulated though a cleanup and abatement order (Wat. Code, § 13304) or cease and desist order (Wat. Code, § 13304).

State Water Board’s nonpoint source program addresses discharges from other types of land, such as forests and grazing land or open land, which may include mine tailings that have become part of the landscape (discussed in Section 6.10). For streams and creeks that are impacted by deposits of mercury contaminated sediments from historic mining, these sources may be more appropriately addressed through the Clean Water Act 401 Water Quality Certification and Wetlands Program by which the Water Boards regulate discharges of fill and dredged material under Clean Water Act section 401 (33 U.S.C.1341) and the Porter-Cologne Water Quality Control Act (13370 et seq.) (discussed in Section 6.10). Additionally, if mining (e.g. gravel mining) is conducted within a stream, in a wetland or in a riparian zone, the activity may be regulated under the Clean Water Act 401 Water Quality Certification and Wetlands Program.

Mines that are now inactive are responsible for much of the mercury contamination associated with mining activity in California today. Currently active mines, which must abide by waste discharge requirements, contribute far less mercury. Most of the old inactive mines have been abandoned. Some inactive mines do not have a responsible party to which a permit or clean up order can be issued. Many of the abandoned mines are on land now owned by the Bureau of Land Management or other public agencies. The mining activity responsible for much of the mercury contamination in California today is from mines that are now inactive and from historic mine tailings, which have been spread widely across the landscape.

Many other agencies are also involved in the regulation of mines and in addressing abandoned mines. The Department of Conservation in now developing a prioritization strategy to address hazards from 47,000 abandoned mines sites. Not all sites contain mercury. Abandoned mines may also pose a physical hazard or release other contaminants (See Appendix F).

Although active mines are required to implement measures to control sediment and erosion when closing per California Code of Regulations, title 27 section 22510, for many mine sites that have were closed or abandoned prior to inception of the regulations, the requirements for implementing sediment and erosion control measures may be a new requirement.

Currently operating mines are much smaller sources than historic mines. Before a mine may discharge to surface water the mine owner must first obtain an NPDES permit. For mines regulated with an NPDES permit, the requirements are discussed in Section 6.12 and Section 6.13. Mines that don't discharge directly to surface water still generate runoff from storm water. Storm water from a mine site may be regulated under the Water Board's NPDES Statewide General Permit for Storm Water Discharges Associated with Industrial Activities (Industrial General Permit), and the requirements for storm water discharges are discussed in Section 6.11.

6.9.2 Issue Description

The issue is how the Provisions should control mercury discharges from legacy/abandoned mines. Historic mercury and gold mining in California is known to be one of the largest sources of mercury pollution in the state. Currently active mines, which must abide by waste discharge requirements, contribute far less mercury (and are addressed in other sections). Therefore, the focus of this issue is on legacy/abandoned mines. Mines or mine tailings can contribute mercury through erosion, mercury carried in storm water, or effluent discharges to water bodies. Many Water Board programs already exist that can be used to control mercury from legacy/abandoned mines, but due to the large number of a mines and the lack of responsible parties (mine owners), few abandoned mines have been addressed. Some inactive mines do not have a responsible party to which a permit or clean up order can be issued, or they are now on land now owned by the Bureau of Land Management or other public agencies.

Another challenging aspect to the historic mining legacy is that much of the landscape downstream from mercury mines is already contaminated with mercury laden sediment over broad areas and to deep depths. These are not recognizable mine sites, rather the sediment has become part of the landscape. This type of mercury is very difficult to address and may be a more important source of methylmercury than the original mine sites. In some cases, these sources could be addressed though the Clean Water Act 401 certification and wetland program and the nonpoint source program (Section 6.10).

6.9.3 Options

Option 1: No action. Use existing programs.

In this option, mine sites and mining waste from legacy/abandoned mines that discharge mercury to surface water would be addressed through existing regulatory programs. Existing Water Board regulatory tools, such as cleanup orders and permits (waste discharge requirements), would be used to address discharges from mine sites and mining waste (including dredge tailings and dredge fields) that discharge mercury to surface waters. Such permits could require implementation of erosion and sediment controls and other management practices to reduce erosion and sediment runoff rates to the maximum extent practicable.

The disadvantage of this option is that mines that are more significant contributors may not be addressed, since there is no effort statewide for Water Boards to prioritize mine sites that may be mercury sources. The existing programs often rely on other agencies or private parties to identify sites that should be regulated. Many mine sites have not been evaluated as to their potential to discharge mercury (or other contaminants) to water bodies, and are not permitted. Another difficulty is that many mine sites do not have an obvious responsible party with funds to correct the discharge of pollutants. Other sites are on public lands, and while state and federal agencies remediate many mine sites, there are limited funds for this purpose.

Option 2 (RECOMMENDED): Require dischargers subject to California Code of Regulations, title 22, section 22510 to implement erosion and sediment control measures to control mercury.

This option is similar to the option 1, but this option would require dischargers subject to California Code of Regulations, title 22, section 22510 to implement erosion and sediment control measures to control mercury when the discharge is from land where mercury was mined or mercury was used during ore processing. Title 27 already requires mine site remediation plans that include maintenance and monitoring plans to ensure continued effectiveness of the mine site remediation control measures (Cal. Code Regs, tit. 27, § 22510, subd. (b)). The Provisions would contain requirements to control erosion rather than assigning some mercury sediment or water column threshold. Erosion controls would a likely already be required at mines to control sediments and pollutants that bind to sediments (such as mercury), but this option may result in more sediment controls being included in mine remediation plans. If a water body is on the 303(d) list of impaired water bodies and a TMDL is developed, any upstream mine sites would likely be prioritized for clean-up and may be issued additional requirements as part of the TMDL program of implementation.

Option 3: Statewide Mine Prioritization Strategy.

In this option the Provisions could include a strategy to identify and prioritize legacy/abandoned mine sites and mining waste for cleanup. This approach would be hindered by the limited funds available for clean up as noted above. This approach would focus efforts on the worst sites first. The developing Reservoir Program is considering a similar approach that includes many areas of the Sierra Nevada which are heavily impacted by historic gold mining. Other state agencies responsible for regulating mine lands may need to be involved to identify the mine sites. This option would require additional staff or contract resources for this work to be performed.

Since funding will limit the number of sites that can be remediated, an important part of this option would be to identify additional funding. Partnerships could be developed with industry to re-mine legacy/abandoned sites. Currently, there is little incentive for industry to clean up and reuse an old mine site that was abandoned by another party. Also, public agencies have little funding available for mine clean-up activities.

6.9.4 Recommendation

Option 2. Require dischargers subject to California Code of Regulations, title 22, section 22510 to implement erosion and sediment control measures to control mercury.

6.10 Issue J. How should dredging, wetlands, and nonpoint sources be addressed?

6.10.1 Current Conditions

The existing policy for nonpoint sources is the State Water Board's *Policy for the Implementation and Enforcement of the Nonpoint Source Pollution Control Program* (Nonpoint Source Policy, State Water Board 2004). The Nonpoint Source Policy aims to minimize nonpoint source pollution from land use activities in agriculture, grazing, urban development, forestry, recreational boating and marinas, hydromodification, and wetlands. This can include lands with historic mine tailings and other open land. Agriculture wetlands are usually regulated by the Irrigated Lands Regulatory Program. The requirements for dischargers in that program should take into account nearby mercury impaired waters.

Additionally, the State Water Board has a Clean Water Act 401 Water Quality Certification and Wetlands Program that regulates discharges of fill and dredged material under Clean Water Act section 401 (33 U.S.C.1341) and the Porter-Cologne Water Quality Control Act (13370 et seq.). This program has special responsibility for wetlands, riparian areas, and headwaters because these water bodies have high resource value, are vulnerable to filling, and are not systematically protected by other programs. The program includes the protection of special-status species and regulation of hydromodification impacts. The program encourages basin-level analysis and protection, and most projects are regulated by the Regional Water Boards. The State Water Board directly regulates multi-regional projects and supports and coordinates the Program statewide.

6.10.2 Issue Description

The issue is how the Provisions should control mercury discharges from dredging, wetlands, and nonpoint source discharges (other than legacy mines, addressed in Section 6.9 and current NPDES permitted discharges, addressed in Section 6.10 through Section 6.13). Soils in California can be either naturally enriched with mercury, contaminated with mercury from gold mining activities, or, increase mercury concentration through atmospheric deposition. These mercury enriched soils can be washed into water bodes by nonpoint source discharges. Nonpoint source discharges can include surface water runoff from forests, agricultural land, grazing land, some urban areas, wetland/riparian areas, hydromodifcations, and other land features. Landscape changes or activities that increase run off or erosion can increase the transport of mercury into water bodies.

Also the inundation of mercury contaminated sediments from occasional flooding of land can produce methylmercury. A great deal of mercury contaminated sediment has already left mine sites and become part of the landscape as a result of historic mining. The methylation of the mercury in these contaminated sediments during occasional flooding is not a feasibly controllable process at this time.

This issue also concerns wetland projects, flooded agricultural lands, and dredging activities. These areas/activities can increase mercury levels in fish because flooded areas typically have low oxygen and high organic matter content. Those conditions tend to promote the methylation of inorganic mercury, and a great deal of mercury contaminated sediment has already moved down into stream beds and wetlands as a result of historic mining. When a wetland is established (created), enhanced, or restored, the modified site could increase the methylation of mercury or the discharge of mercury or methylmercury to downstream waters. Similarly, other dredging activities could disturb the mercury contaminated sediment and exacerbated mercury methylation and spread contaminated sediment downstream and to the location where the dredged material is being placed. However, wetlands and wetland restoration projects are very valuable as habitat for wildlife and flood control. As of 1990 California had lost 91 percent of its wetlands, more than any other state in the U.S (Dahl 1990).

6.10.3 Options

Option 1: No Action.

In this option, Water Boards staff would continue to issue or reissue permits (e.g. WDRs or waivers of WDRs) to address discharges of non-point source pollutants, with requirements based on State Water Board's Nonpoint Source Policy. Such requirements may include erosion and sediment control measures. Waste discharges from other sources, such as construction and road maintenance, would continue to be covered under NPDES storm water permits (See Section 6.11.) Dredging activities and wetland projects would continue to be regulated under Clean Water Act section 401 and 404 requirements or WDRs.

Option 2 (RECOMMENDED): Emphasize that under existing law the Water Boards have discretion to address nonpoint source discharges of mercury and methylmercury production in wetlands and the Water Boards should consider such implementation measures in areas with elevated mercury concentrations.

This option would acknowledge existing authority and provide some guidance to programs on where mercury should be addressed and what could be done. Areas where mercury should be considered to be addressed would include areas with known elevated mercury concentrations. This would be: a site that contains naturally-enriched soil in the Coast Range of 1 ppm or higher; a site with soil or sediments with mercury concentrations of 1 ppm or higher (Section 4.5.5); or a site in historic mercury or gold mine tailings. Also, sites within historic hydraulic gold mining pits in the Sierra Nevada Mountains should be considered as high mercury areas for which mercury monitoring may be required. (A map of historic hydraulic gold mining pits may be available in the near future on the U.S. Geological Survey website in the form of a GIS shapefile related to the project described in Alpers et al. 2016)

In this option, discharges in high mercury areas could be required to implement sediment and erosion control measures. Such requirements may already exist pursuant to existing authority and implementation. The Provisions would emphasize that permit writers may consider requiring sediment controls to control mercury, particularly in areas with elevated mercury concentrations

Under the Nonpoint Source Policy, Regional Water Board permit writers have the discretion to include management practices for mercury in permits for nonpoint sources. The decision to include requirements for mercury should be based on information that indicates the area has high levels of mercury. The permits could require public and private landowners whose activities disturb and discharge soils containing mercury to implement enhanced erosion and sediment controls and other management practices to reduce erosion and sediment runoff rates to the maximum extent practicable.

Dredging fill activities would continue to comply with Clean Water Act section 401 and 404 requirements, particularly the avoidance and minimization requirements of the 404(b)(1) Guidelines. In addition, dredging activities not subject to federal regulation would continue to be required to comply with existing Porter-Cologne Act waste discharge requirements. In San Francisco Bay and the Sacramento San Joaquin Delta, which are more heavily impacted by mercury, existing programs specifically consider mercury. One such program is the *Long Term Management Strategy (LTMS) for the placement of dredged material in San Francisco Bay* and the strategy's accompanying *Beneficial Reuse of Dredged Materials: Sediment Screening and Testing Guidelines*. Also the *General WDR for maintenance dredging operation Sacramento-San Joaquin Delta* (Order R5-2009-0085) has mercury related requirements for dredging in the Bay and Delta. These guidelines and this permit can be used as guidance to address dredging in other areas where mercury levels are high. Through these guidelines and permit the discharger may be required to monitor mercury, although some of the numeric thresholds are site-specific based on the background sediment mercury concentrations in the specific area. If the sediment or water released from the sediment has high levels of mercury, alternative procedures may be required to minimize the disturbance and release of mercury-contaminated material during dredging, excavation, and/or disposal of dredged or excavated material.

New wetland projects (creation or restoration of wetlands) should not be prevented because of mercury concerns. However, wetland projects should be done in manner to reduce unintended impacts (see Section 4.4.7). If practicable, new wetlands should not be created in areas with high levels of mercury. This option essentially recommends methylmercury controls in high mercury areas. This is included in the Provisions by restating exiting authority (that a permit writer could require parties to include features or measures to reduce methylmercury), while specifying in areas with high mercury levels the permit writer should consider requiring such requirements. Frequent water level fluctuations (wetting and drying of soil) may exacerbate methylation (see Appendix Q) and should be avoided in high mercury areas. The minimization of wetting and drying of soil is included as a possible measure to control methylation. Additionally, if new wetlands are to be created, restored, or enhanced in areas with high mercury levels, then the permit writer may include requirements for sediment controls. Sediment controls can limit the transport of methylmercury out of a wetland. (For additional information on how wetlands can increase or decrease mercury methylation, see Section 4.4.7 or Appendix Q). Wetland projects also would need to adhere to the requirements of the Proposed Procedures for the Regulation of Discharges of Dredged or Fill Material, upon adoption.

Option 3: Establish new requirements for mercury and methylmercury and continue to use existing programs.

This option would use existing programs and require new implementation actions to control mercury and methylmercury. For example, if specific BMPs could be used to control mercury in wetlands, the Provisions could require the BMPs for every wetland project. However, the science on mercury/ methylmercury controls is not advanced enough to provide BMPs that will clearly reduce mercury or methylmercury in most situations.

6.10.4 Recommendation

Option 2: **Emphasize that under existing law, the Water Boards have discretion to include requirements to address nonpoint source discharges of mercury and methylmercury production in wetlands and the Water Boards should consider such implementation measures in areas with elevated mercury concentrations.**

6.11 Issue K. What should be required of NPDES storm water dischargers?

6.11.1 Current Conditions

Clean Water Act section 402, subdivision (p), and Water Code section 13376 authorize the State Water Board to issue individual and general NPDES permits for storm water discharges. There are a few categories of permit types depending on whether the storm water is related to industry, construction, or municipal separate storm sewer systems (MS4s). Municipalities serving between 100,000 and 250,000 people are required to apply for Phase I MS4 permits, while smaller municipalities and non-traditional permittees (e.g. some state parks) are enrolled in the statewide general Phase II MS4 permit. Storm water discharges arising from projects carried out by the California Department of Transportation (Caltrans) require a unique statewide Phase I MS4 permit (the Statewide Storm Water Permit WDRs for State of California Department of Transportation, or the "Caltrans Permit"). Construction projects that disturb one or more acres of soil are required to enroll in the General Permit for Discharges of Storm Water Associated with Construction Activity (Construction General Permit or CGP). A defined set of industrial dischargers are required to enroll in the General Permit for Storm Water Discharges Associated with Industrial Activity (Industrial General Permit or IGP). Also, individual permits are issued to industries that are either ineligible for the general permit or required to have an individual permit.

Most storm water permits do not have specific implementation for mercury, except when specified by a TMDL. However, many of the existing general requirements in storm water permits can help reduce mercury in storm water. For example, Phase I and II MS4 permits contain requirements for public education outreach, pollution prevention, sediment controls for construction areas, and low impact development; all of these elements can also help reduce mercury in storm water. The Caltrans Permit and the Construction General Permit both have requirements for erosion control. The Industrial General Permit requires monitoring if industrial activities or materials at the facility are a potential source of mercury, and additional action is required if the mercury Numeric Action Level is exceeded. Industrial facilities are not responsible for mercury deposited from atmospheric emissions, if they demonstrate that their facility is not the source. Additional details on requirements in storm water permits that are relevant to mercury are included in Appendix P.

6.11.2 Issue Description

Storm water can transport mercury to water bodies from a variety of sources. Much of the mercury in storm water may be from atmospheric emissions, including emissions that originate from outside of California. While storm water dischargers have control over mercury that comes from their activity or industry, storm water dischargers cannot control the original source of mercury that is deposited from the atmosphere, such as coal burning. Controllable sources of mercury include construction activities and road maintenance, which can increase erosion during storms and carry mercury enriched sediment to surface waters. Accordingly, enhanced erosion controls could be used to control mercury. In urban and industrial settings, items containing mercury can contribute mercury to storm water if not properly disposed (such as batteries, florescent tubes, or switches containing mercury). Additionally, storm drains that allow water to stagnate can create an environment that promotes the generation of methylmercury from inorganic mercury.

A second issue that needs to be considered is whether the current Numeric Action Levels for mercury in the Industrial General Permit should be lowered. A Numeric Action Level is a tool to assist a permittee to evaluate the effectiveness of its facility in preventing storm water pollution. Exceeding a Numeric Action Level is not by itself a permit violation. The current Numeric Action Level in the Industrial General Permit for mercury is 1400 ng/L total mercury, which is very high compared to water quality based thresholds. The threshold of 1400 ng/L is 28 times higher than the outdated California Toxics Rule criterion (50 ng/L). (The Industrial General Permit is the only storm water permit that includes requirements for mercury monitoring.)

Finally, a third issue under the Industrial General Permit is a requirement for new dischargers. New dischargers that directly discharge to a water body that is on the 303(d) list due to mercury (or through an MS4 that directly discharges to a water body that is on the 303(d) list) have to provide documentation that mercury 1) is not present or part of industrial activity at the facility, 2) is not exposed at the facility, or 3) concentrations in the receiving water are in compliance with an applicable water quality objective for mercury. The third requirement may be problematic because the Provisions do not include a water column objective for mercury, so it is not clear how a discharger can demonstrate compliance with the water quality objective. There are many mercury impaired waters throughout the state with no TMDL, where the lack of clarity for this requirement could cause a problem in how to determine compliance.

The requirements in any option below would not affect areas where a mercury TMDL or a site-specific objective is being implemented. In those cases, requirements specified in the TMDL program of implementation should be followed.

6.11.3 Options

Option 1: Best management practices (BMPs) for sediment and erosion control. Entities responsible for municipal separate storm sewer systems (MS4s), industrial facilities, construction activities, and Caltrans would be required to implement BMPs to control erosion and sediment to reduce mercury discharges. The BMPs would be based on existing permit requirements for erosion controls. Erosion controls are already required in many areas, which could fulfill the requirements. A situation that might warrant new controls (where absent) or enhanced sediment erosion controls could be a discharge that flows directly into an impaired water body. In addition, for all discharges in areas where there are elevated mercury levels in the soil (i.e.: in Coast Range, near legacy mining debris) new or enhanced erosion/ sediment controls would be required.

The Caltrans Permit already includes erosion controls that would fulfill these requirements. The Caltrans Permit requires enhanced erosion controls where there are TMDLs for mercury that include a waste load allocation for Caltrans (San Francisco Bay, Cache Creek, Sacramento San Joaquin Delta), and also where there are TMDLs for sediment, nutrients, turbidity or siltation. Moreover, in the mercury-enriched North Coast

Regions (see the prevalence of mercury mines in Figure 4-1); the erosion control requirements would be fulfilled by the existing permit.

The Construction General Permit already includes erosion controls that would fulfill these requirements. In the Construction General Permit, sites with a higher risk of sediment discharge (based the slope of the site, erosion rates, ground cover, and other factors) are placed in a higher risk category (risk category 2 or 3). If a site is in an area that is naturally mercury enriched, and has a high potential for erosion (particularly the Coat Range Mountains), the site should be placed in risk category 2 or 3. This would effectively already be accomplished by the permit since many parts of the North Coast Region and the Coast Range Mountains are already risk 2 or 3 sites because these areas are sensitive to excessive sediment loads or these areas are already impaired due to sediment levels.

The Industrial General Permit already includes erosion and sediment controls that would fulfill these requirements. In the Industrial Activities General permit, facilities are required to implement minimum BMPs to control wind erosion, stabilize erodible areas, stabilize site perimeter (includes entrances and exits), divert run-off from erodible materials and adhere to design storm standards for new sediment basins. Dischargers must also consider advanced BMPs to control erosion and sediment discharges if the minimum BMPs are insufficient to control the storm water effluent quality. Finally, the permit includes a Numeric Action Level for suspended solids of 100 mg/L, which if exceeded, triggers the discharger to take action to address the exceedance.

Phase I and Phase II MS4s are, on the whole, a smaller source of sediments. The sediment and erosion controls in the current MS4s permits would fulfill the requirements for mercury.

Option 2: Mercury Pollution Prevention and Pollution Control
MS4s would be required to implement specific mercury pollution prevention and pollution control measures in their NPDES Storm Water Management Plans (SWMPs) or equivalent documents to reduce mercury/methylmercury discharges. At the Water Boards discretion, additional measures may be substituted for one or more of the required mercury pollution prevention and pollution control measures. Phase I and Phase II MS4s would be required to implement the actions listed below. The required effort involved in the actions would be proportional to the size and population of the community served by the MS4Required implementation actions include:

- Thermometer exchange programs and fluorescent lamp recycling programs, or enhancement of household hazardous waste collection programs to better address mercury-containing waste products (potentially including thermometers and other gauges, batteries, fluorescent and other lamps, switches, relays, sensors and thermostats);

- Public education and outreach, per the MS4 permit, on disposal of household mercury-containing products and use of non-mercury containing alternatives;
- Education of auto dismantlers on how to remove, store, and dispose of mercury switches in autos; and
- Survey of use, handling, and disposal of mercury-containing products used by the MS4 permittee agencies and development of a policy and time schedule for eliminating the use of mercury containing products by the permittees;

Mercury containing items need to be collected and disposed of in accordance with DTSC regulations. Details can be found at www.dtsc.ca.gov/HazardousWaste/Mercury/.

Phase I and II MS4s already have some existing requirements for public education outreach, pollution prevention, sediment controls for construction areas, and low impact development. Additionally, street sweeping is already required by both Phase I and II MS4s. Street sweeping removes fine dust, which may contain mercury from brake pads or atmospheric deposition and keeps improperly discarded mercury containing items from contaminating storm water. If the required actions are already being conducted by an MS4 those activities would count towards compliance.

Option 3: Update the Numeric Action Level in the Industrial General Permit
The Numeric Action Level for mercury in the Industrial General Permit would be changed from 1400 ng/L to 300 ng/L total mercury. A Numeric Action Level is a target concentration of a pollutant in storm water. If this concentration is exceeded it would trigger additional BMPs to control that pollutant. The Numeric Action Levels in the Industrial Activities Permit are intended to be economically feasible with current technology. They are not meant to be water quality standards, objectives, or criteria. All of the numeric action levels in the Industrial General Permit are from the U.S. EPA 2008 Multi-Sector General Permit for Storm Water Discharges Associated with Industrial Activity (U.S. EPA 2008b). The development of the Numeric Action Levels incorporated the fact that pollutants would be diluted by large volumes of other storm water and that storm water discharges are sporadic (as opposed to water quality based effluent limitations that may apply to continuous discharges, Section 6.13).

Hazardous Waste Facilities are currently the only type of facility required to automatically monitor mercury (Order 2014-0057-DWQ, Table 1). However, permittees that handle mercury or materials containing mercury as part of the industrial process (not as a result of atmospheric deposition), and are therefore likely to discharge mercury in storm water, should also be monitoring mercury, especially if the discharge is to a water body on the 303(d) list due to mercury. Other facilities likely to discharge mercury include recycling facilities, dismantling yards or wrecking yards, scrap and waste material facilities (SIC 4953 -5093), and metal mining facilities (SIC10XX-14XX).

A Numeric Action Level below 300 ng/L is not recommended because Numeric Action Levels are technology based, not water quality based. It is not clear that a lower threshold would be achievable with currently available storm water treatment methods. The concentration of 300 ng/L is just above the quantitation limit of the old method (200 ng/L, method 245.1), so it is not clear from monitoring data whether a lower threshold could even be met.

Atmospheric mercury carried by rain should not cause an exceedance of the Numeric Action Level (300 ng/L) based on nationwide measured mercury concentrations in rain, including five locations in California. The median and average mercury concentrations in rain in California were 6 ng/L and 12 ng/L. The 99.8th percentile of mercury concentrations in rain in the United States was 174 ng/L (Appendix P). Additionally, the Numeric Action Level for suspended solids should provide adequate control for mercury, if mercury in the discharge is from contaminated sediments (see Appendix P).

This concentration (300 ng/L) is six times higher than the outdated California Toxics Rule criterion (50 ng/L) and 25-75 times higher than water column targets that are consistent with meeting the objective (4 – 12 ng/L, Appendix I). Yet, the Numeric Action Level of 300 ng/L is about five times more protective than the current Numeric Action Level of 1400 ng/L.

For new dischargers discharging directly into a water body that is on the 303(d) list due to mercury, the discharger must meet one of three conditions specified in the Industrial General Permit (Order 2014-0057-DWQ, Section VII. B; or other conditions may apply if there is a TMDL). In fulfilling these requirements, the discharger may need to provide a demonstration that the discharge of any listed pollutant complies with water quality objective at the point of discharge. Because there would be no water column objective for mercury after the California Toxics Rule criteria are de-promulgated by U.S. EPA, compliance with the mercury Numeric Action Level (300 ng/L) is sufficient for demonstration of compliance with mercury water quality objectives for coverage under the Industrial General Permit.

Option 5 (RECOMMENDED): A combination of all of the above, using existing requirements and proposing new requirements for MS4s and the Industrial General Permit.

All of the requirements outlined in the options previously listed would be used. For some of the storm water dischargers, appropriate requirements are already included in storm water permits and a very unlikely to change over time, no new requirements would be developed (e.g., the erosion controls in the Caltrans Permit, the Construction General Permit, and Industrial General Permit). For MS4s and Industrial Activities, new requirements would be included in the Provisions. These requirements are a refinement of existing requirements, so they may result in dischargers needing to take additional actions. Meanwhile for other dischargers, the requirements may be fulfilled by existing actions of the discharger.

Many of these requirements have multiple benefits. Sediment/erosion controls are important for addressing the many sediment impairments throughout the State. Sediment controls are also valuable for controlling other pollutants that bind to sediments, such as pesticides, metals, and nutrients.

6.11.4 Recommendation

Option 5: A combination of all of the above, using existing requirements and proposing pollution prevention and erosion requirements for MS4s and lowering the NAL for the Industrial General Permit.

6.12 Issue L. What procedure should be used to determine which municipal wastewater and industrial dischargers would need effluent limitations?

6.12.1 Current Conditions

Municipal wastewater and industrial facilities that discharge directly to surface waters are regulated through NPDES permits. Federal regulations require water quality based effluent limitations for NPDES permittees with reasonable potential to cause or contribute to an excursion above any water quality objective (33 U.S.C. § 1311(b); 40 C.F.R. § 122.44(d)). The State Water Board's SIP 2005 is used to establish the need for effluent limitations for wastewater and industrial discharges (does not include storm water discharges), including those with NPDES permits.

Section 1.3 of the SIP outlines a procedure to determine whether a discharge causes, or has the reasonable potential to cause or contribute to an excursion above applicable objectives for priority pollutants. This process excludes discharges to receiving waters for which TMDLs have been developed and where the facilities have been assigned waste load allocations in the TMDL. In this process, the permit writer determines the maximum effluent concentration for a given pollutant from monitoring data submitted by the discharger. If the maximum effluent concentration is greater than or equal to the pollutant objective, or if the maximum background concentration of the pollutant is found to be above the pollutant objective and any amount of the pollutant is detected in the effluent, then "reasonable potential" has been established and an effluent limitation and routine monitoring is required for the discharge.

Currently, the SIP is used to implement the mercury criteria in the California Toxic Rule. Many facilities discharge much lower mercury concentrations than are required by the California Toxics Rule criteria (50/51 ng/L[5]). As a result, many dischargers currently do not have effluent limitations for mercury and do not monitor mercury routinely. A more protective approach has been used for discharges to mercury impaired waters, using the narrative considerations in the SIP. In some cases, an effluent limitation based on current performance was issued (which was lower than 50 ng/L), and the permit included a reopener in anticipation of a potential future TMDL waste load allocation.

All possible implementation requirements described in this section only apply to discharges that are not included in an adopted methylmercury/ mercury TMDL. Dischargers with a waste load allocation for the discharge of mercury/methylmercury from a TMDL must have a water quality based effluent limitation consistent with that waste load allocation (see 40 C.F.R. § 122.44(d)(1)(vii)(B)).

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[5] The California Toxics Rule mercury criteria protect human health. The criterion of 50 ng/L protects consumption of water and aquatic organisms, and 51 ng/L protects consumption of aquatic organisms only (40 C.F.R. § 131.38).

Additionally, when modifying or reissuing permits with existing water quality based effluent limitations for mercury, permit writers must ensure compliance with Clean Water Act anti-backsliding requirements. For modified or reissued permits with existing effluent limitations for mercury, any less stringent effluent limitation must be consistent with anti-backsliding requirements within the Clean Water Act section 402(o)(1), unless a specific exception applies under anti-backsliding requirements (33 U.S.C. §1342 (o)(2), 40 C.F.R. §122.44(l)), or antidegradation requirements (33 U.S.C. § 1313(d)(4), State Water Board Resolution No. 68-16 (Statement of Police with Respect to Maintaining High Quality of Waters in California)). An example of a revision, would be one that is based on a waste load allocation from a TMDLs which will assure the water quality objective is attained (33 U.S.C. § 1313(d)(4)(B)(A)).

The U.S. EPA established *Guidance for Implementing the January 2001 Methylmercury Water Quality Criterion*, which was used to develop the options described in this section (U.S. EPA 2010). This guidance may also be useful to permit writers for providing additional information on incorporating the methylmercury water quality objectives in NPDES permits.

6.12.2 Issue Description

A process is needed to determine which wastewater and industrial discharges would have effluent limitations, including municipal wastewater and industrial discharges. The SIP works well to establish which discharges must be issued effluent limitations for an objective expressed as a water column concentration. However, the SIP does not provide a method to assess the need for effluent limitations if the water quality objective is expressed as a concentration in fish tissue, as in the Mercury Water Quality Objectives. A method that is both consistent and simple to use would greatly aid the Regional Water Boards during the permit writing process. Municipal wastewater treatment plants are generally relatively minor sources of mercury to the environment compared to other sources. In addition, most wastewater treatment plants are efficient at removing mercury. About half of the current wastewater and industrial facilities are POTWs. Industrial dischargers also have been found to be a minor source in mercury TMDLs, such as the San Francisco Bay Mercury TMDL (San Francisco Bay Water Board 2006). However, there is a wide range of mercury removal achieved by different facilities, so there is no certainty that the mercury discharge from every discharge is insignificant.

The discussion on this issue does not focus on the possible numerical value of the effluent limitations. The effluent limitations themselves are described in the next issue (Section 6.13). For any of the options below and in Section 6.13, the Provisions include total mercury effluent limitations rather than effluent limitations for methylmercury or both. It is the methylated forms of mercury that are taken up into the food web. However, total mercury is relevant because any form of mercury can be methylated in the environment. Total mercury is less costly to monitor than methylmercury, or monitoring both forms separately. However, a permit writer may also require monitoring of methylmercury depending on the particular circumstances.

The Provisions would apply to dischargers with individual permits. The Provisions would not automatically apply to dischargers enrolled in general permits. General permits (non-storm water) should be considered on a case-by-case basis during development or renewal by the permit writer. Many general permits fall under exceptions in the SIP (vector control, drinking water systems) and others are low volume, low threat discharges. General storm water permits are addressed in Section 6.11.

6.12.3 Options

Option 1 (**RECOMMENDED): Use a mercury concentration in water.**
In this option, discharges with a mercury level above or equal to the water column target would generally need effluent limitations. The water column target would be used in the existing procedures in the SIP (Figure 6-2. Also see SIP section 1.3, the target would be used as “C”). Data on mercury level in fish tissue would not be a routine consideration in this option. There are three options to consider as the potential water column targets which are the options described in Section 6.13.

A major advantage of this option is that the typical procedures in the SIP can be utilized, and this option is much less complicated for permit writers to implement. This option is less complex because permit writers would not have to interpret fish tissue data (adequate number of data, appropriate size of fish, applicable species, etc.). Figure 6-2 and Figure 6-3 show that option 1 is less complex than option 2. Another advantage is that this approach may be more consistent with the federal regulations than the second option. An alternative to this approach is described in option 2, but the alternative is intended for cases where a water column translation in not available, infeasible, or appropriate (U.S. EPA 2010, see option 2).

This disadvantage of this option is that an appropriate value for the water column target is difficult to determine (the issues associated with using this value as the effluent limitation is discussed in 6.13). There will always be a fair amount of uncertainty associated with a water column target for mercury that is to be used in an area as large as California.

Another disadvantage is that this option could create unnecessary requirements for effluent limitations for some dischargers. This is because un-impaired waters still have assimilative capacity, so the mercury currently in the discharge might be acceptable or insignificant, depending on the circumstances.

However, mercury does not dissipate or break down over time. Once a water body is impaired for mercury it will take a very long time to reverse the impairment. The only way to prevent waters from becoming mercury impaired to is to control discharges before waters are impaired. Additionally, mercury impairments are not restricted to the vicinity of a discharge. Discharges of mercury may cause impairments far downstream, where the water flow slows and changes the water chemistry to promote the bioaccumulation of methylmercury in fish.

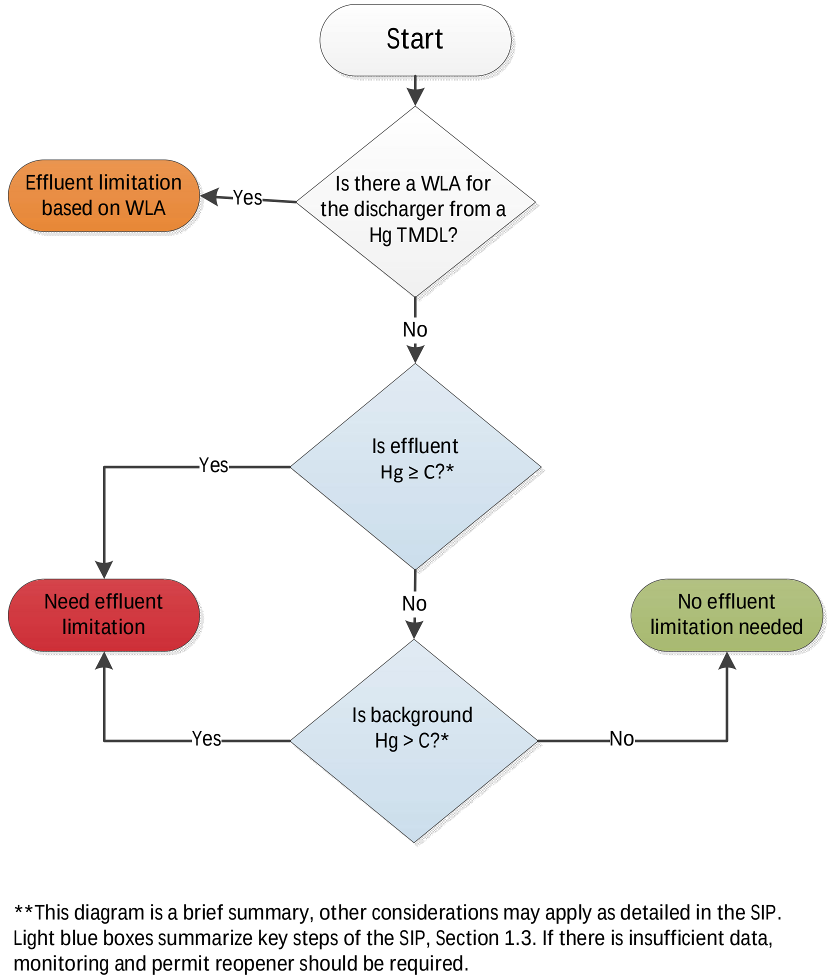


Figure 6-2. Summary of option 1: the water column target based approach to determine the need for effluent limitations. For "C" a target 4 ng/L or 12 ng/L could be used (see Section 6.13).

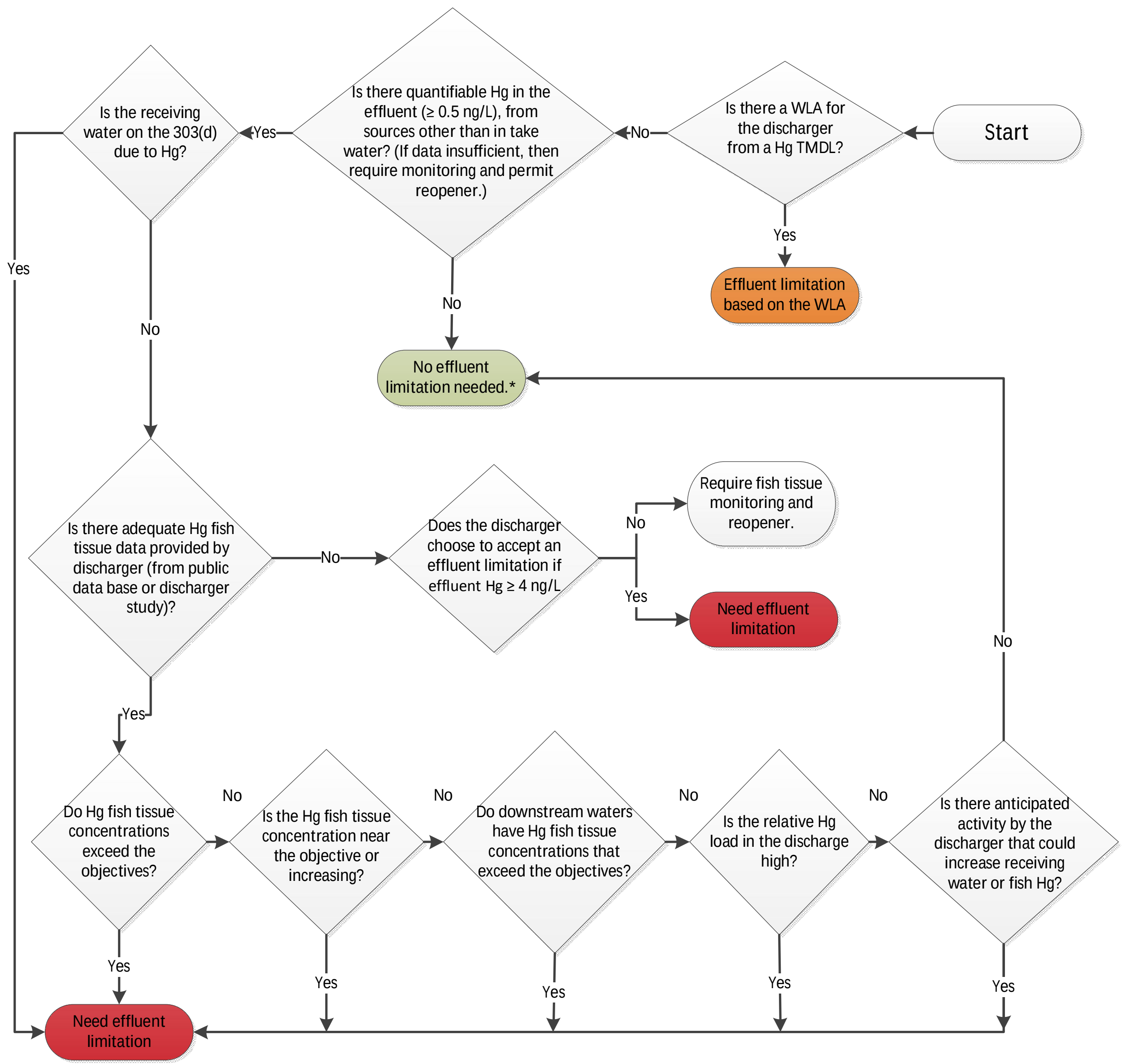
Option 2: Use mercury concentrations in fish tissue.
In this option, effluent limitations would be required for discharges to waters where the fish mercury levels exceed the water quality objectives if the discharge contains quantifiable levels of mercury, (≥ 0.5 ng/L total mercury). If these conditions do not exist, then depending on the specific circumstances, there may not be a need for effluent limitations.

The procedure for this option is not currently in the SIP. According to the SIP, fish tissue data may be considered when determining the need for effluent limitations, but there is not a specific procedure. The U.S. EPA *Guidance for Implementing the January 2001 Methylmercury Water Quality Criterion* (U.S. EPA 2010, sections 7.2 and 7.5) outlined such a procedure, for cases where a water column translation in not available. This may apply in circumstances when it is also infeasible to calculate a water column translation as discussed further below.

A preliminary draft procedure is outlined in Figure 6-3. The following are some of the caveats that should apply (described in U.S. EPA 2010, sections 7.2.2 and 7.2.3).

a. If there are existing permits limitations, they may need to be retained to fulfil antidegradation and anti-back sliding requirements.
b. If a facility plans activities that could increase the mercury loading to the receiving water body, then an antidegradation review and requirements may be necessary (40 C.F.R. § 131.12, State Water Board Resolution No. 68-16, see also U.S. EPA 2010, section 7.5.1.2.2). Such activities may include: an increase in the design flow, a change in treatment, adding a new subdivision or an unsewered neighborhood to a sewer service area, or adding a new industry to the sewer service area that uses or handles mercury.
c. If fish mercury levels downstream exceed the water quality objective, then effluent limitations may be warranted.
d. If mercury concentrations in fish in the receiving water are close to the objective or trending up, then effluent limitations would be required.
e. The relative contribution of mercury or methylmercury from the source should be considered when determining whether a facility needs effluent limitations in waters that are not yet impaired.

Where objectives are being attained and dischargers have no effluent limitations, a new set of fish tissue data could be required for every permit renewal to ensure the mercury levels in fish tissue are not increasing, particularly if the effluent mercury concentration is above that from normal discharges (e.g. thresholds in Table 6-2, Section 6.13.3, option 3).



*Antidegradation and anti-backsliding requirements still need to be met

Figure 6-3. Summary of option 2: the fish tissue based approach to determine the need for effluent limitations.

The advantage of this option is that it avoids the uncertainty over using BAFs to calculate water column targets (as in the first option, above). Water column targets from BAFs include uncertainties involved in quantifying the relationship between mercury concentrations in fish tissue data to mercury concentrations in the water column and discharges. Water column concentrations of mercury or methylmercury are not always directly related to mercury impairments. Mercury fish tissue data, on the other hand, integrates spatial and temporal complexity as well as the cumulative effects of variable mercury loading from point and nonpoint sources that affect methylmercury bioaccumulation in aquatic systems. The fact that water quality objectives are currently being attained (in fish tissue) may be an effective indicator of current and potential continued future attainment, and could be used to justify that effluent limitations may not be needed. Although, the final decision of whether to issue an effluent limitation for mercury would depend on the particular case.

One disadvantage of this option is that it would be more difficult for permit writers to implement because the permit writer would have to evaluate fish tissue data. The list of caveats above and Figure 6-3 describes a number of factors that must be considered, many of which would not be straightforward. One difficulty would be assessing a situation where ambient fish mercury does not exceed the objective but is *close* to exceeding the objective (see U.S EPA 2010, section 7.5.1.2.3). In reality, significant increases in fish mercury (e.g. + 0.05 mg/kg) may not be detectable with typical fish tissue data sets since the data sets can be small (e.g. 12-24 data points) and fish tissue data can be fairly variable (e.g. standard deviation 0.09.)

A second disadvantage is that this approach may not be appropriate since a water column translation is possible. The appropriateness of such translation would ultimately depend on the calculations used and the resulting threshold. The possible water column thresholds and the achievability of such thresholds are discussed in the next issue when they are considered as effluent limitations. Still, the assumptions used to develop a water column translation (option 1) may be more consistent with the federal regulations that require an evaluation of the discharge, not just the receiving water as in this option (40 C.F.R. § 122.44(d)).

A third disadvantage is that this approach may fail to prevent future impairments because there would be no requirements to monitor or control mercury until a receiving water is impaired for mercury. A discharge into a receiving water with fish that meet the objective would have no restriction on how much mercury is allowed in the discharge. This approach ignores the fact that mercury can accumulate in a water body over time since mercury does not break down. To address some of these issues, the regulation would contain language with the caveats that apply to this option (listed above).

A fourth disadvantage is that dischargers would be required to provide data on fish mercury concentrations upon permit issuance or reissuance. If adequate fish tissue data are not already available (for example, in CEDEN), dischargers may be required to collect fish. Alternatively, if there is no fish tissue data then the dischargers could opt out of the fish collection obligation by agreeing to use a water column target to determine if they would be issued effluent limitations (same as option 1). That water column target may be based on the effluent limitation ultimately chosen. The water column target could be values in Table 6-1 (from Option 1, Section 6.13), a value based on facility type (Table 6-2, Option 2, Section 6.13), 4 ng/L (from Option 3, Section 6.13) or another value based on the effluent limitation ultimately chosen. In Figure 6-3, the value of 4 ng/L is shown as an example.

If dischargers are required to collect data, it would create extra expense for the discharger, which may be significant for a small discharger. However, additional fish tissue data would have the benefit of providing more monitoring data. Preferably fish collection and sample analysis would be done by a Regional Monitoring Program so that methods are consistent with appropriate monitoring protocols. However, many dischargers are not in a geographical area included in a Regional Monitoring Program (see Appendix N). Another complexity is how to handle situations where there are no fish in the receiving water, such as intermittent streams. In those cases, fish in downstream waters could serve as a substitute, such as fish in a bay or estuary.

6.12.4 Recommendation

Option 1: Use a mercury concentration in water.

6.13 Issue M. How should the effluent limitations be calculated for municipal wastewater and industrial discharges?

6.13.1 Current Conditions

Municipal wastewater and industrial facilities that discharge directly to surface waters are regulated through NPDES permits. Federal regulations require water quality based effluent limitations for NPDES permittees with reasonable potential to cause, or contribute to an excursion above any State water quality objective (33 U.S.C. § 1311(b); 40 C.F.R. § 122.44(d)). The State Water Board's SIP, 2005 is used to establish reasonable potential and water quality based effluents limitations for wastewater and industrial discharges (excluding storm water discharges). Currently, the SIP is used to implement the mercury criteria in the California Toxic Rule (50/51 ng/L[6]). Anti-backsliding requirements apply as described in Section 6.12.

Note that in addition to water quality based effluent limitations some industries must adhere to *technology-based* limitations pursuant to Clean Water Act section 301(b) and 40 C.F.R. sections 125.3 and 122.44(a)(1). The technology-based limitations establish a minimum level of treatment. The limitation also varies by industry type. (There are no technology-based limitations for mercury for POTWs.) These limitations often apply to one specific part of the industrial process, not to the final effluent. So the technology-based limitations are difficult to compare to a concentration limit for the final effluent. The Provisions would not affect technology-based limitations.

On December 15, 2016, the U.S. EPA established a new national rule establishing technology-based limitations for the dental sector. The U.S. EPA estimates that about half of the mercury entering POTWs comes from dental offices. The U.S. EPA proposed rule should reduce mercury discharges to POTWs nationwide. The rule would require dentists to reduce their discharge of dental amalgam through the use of amalgam separators and BMPs (http://water.epa.gov/scitech/wastetech/guide/dental/, 79 Fed. Reg. 63258 (Oct. 22, 2014)). In California, this new rule would be enforced by authorized municipal waste water treatment plants that implement a pretreatment program and Regional Water Board staff.

Additional information on wastewater and industrial discharges that is not included in this issues analysis is included in Appendix N. This includes the number, type, and location of facilities, and measured effluent mercury concentrations. As in Section 6.12, this issue only applies to discharges that are not included in an adopted methylmercury/ mercury TMDL.

6 The California Toxics Rule mercury criteria protect human health. The criterion of 50 ng/L protects consumption of water and aquatic organisms, and 51 ng/L protects consumption of aquatic organisms only (40 C.F.R. § 131.38).

6.13.2 Issue Description

The issue is how to calculate effluent limitations for mercury for individual wastewater and industrial dischargers, including POTWs. While the SIP works well to establish effluent limitations for an objective that is expressed as a water column concentration, the SIP does not provide for a procedure to calculate effluent limitations from an objective expressed as fish tissue concentration. Therefore a procedure is needed to derive effluent limitations for dischargers.

Municipal wastewater treatment plants are generally a relatively minor source of mercury to the environment compared to other sources. Wastewater treatment plants already remove most of the mercury from the effluent. The plants are designed to remove solid materials and since mercury tends to adhere to solids, the removal of solid materials also removes the mercury. Major contributors of mercury to municipal wastewater treatment systems are typically dental offices, hospitals, and schools (Association of Metropolitan Sewage Agencies 2000, Larry Walker Associates 2002, U.S. EPA 2004). The original sources may be mercury amalgam dental fillings, broken thermometers, other consumer products and hospital equipment. Industrial dischargers, too, have been found to be minor sources of mercury when considering relative contribution compared to other sources in TMDL analyses, such as the San Francisco Bay Mercury TMDL (San Francisco Bay Water Board 2006).

Wastewater treatment plants with tertiary level treatment with nitrification and denitrification likely would meet any of the water column thresholds discussed in this issue (Central Valley Water Board 2010a). However, many facilities in California only have secondary treatment. Upgrading wastewater treatment plants to the tertiary level of treatment would have multiple benefits to the environment beyond just controlling for mercury. This level of treatment would assist in addressing nutrient over enrichment and could assist in meeting the goal for increased use of recycled water.

However, the costs to upgrade a wastewater treatment plant from secondary to tertiary level treatment are likely to be significant. (Costs will be evaluated as part of an economic analysis, see Section 1.1.) Additionally, most mercury 303(d) listings in California are thought to be due to the large mercury load from the mining legacy and atmospheric deposition (San Francisco Bay Water Board 2006, Central Valley Water Board 2010b).

It is difficult to accurately gauge the impact of the options for effluent limitations since most facilities are not routinely monitoring for mercury. Many facilities discharge much lower mercury concentrations than specified by the California Toxics Rule criteria (50/51 ng/L), therefore, many of these facilities do not currently have effluent limitations for mercury and do not routinely monitor mercury. Other factors that compound this issue include California's limited water supply, global climate change, and a growing population. These factors are driving reductions in per capita water use, while the population grows. The resulting effect of these factors on mercury levels in effluent is not clear. Mercury tends to stick to solids during treatment process at wastewater treatment plants, so the resulting effect to the mercury concentration in the effluent will not be as simple as the result of a loss of dilution.

Additionally, the background levels of mercury in some of California's waters are elevated. The average total mercury concentration in surface waters from 2004 to 2012 was 4.7 ng/L (median was 2 ng/L, 95th percentile: 16.1 ng/L, see section 4.5.1). The average is higher than the lowest water column target included in the options below, 4 ng/L total mercury. Where the background mercury level is high, it may not be reasonable to require smaller contributors of mercury to reduce their mercury discharge to levels below background

For any of the options below, the effluent limitations are in the form of total mercury rather than methylmercury, as explained in Section 6.12. Routine monitoring would be required once per calendar quarter, except for small facilities (authorized to discharge less than five million gallons per day), for which the frequency of monitoring may be reduced with the approval of the overseeing Water Board. Medium and large size facilities (authorized to discharge more than five million gallons per day) have requirements for pretreatment, since these facilities are more likely to receive discharges from industries or commercial facilities.

6.13.3 Options

Option 1 (RECOMMENDED): Effluent limitations based on water body type and bioaccumulation factors.

In this option, a modified version of the procedures in the SIP would be used and water column concentrations would be provided. The water column concentrations would be derived using BAFs and differ based on water body type, as shown below in Table 6-1. Additionally since there are five different mercury water quality objectives apply to different beneficial uses, the effluent limitations would depend on the beneficial use of the receiving water, also shown in Table 6-1.

Discharges with mercury levels above or equal to the water column concentration from Table 6-1 (e.g., 12 ng/L total mercury, as an annual average) would be required to meet an effluent limitation. The effluent limitation would be derived from the same water column concentration, and would be equal to the water column concentration or would be a higher concentration if dilution credits are granted (e.g.,12 ng/L total mercury or higher concentration, as annual average).

Table 6-1. Water column concentrations based on water body type and beneficial use.

Beneficial Use of the Receiving Water	**COMM, CUL, WILD, MAR, RARE**	**COMM, CUL, WILD, MAR, RARE**	**COMM, CUL, WILD, MAR, RARE, T-SUB**	**T-SUB**	**T-SUB**	**SUB**
Water body type	Flowing water bodies (generally, rivers, creeks and streams)	Slow moving water bodies (generally, lagoons and marshes)	Lakes and reservoirs	Flowing water bodies (generally, rivers, creeks and streams)	Slow moving water bodies (generally, lagoons and marshes)	Any
Value for "C"	12 ng/L total mercury	4 ng/L total mercury	Case-by-case	4 ng/L total mercury	1 ng/L total mercury	Case-by-case

For subsistence fishing, since the water quality objective is narrative, the effluent limitation would be derived on a case-by-case basis. The California or U.S. EPA BAFs could be used to calculate a water column concentration as was done in Appendix I.

This option includes two appropriate exceptions to avoid undue economic or social hardship: 1) facilities only serving small disadvantaged communities, and 2) insignificant discharges. These exceptions would not be automatic. The permit writer would have to review water body specific information and make a finding based on the information that the discharge will have no reasonable potential to cause or contribute to an exceedance of the water quality objective. For example, the fact that fish mercury concentrations meet the water quality objectives could support the finding. Insignificant discharges are discharges determined by the permit writer to be a very low threat to water quality, such as small, non-continuous discharges. The Provisions define "small disadvantaged communities" as "[m]unicipalities with populations of 20,000 persons or less, or a reasonably isolated and divisible segment of a larger municipality encompassing 20,000 persons or less, with an annual median household income that is less than 80 percent of the statewide annual median household income." These two exceptions could be used to relieve small dischargers form the expense of routine monitoring. Mercury monitoring using the newest method (Method 1631 E) is much more expensive than monitoring for other common metals.

Additionally, under this option the Provisions would provide that the Regional Water Boards could develop a site-specific BAF, from which a site-specific water column target could be derived. A study of the receiving water would need to be performed to provide the data. This study could be done by the Regional Water Board or by other parties, such as dischargers, with Regional Water Board approval. Using this procedure a study would be required that includes the collection of samples and measurements of the mercury concentrations in the water and mercury concentrations in applicable fish species. The study could include mercury samples collected from the water body and fish (using a minimum of 10 fish per time point or location, following Water Board's monitoring protocol (Bonnema 2014)). An alternative model that could be used to derive a site-specific water column concentration is linear regression (see Appendix I for examples). Other models may be used if peer reviewed such a food web model.

Dilution credits would be allowed but would not be recommended in most situations since mercury is a bioaccumulative compound, and the SIP (Section 1.4.2.2.B) and the U.S. EPA recommends limiting dilution for bioaccumulative compounds (U.S. EPA 2010, section 5.3.2). The U.S. EPA explains "While fish tissue contamination tends to be a far field problem affecting entire water bodies, rather than a narrow scale problem confined to mixing zones, the U.S. EPA's guidance recommends restricting or eliminating mixing zones for bioaccumulative pollutants such as mercury so that they do not encroach on areas often used for fish harvesting (particularly for stationary species such as shellfish). Restriction or elimination might also be used to compensate for uncertainties regarding the ability of aquatic life or the aquatic system to tolerate excursions above the criteria, uncertainties inherent in estimating bioaccumulation, or uncertainties in the assimilative capacity of the water body."

<u>Advantages / Disadvantages</u>
One advantage of this option is consistency with the SIP, which would make the process more straight forward for permit writers, as opposed to option 2. Another advantage is that this approach uses a water quality based threshold as required by federal regulations, as opposed to option 2. A third advantage is that the threshold for flowing waters, which would apply to the most discharges, is supported by California data. And finally, since the effluent limitations would match the level of protection needed for the receiving water type, dischargers would not need to meet unnecessarily stringent effluent limitations.

A disadvantage is that this approach has some complexity since the permit writer must judge the applicable water body type. However, in most cases (at least 65 percent of the cases, for rivers and creeks) this decision would be straight forward. Another disadvantage is that rivers flow through estuaries before reaching the ocean, and it is not clear that this approach would be protective of downstream uses. On the other hand, it is unknown if the mercury would reach the downstream water body. The mercury could settle out of the water column or be taken up into the local food web. To address these issues, option 3 uses one numeric effluent limitation for all water body types to avoid possible impacts to downstream waters and avoid the complication of evaluating "slow moving waters".

Derivation of effluent limitations and water body types

The water column target of 12 ng/L (total mercury) was calculated by using the U.S. EPA BAF from rivers and streams only, as shown in Appendix I. Most (65 percent) of the discharges from wastewater and industrial facilities flow into rivers or creeks (Appendix N). An equivalent threshold of 12 ng/L was derived using the California BAF. The California BAF was derived from data from rivers (Appendix I). Additional discharges (19 percent) flow to channels, canals, ditches and drains, which may experience roughly similar bioaccumulation rates as rivers or creeks, so the 12 ng/L effluent limitation would apply. These receiving waters were classified as “flowing water bodies” in the Provisions for permitting. This category includes intermittent or effluent dominated streams and creeks as well, since the bioaccumulation rate is not anticipated to be significantly different.

About 7 percent of discharges within the geographic scope of the Provisions flow into water bodies that are estuaries, sloughs, or wetlands, while 10 percent of discharges are to bays (Appendix N). Slower moving waters may experience higher rates of mercury methylation and bioaccumulation. For estuaries, there are no established BAFs. Some estuaries may experience flushing and the translation for the rivers BAF may be the most appropriate value to use. On the other hand, some estuaries may be enclosed and more stagnant, and the U.S. EPA BAFs for lakes may be more appropriate. Due to the uncertainties surrounding an appropriate number for estuaries, the draft national BAF that combined lakes and rivers data was used to derive a water column translation for slow-flowing estuaries and bays (Appendix I), and the resulting effluent limitation is 4 ng/L. These receiving waters were classified as “slow moving water bodies” in the Provisions for permitting. Professional judgment of the permit writer and site-specific information is needed to asses if the receiving water type would best be categorized as “slow moving” or “flowing” as listed in Table 1 as described here.

For reservoirs and lakes, since there are few discharges to these waters (about 12), and many of these discharges (6) would be assigned waste load allocation from the reservoir TMDL being developed as part of the Reservoir Program, specific effluent limitations were not developed for discharges to reservoirs or lakes as part of the Provisions. If any permit for these six facilities is renewed after the Provisions are adopted but before the reservoir TMDL is adopted as part of the reservoir program, the Provisions allow for requirements to be developed on a case-by-case basis. The permit writer should also include a reopener for the waste load allocation from the reservoir TMDL. For the other six discharges (or future discharges) to reservoirs not on the 303(d) list due to mercury, the requirements would be developed on a case-by-case basis and existing data could be used, such as the U.S. EPA BAFs and translators. Many of the discharges to reservoirs are small and may qualify for either the small disadvantaged communities or insignificant discharges exception, described above.

Achievability of effluent limitations

For the 12 ng/L effluent limitation, recent data from discharger self-monitoring reports indicates that about 8 percent of all discharges to rivers or other flowing waters included in geographic scope of the Provisions exceeded 12 ng/L at least once during 2009 – 2015 (Appendix N). Therefore, of the discharges to rivers or other flowing waters in the geographic scope of the Provisions (about 216 facilities), it is likely that about 8 percent (about 17 facilities) would be issued new requirements for mercury. These facilities would need to monitor their effluent and ensure their discharge meets the effluent limitation. Some of the facilities that exceeded this threshold only exceeded it in one or two samples within the past six years, so they may be able to adapt to the threshold without a major facility upgrade.

For the 4 ng/L effluent limitation, recent data from discharger self-monitoring reports indicates that about 27% of all discharges to waters included in the geographic scope of the Provisions exceeded 4 ng/L, based on 2009 – 2015 data (Appendix N). There are 29 facilities that discharge to estuaries or bays that may include slow moving waters in the geographic scope of the Provisions. Therefore, of facilities that discharge to estuaries/slow moving waters (roughly 29 facilities) in the geographic scope of the Provisions, it is likely that about a third (roughly 10 facilities) would likely need to meet the effluent limitation of 4 ng/L and or make upgrades to the facility. These numbers are illustrative only. Not all bays and estuaries are slow moving waters.

For the 1 ng/L effluent limitation, recent data from discharger self-monitoring reports indicates that about 73% of all discharges to waters included in the geographic scope of the Provisions exceeded 1 ng/L, based on 2009 – 2015 data (Appendix N). This data indicates that there is a good chance that the effluent limitation of 1 ng/L would cause a facility to upgrade. For this effluent limitation to take effect, the applicable beneficial use of Tribal Subsistence Fishing would need to be designated to a slow moving water body through the basin plan amendment process. It is unknown where this use may be designated in the future. The Subsistence Fishing Water Quality Objective, too, could result in effluent limitations of roughly 1 ng/L to 4 ng/L, where the corresponding use might be designated in the future.

For implementing the effluent limitations for either of the two subsistence fishing water quality objectives (1 to 4 ng/L), it may be appropriate for a compliance schedule to be issued with the permit if the resulting effluent limitation would require a major infrastructure upgrade. In general, this category of dischargers is not thought to be a major source of mercury, so a higher effluent limitation, could be appropriate upon consideration of all mercury sources, as would be done for a TMDL. An informational TMDL based on Clean Water Act section 303(d)(3) can aid in permitting (33 U.S.C. § 1313(d)(3)). If there is an existing TMDL for mercury, the TMDL could be reopened and revised to include the Subsistence Fishing Water Quality Objective. Additionally, since the subsistence type uses vary by water body, the Regional Water Boards are encouraged to develop site-specific subsistence water quality objectives at the same time that the beneficial use is designated. Site-specific water quality objectives may be adopted with compliance schedules that are longer than normal. The longer compliance schedule could allow time for facility upgrades, development of TMDLs, or studies to develop a site-specific BAF to implement the subsistence objective.

<u>Additional details of this option</u>
The effluent limitation in this option was calculated considering that the Mercury Water Quality Objectives are intended to protect against chronic effects from consumption of fish with elevated mercury, and the fact that the mercury concentration in fish is a result of a long term process of mercury methylation and bioaccumulation in the food web. Therefore, the calculation of the effluent limitation was made with the procedures in the SIP for human health criteria, which protect against chronic toxicity, rather than deriving effluent limitations both for human health and aquatic life, as indicated in the SIP (section 1.4. B). Also, the effluent limitation would be an annual average, not a monthly average, to account for the long term process of mercury methylation and bioaccumulation. On the other hand, the procedure in the SIP for calculating effluent limitations based on aquatic life criteria was derived to protect the short term averaging periods (1 hour or 4 days), which protect aquatic life from faster acting pollutants and toxicity through the water column. A daily maximum effluent limitation for mercury is not recommended for the same reason. Additionally, the effluent limitation (12 ng/L) is well below acute aquatic life thresholds for mercury (listed in Section 3.11). In a realistic scenario, a discharge that exceeded the U.S. EPA's most recent acute mercury threshold (1400 ng/L) would not be able to also meet the annual effluent limitation (12 ng/L). Federal regulations require daily and monthly or weekly and monthly limitations depending on the facility type, unless "impracticable" (40 C.F.R. 122.45 (d)). Such daily and monthly limitations are impracticable for mercury in that they do not provide necessary information over an annual average limitation for controlling the mercury levels in fish tissue.

The Reservoir Program may include waste load allocations for discharges upstream of reservoirs. These waste load allocations would be intended to achieve the Mercury Water Quality Objectives in the reservoir, not in the upstream water body. Therefore, the permit writer should consider both possible requirements (if applicable to the discharge) and select the most stringent requirement for the discharge.

The wildlife objectives are consistent with meeting the one meal per week objective in trophic level 4 fish or very close. Data are not available to make this determination in a very exact manner, but see Section 6.1 through Section 6.6 of Appendix K for estimations. Therefore, the Prey Fish Water Quality Objective and the California Least Tern Prey Fish Water Quality Objective would not require a different effluent limitation than the Sport Fish Water Quality Objective for wastewater and industrial discharges (unless a TMDL indicates otherwise).

Option 2: Effluent limitations from the Proposed Mercury Control Program for Reservoirs.

This option is being discussed for the Reservoir Program's mercury control program (see Section 1.6). In this option, dischargers with mercury in the effluent above or equal to the concentration specified in Table 6-2 would be issued an effluent limitation. The effluent limitation would be the same concentration from Table 6-2. The smallest dischargers would not have requirements as indicated in Table 6-2.

Table 6-2. Effluent Limitations Based on the Proposed Mercury Control Program for Reservoirs

Facility type	Reasonable potential Threshold/ Effluent limitation (total mercury) and other requirements
Design flow < 0.2 MGD	• No new requirements
Design flow : 0.2 MGD – 1 MGD	• Municipal wastewater: 20 ng/L annual average • Other facilities: 60 ng/L
Design flow >1 MGD	• Municipal wastewater: 10 ng/L annual average • Other facilities: 30 ng/L

MGD = million gallons per day

Current data from discharger self-monitoring report indicate that about 8 percent of all discharges to waters included in the geographic scope of the Provisions exceed the various thresholds in Table 6-2, based on 2009 – 2015 data (Appendix N). Therefore, it is likely that about 8 percent of facilities in the Provisions' scope would be issued new requirements for mercury, which is similar to option 1. These facilities would need to monitor their effluent and ensure their discharge meets the effluent limitation.

The thresholds in this option are based on the Reservoir Program (State Water Board 2016). The thresholds were derived based on a current performance of facilities statewide. The analysis included mercury effluent concentrations from 2008-2013 from all individual wastewater and industrial discharges (except discharges to the ocean), not only data from facilities that discharge into reservoir watersheds. These thresholds are also similar to the 95th and 99th percentiles of existing mercury concentrations from the 2009-2015 data set analyzed in Appendix N, (see Table N-10, e.g. 10 ng/L and 20 ng/L for municipal wastewater are the 95th and 99th percentiles, respectively). The Reservoir Program may have slightly different categories of facilities than shown in Table 6-2 and may include other requirements for impaired reservoirs that are not included here.

The advantage of this option is that it seeks reasonable controls for municipal wastewater facilities that are feasible with current technologies. Most facilities in California are already achieving these effluent limitations, since the limitations are based on current performance of facilities. This option rewards dischargers that maintain existing effluent quality.

A disadvantage is that this approach was designed to implement a TMDL for reservoirs which have few wastewater and industrial discharges. This approach is based on the assertion that these dischargers are not a significant source of mercury to reservoirs. Hence, capping the amount of mercury in the discharge at the level it is at currently should be a sufficient level of control. However, effluent limitations based on *current performance* are inconsistent with federal regulations that govern implementation of water quality objectives. The federal regulation require *water quality based* effluent limitations for wastewater and industrial discharges that have reasonable potential to cause, or contribute to an excursion above any State water quality objective (33 U.S.C. § 1311(b); 40 C.F.R. § 122.44(d)). The federal regulations essentially provide that if the level of mercury in the discharge has no reasonable potential to cause or contribute to an exceedance of the water quality criteria (objectives in California), then the discharge should not have any effluent limitation.

Another disadvantage is the assertion that all wastewater and industrial discharges in the state are an insignificant source of mercury. This is problematic since there was no analysis of the relative contribution of all discharges in their respective watersheds, statewide. The geographic scope of the Provisions includes many large discharges that are close together in urban areas, in contrast to the few discharges to or upstream of reservoirs. For example in the Sacramento-San Joaquin Delta TMDL the combined wastewater and industrial discharges contributed a methylmercury load that needed to be controlled (Central Valley Water Board 2010b). In that TMDL, the wastewater and industrial discharges contributed more methylmercury than atmospheric deposition. If the mining legacy were removed from the relative load analysis, then the wastewater and industrial discharges would be a much larger relative load. Therefore, the assumption that these dischargers are insignificant does not apply in areas of the state that are not impacted by historic mining.

A third disadvantage is that this approach is more stringent on POTWs compared to privately owned industrial facilities. A fourth potential issue with using this approach (outside of a TMDL), is that the current effluent limitation for industrial facilities is higher than the current California Toxics Rule mercury criteria (50 ng/L). This issue may be confusing or conflicting. In this option, facilities that have no new requirements (facilities less than 0.2 MGD) may retain their old limitation based on the California Toxics Rule mercury criteria, which is likely lower than the threshold for larger facilities (60 ng/L for facilities 0.2-1 MGD). Also, if facilities need to adhere to a lower effluent limitation based on the California Toxics Rule mercury criteria for the municipal and domestic supply beneficial use (MUN) then that limitation would apply.

Option 3: Combination: Mercury Minimization Plan, one statewide water column target, and effluent limitations from the Reservoir Program.

In this option the water column target 4 ng/L (total mercury annual average) would be used as the basis to determine which discharges need effluent limitations. For dischargers with mercury effluent concentration above 4 ng/L in the discharge, an effluent limitation and a mercury minimization plan would be required. The effluent limitation would be thresholds based on current performance of facilities from option 2 (Table 6-2). Essentially, the threshold of 4 ng/L serves as a trigger for the mercury minimization plan, while the numeric effluent limitation serves as a backstop to maintain current performance. The mercury minimization plan is explained in more detail at the end of this option. This option would include the same three exceptions from option 1: 1) small disadvantage communities, 2) insignificant discharges, and 3) site-specific water column translation.

The water column target of 4 ng/L was calculated using the U.S. EPA draft national BAF and translators. In this option, the target would not be used to calculate effluent limitations, because of the high uncertainty in the value. Instead, it would be a trigger for the mercury minimization plan. However, the water column target of 4 ng/L compares well with the targets from the Cache Creek, Bear Creek, Harley Gulch and Sacramento San Joaquin Delta TMDLs (see Appendix I).

Most tertiary plants, such as those with nitrification and denitrification processes, have mercury concentrations under 4 ng/L (annual average) in the effluent because of the enhanced filtration maximize removal of suspended solids (Central Valley Water Board 2010a). Therefore, tertiary plants are unlikely to be issued any new mercury requirements. On the other hand, most secondary treatment facilities do not achieve concentrations below 4 ng/L mercury in the effluent, since such technology is not designed to achieve this low level of mercury. Facilities with only secondary treatment would most likely need to implement the mercury minimization plan and meet the performance based limitations. Current data from discharger self-monitoring report indicate that about 27 percent of all discharges to waters included in the geographic scope of the Provisions exceed the 4 ng/L threshold, based on 2009 – 2015 data (Appendix N). Therefore, it is likely that about 27 percent of facilities in the Provisions' scope would likely need to implement the mercury minimization plan and meet the performance based effluent limitations.

An advantage of this option is that it is an economically viable method to reduce mercury in discharges to meet the water quality based water column target derived to protect all waters. Also, this approach would likely provide more of a driver to reduce mercury compared to option 2 or option 3 alone, because the threshold (4 ng/L) is the lowest threshold. Furthermore, concentrations lower than 4 ng/L may be needed to achieve the Sport Fish Water Quality Objective in lakes and reservoirs, as suggested by bioaccumulation factors for lakes (Appendix I). These advantages are important since mercury is a persistent, bioaccumulative pollutant. Mercury never degrades and it can be transported to other environmental compartments and other watersheds. Sludge from municipal wastewater facilities may be burned, composted or applied to land where mercury can enter the atmosphere (mercury is volatile metal), or it may be landfilled in another watershed, where the mercury can potentially be released back into the environment.

A second advantage is that this option is the most protective option for the environment because the threshold (4 ng/L) is the lowest compared to the other options. Option 1 may not be protective enough for waters other than rivers and streams. While most discharges are in rivers, these waters pass through estuaries which may require a lower mercury concentration to protect human health and wildlife. For example, many facilities discharge into rivers that are upstream of the Sacramento-San Joaquin Delta Estuary. Additionally, methylmercury bioaccumulation is a complex process that is not confined to the immediate vicinity of a discharge.

A disadvantage of this option is that the water column value comes with a great deal of uncertainty. The actual water column concentration necessary to achieve the objective is fish tissue may be an order of magnitude higher or lower that the water column target (4 ng/L) depending on many site-specific factors. The target was calculated with data that originated in lakes and rivers, mainly from waters outside of California (U.S. EPA national bioaccumulation factors, U.S. EPA 2001). In addition, since many discharges in California only flow into rivers, this threshold (4 ng/L) may be inappropriate for most dischargers in the state. This is because rivers are known to experience lower rates of bioaccumulation. Therefore, translating to a water concentration with BAFs for rivers yields less stringent thresholds (e.g. 12 ng/L, as calculated in option 1).

A second disadvantage is similar to a disadvantage discussed in option 2 in that there is an inconsistency with federal regulations. The effluent limitation is not water quality based. Only the target for the mercury minimization plan is based on water quality. A third disadvantage is inconsistency with the Reservoir Program. Although the numeric effluent limitations are the same as those developed for impaired reservoirs, this requires more stringent implementation for unimpaired water (with the addition of the mercury minimization plan). However, that project is still under development at this time.

A fourth disadvantage is that this option requires extra time and resources from all parties to implement the mercury minimization plan, but it is not clear that the effect to the environment would be better than the other options, since the effectiveness of mercury minimization plans is debatable (see below on mercury minimization plans). This option would add an extra step to the permitting process to implement the mercury minimization plan.

<u>Mercury minimization plan</u>

For the mercury minimization plan, the extent of the plan effort should be proportional to the facility discharge flow, the potential impact, and the discharger’s available resources. Monitoring would be used to evaluate the effectiveness of the plan. The U.S. EPA recommends monitoring and a reopener clause in case the mercury minimization plan is ineffective. A mercury minimization plan could include (see U.S. EPA 2010 for more details):

- Identification of sources and methods for reducing mercury,

- BMPs/limitations of all potential sources
- Material substitution, material recovery, spill control, waste recycling, and disposal practices
- Public education on proper disposal or selecting products without mercury
- Outreach to dental offices to control dental amalgam, as may be required by U.S. EPA's proposed rule.

As an alternative to the standard requirements of a mercury minimization plan, a discharger could perform one or more of the following, depending on the facility size and population served:

- Public education on risks of eating fish.
- Activities that can reduce mercury in the watershed, such as participating in a mine clean up.
- Initiate and fund (in coordination with other appropriate authorities) a residential liquid mercury collection program, especially in areas where small scale gold mining is, or was common.
- Perform a 10 year study with isotopically labeled mercury to determine if mercury from the discharge accumulates in fish. If mercury from the discharge is not detectable in fish, then the discharger may not have additional requirements. If the mercury is detectable in the fish, then the discharger would need to develop and implement the mercury minimization plan.

The U.S. EPA has found pollution minimization programs successful in reducing mercury loadings to the environment. The reports *Mercury Study Report to Congress* (U.S. EPA 1997b) and draft *Overview of P2 Approaches at POTWs* (Publicly Owned Treatment Works, U.S. EPA 1999b) show that municipal wastewater facilities and industrial dischargers have implemented source controls, product substitution, process modification, and public education programs with great success. These minimization practices focus on sources and wastes that originate within a facility and are under the reasonable control of that facility, not on pollutants in rainwater or source water (U.S. EPA 2010). Since mercury is a bioaccumulative, persistent pollutant that can cause adverse health effects, U.S. EPA believes that it is reasonable to expect wastewater and industrial dischargers to implement cost-effective, feasible, and achievable measures to reduce the amount of mercury they discharge into the environment. Depending on the particular facts, permit writers may reasonably conclude that permit limitations that require such measures derive from, and comply with, water quality objectives as required by U.S. EPA regulations at 40 Code of Federal Regulations section 122.44(d)(1)(vii)(A) (U.S. EPA 2010).

However, the effectiveness of mercury minimization plans is debatable, particularly their ability to reduce mercury in the effluent of wastewater treatment plants. Wastewater treatment plants already trap most of the mercury in the sludge. Therefore, minor reductions of mercury in the influent may not translate to noticeable reductions in the effluent. A 2002 analysis found that mercury pollution prevention is unlikely to reduce mercury to the point of compliance with a BAF based effluent limitation, "…pollution prevention or source control are potentially effective in achieving sufficient reductions to enable POTWs to meet effluent limits that are 7.8 ng/L or greater. However, if more stringent effluent limits are in effect such as the 3.1 or 1.3 ng/L limits that have been imposed on POTWs in the Great Lakes Region, pollution prevention or source control with no treatment process modifications will not be effective in achieving these limits. Regardless of the potential for meeting effluent limits through pollution prevention and source control alone, these efforts have many benefits as described in this report and should be considered as an essential tool in any mercury reduction effort" (Larry Walker Associates 2002). Additionally, the San José-Santa Clara Wastewater Facility has shown that reduction in influent total mercury does correlate to reduction in the effluent mercury (San José-Santa Clara Regional Wastewater Facility 2014.)

6.13.4 Recommendation

Option 1: Adopt numeric effluent limitations based on water body type and BAFs (requirements would not apply automatically apply to dischargers included in a TMDL, such as discharges to the San Francisco Bay or Delta).

6.14 Issue N. Should the Provisions include a public exposure reduction program?

6.14.1 Current Conditions

There is no established policy, although two mercury TMDLs have included mercury public exposure reduction programs. These are the San Franco Bay mercury TMDL and the Sacramento San Joaquin methylmercury TMDL. In the San Francisco Bay, the public exposure reduction program also included PCBs, not just mercury. These programs were funded by dischargers included in the TMDL.

The participation of other state agencies has been an integral part of Water Board mercury public exposure reduction programs, including CDPH, and OEHHA. Part of the mandate of these agencies is protecting public health. OEHHA also issues health advisories for mercury in locally caught fish (Appendix E). A goal of current advisories and exposure reduction programs is to inform the public on the type fish that is better to eat, rather than the most hazardous fish, which can leave people confused as to which fish they should choose.

6.14.2 Issue Description

The issue is if a public exposure reduction program should be included in the Provisions or if such a program should be conducted on a statewide basis by the Water Boards. Mercury concentrations in fish are unlikely to improve much in the near future, yet people would continue to eat locally-caught fish. Public education is needed to warn people about the risk of eating fish with high levels of mercury, so that people can make better choices on which fish to eat.

The work of educating the public on health issues generally falls under the mandate of the CDPH, OEHHA, or the County Health Departments. However, for example, the County Public Health Departments have many other mandates concerning more immediate heath issues, and those mandates provide the agencies with funds to implement them.

The San Francisco Bay mercury TMDL included a public exposure reduction program that was fairly successful (CDPH 2012). The success of the San Francisco Bay program was partly attributed to the assistance provided by CDPH. However, those resources have not been available for the public exposure reduction program for the Sacramento San Joaquin Delta, and it has been a struggle to put that program into action. The Water Boards would require staff and funding to perform public education.

6.14.3 Options

1. **No action (Recommended). Recognize the role of the California Department of Public Health, and the Office of Environmental Health Hazard Assessment, continue to support these agencies with data, and recommend they continue this work.** In this option, the Water Boards would continue working with other agencies on public exposure reduction by providing data on the levels of mercury in fish in order to generate consumption advisories and providing input on the water bodies that need

health advisories the most. In this option, the Water Boards would not develop a public exposure reduction program for mercury. The State Water Board would recommend that other agencies continue to inform the public on the risks of eating fish with high levels of mercury. This work could include posting signs, public outreach, involvement of local community groups, or outreach to medical or public health professionals.

2. **Commit to develop a mercury exposure reduction program.**
   In this option, the Water Boards would commit to establish a statewide program to educate the public on which fish are safer to eat due to lower levels of mercury. This may include posting signs, public outreach, involvement of local community groups, or outreach to medical or public health professionals.

   Staff resources would be needed to coordinate such a program with other state agencies and the many communities involved, and this approach would be best accomplished with a dedicated a staff person to coordinate such a program. The Water Boards existing mercury public exposure reduction programs have depended on other agencies that normally perform public outreach activities, such as OEHHA which currently issues fish advisories, and the CDPH. A successful statewide public reduction program would depend on collaboration with these agencies and local communities. To fund the work, the water boards could rely on dischargers, however the dischargers are not the source of most of the mercury contamination. It would be more appropriate to use public funds to perform the work.

   Another consideration in developing a public education program is that the program should also consider other contaminants, such as PCBs. In many areas, mercury is not the only contaminant at levels of concern in fish tissue. For example, a species like bass may have high mercury, but a bottom feeder like catfish may have lower mercury but higher PCBs. The public education should not be based only on mercury level in fish, since it could misrepresent the risks of eating fish containing elevated levels of other contaminants.

6.14.4 Recommendation

Option 1. Recognize the role of the CDPH, and OEHHA, continue to support these agencies with data, and recommend they continue this work.

7. Reasonably Foreseeable Methods of Compliance

This section provides a description of the reasonably foreseeable methods of compliance for each element of the Provisions. The Water Boards do not specify a manner of compliance and accordingly, the actual compliance strategies would be selected by the local agencies and other permittees. Although the Water Boards do not mandate the manner of compliance, the State Water Board's SED for a proposed project is required to include an analysis of the reasonably foreseeable methods of compliance with the project (see Cal. Code Regs., tit.23, § 3777; Pub. Resources Code, § 21159). Several of the reasonably foreseeable methods of compliance are well known methods of mercury control, and a discussion of a reasonable range of these methods of compliance and design parameters is presented below. Chapter 8 contains the environmental analysis of the reasonably foreseeable methods of compliance.

Mercury is one of the basic elements. Therefore, it does not break down or dissipate over time. Once mercury is introduced into the environment it will remain within that environment unless it is either washed further downstream into another environment, entrapped within sediments, or physically removed through activities such as excavation or dredging. Once in the environment, elemental mercury does not pose a significant risk to humans and wildlife as long as it remains in its elemental form. However, under certain conditions, generally in waters that are anoxic and high in organic matter, bacteria readily convert elemental mercury into the more toxic and bioavailable compound methylmercury.

7.1 Compliance Methods

Reasonable and foreseeable methods of compliance related to mercury focus on four major components, which are discussed in greater detail as they relate to each type of potential discharger within this Chapter of the Staff Report. The major reasonably foreseeable methods of compliance for mercury control are:

- Institutional controls, such as mercury minimization plans, to keep mercury from entering into the environment.
- Mercury removal methods to remove mercury from the environment.
- Sediment controls to prevent mercury in the environment from entering the waterways.
- Water management practices to prevent or reduce the conversion of elemental mercury to methylmercury.

The methods of compliance discussed would not include methods that are not reasonably foreseeable as a result of the Provisions.

7.1.1 Institutional Controls

"Institutional controls" refers to practices and programs designed to prevent diffuse sources of mercury from entering waterbodies and treatment facilities. These programs are typically implemented by a municipal government or agency. Institutional controls for mercury include: mercury minimization programs, in which facilities limit mercury sources (described below) from entering the wastewater stream; mercury thermometer collection and disposal; waste collection of mercury-containing materials, such as thermometers and fluorescent light bulbs; and education campaigns for auto dismantlers regarding proper disposal of batteries and switches.

A mercury minimization program could be conducted by a wastewater treatment facility or an industrial facility. The first step in a mercury minimization program is identification of sources and methods for reducing mercury. For a wastewater treatment facility, sources could include dental offices (from the dental amalgam), hospitals, schools, or industrial dischargers that discharge into a municipal wastewater treatment system. Also the facility conducting the mercury minimization program should look for chemicals used in the facility that contain mercury, such as chlorine. (Mercury is used to produce chlorine, and chlorine is added to reduce bacteria in wastewater.) This identification of sources could include mercury monitoring at various places in the system to find significant inputs of mercury. Once mercury sources are identified, the facility would conduct actions to reduce the mercury from those sources. This might include issuing limitations or requirements for BMPs to the indirect dischargers (dental offices, hospitals, schools or industries). The BMPs could include material substitution, material recovery, spill control, waste recycling, and proper disposal practices. Such BMPs may also be used to control in-house sources of mercury in the facility. Also, a wastewater treatment facility may conduct actions to generally try to reduce mercury inputs such as public education on proper disposal of products containing mercury or selecting products without mercury (see U.S. EPA 2010 for more details on mercury minimization programs). Requirements for dental offices to control dental amalgam will be required by U.S. EPA's recent rule (http://water.epa.gov/scitech/wastetech/guide/dental/, 79 Fed. Reg. 63258 (Oct. 22, 2014)), but a wastewater treatment facility could opt to take more action than required by that rule, depending on the circumstances.

7.1.2 Mercury Removal Methods

In general, mercury has contaminated air, water, and soil resources. Mercury can be removed from the environment through a variety of methods, but those methods depend on the medium in which the mercury is contained. Removal methods, in the context of water quality control, are limited to removal from soil and water.

Mercury binds strongly to soil and sediment, but can be liberated when contaminated soils or sediments are disturbed. In some cases, contaminated soil and sediment can be physically removed from a site and disposed at a landfill, a hazardous material storage facility, or stored at a stabilized structure on or near the remediation site. Heavy earth-moving equipment is often involved in this process.

Wastewater treatment facilities are a potential source of mercury entering into a waterway, depending upon the sources of wastewater going to the facility. Mercury disposed into drainage systems from sources such as dental offices, industrial sources, household products, and deposition of ambient mercury in air onto areas linked to sewer systems (e.g., parking lots) can be routed to wastewater treatment facilities. In these cases, the treatment facilities can remove a significant portion of the mercury within their system by taking steps to remove solids during their treatment process. Treatment plants that install systems to upgrade from “secondary” to “tertiary” treatment remove additional materials and reduce final mercury emissions in discharges to the environment. Secondary treatment systems use biological processes to break down liquid organic waste into consolidated sludge and dissolved inert organic matter (i.e., organics that will not absorb oxygen from receiving waters). Tertiary treatment systems add chemical and physical processes to filter out suspended matter left over from earlier treatment processes (such as suspended sediments, and residual organic particles). Because mercury adheres to solids, a facility that takes additional steps to remove solids in their treatment process would also remove more of the mercury that passes through their system. Data from California’s Central Valley shows that facilities that have tertiary treatment have significantly less mercury in their effluent than treatment facilities that rely on secondary treatment (Central Valley Water Board 2010a).

7.1.3 Sediment Controls

Mercury actively adheres to solids, including sediments. Sediment contaminated with diffuse mercury introduces mercury into aquatic environments when it erodes and flows into nearby waterbodies. Controlling this source of mercury is achieved by preventing the sediment, or runoff moving over the sediment from reaching waterbodies.

Sediment controls are most needed in areas contaminated by mercury from mining activities or areas where soils are naturally enriched with mercury. However, due to atmospheric deposition, all soils throughout California are potential sources of mercury contamination when eroded providing sediments that wash into our waterways.

Sediment controls can be achieved in a number of ways. Some of the more simple sediment controls involve placing absorbent barriers such as hay bales or wattles (mesh tubes filled with straw) around construction sites or along degraded slopes to prevent or minimize runoff from disturbed areas, especially in burn areas. However, these are temporary solutions intended for short term projects. More permanent solutions often involve structural controls, such as earthmoving equipment to create barriers, berms, hillside grading, and installation of riprap (barriers made of large loose rock) to direct and slow flows. Silt fences can be used to catch and help prevent sediments from washing into nearby waterbodies. Revegetation of slopes and hills in disturbed areas is an important component to preventing erosion as well as the restoration and enhancement of riparian areas, which can catch and hold silt.

Storm water capture and infiltration methods have the added benefit of reducing the amount of sediment load to nearby waterbodies. Storm water capture and infiltration methods include “settling” structures and basins designed to capture and hold storm water rather than direct storm water directly into nearby waterbodies. Sediments are trapped and held in these areas, along with any mercury that has adhered to the sediments. Sediment can then be removed, preventing it from introducing mercury into an aquatic environment. Other methods of storm water capture and infiltration include installing permeable paving materials or non-paved landscapes, such as gravel, mulch, or vegetation, which allow infiltration. Many of these methods are consider low-impact development (LID) controls and are considered in the use of green infrastructure design.

Sediment or soil contaminated with mercury can also be directly removed from or contained within a contaminated site, as described in Section 7.1.2. This is also considered a sediment control method.

7.1.4 Water Management Practices

Once elemental mercury enters an aquatic environment, it must undergo a transformation before it is readily bioavailable. Anaerobic bacteria in environments that are both low in oxygen and high in nutrients are primarily responsible for converting elemental mercury to methylmercury in aqueous environments. There is still much ongoing research on the subject of the specific conditions that enhance methylation and methods that can be employed to reduce or prevent this process. Some studies have found that seasonal wetlands are a major source of methylmercury, while permanent wetlands can work as methylmercury sinks (Appendix Q). Management practices that increase flow and aeration and reduce anthropogenic sources of nutrients into waterbodies may help reduce mercury methylation.

7.2 Methods of Compliance by Discharger

7.2.1 Mines

The Provisions specify that the Water Boards shall require dischargers subject to California Code of Regulations Title 27, section 22510 (Closure and Post Closure Maintenance of Mining Units), to implement erosion and sediment control measures to prevent or control mercury discharges (see Section 6.9). Mine owners are already responsible for discharges from their property based on existing policy. The Porter Cologne Water Quality Control Act gives the Regional Water Boards the authority to require responsible parties to cleanup and abate wastes that cause or threaten to cause pollution. Mine sites that discharge wastes may be subject to waste discharge requirements (Title 27 requirements for mine wastes and/or NPDES storm water requirements). The reasonably foreseeable methods of compliance for such mines are listed below.

Methods of compliance for mercury control at mine sites are expected to vary widely based on the individual physical characteristics of each particular mine. In general, potential mercury discharges from mines come from mobilized sediment, water flowing through contaminated or unprocessed ore, or tailings. Examples of possible methods of compliance include:

- Sediment Controls
    - Hillside grading
    - Hillside re-contouring
    - Detention ponds
    - Riprap installation
    - Re-vegetation (i.e., planting trees and shrubs).
    - BMPs to minimize sediment or ore washing off a site

- o Terracing
- o Retaining walls
- o Sediment removal

7.2.2 Nonpoint Sources

The Provisions acknowledge that the Permitting Authority has discretion under existing law to require nonpoint source dischargers to implement erosion and sediment control measures and should consider requiring such measures in areas of elevated mercury. Examples of possible methods of compliance include:

Sediment Controls:

- o Access road (sediment) maintenance
- o Hillside grading
- o Detention ponds
- o Buffer zones
- o Riprap installation
- o Re-vegetation
- o Retaining walls
- o Silt fences
- o Ongoing management of riparian buffer (seeding, mulching)
- o BMPs to minimize sediment washing off the site
- o Terracing
- o Hillside re-contouring

7.2.3 Dredging Activities

The Provisions acknowledge that the Water Boards have the discretion under existing law to require dischargers for dredging activities to implement total mercury monitoring and control procedures, and should consider requiring such measures in permits in areas with elevated mercury concentrations. These procedures may be necessary to control the disturbance and discharge of mercury-contaminated material during dredging and disposal of dredging material, particularly in areas with elevated mercury concentrations. Dredging projects are variable in size, location, frequency and scope. Typically, a dredge project would require a site-specific analysis to determine appropriate methods for sediment removal and transport, as well as environmental risks. The Water Boards would have ultimate say over the way the project is performed. The requirements of the Provisions are not expected to change the amount of dredging activities in the state. Special equipment or procedures may be required to minimize mercury-contaminated sediment releases, but as to what kinds of equipment or procedures used for future projects is speculative.

If dredging activities are involved in removing sediments, some of the mercury that is trapped in the sediment may be released into the water, where there is a greater chance of it becoming methylated. As long as the mercury remains trapped within the sediments, and not readily available for methylation, it may pose less of a risk to the environment to leave the mercury in place than to try to remove the mercury and risk releasing some of that mercury into a waterbody where it is more readily methylated.

Typically, dredged sediment is disposed of on a project site. If the Water Boards determine that sediment is contaminated with mercury, and presents a significant threat of contaminating a water body, the agency may require transport to an off-site storage facility or landfill, increasing use and distances travelled for heavy hauling equipment. However, given the variability possible projects, the amount of projects having such requirements is not reasonably foreseeable.

Mercury Monitoring

Mercury monitoring may need to be done to characterize the degree of mercury contamination and the potential for release of mercury from the dredging. If mercury monitoring is required, water and/or sediment samples would need to be regularly collected and transported by vehicle to a laboratory for analysis.

7.2.4 Wetlands

The Provisions acknowledge that the Permitting Authority (the Water Boards) has the discretion under existing law to require project applicants that are establishing or restoring wetlands by discharging dredged or fill material to include design features or management measures to reduce the production of methylmercury in wetlands, and should consider requiring such measures in areas with elevated mercury concentrations. Design features could include adding open water areas or settling ponds to reduce the transport of mercury and minimizing fluctuations in water levels to reduce wetting and drying cycles of soil. This requirement should not diminish the ecological value of the resulting wetland habitat. The Provisions should not reduce the amount of land converted to wetlands.

Earth moving activities would still be needed to create a wetland, regardless of any requirements pertaining to wetlands in the Provisions. New requirements might or might not result in greater use of vehicles or equipment. It would be difficult to estimate how much the Provisions might increase the need for earth moving or the use of heavy vehicles or construction equipment.

7.2.5 Storm Water: Municipal

The Provisions require Phase I and Phase II MS4s permits to include mercury pollution prevention and pollution control measures to reduce total mercury or methylmercury discharges. The requirements for MS4 dischargers in the Provisions are already required by permits for most MS4s, but not explicitly for mercury control or prevention. Therefore, it is anticipated that the reasonably foreseeable methods of compliance are likely already being done by Phase I MS4s and there would be little to no change for Phase I MS4s. Phase II MS4s generally have fewer requirements, so it is estimated that some Phase II MS4s may need to add some of the activities described below.

Waste Collection Programs
The Provisions require thermometer exchange programs and fluorescent lamp recycling programs, or enhancement of household hazardous waste collection programs to better address mercury-containing waste products (potentially including thermometers and other gauges, batteries, fluorescent and other lamps, switches, relays, sensors and thermostats).

Education
The Provisions require MS4s to educate the public on disposal of household-mercury containing products or alternative products. Examples of compliance methods are: increasing disposal bins in public areas; producing and printing educational flyers; or producing radio, television, or billboard advertisements for the public. This requirement could increase vehicle use and solid waste disposal.

Educating Auto Dismantlers
The Provisions require MS4s to educate auto dismantlers on the proper removal, storage, and disposal of mercury containing switches in automobiles. Staff from MS4s may travel to auto dismantlers to provide training on the proper disposal of mercury containing items. Also, staff from MS4s may provide educational information by postal mail or electronically. This requirement could increase vehicle use and solid waste disposal.

Internal Surveys
The Provisions require MS4s to perform an in house survey on the use, handling, and disposal of mercury-containing products used by agency (the MS4 discharger). The Provisions also require MS4s to develop a policy and time schedule for eliminating the use of mercury containing products by the agency. The resulting actions would depend on the sources of mercury identified.

Sediment Controls
The methods of compliance for sediment controls in the Provisions are similar to the methods of compliance implemented by MS4 permittees to satisfy existing permit requirements, but there could be an increase in these activities and the degree of increase is unclear. The Provisions require sediment controls be included in MS4 permits in areas with elevated mercury concentrations. However, with respect to areas that do not have elevated mercury concentrations, the Provisions provide that the Permitting Authority (the Water Boards) has discretion to include BMPs to control sediment. Methods of compliance could be either structural controls or management practices. Examples that involve some degree of earth moving or construction are: retaining walls, grading hillsides, installing riprap, and adding vegetation (trees or shrubs). Management practices could include maintaining a vegetated riparian buffer next to waterbodies, use of silt fences, rolled erosion control products, seeding, and mulching.

7.2.6 Storm Water: Industrial Activities

Exceedance Response Actions

The Provisions would lower the numeric action level (NAL) for mercury contained in the NPDES Industrial General Permit from 1400 ng/L to 300 ng/L or lower. The Industrial General Permit requires that if the NAL is exceeded then the permittee must take to address the source of the mercury. These actions, called Exceedance Response Actions, may be BMPs such as general housekeeping, covering mercury sources at the facility, or proper containment of sources. In general, the methods of compliance are not anticipated to change from the existing methods. Instead, the Exceedance Response Actions may need to be performed more frequently, because the Provisions lower the NAL. However, a review of storm water monitoring data found most mercury measurements in storm water were below the 300 ng/L threshold (Appendix P). Also, in the few instances that the measured mercury concentration was higher than the 300 ng/L NAL, it was often higher than the current NAL as well. Therefore, the statewide increase in Exceedance Response Actions is anticipated to be small.

Mercury Monitoring

Storm water must be sampled and analyzed to evaluate compliance with the NAL. Samples would likely be sent or shipped via motor vehicle to a laboratory, where the mercury concentration in the storm water sample would be measured. Mercury Monitoring is already required by the existing permit. The Provisions would not change what is already required by the existing permit. It is possible that monitoring may increase if more dischargers need to address exceedances and ensure they can attain compliance with a lower NAL. The change in the NAL may result in a slight increase in vehicle use, lab supply use, and waste generation.

7.2.7 Wastewater Treatment Plants and Industrial Dischargers – Requirements for Sport Fish and Wildlife Water Quality Objectives in Flowing Water Bodies

For waste water and industrial discharges into flowing water bodies, the Provisions specify a water column concentration of 12 ng/L for determining whether the discharge is projected to cause or contribute to an excursion above the water quality standard (hereafter referred to as reasonable potential) and as the objective value used to calculate an effluent limitation for the Sport Fish Water Quality Objective, the Prey Fish Water Quality Objective, and the California Least Tern Prey Fish Water Quality Objective, where the COMM beneficial use, the WILD beneficial use, and/or MAR beneficial uses have been designated or are existing beneficial uses.

Wastewater Treatment/Industrial Facility Upgrades

It is anticipated that major facility upgrades are unnecessary to achieve the effluent limitations in the sport fish and wildlife objectives in flowing water bodies. The Sport Fish Water Quality Objective water column concentration proposed in the Provisions is about five times more stringent than the lowest human health water quality objective promulgated in the CTR applicable to COMM (12 ng/L total mercury versus 50 ng/L).

However, current information on loads of mercury in waste water suggests that the proposed objective (also 12 ng/L) is achievable based on current technology. In addition, in accordance with the Provisions, the Water Boards have the discretion to allow dilution credits in waters that currently meet the applicable water quality standards, which would make the final effluent limitations more achievable where dilution is allowed.

Recent data from discharger self-monitoring reports indicate that about 8 percent of all discharges to waters included in geographic scope of the Provisions exceeded the 12 ng/L threshold at least once during 2009 – 2015 (Appendix N). Some of the facilities that exceeded this threshold only exceeded it in one or two years within the past six years, and met the effluent limitations in other years. Therefore, it is anticipated that these facilities would be able to adapt to the effluent limitation without a major facility upgrade.

In the Eastern U.S., especially near the Great Lakes, wastewater treatment/ industrial facilities have already been achieving permit requirements for mercury based on a threshold of 12 ng/L total mercury from U.S. EPA's 1984 criterion (U.S.EPA 1985), which is much lower than California's current criterion of 50 ng/L. In Minnesota's 2007 statewide mercury TMDL, the average mercury effluent concentration from NPDES point sources was estimated as 5 ng/L (Minnesota Pollution Control Agency 2007). The median concentration for North Eastern States was 7 ng/L (Northeast states and the New England Interstate Water Pollution Control Commission 2007).

The Ohio variance suggests 12 ng/L is achievable with secondary treatment, since meeting that threshold is an expectation of facilities issued the variance. Ohio's mercury variance provides relief for discharges that must meet an effluent limitation of 1.3 ng/L (the use of mixed zones was phased out after 2010, although under certain circumstances mixing zones may be authorized (40 CFR part 132, appendix F, procedure 3)). Ohio's mercury variance guidance, issued in 2000, explains that achieving a mercury concentration *below* 12 ng/Lis anticipated to require end of pipe treatment (a facility upgrade), implying that 12 ng/L is achievable with currently technology or source control, such as a mercury minimization program (Ohio EPA 2000).

Other evidence suggests that a Mercury Minimization Program (discussed below) may be sufficient to meet the effluent limitation (12 ng/L). A study on the topic reported that "pollution prevention or source control are potentially effective in achieving sufficient reductions to enable POTWs to meet effluent limits that are 7.8 ng/L or greater. However, if more stringent effluent limits are in effect, such as the 3.1 or 1.3 ng/L limits that have been imposed on POTWs in the Great Lakes Region, pollution prevention or source control with no treatment process modifications would not be effective in achieving these limits" (Larry Walker Associates 2002).

However, wastewater and industrial facility upgrades may be needed to comply with multiple future statewide or region-wide water quality objectives for other pollutants adopted by the Water Boards over the next several years. Currently, the State Water Board is developing statewide water quality objectives for bacteria, toxicity, nutrients, and biological integrity. These new water quality objectives, when adopted, may require more stringent effluent limitations. The effect of these anticipated effluent limitations, together with the need to achieve mercury effluent limitations, may result in facility upgrades. Facility upgrades would be a significant constriction project to a plant that only has a secondary level of treatment. The upgrade would likely add nitrification and denitrification steps to the treatment process, or add additional filtration.

Mercury Minimization Program

A Mercury Minimization Program may be needed to achieve the effluent limitations and would be the expected method of compliance before a facility considers upgrading. As stated above, a Mercury Minimization Program should allow a municipal wastewater treatment plant to achieve an effluent limitation of 12 ng/L (Larry Walker Associates 2002). Pollution prevention involves an assessment of in-house sources of mercury and indirect discharges of mercury to the facility (such as a dentist office that connects to the city sewer). The method of compliance would depend on the predominant sources of mercury. A large source of mercury to municipal wastewater treatment plants is dental amalgam. A foreseeable method of compliance is ensuring dental offices in the service area have proper mercury separators installed. This may include travel to dentist offices, inspection of equipment in the office, and mercury monitoring at various locations throughout the collection system. Therefore, the effluent limitation may result in an increase in vehicle use by the few wastewater and industrial facilities that may not be able to achieve the effluent limitation consistently. There may also be an increase in the laboratory resources used for additional monitoring to locate sources of mercury in the system. (U.S. EPA has promulgated a new rule on dental amalgam, so compliance methods to address dental amalgam will be required by U.S. EPA (http://water.epa.gov/scitech/wastetech/guide/dental/)).

Mercury Monitoring

Additional monitoring by wastewater treatment plants and industrial dischargers would be required at certain intervals during the permit term for those facilities with a mercury effluent limitation (dischargers authorized to discharge at a rate equal to or greater than five million gallons per day are required to conduct monitoring at least one time each calendar quarter, dischargers authorized to discharge at a rate less than five million gallons per day must monitor at least one time per year) and facilities without a mercury effluent limitation would be required to monitor one time per permit term. Some facilities would have new monitoring requirements.

Recent data from discharger self-monitoring reports indicate that about eight percent of all discharges to waters included in geographic scope of the Provisions exceeded the 12 ng/L threshold at least once during 2009 – 2015 (Appendix N). Some of the facilities that

exceeded this threshold only exceeded it in one or two years within the past six years, and met the effluent limitations in other years. It is anticipated that these facilities could adapt to the effluent limitation without a major facility upgrade. Therefore, it is likely that about 8 percent of discharges in the Provisions' scope (25 facilities) with respect to the sport fish and wildlife objectives would be issued new effluent limitations and requirements for mercury. These dischargers would need to monitor the mercury concentration in the effluent discharging from the facility, and ensure that mercury concentration meets the effluent limitation (Staff Report section 6.13). This analysis is based on available data, and data was only available for a little over one quarter of the facilities in the in the scope of the Provisions (see Appendix N). It is unknown whether the facilities affected would be those authorized to discharge at a rate equal to or greater than five million gallons per day.
Mercury analysis is not typically done on-site at the facility, and technicians trained in the clean hands technique must perform sampling. So the monitoring and sample analysis would require additional vehicle use. Also, there would be an increase in lab supplies and waste generation.

The resulting additional miles of vehicle use was calculated with the following assumptions. An additional 25 facilities would sample quarterly and transport samples 100 miles one way (200 miles of vehicle use to return the vehicle to the starting location). The added miles were calculated by multiplying 25 facilities, times four samples per year, times 200 miles, which equates to 20,000 total additional miles per year. Quarterly sample was assumed to apply to all facilities as a worst case scenario, since it is unknown whether the facilities affected would be those authorized to discharge at a rate equal to or greater than five million gallons per day.

The Provisions include the following two exceptions to the reasonable potential analysis: 1) small disadvantaged communities and 2) insignificant discharges. More specifically, these exceptions would relieve the need for routine monitoring for small facilities that are not a threat to water quality, since mercury monitoring with sufficiently sensitive methods is expensive (Section 4.4 of Appendix P). These exceptions would also reduce the vehicle use to ship the mercury samples. These exceptions would not be automatic. The permit writer for the Water Board must review water body specific information and determine if there is information that indicates that the discharge would not cause or contribute to an exceedance of the water quality objective(s). Insignificant discharges are NPDES discharges that are determined to be a very low threat to water quality by the Water Board. Small disadvantaged communities are municipalities with populations of 20,000 persons or less, or a reasonably isolated and divisible segment of a larger municipality encompassing 20,000 persons or less, with an annual median household income that is less than 80 percent of the statewide annual median household income.

7.2.8 Wastewater Treatment Plants and Industrial Dischargers – Requirements for Sport Fish and Wildlife Water Quality Objectives in Slow Moving Water Bodies and Tribal Subsistence Fishing Water Quality Objective and Subsistence Fishing Water Quality Objective in Flowing Water Bodies

For waste water and industrial discharges into slow moving water bodies, the Provisions specify a water column concentration of 4 ng/L for determining reasonable potential and as an objective used to calculate effluent limitations for the Sport Fish Water Quality Objective, the Prey Fish Water Quality Objective, and the California Least Tern Prey Fish Water Quality Objective, where commercial and sport fishing or wildlife beneficial uses have been designated or are existing beneficial uses. In flowing water bodies where the Tribal Subsistence Fishing beneficial use has been designated, the Provisions also specify a water column concentration of 4 ng/L for determining reasonable potential and as an effluent limitation for the Tribal Subsistence Fishing Water Quality Objective. The Subsistence Fishing Water Quality Objective is a narrative objective without numeric mercury targets but the effluent limit in flowing water bodies could be similar to those assigned for the Tribal Subsistence Fishing Objective.

Wastewater Treatment/Industrial Facility Upgrades

It is anticipated that major facility upgrades may be needed for some facilities to achieve the effluent limitations for the sport fish and the two wildlife objectives in slow moving water bodies, and the Tribal Subsistence Fishing Water Quality Objective in flowing water bodies. The effluent limitation could be about 15 times more stringent than previous effluent limitations (3 or 4 ng/L vs. 50 ng/L). However, if the Water Boards exercise discretion to allow dilution credits in waters achieving the applicable water quality standard(s), the effluent limitations would be much more achievable.

For the Tribal Subsistence Fishing Water Quality Objective, roughly eight treatment plant upgrades are reasonably foreseeable based on assumptions and current designations of CUL (described below), and for the Sport Fish Water Quality Objective and the two wildlife water quality objectives in slow moving waters, roughly seven treatment plant upgrades are reasonably foreseeable in the near future, as described below.

Most tertiary plants with nitrification and denitrification processes have mercury concentrations less than 4 ng/L (annual average) in the effluent because the enhanced filtration maximizes removal of suspended solids (Central Valley Water Board 2010a). Secondary treatment facilities do not achieve concentrations below 4 ng/L mercury in the effluent, since such technology is not designed to achieve a level of mercury this low. Facilities with only secondary treatment would most likely need to build additional infrastructure to be able to meet an effluent limitation of 4 ng/L or lower which would be required to meet future effluent limits based on future designations for SUB or T-SUB. Current data from discharger self-monitoring reports indicate that about 27 percent of all discharges to inland surface waters, enclosed bays and estuaries, that are not included in an existing mercury TMDL, exceed the 4 ng/L threshold, based on 2009 – 2015 data (Appendix N). Therefore, it is likely that about 27 percent of facilities assigned an effluent limitation of 4 ng/L would likely need to take action to improve their treatment process. In addition should future designations of SUB or T-SUB to slow moving waters require effluent limits below 4 ng/L the Water Boards may use compliance schedules, site-specific objectives (with extended compliance schedules), TMDLs, or variances if the effluent limitation is unachievable. In cases where variances are adopted, it is anticipated that the Water Boards would require the implementation of source control measures and tertiary treatment as a condition of the variance. (See 40 CFR § 131.14 (water quality standards variances).) Additionally, some facilities that are close to meeting the 4 ng/L may only need to implement a mercury minimization plan.

Currently, about 7 percent of waste water and industrial discharges are to waters classified as harbors, bays, estuaries, sloughs, wetlands, tidal prisms, ponds, or marshes (Appendix N). The Permitting Authority may determine that these discharges are to slow moving water bodies and assign an effluent limit of 4 ng/L for achieving the Sport Fish Water Quality Objective and the two wildlife water quality objectives. Facilities with only secondary treatment discharging into these water bodies would likely need to take action to improve their treatment process, which may include a major treatment plant upgrade. None of these waters are on the 303(d) list due to mercury, but about half of these discharges are upstream of a river in the Central Valley that is on the 303(d) list due to mercury and so these discharges may be included in a future TMDL.

In the North Coast Regional Water Board's water quality control plan, the Native American Culture beneficial use (which includes subsistence fishing) is designated to many water bodies, including reaches of the Smith River, the Klamath River Watershed, the Trinity River Watershed, the Mad River Watershed, the Eureka Plain Watershed, and the Eel River Watershed. There are municipal wastewater or industrial discharges to or upstream of the Lower Klamath River, the Lower Trinity River, the Mad River, the Eureka Pain Watershed, and the Lower Eel River. In total, there are an estimated 24 facilities that discharge to waters currently designated with Native American Culture beneficial use or upstream of those waters. Mercury monitoring data was available for five of the 24 facilities. The highest annual average was 3.5 ng/L. Based on statewide monitoring data for all facilities that may be impacted by the Provisions, it is estimated that eight facilities would not meet the new effluent limits for the Tribal Subsistence Fishing Water Quality Objective in flowing water bodies and will have to undergo a major treatment plant upgrade if they are designated with the T-SUB beneficial use in the future. The North Coast Regional Water Board does have a subsistence beneficial use definition included in their water quality control plan but it has not been designated to any of the water bodies that have been designated with their Native American Culture beneficial use. While these waters have not been designated with Tribal Subsistence Fishing beneficial use, tribes are currently using these waters for traditional practices as designated with the Native American Culture beneficial use, which includes subsistence fishing. Therefore, it is anticipated that some or all of these waters may be designated with T-SUB beneficial use in the future.

Mercury Minimization Program

A Mercury Minimization Program (described in Section 7.2.7) may be used by some facilities that are not able to achieve the effluent limitation consistently. Therefore, the effluent limitation may result in an increase in vehicle use, lab supplies and waste generation.

<u>Mercury Monitoring</u>
Additional monitoring by wastewater treatment plants and industrial dischargers would be required for those facilities issued effluent limitations (dischargers authorized to discharge at a rate equal to or greater than five million gallons per day are required to conduct monitoring at least one time each calendar quarter, dischargers authorized to discharge at a rate less than five million gallons per day must monitor at least one time per year), and facilities without a mercury effluent limitation would be required to monitor one time per permit term. Because the reasonable potential analysis for the sport fish and the two wildlife objectives in slow moving water bodies and the Tribal Subsistence Fishing Water Quality Objective in flowing water bodies is more stringent than for the Sport Fish Water Quality Objective and the two wildlife water quality objective in flowing water bodies (4 ng/L vs. 12 ng/L), it is anticipated that a greater percent of facilities discharging into these waters would have new monitoring requirements. This would result in an increase in vehicle use, lab supply use, and waste generation.

There are an estimated 24 facilities that discharge to waters currently designated with the Native American Culture beneficial use or upstream of those waters. Based on statewide monitoring data for all facilities that may be impacted by the Mercury Objectives Amendment, it is estimated that one third of those facilities, or approximately eight, would not meet the thresholds (Appendix N) and would have to perform compliance monitoring. There are an estimated 19 facilities that discharge into slow moving water bodies. Based on the same statewide monitoring data, an estimated one third, or approximately 7, would have to also preform compliance monitoring.

The estimated additional miles of vehicle use was calculated with the following assumptions. Combining the estimated number of facilities that would need to perform compliance monitoring to meet the tribal subsistence beneficial use, the sport fish, and the wildlife beneficial uses in slow moving waters gives us an estimated 15 facilities that will need to perform routine monitoring. The 15 facilities sample quarterly and transport samples 100 miles one way (200 miles of vehicle use to return the vehicle to the starting location). The added miles were calculated by multiplying 15 facilities, times four samples per year, times 200 miles, which equates to 12,000 total additional miles per year.

<u>7.2.9 Wastewater Treatment Plants and Industrial Dischargers – Requirements for Tribal Subsistence Fishing Water Quality Objectives in discharges to slow moving waters.</u>
For waste water and industrial discharges into slow moving water bodies where the tribal subsistence fishing beneficial use has been designated as a beneficial use, the Provisions recommend a water column concentration of 1 ng/L for determining reasonable potential and as

objective value used to calculate effluent limitations for the Tribal Subsistence Water Quality Objective.

In the North Coast Water Board, the Native American Culture beneficial use is designated to many water bodies. Some of these water bodies may be considered “slow moving waters.” However, because no waters have been designated with the subsistence fishing beneficial use, the Water Board would need to designate the beneficial use, and then the Permitting Authority would need to make the determination if the discharge is into a slow moving water, it is not possible to determine how many wastewater and industrial discharges would need to meet the 1 ng/L threshold in their effluent. Although some of the waters designated with the Native American Culture beneficial use include bays, estuaries, and sloughs, most of these waters are in areas without wastewater or industrial discharges. However, there are some wastewater and industrial discharges into slower waters around Humboldt Bay.

Wastewater Treatment/Industrial Facility Upgrades

It is anticipated that major facility upgrades may be needed for some facilities to achieve the effluent limitations for the Tribal Subsistence Fishing Water Quality Objective in slow flowing water bodies. The effluent limitation could be about 50 times more stringent than previous effluent limitations (1 ng/L vs. 50 ng/L), so it would be very difficult for some dischargers to continue to meet this limit on an annual basis. Recent data from discharger self-monitoring reports indicates that about 73 percent of all discharges to waters included in the geographic scope of the Provisions exceeded 1 ng/L, based on 2009 – 2015 data (Appendix N). This data indicates that there is a good chance that the effluent limitation of 1 ng/L would cause a facility to upgrade. However, if the Water Board exercises its discretion to allow dilution credits, the objective would be much more achievable. It is not possible to predict how many facility upgrades may be needed to achieve the Tribal Subsistence Fishing Water Quality Objective in slow-moving water bodies. Most tertiary plants with nitrification and denitrification processes have mercury concentrations less than 4 ng/L (annual average) in the effluent because the enhanced filtration maximizes removal of suspended solids (Central Valley Water Board 2010a). Secondary treatment facilities do not achieve concentrations below 4 ng/L mercury in the effluent, since such technology is not designed to achieve a level of mercury this low. Facilities with only secondary treatment would most likely need to build additional infrastructure to be able to meet an effluent limitation of 4 ng/L or lower which would be required to meet future effluent limits based on future designations for SUB or T-SUB. Current data from discharger self-monitoring reports indicate that about 27 percent of all discharges to inland surface waters, enclosed bays and estuaries, that are not included in an existing mercury TMDL, exceed the 4 ng/L threshold, based on 2009 – 2015 data (Appendix N). Therefore, it is likely that about 27 percent of facilities assigned an effluent limitation of 4 ng/L would likely need to take action to improve their treatment process. In addition should future designations of SUB or T-SUB to slow moving waters require effluent limits below 1 ng/L, the Water Boards may use compliance schedules, site-specific objectives (with extended compliance schedules), TMDLs, or variances if the effluent limitation is unachievable. In cases where variances are adopted, it is anticipated that the Water Boards would require the implementation of source control measures and tertiary treatment as a condition of the variance. (See 40 CFR § 131.14 (water quality standards variances).) Additionally, some facilities that are close to meeting the 1ng/L may only need to implement a mercury minimization plan.

Mercury Minimization Program

A Mercury Minimization Program (described in Section 7.2.7) may be used by some facilities that are not able to achieve the effluent limitation consistently. Therefore, the effluent limitation may result in an increase in vehicle use, lab supply use, and waste generation.

Mercury Monitoring

Additional monitoring by wastewater treatment plants and industrial dischargers would be required for those facilities with a mercury effluent limitation. Because the reasonable potential analysis for the tribal Subsistence Fishing Water Quality Objective in slow moving water bodies is the most stringent (1ng/L vs 4 ng/L or 12 ng/L), it is anticipated that a far greater percent of facilities discharging into waters would have new monitoring requirements. This would result in an increase in vehicle use, lab supply use, and waste generation.

7.2.10 Wastewater Treatment Plants and Industrial Dischargers – Requirements for Subsistence Fishing Water Quality Objectives in discharges to any waters and any of the Mercury Water Quality Objectives (Sports Fish, Prey Fish, Tribal Subsistence Fishing and Subsistence Fishing) for Discharges to Lakes and Reservoirs.

When the subsistence beneficial use is designated to any water body, or where waste water or industrial dischargers are discharging into a lake or reservoir, the effluent limit for mercury should be determined on a case-by-case basis.

It would be difficult to determine an appropriate water column concentration for the Subsistence Water Quality Objective, because it is a narrative objective and the fish tissue target is not specified. The Permitting Authority may require a site-specific study to determine the appropriate mercury fish tissue concentration and then use the appropriate BAF for the water body type to determine the mercury water column concentration effluent limit.

If the U.S. EPA BAF for lakes is applied to the Sport Fish Water Quality Objective, the resulting effluent limit is around 1 ng/L. However, the U.S. EPA data was for lakes mostly outside of California; only one lake was in California. Unlike with flowing waters, a California-specific study was not conducted to confirm whether the U.S. EPA BAF for lakes is appropriate for California. Therefore, the appropriate mercury effluent limit for discharges into lakes and reservoirs would need to be determined on a case-by-case basis.

Wastewater Treatment/Industrial Facility Upgrades

It is anticipated that major facility upgrades may be needed for some facilities to achieve the mercury effluent limitations for the Subsistence Fishing Water Quality Objective, the

Tribal Subsistence Fishing Water Quality Objective, or for any discharges into lakes or reservoirs. Because these effluent limits are determined on a case-by-case basis, it is difficult to know how stringent they will be. However, if the Water Board exercises its discretion to allow dilution credits, the objective would be much more achievable.

No waters have been designated with a subsistence fishing beneficial use and it is difficult to anticipate which waters may be designated in the future. If, in the future, waters are designated with the subsistence fishing beneficial use, it is possible that it would lead to facility upgrades for facilities discharging to those waters. If it possible that the Water Board may grant dilution credits, which would help make any effluent limits more achievable.

Currently there are twelve wastewater and industrial discharges to lakes and reservoirs in California. Six of these discharges are to impaired waters. For impaired waters, a TMDL may grant load allocations, which can include a more manageable, load-based, effluent limit. For the six discharges to an unimpaired lake or reservoir (or future discharges), the Water Board would need to determine the most appropriate effluent limit based on site-specific factors.

Facilities with only secondary treatment would most likely need to build additional infrastructure to be able to meet an effluent limitation of 4 ng/L or lower which would be required to meet future effluent limits based on future designations for SUB or T-SUB. Current data from discharger self-monitoring reports indicate that about 27 percent of all discharges to inland surface waters, enclosed bays and estuaries, that are not included in an existing mercury TMDL, exceed the 4 ng/L threshold, based on 2009 – 2015 data (Appendix N). Therefore, it is likely that about 27 percent of facilities assigned an effluent limitation of 4 ng/L would likely need to take action to improve their treatment process. In addition should future designations of SUB or T-SUB to slow moving waters require effluent limits at or below 1 ng/L the Water Boards may use compliance schedules, site-specific objectives (with extended compliance schedules), TMDLs, or variances if the effluent limitation is unachievable. In cases where variances are adopted, it is anticipated that the Water Boards would require the implementation of source control measures and tertiary treatment as a condition of the variance. (See 40 CFR § 131.14 (water quality standards variances).) Additionally, some facilities that are close to meeting the 4 ng/L may only need to implement a mercury minimization plan.

<u>Mercury Minimization Program</u>

A Mercury Minimization Program (described in Section 7.2.7) may be used by some facilities that are not able to achieve the effluent limitation consistently. Therefore, the effluent limitation may result in an increase in vehicle use, lab supplies and waste generation.

<u>Mercury Monitoring</u>

Additional monitoring by wastewater treatment plants and industrial dischargers would be required for those facilities with mercury effluent limitations. Because the reasonable potential analysis is based on an currently unknown effluent limit for the Subsistence Fishing Water Quality Objective, which would be determined on a case-by-case basis, and because it is not known where the subsistence fishing beneficial use may be designated, it is not possible to predict the amount of additional mercury monitoring that would be required for the Subsistence Fishing Water Quality Objective.

8 Environmental Effects

8.1 Introduction

In accordance with Public Resources Code, section 21080.5, subdivision (c), the Water Boards' Water Quality Control/208 Planning Program has been certified as an exempt regulatory program by the Secretary for Natural Resources (Cal. Code Regs., tit. 14, § 15251, subd. (g); *id*., tit. 23, § 3775). The certification means the Water Boards are exempt from having to develop an environmental impact report because the environmental analysis is contained in substitute environmental documentation (SED). Chapter 27 of the California Code of Regulations (beginning with section 3720) contains the Water Boards' regulations for implementing the California Environmental Quality Act (CEQA) (Pub. Resources Code, § 21000, et seq.) (referred to as the certified regulatory program). The Water Boards' certified regulatory program incorporates the CEQA Guidelines (Cal. Code Regs., tit. 14, div. 6, ch. 3 (commencing with section 15000). The State Water Board's SED must contain an environmental analysis of its proposed action. The Staff Report, which contains the SED, is being used to satisfy this requirement.

The Water Boards' certified regulatory program must still comply with CEQA's overall objectives to: inform the decision makers and the public about the potentially significant environmental effects of a proposed project; identify ways that significant adverse environmental impacts may be mitigated; and prevent significant, avoidable adverse environmental impacts by changing the proposed project or requiring mitigation measures. There are certain guiding principles that are contained in the CEQA Guidelines that help to inform the Water Board's certified regulatory process and preparation of the SED:

> Forecasting: Drafting the environmental analysis necessarily involves some degree of forecasting. While foreseeing the unforeseeable is not possible, an agency must use its best efforts to find out and disclose all that it reasonably can (Cal. Code Regs., tit. 14, § 15144).
>
> Speculation: If, after thorough investigation, a lead agency finds that a particular impact is too speculative for evaluation, the agency should note its conclusion and terminate discussion of the impact (Cal. Code Regs., tit. 14, § 15145).
>
> Specificity: The degree of specificity required in the environmental analysis will correspond to the degree of specificity involved in the underlying activity which is described in the Environmental Impact Report (Cal. Code Regs., tit. 14, § 15146.)
>
> Standards for Adequacy: The environmental analysis should be prepared with a sufficient degree of analysis to provide decision makers with information which enables them to make a decision which intelligently takes account of environmental consequences. An evaluation of the environmental effects of a proposed project need not be exhaustive, but the sufficiency the analysis is to be reviewed in the light of what is

reasonably feasible. The courts have looked not for perfection but for adequacy, completeness, and a good faith effort at full disclosure (Cal. Code Regs., tit. 14, § 15151).

This section of the Staff Report identifies and evaluates the potential environmental impacts that may arise from the Provisions and the reasonably foreseeable methods of compliance, and contains the Environmental Checklist. It also discusses mitigation, where applicable, to avoid the identified significant or potentially significant impacts (Cal. Code Regs., tit. 23, § 3777(b)).

8.1.1 Impact Methodology

Any potential environmental impacts associated with the Provisions depend upon the specific compliance methods selected by the complying permittee, most of whom would be public agencies subject to their own CEQA obligations (see Pub. Resources Code, § 21159.2). This document identifies broad mitigation approaches that could be considered at a statewide level. Consistent with Public Resources Code section 21159 and the Water Boards' certified regulatory program, the document does not engage in speculation or conjecture, but rather considers the potential environmental impacts of the Provisions and reasonably foreseeable methods of compliance, the feasible mitigation measures, and feasible alternatives (including alternative methods of compliance) which would meet the project objectives and avoid or reduce the potentially significant impacts of the Provisions.

Within each of the subsections of Section 8.4 below, this document evaluates the potentially significant impacts of the Provisions and each implementation alternative relative to the subject resource area. The implementation alternatives evaluated in this document are evaluated on a statewide level for impacts for each resource area. Project-level analysis is expected to be conducted by the appropriate public agencies prior to implementation of project specific methods of compliance with the Provisions. The environmental analysis in this document assumes that the project specific-methods of compliance with the Provisions would be designed, installed, and maintained following all applicable state and local laws, regulations, and ordinances. Several handbooks are available and currently used by municipal agencies that provide guidance for the selection and implementation of BMPs)(California Stormwater Quality Association 2003a; 2003b, Water Environment Research Foundation 2005, Caltrans 2010).

8.1.2 Level of Analysis

The State Water Board is the lead agency for the proposed Provisions, while the responsible agencies identified in Section 1.4 (Agencies Expected to use this Staff Report in their Decision Making and Permits) may be the lead agency for CEQA compliance for approval and implementation of a project-specific method of compliance with the Provisions.

The State Water Board does not specify the actual methods of compliance by which permittees choose to comply with the Provisions. However, as required by the State Water Board's certified regulatory program, this Staff Report analyzes the potential environmental impacts of the Provisions and the reasonably foreseeable methods of compliance on a statewide level. The specificity of the "activity" described in this Staff Report related to the reasonably foreseeable methods of compliance is of a general nature and the level of analysis of the potentially significant adverse environmental effects is commensurate with that level of detail. At the time of approval of a project-specific compliance project where the detail of the method of compliance is known, a project-level environmental analysis may be performed by the local approval agency.

Project-level impacts of the reasonably foreseeable methods of compliance will necessarily vary depending on the choice of compliance and the size, location, and type of discharger and the environmental resources in and around the project site. It would be speculative to estimate the specific impacts of the Provisions caused by implementation of a project-specific compliance method. It is possible that, at a specific site with particularly sensitive environmental resources, implementation with compliance methods could cause potentially significant impacts as compared to baseline conditions. Since it is speculative to estimate the type, size, and location of any particular compliance method (e.g., type of construction activities and type of resources adversely affected by those activities), this evaluation makes no attempt to quantify the impacts associated with implementation or maintenance of a particular compliance method.

Per the requirements of the State Water Board's certified regulatory program, the resource analysis (Chapters 7 through 9) includes:

- An identification of any significant or potentially significant adverse environmental impacts of the proposed project (Provisions);
- An analysis of reasonable alternatives to the project (Provisions) and mitigation measures to avoid or reduce any significant or potentially significant adverse environmental impacts; and
- An environmental analysis of the reasonably foreseeable methods of compliance, including:
    - An identification of the reasonably foreseeable methods of compliance with the project;
    - An analysis of any reasonably foreseeable significant adverse environmental impacts associated with those methods of compliance;
    - An analysis of reasonably foreseeable alternative methods of compliance that would have less significant adverse environmental impacts; and
    - An analysis of reasonably foreseeable mitigation measures that would minimize any unavoidable significant adverse environmental impacts of the reasonably foreseeable methods of compliance.

(Cal. Code Regs., tit. 23, section 3777, subds. (b)(2)-(b)(4).) The analysis does not include actions that would already be performed according to existing law or policy.

8.2 Environmental Setting

CEQA directs that the environmental setting normally be used as the baseline for determining significant impacts of a proposed project (Cal. Code Regs., tit.14, § 15125, subd. (a)). Chapter 4 and Appendix D present a broad overview of the environmental setting for the state of California related to the Provisions. As such, the environmental setting and baseline for determining impacts is presented at a general level as each of the Water Boards and permittee may address mercury with a range of treatment and institutional controls. This section and the following discussion by resource type (Section 8.4 (The Environmental Checklist)) present additional specific environmental setting information relevant to the assessment of environmental impacts of the Provisions.

In the majority of instances where the discharge of mercury into the aquatic environment is of concern (implicated by the Provisions), such discharges are related to activities currently regulated by other programs. Many of these programs require the implementation of erosion and sediment controls.

Surface Mining and Reclamation Act (SMARA)
At a minimum, surface mining operations must practice: (a) soil erosion control, including facilities such as retarding basins, ditches, streambank stabilization, and diking; (b) water quality and watershed control, including settling ponds or basins to prevent potential sedimentation of streams; and (c) protection of fish and wildlife habitat (Cal. Code Regs., tit. 14, § 3503).

SMARA also provides that reclamation plans required for surface mining include: (a) a description of the manner in which contaminates will be controlled, and mining waste will be disposed; and (b) a description of the manner in which affected streambed channels and stream banks will be rehabilitated to a condition minimizing erosion and sedimentation will occur (Pub. Resources Code, § 2772, subd. (c)(8)).

Mining Waste Management Regulations (State Water Board) (Cal. Code Regs., tit. 27 § 22470 et seq.)
The Regional Water Boards issue WDRs for the discharge of mining wastes which include requirements that facilities be designed, constructed and maintained to prevent surface erosion (Cal. Code Regs., tit. 27, § 22510, subd. (m)).

Caltrans Statewide Storm Water Permit (NPDES No. CAS000003 Order No. 2012-0011-DWQ)
The California Department of Transportation (Caltrans) is responsible for the design, construction, management, and maintenance of the State highway system, including freeways, bridges, tunnels, Caltrans' facilities, and related properties, and is subject to the permitting requirements of Clean Water Act section 402(p). Caltrans' discharges consist of storm water and non-storm water discharges from State owned rights-of-way. The Caltrans permit regulates all discharges from Caltrans MS4s, maintenance facilities, and construction activities. Caltrans' Storm Water Management Plan (SWMP) describes the procedures and practices used to reduce or eliminate the discharge of pollutants to storm drainage systems and receiving waters. The SWMP includes BMPs to be incorporated into projects for the control of erosion and

sedimentation. Since erosion from roads is a significant source of nutrients, mercury, and sediment, Caltrans controls the discharge of sediment to address these pollutants.

Construction Storm Water General Permit (NPDES No. CAS000002*, Order No. 2009-0009-DWQ)*
Dischargers whose projects disturb one or more acres of soil or whose projects disturb less than one acre but are part of a larger common plan of development that in total disturbs one or more acres, are required to obtain coverage under the Construction General Permit. Dischargers covered under the Construction General Permit are required, at a minimum, to implement effective wind erosion control; provide effective soil cover for inactive areas and all finished slopes, open space, utility backfill, and completed lots; establish and maintain effective perimeter controls and stabilize all construction entrances and exits to sufficiently control erosion and sediment discharges; and, where sediment basins are used, dischargers shall, at a minimum, design sediment basins according to the method provided in the California Stormwater Quality Association's Stormwater Best Management Practice Handbook Portal: Construction (California Stormwater Quality Association 2003c).

Dischargers at higher risk levels are also required to: implement appropriate erosion control BMPs in conjunction with sediment control BMPs for areas under active construction; apply linear sediment controls along the toe of the slope, face of the slope, and at the grade breaks of exposed slopes; ensure that construction activity traffic to and from the project is limited to entrances and exits that employ effective controls to prevent offsite tracking of sediment; ensure that all storm drain inlets and perimeter controls, runoff control BMPs, and pollutant controls at entrances and exits are maintained and protected from activities that reduce their effectiveness; and, inspect on a daily basis all immediate access roads. At a minimum daily (when necessary) and prior to any rain event, the discharger shall remove any sediment or other construction activity related materials that are deposited on the roads

Industrial Storm Water General Permit (NPDES No. CAS000001, Order No*. 2014-0057-DWQ)*
Similar to the Construction General Permit, the Industrial General Permit requires dischargers to: implement effective wind erosion controls; provide effective stabilization for inactive areas, finished slopes, and other erodible areas prior to a forecasted storm event; maintain effective perimeter controls and stabilize all site entrances and exits to sufficiently control erodible materials from discharging or being tracked off the site; divert run-on and storm water generated from within the facility away from all erodible materials; and, if sediment basins are implemented, ensure compliance with the design storm standards.

Phase II Small MS4 Storm Water General Permit (NPDES General Permit No. S000004, Order No. 2013-0001-DWQ)
Permittees subject to the Phase II Small MS4 Permit, generally cities with a population less than 100,000 and other "non-traditional" facilities such as parks and schools, are required to develop a construction site storm water runoff control ordinance that includes, at a minimum, requirements for erosion and sediment controls, soil stabilization, dewatering, source controls, pollution prevention measures and prohibited discharges. The Phase II Small MS4 Permit also

provides that: (a) Prior to issuing a grading or building permit, the Permittee shall require each operator of a construction activity within its jurisdiction to prepare and submit an erosion and sediment control plan for the Permittee's review and written approval. The Permittee shall not approve any erosion and sediment control plan unless it contains appropriate site-specific construction site BMPs that meet the minimum requirements of the Permittee's construction site storm water runoff control ordinance. If the erosion and sediment control plan is revised, the Permittee shall review and approve those revisions; and, (b) Require that the erosion and sediment control plan include the rationale used for selecting BMPs including supporting soil loss calculations, if necessary.

Grading and Erosion Prevention Ordinances
Local jurisdictions have adopted grading ordinances that include erosion control requirements to protect watercourses and adjacent property (e.g., the grading and erosion prevention ordinance of Placer County (Placer Co., Ord. 5056-B (part), 2000)).

Ban on Disposal of Hazardous Waste and Universal Waste in Trash
As of February 9, 2006 all universal waste items are banned from the trash because they cannot be safely disposed in class three landfills (landfills that accept municipal solid waste). Mercury containing items, such as thermostats, thermometers, electronic switches and relays, mercury gages, and fluorescent lamps and tubes are classified as either universal waste or hazardous waste and are not allowed to be disposed in the regular trash per California's Universal Waste Rule (DTSC 2010). Most cities and counties in California have either established household hazardous waste collection programs or participate in regional household hazardous waste collection programs. These household hazardous waste collection programs also accept universal waste including mercury containing items. Each jurisdiction in California is required to complete and submit an annual report to CalRecycle to provide data on the amount of household hazardous waste collected by local programs and the methods for managing these waste streams (CalRecycle 2016).

8.3 Summary of potential environmental impacts

Section 8.4 contains the Environmental Checklist and the environmental analysis (by resource type) of the proposed Provisions.

The environmental analysis (Sections 8.4 through 8.7) found that the resource areas that may have potentially significant impacts are:

- Biological Resources (Section 8.4.4)
- Geology/Soils (Section 8.4.6)
- Greenhouse Gas Emissions (Section 8.4.7)
- Noise and Vibration (Section 8.4.12)
- Public Services (Section 8.4.14)
- Utilities/Service Systems (Section 8.4.17)

The methods of compliance that are anticipated to have the greatest potential to cause a direct or indirect physical change in the environment and cause the potentially significant impacts to the resources areas listed above are:

Wastewater Treatment/Industrial Facility Upgrades
Although unlikely, it is possible that the implementation of the effluent limitations for the Sport Fish Water Quality Objective, the Prey Fish Water Quality Objective, or the California Least Tern Prey Fish Water Quality Objective could necessitate facility upgrades in order to comply with the water quality objectives. Effluent limitations for the Subsistence Fishing Water Quality Objective and Tribal Subsistence Fishing Water Quality Objective are much more likely to necessitate facility upgrades. However, Regional Water Boards have not designated Subsistence Fishing or Tribal Subsistence Fishing beneficial uses to any waters in California, so it is difficult to predict where those beneficial uses may be designated and if they would have an impact on any wastewater treatment or industrial facilities requiring upgrades (but see Section XX, which acknowledges that the North Coast Regional Water Board has designated numerous waters with the Native American Culture beneficial use). Wastewater Treatment/Industrial Facility Upgrades would involve earth moving, construction activities, and heavy vehicle/equipment use. Depending on the location and specifics of the upgrade, various construction activities resulting from such upgrades could potentially significantly impact biological resources, geological resources, greenhouse gas emissions, noise, and utilities and service systems (described more in detail in Section 8.4).

Sediment Controls
Sediment control projects may vary wildly in the size and the resulting impact. Substantial Sediment Control projects, such as re-contouring hillsides, would involve earth moving activities and use of heavy vehicles and equipment. These activities could create potentially significant impacts to biological resources, geological and soils resources, noise and vibration, and utilities and service systems (described more in detail in Section 8.4).

Cumulative Impacts to Greenhouse Gases
Many of the reasonably foreseeable methods of compliance could increase vehicle use and result in impacts to greenhouse gases. For the individual methods of compliance, these impacts are anticipated to be less than significant, but the impacts are not easy to estimate. The impacts would occur throughout the state and the total contribution to greenhouse gas emission would be the sum of all emissions throughout the state. Impacts may also continue indefinitely. The global warming effects from greenhouse gases are from emissions from all location though the world, over long time periods. There is the potential that the impact to greenhouse gas emission from all of the Provisions' reasonably foreseeable methods of compliance could be cumulatively considerable (see Section 8.4.7). When considering other Water Board projects

cumulatively with the Provisions, the increase in vehicle use and result in increased greenhouse gas emissions, then the impact to greenhouse gases is also cumulatively considerable (see Section 8.7).

Table 8-1 identifies the Provisions' primary elements and summarizes any related reasonably foreseeable methods of compliance and the actions that could have potential significant impacts. Table 8-1 also provides a brief assessment of whether significant environmental impact is anticipated.

Table 8-1. Methods of Compliance

Provisions' Element/Requirement	Reasonably Foreseeable Method of Compliance*	Activities from method of compliance with possible environmental impacts	Impact Assessment
Beneficial use definitions (CUL, T-Sub, and SUB)	None	Not applicable	Not applicable
Mercury Water Quality Objectives	None	Not applicable	Not applicable
Mercury Water Quality Objectives- Implementation: **Mines**	Increased Sediment Controls	• Unknown increase in vehicle use, • Possibly earth moving, • Possibly re-contouring landscape and revegetation • Possibly construction	POTENTIALLY SIGNIFICANT IMPACT(Geology/Soils; Biological Resources/
Mercury Water Quality Objectives- Implementation: **Nonpoint Sources**	Increased Sediment Controls	• Unknown increase in vehicle use, • Possibly earth moving, • Possibly re-contouring and revegetation, • Possibly construction	POTENTIALLY SIGNIFICANT IMPACT
Mercury Water Quality Objectives- Implementation: **Dredging**	Alternative Dredging Procedures; Increased Mercury Monitoring (Aqueous)	• Unknown increase in vehicle use • Laboratory supplies and waste • Heavy vehicle/equipment use	No potentially significant impact
Mercury Water Quality Objectives- Implementation: **Wetlands** (projects that establish or restore wetlands)	Wetland Design Features or Management Measures to Reduce Methylation	• Possibly heavy vehicle/ equipment use, • Earth moving, • Possibly re-contouring landscape and revegetation	No potentially significant impact

Provisions' Element/Requirement	**Reasonably Foreseeable Method of Compliance***	**Activities from method of compliance with possible environmental impacts**	**Impact Assessment**
Mercury Water Quality Objectives-Implementatio: **Storm water: Municipal (MS4s)**	Small increase in Waste Collection and Education	• Possibly vehicle use	No potentially significant impact
	Small increase in Educating Auto Dismantlers	• Possibly vehicle use	No potentially significant impact
	Internal Surveys	• (In house activity)	No impact
	Small increase in Sediment Controls	• Unknown increase in vehicle use, • Possibly earth moving, • Possibly re-contouring and revegetation, • Possibly construction	POTENTIALLY SIGNIFICANT IMPACT
Mercury Water Quality Objectives-Implementation**:** **Storm water: Industrial Activities**	Small increase in Mercury Monitoring (Aqueous); Exceedance Response Actions	• Small Increase in vehicle use • Laboratory supplies and waste, • (In house activity)	No potentially significant impact
Mercury Water Quality Objectives-Implementation: **Wastewater treatment plants and industrial dischargers**	Relatively few Wastewater Treatment/Industrial Facility Upgrades	• Possibly vehicle use, • Heavy vehicle/equipment use, • Construction, • Earth moving	POTENTIALLY SIGNIFICANT IMPACT
	Small increase in Mercury Pollution Prevention	• Vehicle use • Laboratory supplies and waste	No potentially significant impact
	Increased Mercury Monitoring (Aqueous)	• Vehicle use • Laboratory supplies and waste	No potentially significant impact

*Each method of compliance is described in Chapter 7

8.4 Environmental Factors potentially affected (ENVIRONMENTAL CHECKLIST)

8.4.1 AESTHETICS

Would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☑	☐
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☑	☐
c) Substantially degrade the existing visual character or quality of the site and its surroundings?	☐	☐	☑	☐
d) Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area?	☐	☐	☐	☑

Impacts and Mitigation

Reasonably foreseeable methods of compliance should not affect lighting.

Wastewater Treatment/Industrial Facility Upgrades

Existing wastewater treatment/industrial facilities may need to be upgraded in order to comply with the proposed effluent limitations. However, this is only likely to occur in previously developed areas. Therefore, it is unlikely that the aesthetics of the natural environment or scenic vistas would be adversely affected by improvements to existing infrastructure.

Sediment Controls

Land alterations may occur if sediment control structures are employed to prevent sediments in urban runoff from running directly into streams or other water bodies. This is expected to cause minimal land alteration and it is unlikely that the aesthetics of the natural environment would be significantly adversely affected.

Sediment controls that are part of mine closure activities would likely result in physical changes to the landscape at the project site. Reasonably foreseeable changes may include altered topography, slope terracing, and exposure of soils during grading and construction, and long-term changes in vegetation. These changes may be noticeable to nearby residents, workers, and visitors. However, given that the mine sites have been extensively altered and modified by mining, coupled with the subtle nature of the changes, impacts to scenic vistas would be minimal. In fact, mine remediation can improve the aesthetics of a landscape that is scared from mining. Furthermore, replanting and monitoring should be required for all mining waste cleanup projects, to continue to prevent erosion. These actions would also mitigate negative effects to aesthetics. Growth of new vegetation would lessen the impact of visual changes in the landscape. Therefore, visual impacts on scenic vistas should be less than significant.

Summary
Compliance with the Provisions is anticipated to have a less than significant effect on aesthetics.

8.4.2 AGRICULTURAL AND FOREST RESOURCES

In determining whether impacts to agricultural resources are significant environmental impacts, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board.

Would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping & Monitoring Program of the California Resources Agency, to non-agricultural uses?	☐	☐	☐	☑
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☑
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)) or timberland (as defined by Public Resources Code section 4526)?	☐	☐	☐	☑
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☑
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☑

Impacts and Mitigation

The Provisions would not affect agriculture or farmland as the Provisions do not alter zoning laws or require conversions to different land uses. The Provisions may result in the use of sediment controls on forest lands, but this action is not anticipated to inhibit the use of the land for forestry.

Summary
There are no foreseeable impacts on agricultural or forest resources.

8.4.3 AIR QUALITY

Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations.

Would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☐	☑
b. Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	☐	☐	☑	☐
c. Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☑	☐
d. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors)?	☐	☐	☑	☐
e. Create objectionable odors affecting a substantial number of people?	☐	☐	☑	☐

Background

State Law

The California Air Resources Board (ARB) is a board within the California Environmental Protection Agency that coordinates local, state and federal air pollution control programs in California. In 1988, the State Legislature adopted the California Clean Air Act (Health & Safety Code, § 39000 et seq.), which established a statewide air pollution control program. The California Clean Air Act's requirements include annual emission reductions, increased development and use of low emission vehicles, and submittal of air quality attainment plans by air districts. The ARB has established state ambient air quality standards, also shown in Table 8.2. Additionally, the ARB has established state standards for pollutants that have no federal ambient air quality standard, including sulfate, visibility, hydrogen sulfide, and vinyl chloride.

The ARB has established state ambient air quality standards to identify outdoor pollutant levels considered safe for the public. Ambient air quality standards define clean air, and are established to protect even the most sensitive individuals in our communities. An air quality standard defines the maximum amount of a pollutant that can be present in outdoor air without harm to the public's health. In addition to state standards, the federal Clean Air Act (42 U.S.C. § 7401, et seq.) requires U.S. EPA to set national ambient air quality standards (federal standards or national standards). The ARB makes area designations for ten pollutants: ozone, suspended particulate matter (PM10 and PM2.5), carbon monoxide, nitrogen dioxide, sulfur dioxide, sulfates, lead, hydrogen sulfide, and visibility reducing particles.

After state standards are established, state law requires the ARB to designate each area as attainment, nonattainment, or unclassified for each state standard. The area designations, which are based on the most recent available data, indicate the healthfulness of air quality throughout the state. Classifications determine the applicability and minimum stringency of pollution control requirements.

The gaseous criteria pollutants, particulate matter, and toxic air contaminants, and the associated adverse health effects of these air quality contaminants are summarized below. Daily emissions and pollutant concentrations are used to quantify air pollution. The term "emissions" means the quantity of pollutant released into the air and has units of pounds per day (lbs /day). The term "concentrations" means the amount of pollutant material per volumetric unit of air and has units of parts per million (ppm) or micrograms per cubic meter ($\mu g/m^3$).

Carbon Monoxide

Exposure to high concentrations of carbon monoxide, a colorless and odorless gas, reduces the oxygen-carrying capacity of the blood, and therefore can cause dizziness and fatigue, impair central nervous system functions, and induce angina in persons with serious heart disease. Carbon monoxide is emitted almost exclusively from the incomplete combustion of fossil fuels. In urban areas, motor vehicles, power plants, refineries, industrial boilers, ships, aircraft, and trains emit carbon monoxide. Motor vehicle exhaust releases most of the carbon monoxide in urban areas. Vehicle exhaust contributes approximately 56 percent of all carbon monoxide emissions nationwide and up to 95 percent in cities. Carbon monoxide is a reactive air pollutant that dissipates relatively quickly. As a result, ambient carbon monoxide concentrations generally follow the spatial and temporal distributions of vehicular traffic. Carbon monoxide concentrations are influenced by local meteorological conditions; primarily wind speed, topography, and atmospheric stability. Carbon monoxide from motor vehicle exhaust can become locally concentrated when surface-based temperature inversions combine with calm atmospheric conditions.

Ozone

While ozone serves a beneficial purpose in the upper atmosphere (stratosphere) by reducing potentially harmful ultraviolet radiation, elevated ozone concentrations in the lower atmosphere can be harmful to humans and to sensitive species of plants. Short-term ozone exposure can reduce lung function and increase an individual's susceptibility to respiratory infection. Long-term exposure can impair lung defense mechanisms and lead to emphysema and/or chronic bronchitis. Ozone concentrations build to peak levels during periods of light winds or stagnant air, bright sunshine, and high temperatures. Ideal conditions for high ozone production occur during summer and early autumn. Sensitivity to ozone varies among individuals. About 20 percent of the population is sensitive to ozone, with children being particularly vulnerable, especially during exercise. Ozone is formed in the atmosphere by a complex series of chemical reactions under sunlight that involve "ozone precursors." Ozone precursors are categorized into two families of pollutants: oxides of nitrogen and reactive organic compounds. Oxides of nitrogen and reactive organic compounds are emitted from a variety of stationary and mobile sources. While oxides of nitrogen are considered a criteria pollutant, reactive organic compounds are not in this category, but are included in this discussion as ozone precursors. Ozone is the chief component of urban smog and the damaging effects of photochemical smog generally relate to the concentration of ozone. Meteorology and terrain play major roles in ozone formation. The greatest source of smog producing gases is the automobile.

Nitrogen Dioxide

The major health effect from exposure to high levels of nitrogen dioxide is the risk of acute and chronic respiratory disease. Like ozone, nitrogen dioxide typically is not directly emitted, but it is formed through a rapid reaction between nitric oxide and atmospheric oxygen. Nitric oxide and nitrogen dioxide are collectively called "oxides of nitrogen" and are major contributors to ozone formation. Nitrogen dioxide also contributes to the formation of respirable particulate matter (see discussion of particulate matter below) and fine particulate matter through the formation of nitrate compounds. At atmospheric concentrations, nitrogen dioxide is only potentially irritating. In high concentrations, the result is a brownish-red cast to the atmosphere and reduced visibility.

Sulfur Dioxide

The major health effects from exposure to sulfur dioxide are acute and chronic respiratory disease. Exposure may cause narrowing of the airways, which may cause wheezing, chest tightness, and shortness of breath. Sulfur dioxide can also react with water in the atmosphere to form acids (or "acid rain"), which can cause damage to vegetation and man-made materials. The main sources of sulfur dioxide are coal and fuel oil combustion in power plants and industries, as well as diesel fuel combustion in motor vehicles. Generally, the highest levels of sulfur dioxide are found near large industrial complexes. In recent years, sulfur dioxide concentrations have been reduced by the increasingly stringent controls placed on stationary source emissions of sulfur dioxide and by limiting the sulfur content in fuel. Sulfur dioxide concentrations in southern California have been reduced to levels well below the state and national ambient air quality standards, but further reductions in emissions are needed to attain compliance with ambient air quality standards for sulfates, respirable particulate matter, and fine particulate matter, to which sulfur dioxide is a contributor.

Particulate Matter

Particulate matter pollution consists of very small liquid and solid particles in the air, which can include smoke, soot, dust, salts, acids, and metals. Particulate matter also forms when gases emitted from industries and motor vehicles undergo chemical reactions in the atmosphere. Regulated particulate matter is classified as respirable particulate matter, or inhalable particulate matter less than ten micrometers in diameter. Respirable particulate matter has been subdivided into to sub-categories, coarse and fine fractions, where the coarse fraction is between 10 and 2.5 micrometers in diameter and the fine fraction is less than 2.5 micrometers in diameter. Major sources of coarse and fine respirable particulate matter include crushing or grinding operations; dust stirred up by vehicles; wood-burning stoves and fireplaces; dust from construction, landfills, and agriculture; wildfires and brush/waste burning; industrial sources; windblown dust from open lands; and atmospheric chemical and photochemical reactions. Fine particulate matter is generated from fuel combustion (e.g., from motor vehicles, power generation, and industrial facilities), residential fireplaces, and wood stoves. In addition, fine particulate matter can be formed in the atmosphere from gases such as sulfur dioxide, oxides of nitrogen, reactive organic compounds, and ammonia, and elemental carbon.

The health effects from long-term exposure to high concentrations of particulate matter are increased risk of chronic respiratory disease like asthma and altered lung function in children. Coarse particulate matter tends to collect in the upper portion of the respiratory system. Fine particulate matter is so small that it can penetrate deeper into the lungs and damage lung tissues. Fine particulate matter can be absorbed into the bloodstream and cause damage elsewhere in the body. Short-term exposure to high levels of particulate matter has been shown to increase the number of people seeking medical treatment for respiratory distress, and to increase mortality among those with severe respiratory problems. Particulate matter also results in reduced visibility.

Toxic Air Contaminants

Toxic air contaminants include air pollutants that can produce adverse public health effects, including carcinogenic effects, after long-term (chronic) or short-term (acute) exposure. One source of toxic air contaminants is combustion of fossil fuels or digester gas. Human exposure occurs primarily through inhalation, although non-inhalation exposure can also occur when toxic air contaminants in particulate form deposit onto soil and drinking water sources and enter the food web or are directly ingested by humans. Many pollutants are identified as toxic air contaminants because of their potential to increase the risk of developing cancer. For toxic air contaminants that are known or suspected carcinogens, it has been found that there are no levels or thresholds below which exposure is risk free. No ambient air quality standards exist for almost all toxic air contaminants, except for standards for lead, hydrogen sulfide, and vinyl chloride that are provided in California Ambient Air Quality Standards. Instead, numerous national, state, and local rules that affect both stationary and mobile emission sources regulate emissions of toxic air contaminants emission. Individual toxic air contaminants vary greatly in the risk they present. At a given level of exposure, one toxic air contaminant may pose a hazard that is many times greater than another. Where data are sufficient to do so, a “unit risk factor” can be developed for cancer risk. The unit risk factor expresses assumed risk to a hypothetical population, the estimated number of individuals in a million who may develop cancer as the result of continuous, lifetime (70-year) exposure to one $\mu g/m^3$ of the toxic air contaminants. Unit risk factors provide a standard that can be used to establish regulatory thresholds for permitting purposes. This is, however, not a measure of actual health risk to a real-world population because actual populations do not experience the extent and duration of exposure that the hypothetical population is assumed to experience. For non-cancer health effects, a similar factor called a Hazard Index is used.

Federal Law

The U.S. EPA is the federal agency charged with administering the federal Clean Air Act (42 U.S.C. § 7401 et seq.), which established a number of requirements. The U.S. EPA oversees state and local implementation of federal Clean Air Act requirements. The Clean Air Act requires the U.S. EPA to approve State Implementation Plans to meet and/or maintain the national ambient standards. The federal (and California) ambient air quality standards are shown in 8-2.

Table 8-2. Federal and California Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards	Federal Standards	
			Primary	Secondary
Ozone	1 Hour	0.09 ppm (180 $\mu g/m^3$)	-	Same as Primary Standard
	8 Hour	0.070 ppm (137 $\mu g/m^3$)	0.075 ppm (147 $\mu g/m^3$)	
Respirable Particulate Matter	24 Hour	50 $\mu g/m^3$	150 $\mu g/m^3$	Same as Primary Standard
	Annual Arithmetic Mean	20 $\mu g/m^3$	-	
Fine Particulate Matter	24 Hour	No Separate State Standard	35 $\mu g/m^3$	35 $\mu g/m^3$
	Annual Arithmetic Mean	12 $\mu g/m^3$	12.0 $\mu g/m^3$	15.0 $\mu g/m^3$
Carbon Monoxide	1 Hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)	-
	8 Hour	9.0 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m^3)	-	-
Nitrogen Dioxide	Annual Arithmetic Mean	0.030 ppm (57 $\mu g/m^3$)	0.053 ppm (100 $\mu g/m^3$)	Same as Primary Standard
	1 Hour	0.18 ppm (339 $\mu g/m^3$)	100 ppm (188 $\mu g/m^3$)	-
Sulfur Dioxide	Annual Arithmetic Mean	-	0.030 ppm	-
	24 Hour	0.04 ppm (105	0.14 ppm (365	-

		µg/m^3)	µg/m^3)	
	3 Hour	-	-	0.5 ppm (1300 µg/m^3)
	1 Hour	0.25 ppm (655 µg/m^3)	75 ppb (195 µg/m^3)	-
Lead	30 Day Average	1.5 µg/m^3	-	-
	Calendar Quarter	-	1.5 µg/m^3	Same as Primary Standard

Local Regulations
There are 35 local air districts within California. Each district (referred to as either an Air Pollution Control District or an Air Quality Management District) is responsible for controlling emissions, primarily from stationary sources of air pollution, within their area. Each district develops and adopts an Air Quality Management Plan, which serves as the blueprint to bring their respective areas into compliance with federal and state clean air standards. Rules are adopted to reduce emissions from various sources.

Impacts

<u>Sediment Controls</u>
Air emissions that could result from sediment controls installed for mine closure projects or related to the requirements nonpoint source dischargers would be related to grading and earth moving (dust and vehicle exhaust) and vehicle use for installing vegetation. Previous Water Board analyses described in the Guadalupe River Watershed Mercury TMDL (San Francisco Bay Water Board 2008) found that particulate matter (PM10) is the pollutant of greatest concern with respect to construction. PM10 emissions can result from a variety of construction activities, including excavation, grading, vehicle travel on paved and unpaved surfaces, and vehicle and equipment exhaust. Temporary emissions of carbon monoxide, ozone precursors, and other vehicle exhaust byproducts would also be generated from heavy construction equipment.

Although this impact should be less than significant, the mitigation measures at the end of this section should be included in orders issued by the Water Boards.

<u>Wetland Features or Measures to Reduce Methylation</u>
Similar to effects described above from sediment controls, the Wetland Features or Measures to Reduce Methylation could cause a temporary increase in the use of heavy vehicles or heavy equipment and earth moving and grading. Vehicle use can releases a number of pollutants and particles into the air as described above. The provisions do not alter where a wetland project is created, rather the Provisions may prompt a different design for the wetland project. Heavy vehicle use and earth movement would likely occur with or without the Provisions, but the Provisions could cause an increase in heavy vehicle use to create specific landscape features, such as a settling pond. The increase in this activity from the Provisions is not anticipated to be significant compared to the vehicle use that would otherwise be used to build the wetland.

Although potential impacts to air quality should be less than significant, mitigation measures are provided at the end of this section that can reduce impacts to air quality.

Wastewater Treatment/Industrial Facility Upgrades

The construction of wastewater treatment and industrial facility upgrades would have a similar impact on air quality as sediment control (described above) from the construction activities (heavy vehicle use and earth moving) and similar mitigation measures (described below) could be used to reduce the pollutants, dust and fine particles.

Alternative Dredging Procedures

For dredging activities, the Provisions could result in different procedures being used that increase the use of heavy vehicles or heavy equipment. If dredged material must be disposed of at a site further away, there would likely be an increase the use of the heavy vehicles. This in turn could release more emissions to the air. However, it is difficult to determine how much change there will be from existing methods, since heavy vehicles and equipment would already have been used for dredging. It is also uncertain how many locations would be affected. Specific calculations of the added emissions would be too speculative.

Mercury Monitoring (Aqueous)

Aqueous mercury monitoring is required for wastewater treatment plants and industrial dischargers for compliance with the effluent limitation. Impacts to air quality would be the result of increased vehicle use for the transport of samples and personnel. Vehicle use can release a number of pollutants into the air as described above.

For the Sport Fish Water Quality Objective, it is likely that few facilities would need to monitor mercury routinely. On the other hand, for the Subsistence Fishing Water Quality Objective and Tribal Subsistence Fishing Water Quality Objective, the effluent limitations would be more stringent and more facilities would likely be required to monitor mercury in the effluent. However, requirements for the Subsistence Fishing Water Quality Objective and Tribal Subsistence Fishing Water Quality Objective would not apply to very many dischargers within the next 5 to 10 year or until the Water Boards designate the beneficial uses. Foreseeable routine mercury monitoring would result in 32,000 miles driven annually (see Chapter 7).

The increase in emissions from an additional 32,000 miles per year could be estimated, however the increase in emission is not anticipated to be significant in light of the over 300 billion miles driven annually in California (U. S. Department of Transportation 2016). Additionally, the emissions can be mitigated as described below.

Waste Collection and Education

A permanent increase in the use of heavy vehicles could be due to the requirement for Waste Collection and Education. The heavy vehicles would be used to pick up waste and haul it to another location for disposal. Also, vehicle use for education would need to continue indefinitely. The magnitude of the increase is very difficult to predict. The increase is not anticipated to be significant.

Cumulative Impacts from All Methods of Compliance
Many of the methods of compliance listed above could increase vehicle use and result in impacts to air quality. For the individual methods of compliance, these impacts are anticipated to be less than significant. When considering impacts of all methods of compliance collectively, impact is still anticipated to be less than significant, since each method of compliance would occur in various locations thought the state. The resulting emissions are not anticipated to result in an exceedance of an air quality standard in any one location.

Mitigation
Measures to lessen the air emissions caused by vehicle trips or construction equipment include: (1) use of construction and maintenance vehicles with lower-emission engines; (2) use of soot reduction traps or diesel particulate filters; and (3) use of emulsified diesel fuel and (4) combining trips, if possible.

The Bay Area Are Quality Management District developed a set of Mitigation Measures contained in Table 8-2 of the 2010 District's CEQA Air Quality Guidelines (Bay Area Air Quality Management District 2010): These Mitigation Measures can be used and/or modified to fit specific situations by the implementing agencies to reduce air emissions for their activities.

1. All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.
2. All haul trucks transporting soil, sand, or other loose material off-site shall be covered.
3. All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
4. All vehicle speeds on unpaved roads shall be limited to 15 mph.
5. All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.
6. Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]). Clear signage shall be provided for construction workers at all access points.
7. All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.
8. Post a publicly visible sign with the telephone number and person to contact at the Lead Agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The Air District's phone number shall also be visible to ensure compliance with applicable regulations.

Summary

The reasonably foreseeable methods of compliance would not be of the size or scale to result in significant increases in air pollution. Mitigation measures are available to decrease the impacts further. The Provisions are projected to have a less than significant impact on air quality.

8.4.4 BIOLOGICAL RESOURCES

Would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☑	☐	☐	☐
b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☑	☐	☐	☐
c. Have a substantial adverse effect on federally-protected wetlands as defined by Section 404 of the federal Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, *etc.*) through direct removal, filling, hydrological interruption or other means?	☑	☐	☐	☐
d. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory corridors, or impede the use of native wildlife nursery sites?	☐	☐	☑	☐
e. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☑
f. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☑

Background (Regulatory Setting)

Federal Endangered Species Act

Pursuant to the federal Endangered Species Act (16 U.S.C. § 1531 et seq.), the U. S. Fish and Wildlife Service and National Oceanic and Atmospheric Administration Fisheries Service, formerly National Marine Fisheries Service, have regulatory authority over federally listed species. Under the Endangered Species Act, a permit is required for any federal action that may result in "take" of a listed species. Section 9 of the Endangered Species Act defines take as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." Under federal regulations, take is further defined to include the modification or degradation of habitat where such activity results in death or injury to wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering.

Clean Water Act

Section 404 of the Clean Water Act requires project proponents to obtain a permit from the U.S. Army Corps of Engineers before performing any activity that involves discharge of dredged or fill material into "waters of the United States," including wetlands. Dredging activities involve any activity, such as construction, that results in direct modification (e.g., alteration of the banks, deposition of soils) of an eligible waterway. Waters of the United States include navigable waters, interstate waters, and other waters where the use or degradation or destruction of the waters could affect interstate or foreign commerce, tributaries to any of these waters, and wetlands that meet any of these criteria or that are adjacent to any of these waters or their tributaries (see 80 Fed. Reg. 37054 (June 29, 2015) (defining ''waters of the United States'' to include eight categories of jurisdictional waters)). Many surface waters and wetlands in California meet the criteria for waters of the United States.

In accordance with section 401 of the Clean Water Act, projects that apply for a U.S. Army Corps of Engineers permit for discharge of dredged or fill material must obtain water quality certification from the Water Boards indicating that the project would uphold state water quality standards.

Section 402 of the Clean Water Act controls water pollution by regulating, through the national pollutant discharge elimination system (NPDES) permit program, point sources that discharge of any pollutant, or combination of pollutants, into waters of the United States prior to discharge. (See 40 CFR § 122.2 for the definitions of point source, pollutant, and waters of the United States.) The State of California has been delegated the authority to administer the NPDES permitting program for implementation through the Water Boards. In California, NPDES permits are also referred to as waste discharge requirements that regulate discharges to waters of the United States.

California Endangered Species Act

Pursuant to the California Endangered Species Act (Fish & Game Code, § 2050 et seq.), a permit from the California Department of Fish and Wildlife is required for projects that could result in take of a plant or animal species that is state listed as threatened or endangered. Under the California Endangered Species Act, "take" is defined as an activity that would directly or indirectly kill an individual of a species. Authorization for take of state-listed species can be obtained through a California Fish and Wildlife Code section 2080.1 consistency determination or a section 2081 incidental take permit.

The Migratory Bird Treaty Act

The Migratory Bird Treaty Act (16 U.S.C. § 703 et seq.) includes provisions for protection of migratory birds under the authority of the U.S. Fish and Wildlife Service and California Fish and Wildlife. The Migratory Bird Treaty Act protects over 800 species including, geese, ducks, shorebirds, raptors, songbirds, and many other relatively common species. It is not reasonably foreseeable that construction activities would result in the deterioration of existing fish and or wildlife habitat.

Section 1600 of the California Fish and Wildlife Code

All diversions, obstructions, or changes to the natural flow or bed, channel, or bank of any river, stream or lake in California that supports wildlife resources is subject to regulation by the California Department of Fish and Wildlife, under sections 1600–1603 of the California Fish and Wildlife Code. Section 1601 states that it is unlawful for any agency to substantially divert or obstruct the natural flow or substantially change the bed, channel or bank of any river, stream or lake designated by CDFW, or use any material from the streambeds, without first notifying CDFW of such activity. The regulatory definition of a stream is a body of water that flows at least periodically or intermittently through a bed or channel having banks and supports fish or other aquatic life. This includes watercourses having a surface or subsurface flow that supports or has supported riparian vegetation. Accordingly, a California Department of Fish and Wildlife Streambed Alteration Agreement must be obtained for any project that would result in diversions of surface flow or other alterations to the bed or bank of a river, stream, or lake.

Porter-Cologne Water Quality Control Act

Under the Porter-Cologne Act (Wat. Code, § 13000), "waters of the state" is defined as "any surface water or groundwater, including saline waters, within the boundaries of the state. (Wat. Code, § 13050, subd. (e).) The Water Boards regulate any activity or factor which may affect the quality of the waters of the state, including the correction and prevention of water pollution and nuisance. (Ibid., §§ 13050, subd. (i), 13100.) The Water Boards must prepare and periodically update water quality control plans. (Wat. Code, §§ 13170, 13240.) Each plan establishes numerical or narrative water quality objectives to protect established beneficial uses, which include wildlife, fisheries and their habitats. Projects that affect wetlands or waters of the state must meet discharge requirements of the Water Boards, which may be issued in addition to a water quality certification or waiver under section 401 of the Clean Water Act.

Local Regulations

Numerous California cities and counties have adopted ordinances regulations and policies for the protection and enhancement of natural resources, including heritage trees, important natural features, habitat alteration, and common and special status species.

Impacts

No impact to policy or plans concerning biological resources are anticipated (item e and item f). Some methods of compliance involve earthmoving or construction and therefore can impact habitat, as described below. Any project that alters habitat could have a small impact on the movement of wildlife.

Wetland Features or Measures to Reduce Methylation

The Provisions provide guidance to the Water Boards to require parties creating or restoring wetlands to add features or use measures that could minimize the production of methylmercury. The implementation of this requirement should provide equivalently viable habitat, and therefore should not have a significant adverse impact on habitat. If anything, this requirement would help provide healthier habitat by reducing the methylmercury levels in the food web. Possible design features that could be used to minimize methylmercury production in a wetland could be incorporating open water areas, settling ponds, or structures to minimize water level fluctuations. Additionally, wetland projects must also include an environmental analysis and consider mitigation and alternatives for any potentially significant impacts.

Wastewater Treatment/Industrial Facility Upgrades

Compliance with the Provisions could require construction for a wastewater treatment plant upgrade. Few upgrades are anticipated over all for the projects in the foreseeable future (Section 7.2.7). In general, the sites for the facility upgrades are likely located in previously developed areas and the presence of fish and wildlife species and their supporting habitat severely limited. Any watercourses, riparian habitat or wetlands downstream from the construction and maintenance activities are unlikely to be adversely impacted further by these compliance measures. Rather, in the long term, these areas would be improved by the reduction in mercury entering from upstream sources. Still, a site for a facility upgrade could be in the habitat of sensitive species. Such construction projects must also include an environmental analysis and consider mitigation and alternatives for any potentially significant impacts.

Sediment Controls

While controlling sediment in a mine impacted or other landscape is designed to benefit, enhance, restore, and protect biological resources, including fish, wildlife, and rare and endangered species, it is possible that the projects involving earthmoving activities and landscape modifications could affect sensitive or special status species, either directly or through habitat modifications. These impacts should be mitigated to less than significant levels through adherence to the conditions, specifications, and requirements of the Endangered Species Act; through avoidance of sensitive resources; and/or through the mitigation actions described below. Such projects must include an environmental analysis and consider mitigation and alternatives for any potentially significant impacts.

In many cases, sediment controls are already being implemented as authorized by existing law. The Provisions are anticipated to result in an increase in the use of sediment controls in some cases, resulting in a small increase in the use of sediment controls statewide. Sediment controls could cause a temporary habitat disturbance, such as bringing additional vehicles to a site on a temporary basis to install new controls. However the impact is temporary, small and too speculative to calculate an amount or frequency of disturbance.

All compliance methods

The compliance methods listed would not foreseeably:

- Cause a substantial reduction of the overall habitat of a wildlife species.

- Produce a drop in a wildlife population below self-sustaining levels.
- Eliminate a plant or animal community.
- Have a substantial adverse effect on federally protected wetlands.
- Conflict with any local policies or ordinances protecting biological resources.

It is not reasonably foreseeable that any of the compliance methods would result in a significant long-term impact to general wildlife species adapted to developed environments. Potential construction activities would occur in previously developed areas and would not result in the removal of sensitive biological habitats.

It is not reasonably foreseeable that any of the compliance methods would result in the introduction of exotic or invasive plant species into an area. Nor would it result in a barrier to the normal replenishment of existing species. Because potential projects would be established in previously developed areas it is not expected that potential project sites would act as a travel route or regional wildlife corridor. In the case that landscaping is incorporated into the specific project design, however, there is a possibility of disruption of resident native species.

It is possible that direct or indirect impacts to special-status animal species may occur at the project level for the compliance method specifically listed in this section (mainly Wastewater Treatment/Industrial Facility Upgrades and possibly large Sediment Control projects). Because these animal species are protected by state and/or federal Endangered Species Acts, impacts to them would be considered potentially significant. Even though it is expected that potential projects would occur in previously developed areas, it is possible for special-status species to occur in what would generally be described as urban areas. If these species are present during activities such as ground disturbance, construction, and operation and maintenance activities associated with the potential projects, it could conceivably result in direct impacts to special status species including the following:

- Direct loss of individuals of a sensitive species.
- Increased human disturbance in previously undisturbed habitats.
- Mortality by construction or other human-related activity.
- Impairing essential behavioral activities, such as breeding, feeding or shelter/refugia.
- Destruction or abandonment of active nest(s)/den sites.
- Direct loss of occupied habitat.
- In addition, potential indirect impacts may include but are not limited to, the following:
- Displacement of wildlife by construction activities.
- Disturbance in essential behavioral activities due to an increase in ambient noise levels and/or artificial light from outdoor lighting around facilities.

Construction activities (mainly associated with Wastewater Treatment/Industrial Facility Upgrades and possibly large Sediment Control projects) may impact migratory avian species. These avian species may use portions of potential project sites, including ornamental vegetation, during breeding season, and may be protected under the Migratory Bird Treaty Act while nesting.

Mitigation
For construction or earth moving related activities, the following measures should be implemented to reduce or avoid potential project-level impacts to biological resources:

Assuming any unique species are present, plant number and species diversity could be maintained by either preserving them prior, during, and after the construction or by re-establishing and maintaining the plant communities post construction. When the specific projects are developed and sites identified, a search of the California Natural Diversity Database could be employed to confirm that any potentially sensitive plant species or biological habitats in the site area are properly identified and protected as necessary. Focused protocol plant surveys for special-status-plant species could be conducted at each site location, if appropriate. If sensitive plant species occur on the project site, mitigation would be required consistent with appropriate expert analysis.

Mitigation measures shall be developed in coordination with U.S. Fish and Wildlife Services and the California Department of Fish and Wildlife. Responsible agencies should endeavor to avoid compliance measures that could result in reduction of the numbers of any unique, rare or endangered species of plants, and instead opt for siting physical compliance measures sufficiently upstream or downstream of sensitive areas to avoid any impacts.

In the case that landscaping is incorporated into the specific project design, the possibility of disruption of resident native species could be avoided or minimized by using only plants native to the area. Use of exotic invasive species or other plants listed in the Exotic Pest Plant of Greatest Ecological Concern in California should be prohibited (California Exotic Pest Plant Council 1999). Responsible agencies should endeavor to avoid requiring compliance measures that could result in significant impacts to unique, rare or endangered (special-status) species, should any such species be present at locations where activities associated with such compliance measures might not otherwise be performed. Mitigation measures, however, could be implemented to ensure that potentially significant impacts to special status animal species are less than significant. When the specific projects are developed and sites identified, a search of the California Natural Diversity Database could be employed to confirm that any potentially special-status animal species in the site area are properly identified and protected as necessary. Focused protocol animal surveys for special-status animal species should be conducted at each site location.

If special-status animal species are potentially near the project site area two weeks prior to grading or the construction of facilities and per applicable U.S. Fish and Wildlife Services or California Department of Fish and Wildlife protocols, pre-construction surveys to determine the presence or absence of special-status species would be conducted. The surveys should extend off site to determine the presence or absence of any special-status species adjacent to the project site. If special-status species are found to be present on the project site or within the buffer area, mitigation should be required consistent with appropriate expert analysis. To this extent, mitigation measures would be developed in coordination with the U.S. Fish and Wildlife Services and the California Department of Fish and Wildlife to reduce potential impacts.

If construction activities occur at locations where they would foreseeably adversely impact species migration or movement patters, mitigation measures previously described could be implemented to ensure that impacts which may result in a barrier to the migration or movement of animal are less than significant. Any site-specific wildlife crossings should be evaluated in consultation with the California Department of Fish and Wildlife. If a wildlife crossing would be significantly impacted in an adverse manner, then the design of the project should include a new wildlife crossing in the same general location.

If construction occurs during the avian breeding season for special status species and/or Migratory Bird Treaty Act -covered species, generally February through August, then prior (within two weeks) to the onset of construction activities, surveys for nesting migratory avian species would be conducted on the project site following U.S. Fish and Wildlife Services or California Department of Fish and Wildlife guidelines. If no active avian nests are identified on or within 200 feet of construction areas, no further mitigation would be necessary.

Alternatively, to avoid impacts, the agencies implementing the compliance measures may begin construction after the previous breeding season for covered avian species and before the next breeding season begins. If a protected avian species were to establish an active nest after construction was initiated and outside of the typical breeding season (February – August), the project sponsor, would be required to establish a buffer of 200 feet or other measure that would result in equivalent mitigation between the construction activities and the nest site.

If active nests for protected avian species are found within the construction footprint or within the 200-foot buffer zone, construction would be required to be delayed within the construction footprint and buffer zone until the young have fledged or appropriate mitigation measures responding to the specific situation are developed in coordination with U.S. Fish and Wildlife Service or California Department of Fish and Wildlife. These impacts are highly site-specific, and assuming they are foreseeable, they would require a project-level analysis and mitigation plan.

Finally, to the extent feasible, responsible agencies should endeavor to avoid compliance measures that could result in significant barriers to the beneficial migration or movement of animals. No significant impact is anticipated after mitigation.

Summary

Adverse impacts to biological resources are not expected to occur due to the nature of the areas where potential compliance activities for the Provisions would be located. Most areas are already extensively developed or mined and the presence of significant biological resources is unlikely. However it is possible that significant impacts could occur in less developed areas or areas inhabited by endangered species. Since the State Water Board cannot guarantee that mitigation measures will be taken, the impact is determined to be potentially significant. In the event that specific construction or earth moving projects do encounter biological resources, measures have been identified to avoid or reduce potential impacts to less than significant levels, and these projects would need to have an independent environmental analysis done by the agency approving the project.

8.4.5 CULTURAL RESOURCES

Would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Cause a substantial adverse change in the significance of a historical resource as defined in § 15064.5?	☑	☐	☐	☐
b) Cause a substantial adverse change in the significance of an archaeological resource as defined in § 15064.5?	☑	☐	☐	☐
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☑	☐	☐	☐
d) Disturb any human remains, including those interred outside of formal cemeteries?	☑	☐	☐	☐
e) Cause a substantial adverse change in the significance of a Tribal Cultural Resource as defined in Public Resources Code § 21074?	☑	☐	☐	☐

Historic Resources

A historical resource includes resources listed in or eligible for listing in the California Register of Historical Resources. The California Register includes resources on the National Register of Historic Places, as well as California State Landmarks and Points of Historical Interest. Properties that meet the criteria for listing also include districts which reflect California's history and culture, or properties which represent an important period or work of an individual, or yield important historical information. Properties of local significance that have been designated under a local preservation ordinance (local landmarks or landmark districts) or that have been identified as local historical resources are also considered a historical resource (California Office of Historical Preservation 2006). Based on substantial evidence within the administrative record, any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California may also be considered to be an historical resource (CEQA Guidelines 15064.5(a)).

Archeological Resources

An archeological site may be considered an historical resource if it is significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military or cultural annals of California (Pub. Resources Code, § 5020.1, subd. (j)) or if it meets the criteria for listing on the California Register (14 Code Cal. Regs. § 4850).

If an archeological site is not an historical resource, but meets the definition of a "unique archeological resource" as defined in Public Resources Code section 21083.2, then it should be treated in accordance with the provisions of that section.

Tribal Cultural Resources

AB 52 (Gatto, 2014) established a new category of resources in CEQA called Tribal Cultural Resources. (Pub. Resources Code, § 21074.) "'Tribal cultural resources' are either of the following: (1) Sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe that are either of the following: (A) Included or determined to be eligible for inclusion in the California Register of Historical Resources. (B) Included in a local register of historical resources as defined in subdivision (k) of Section 5020.1. (2) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Section 5024.1. In applying the criteria set forth in subdivision (c) of Section 5024.1 for the purposes of this paragraph, the lead agency shall consider the significance of the resource to a California Native American tribe." (Ibid.) Consultation with a California Native American Tribe that has requested such consultation may assist a lead agency in determining whether the project may adversely affect tribal cultural resources, and if so, how such effects may be avoided or mitigated. Whether or not consultation has been requested (no such consultation was requested for the State Water Board's development of the Provisions, see Section 2.6.6), the lead agency evaluates whether the project may cause a substantial adverse change in a site, feature, place, cultural landscape, sacred place, or object, with cultural value to a California Native American Tribe.

Impacts

Sediment Controls

Compliance projects meant to control sediments should help keep archeological, historic, and tribal cultural resources intact by preventing erosion. However, the installation of sediment control structures could also disrupt archeological, historic, or tribal cultural resources, or disturb human remains. The site-specific presence or absence of these resources is unknown because the specific locations for sediment control measures would be determined by responsible agencies at the project level. Installation of these measures could result in minor ground disturbances, which could impact cultural resources if they are sited in locations containing these resources and where disturbances have not previously occurred.

Wastewater Treatment/Industrial Facility Upgrades

If upgrades to wastewater or industrial facilities are necessary for compliance, the construction related activities would mostly occur in currently developed areas where ground disturbance has previously occurred. Because these areas are already developed it is unlikely that construction activities would cause a substantial adverse change to historical, archeological, or tribal cultural resources, destroy paleontological resources, or disturb human remains. Depending, however, on the location of facilities, potential impacts to cultural resources or tribal cultural resources could occur. Paleontological resources can be found in areas containing fossil-bearing formations. Archaeological resources have been found within urbanized areas. Historic, archeological, and tribal and cultural resources have also been found within urbanized areas. The site-specific presence or absence of these resources is unknown because the specific locations for compliance methods would be determined by responsible agencies at the project level. Installation of these systems could result in minor ground disturbances, which could impact cultural resources if they are sited in locations containing these resources and where disturbances have not previously occurred.

Mitigation

Upon determination of specific locations where construction activities will occur, responsible agencies should complete further investigation, including consultation with California tribes, to make an accurate assessment of the potential to affect tribal cultural resources, historic or archaeological resources or to impact any human remains. If potential impacts are identified, measures to reduce impacts could include project redesign, such as the relocation of facilities outside the boundaries of archeological or historical sites. According to the California Office of Historic Preservation, avoidance and preservation in place are the preferable forms of mitigation for archeological sites. When avoidance is infeasible, a data recovery plan should be prepared which adequately provides for recovering scientifically consequential information from the site. Studies and reports resulting from excavations must be deposited with the California Historical Resources Regional Information Center.

Require compliance with State Laws regarding disposition of Native American burials, if such remains are found. If human remains of Native American origin are discovered during project activities, it is necessary to comply with state laws relating to the disposition of Native American burials, which are under the jurisdiction of the Native American Heritage Commission (Pub. Res. Code Section 5097). If human remains are discovered or recognized in any location other than a dedicated cemetery, excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent human remains will stop until:

- the county coroner has been informed of the discovery and has determined that no investigation of the cause of death is required; and
- if the remains are of Native American origin:
  - the descendants of the deceased Native Americans have made a recommendation to the landowner or the person responsible for the excavation work, for means of treating or disposing of the human remains and any associated grave goods with appropriate dignity, as provided in Public Resources Code Section 5097.98, or
  - the Native American Heritage Commission is unable to identify a descendant or the descendant failed to make a recommendation within 24 hours after being notified by the commission.

According to the California Health and Safety Code, six or more human burials at one location constitute a cemetery (Section 8100), and disturbance of Native American cemeteries is a felony (Section 7052). Section 7050.5 requires that construction or excavation be stopped in the vicinity of discovered human remains until the coroner can determine whether the remains are those of a

Native American. If the remains are determined to be Native American, the coroner must contact the California Native American Heritage Commission.

Summary
While the potential for adverse impacts to cultural resources is low, there still exists a chance that cultural resources may occur at specific locations where related project compliance methods could be installed. Measures have been identified that could reduce potential impacts to less than significant levels and should be incorporated into site-specific projects carried out or approved by a local agency.

8.4.6 GEOLOGY and SOILS

Would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i. Rupture of a known earthquake fault, as delineated in the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines & Geology Special Publication 42.	☐	☐	☐	☑
ii. Strong seismic ground shaking?	☐	☐	☐	☑
iii. Seismic-related ground failure, including liquefaction?	☐	☐	☐	☑
iv. Landslides?	☐	☐	☐	☑
b. Result in substantial soil erosion or the loss of topsoil?	☑	☐	☐	☐
c. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?	☑	☐	☐	☐
d. Be located on expansive soils, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	☐	☐	☑	☐

e. Have soils incapable of adequately supporting the use of septic tanks or alternate wastewater disposal systems where sewers are not available for the disposal of wastewater?	☐	☐	☐	☑

Impacts and Mitigation

No method of compliance is anticipated to expose people or structures to substantial adverse effects from geologic hazards (item a). The only exception might be if a Wastewater Treatment or Industrial Facility Upgrade or a substantial project for sediment controls. Still such an upgrade or project is unlikely to have a magnitude large enough to cause such great geologic effects. The compliance method of sediment controls is explicitly to prevent erosion (item b). None of the compliance methods should affect the use of septic tanks (item e).

<u>Wastewater Treatment/Industrial Facility Upgrades</u>

An upgrade of a wastewater or industrial facility could result in substantial erosion (item b), create geologic instability (item c), or be located in expansive soils (item d). Such projects must complete an environmental analysis that includes mitigation and alternatives. To the extent that related construction at the wastewater or industrial facility could result in ground instability, potential impacts could be avoided or mitigated through mapping of site facilities away from areas with unsuitable soils or steep slopes; design and installation in compliance with existing regulations; standard specifications and building codes; ground improvements such as soil compaction; and groundwater level monitoring to ensure stable conditions.

<u>Sediment Controls</u>

Installing sediment controls involves earthmoving or construction activities, but such activities would not result in substantial soil erosion or loss of topsoil. The purpose of the sediment controls is to control and reduce erosion, not increase it. Temporary earthmoving operations could result in short-term, limited erosion. Responsible parties would be expected to incorporate erosion control measures as mitigation.

Because portions of California include seismically active areas and the sediment control projects include actions intended to stabilize unstable slopes and erosion within steam banks, some construction is likely to occur in potentially unstable areas and could create geologic instability (item c) or be located in expansive soils (item d). Any proposed work within a geologic hazard zone may need to be reviewed by the County Planning Office and/or the County Geologist.

Future compliance projects that involve earth moving and take place within a defined creek channel and between banks will be subject to, at a minimum, standard conditions in the U.S. Army Corps of Engineers' Nationwide Permits nos. 13 (Bank Stabilization) and 27 (Stream and Wetland Restoration Activities). Future applicants for permits that implicate conditions 13 and 27 will be required to ensure that earthmoving does not result in soil erosion, bank collapse, or land instability. Under federal Clean Water Act section 401 every applicant for a federal permit or license for any activity which may result in a discharge to a water body must obtain State

Water Quality Certification (Certification) that the proposed activity will comply with state water quality standards. Most Certifications are issued in connection with U.S. Army Corps of Engineer Clean Water Act section 404 permits for dredge and fill discharges. Certifications often include conditions that are more stringent than the federal requirements. Federal requirements include, for example, implementation of effective construction site management and erosion control BMPs.

Dischargers whose projects disturb one or more acres of soil or whose projects disturb less than one acre but are part of a larger common plan of development that in total disturbs one or more acres, are required to obtain coverage under the Construction Storm Water General Permit (as described in Section 8.2). Construction activity subject to this permit includes clearing, grading and disturbances to the ground such as stockpiling, or excavation. The Construction General Permit requires the development and implementation of a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP must list the BMPs the discharger will use to control storm water runoff and erosion.

Summary

Possible geologic impacts from construction or earth moving activities resulting from the Provisions could be potentially significant, especially since the State Water Board cannot guarantee that mitigation measures would be followed. With the mitigation, less than significant impacts on geology and soils are anticipated.

8.4.7 GREENHOUSE GAS EMISSIONS

Would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☑	☐	☐	☐
b. Conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☐	☑

Background

General scientific consensus and increasing public awareness regarding global warming and climate change have placed new focus on the CEQA review process as a means to address the effects of greenhouse gas emissions from proposed projects on climate change.

Global warming refers to the recent and ongoing rise in global average temperature near Earth's surface. It is caused mostly by increasing concentrations of greenhouse gases in the atmosphere. Global warming is causing climate patterns to change. Global warming itself, however, represents only one aspect of climate change.

Climate change refers to any significant change in the measures of climate lasting for an extended period of time. In other words, climate change includes major changes in temperature, precipitation, or wind patterns, among other effects, that occur over several decades or longer.

Increases in the concentrations of greenhouse gases in the Earth's atmosphere are thought to be the main cause of human-induced climate change. Greenhouse gases naturally trap heat by impeding the exit of infrared radiation that results when incoming ultraviolet solar radiation is absorbed by the Earth and re-radiated as infrared radiation. The principal greenhouse gases associated with anthropogenic emissions are carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, perfluorocarbon, nitrogen trifluoride, and hydrofluorocarbon (Health and Safety Code, § 38505, subd. (g); CEQA Guidelines, § 15364.5). Water vapor is also an important greenhouse gas, in that it is responsible for trapping more heat than any of the other greenhouse gases. Water vapor, however, is not a greenhouse gas of concern with respect to anthropogenic activities and emissions. Each of the principal greenhouse gases associated with anthropogenic climate warming has a long atmospheric lifetime (one year to several thousand years). In addition, the potential heat trapping ability of each of these gases vary significantly from one another. Methane for instance is 23 times more potent than carbon dioxide, while sulfur hexaflouride is 22,200 times more potent than carbon dioxide (Intergovernmental Panel on Climate Change 2001). Conventionally, greenhouse gases have been reported as "carbon dioxide equivalents." Carbon dioxide equivalents take into account the relative potency of non-carbon dioxide greenhouse gases and convert their quantities to an equivalent amount of carbon dioxide so that all emissions can be reported as a single quantity.

The primary man-made processes that release these greenhouse gases include: (1) burning of fossil fuels for transportation, heating and electricity generation, which release primarily carbon dioxide; (2) agricultural practices, such as livestock grazing and crop residue decomposition and application of nitrogen fertilizers, that release methane and nitrous oxide; and (3) industrial processes that release smaller amounts of high global warming potential gases.

Executive Order S-3-05 (June 1, 2005) proclaimed that California is vulnerable to the effects of climate change. To combat those concerns, the Executive Order established a long range greenhouse gas reduction target of 80 percent below 1990 levels by 2050. Subsequently, Assembly Bill 32 (AB 32) (Nunez and Pavley), the California Global Warming Solutions Act of 2006 (Chapter 488, Statutes of 2006, adding Division 25.5 (commencing with Section 38500) to the Health and Safety Code, relating to air pollution) was signed. AB 32 requires California to reduce statewide greenhouse gas emissions to 1990 levels by 2020. AB 32 directed the ARB to develop and implement regulations that reduce statewide greenhouse gas emissions. The Climate Change Scoping Plan approved by the ARB in December 2008, outlines the State's plan to achieve the greenhouse gas reductions required in AB 32.

Senate Bill (SB) 97, signed in August 2007 (Chapter 185, Statutes of 2007, enacting § 21083.05 and 21097 of the Public Resources Code), acknowledges that climate change is a prominent environmental issue that requires analysis under CEQA. This bill directed the Office of Planning and Research to prepare, develop, and transmit guidelines for the feasible mitigation of greenhouse gas emissions or the effects of greenhouse gas emissions to the California Resources Agency. Office of Planning and Research developed a technical advisory suggesting relevant ways to address climate change in CEQA analyses. The technical advisory also lists potential mitigation measures, describes useful computer models, and points to other important resources. In addition, amendments to CEQA guidelines implementing SB 97 became effective on March 18, 2010.

In 2007, the ARB adopted the Off-Road Diesel Vehicle Regulation (CCR, title 13, article 4.8, chapter 9) which, when fully implemented, would significantly reduce emissions from off-road, non-agricultural, diesel vehicles with engines greater than 25 horsepower—the types of vehicles typically used in construction activities. The regulation required owners to replace the engines in their vehicles, apply exhaust retrofits, or replace the vehicles with new vehicles equipped with cleaner engines. The regulation also limited vehicle idling, required sales disclosure requirements, and reporting and labeling requirements. The first compliance date for large fleets was March 1, 2010; however, amendments have been made several times to extend the deadlines. When the regulation is fully implemented, owners of fleets of construction, mining, and industrial vehicles would have to upgrade the performance of their vehicle fleets to comply with the regulation.

The California Air Resources Board Scoping Plan (California Air Resources Board 2008) proposes a comprehensive set of actions designed to achieve the 2020 greenhouse gas emissions reductions required under AB 32. While some of the regulations would not be implemented until later, when they do take effect, they would likely result in reduced emissions from construction and maintenance activities. Specific actions in the Scoping Plan that would impact construction and maintenance activities include: low carbon fuel standard (Measure Transportation-2), tire inflation regulation (Measure Transportation-4), the heavy-duty tractor truck regulation (Measure Transporation-7), and commercial recycling (Measure Recycling and Waste-3).

In addition, other efforts by the California Air Resources Board would reduce air pollutant emissions through 2020, including the Diesel Risk Reduction Plan (California Air Resources Board 2000) and the 2007 State Implementation Plan. Measures in these plans would result in the accelerated phase-in of cleaner technology for virtually all of California's diesel engine fleets including trucks, buses, construction equipment, and cargo handling equipment at ports.

Impacts

The compliance methods that are likely to increase greenhouse gas emissions are primarily those that increase vehicle use as described below

<u>Mercury Monitoring (Aqueous)</u>

An increase in vehicle use would result from the need to transport personnel and water quality samples in cases where new or stricter effluent limitations for wastewater and industrial dischargers require new or additional sampling. An additional 32,000 miles per year were estimation to result from mercury monitoring for compliance with effluent limitations (see Chapter 7). The increase in emissions from an additional 32,000 miles per year could be estimated, however they are not anticipated to be significant in light of the over 300 billion miles driven annually in California (U.S. Department of Transportation 2016).

Waste Collection and Education, Educating Auto Dismantlers, Mercury Pollution Prevention

Some compliance methods could potentially result in a permanent increase in vehicle use, and therefore additional greenhouse gas emissions. However, it is difficult to determine how much change there would be from existing methods of compliance statewide, since most of these compliance methods are likely already being performed (see Section 8.2).

Alternative Dredging Procedures

For dredging activities, the Provisions could result in different procedures being used that increase the use of heavy vehicles or heavy equipment. If dredged material must be disposed of in a site further away, that would likely increase the use of the heavy vehicles. This, in turn, could release more emissions to the air. However, it is difficult to determine how much change there would be from existing methods of compliance statewide, since heavy vehicles and equipment would already have been used for dredging. It is also uncertain how many locations would be affected, since any new requirements would depend on the professional judgement of a permit writer for a particular permit. Specific calculations of the added emissions would be too speculative.

Wetland Features or Measures to Reduce Methylation

Similar to effects described above for Alternative Dredging Procedures, the Wetland Features or Measures to Reduce Methylation could cause a temporary increase in the use of heavy vehicles or heavy equipment and earth moving and grading. Vehicle use would release greenhouse gas emissions. Heavy vehicle use and earth movement would likely occur with or without the Provisions, but the Provisions could cause an increase in heaving vehicle use to create specific landscape features, such as adding a settling pond. The increase in this activity from the Provisions is not anticipated to be significant compared to the vehicle use that would otherwise be used to build the wetland.

Sediment Controls

Greenhouse gas emissions would result from the vehicle use and heavy vehicle use from a variety of construction activities, including excavation, grading, and vehicle travel to the site. These emissions would be temporary for the duration of the construction, and are anticipated to be less than significant.

Wastewater Treatment/Industrial Facility Upgrades

The construction of a wastewater treatment plant or industrial facility upgrade would be a source of greenhouse gases. The operation of construction equipment and the operation of new maintenance equipment for the facility (or increase in the operation of maintenance equipment) would generate greenhouse gas emissions. Greenhouse gas emissions due to construction equipment would be short-term and limited to minor amounts and therefore would not significantly increase greenhouse gas levels in the environment. The new facility may require more energy to operate, which could contribute more greenhouse gas emissions from the power generation, depending on the source of energy. Greenhouse gas levels are not expected to rise significantly since mitigation measures are available to reduce greenhouse gas emissions due to construction, operation, and maintenance activities.

<u>Cumulative impacts from all methods of compliance</u>
Many of the methods of compliance listed above could all increase vehicle use and result in impacts to greenhouse gases. For the individual methods of compliance, these impacts are anticipated to be less than significant, but the impacts are not easy to estimate. The impacts would occur throughout the state and the total contribution to greenhouse gas emission would be the sum of all emissions throughout the state. There is the positional that the impacts to greenhouse gas emission could be cumulatively considerable.

The Provisions would not conflict with any plan, amendment, or regulation adopted for the purpose of reducing greenhouse gas emissions. Most greenhouse gas reduction plans include replacing government owned vehicles with low or zero-emission vehicles (Marin County 2006, City of Pasadena 2009, City of Citrus Heights 2011, California Department of Water Resources 2012). Implementation of greenhouse gas reduction plans would reduce greenhouse gas emissions from activities undertaken to comply with the Provisions.

The Climate Change Scoping Plan (Scoping Plan) was approved by ARB in December 2008. In particular, the Scoping Plan contains six strategies for the Water Sector to implement that are expected to reduce greenhouse gas emissions due to the fact that water use requires significant amounts of energy. The six strategies for the Water Sector to implement include Water Use Efficiency (Measure W-1), Water Recycling (Measure W-2), Water System Energy Efficiency (Measure W-3), Reuse Urban Runoff (Measure W-4), Increase Renewable Energy Production from Water (Measure W-5), and a Public Goods Charge (Measure W-6). Efficient water conveyance, treatment and use can result in reductions in greenhouse gas emissions for those activities. The Provisions are consistent with this Scoping Plan because, the Provisions are consistence with water reclamation, recycling and reuse. The Provisions do not conflict with water conservation goals. If wastewater treatment facilities must upgrade, this would likely increase the possibility of reusing or recycling the wastewater (see Section 10.3).

Mitigation
The California Department of Water Resources has developed a set of BMPs to reduce greenhouse gas emissions from California Department of Water Resources construction and maintenance activities (California Department of Water Resources 2012). These BMPs can be used and/or modified to fit specific situations by the implementing agencies to reduce greenhouse gas emissions from their activities:

BMP 1. Evaluate project characteristics, including location, project work flow, site conditions, and equipment performance requirements, to determine whether specifications of the use of equipment with repowered engines, electric drive trains, or other high efficiency technologies are appropriate and feasible for the project or specific elements of the project.

BMP 2. Evaluate the feasibility and efficacy of performing on-site material hauling with trucks equipped with on-road engines.

BMP 3. Ensure that all feasible avenues have been explored for providing an electrical service drop to the construction site for temporary construction power. When generators must be used, use alternative fuels, such as propane or solar, to power generators to the maximum extent feasible.

BMP 4. Evaluate the feasibility and efficacy of producing concrete on-site and specify that batch plants be set up on-site or as close to the site as possible.

BMP 5. Evaluate the performance requirements for concrete used on the project and specify concrete mix designs that minimize greenhouse gas emissions from cement production and curing while preserving all required performance characteristics.

BMP 6. Minimize idling time by requiring that equipment be shut down after five minutes when not in use (as required by the State airborne toxics control measure [Cal. Code Regs., tit. 13, § 2485]). Provide clear signage that posts this requirement for workers at the entrances to the site and provide a plan for the enforcement of this requirement.

BMP 7. Maintain all construction equipment in proper working condition and perform all preventative maintenance. Required maintenance includes compliance with all manufacturer's recommendations, proper upkeep and replacement of filters and mufflers, and maintenance of all engine and emissions systems in proper operating condition. Maintenance schedules shall be detailed in an Air Quality Control Plan prior to commencement of construction.

BMP 8. Implement tire inflation program on jobsite to ensure that equipment tires are correctly inflated. Check tire inflation when equipment arrives on-site and every two weeks for equipment that remains on-site. Check vehicles used for hauling materials off-site weekly for correct tire inflation. Procedures for the tire inflation program shall be documented in an Air Quality Management Plan prior to commencement of construction.

BMP 9. Develop a project specific ride share program to encourage carpools, shuttle vans, transit passes and/or secure bicycle parking for construction worker commutes.

BMP 10. Reduce electricity use in temporary construction offices by using high efficiency lighting and requiring that heating and cooling units be Energy Star compliant. Require that all contractors develop and implement procedures for turning off computers, lights, air conditioners, heaters, and other equipment each day at close of business.

BMP 11. For deliveries to project sites where the haul distance exceeds 100 miles and a heavy-duty class 7 or class 8 semi-truck or 53-foot or longer box type trailer is used for hauling, a SmartWay[7] certified truck would be used to the maximum extent feasible.

Summary

The impact of the Provisions on greenhouse gas emissions may be relatively small compared to other sources of greenhouse gas emissions, but they still may be significant, especially when all methods of compliance are considered together cumulatively. Also, given that most of the mitigation measures listed above are optional, and not required by the Provisions or other regulations, the State Water Board cannot guarantee the mitigation will be included. Therefore, the impact is determined to be potentially significant. The incorporation of BMPs and compliance with any plans, amendments, or regulations adopted for the purpose of reducing greenhouse gas emissions, vehicle use or projects undertaken to comply with the Provisions should reduce the impact on the environment due to greenhouse gas emissions.

<u>8.4.8 HAZARDS and HAZARDOUS MATERIALS</u>

Would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☑	☐
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☑	☐
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within ¼ mile of an existing or proposed school?	☐	☐	☐	☑
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code § 65962.5 and, as a result, would it create a significant hazard to the public or to the environment?	☐	☐	☑	☐

[7] The U.S EPA has developed the SmartWay truck and trailer certification program to set voluntary standards for trucks and trailers that exhibit the highest fuel efficiency and emissions reductions. These tractors and trailers are outfitted at point of sale or retrofitted with equipment that significantly reduces fuel use and emissions including idle reduction technologies, improved aerodynamics, automatic tire inflation systems, advanced lubricants, advanced powertrain technologies, and low rolling resistance tires.

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or a public use airport, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☑
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☑
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☑
h) Expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☐	☐	☐	☑

Impacts and Mitigation

Some of the compliance methods may involve transporting (item a) or handling (item b) waste material that is associated with some hazard or hazardous substances. These compliance methods should not pose significant risk to the public, but are further explored below. No method of compliance should emit hazardous emission near any school (item c). Sediment Control projects may take place in a site with hazardous materials (item d), as described below. No methods of compliance will foreseeably affect the operation of airports (item e and f), emergency plans (item g), or risk of wildland fires (item h).

<u>Waste Collection and Education, Educating Auto Dismantlers, Mercury Pollution Prevention</u>

Consumer products with mercury are classified as universal waste, such as thermometers, light bulbs, batteries and switches sin motor vehicles. The methods of compliance would involve collecting and transporting these items for proper disposal. While there is some risk from a spill of a full disposal truck, the mercury containing items are not classified as hazardous waste and do not pose the risk to the public that hazardous waste does. Universal waste should be disposed and transported according to existing regulations, to reduce the risk of exposing the pubic and wildlife to elevated levels of mercury (Appendix E has more information on mercury universal waste).

<u>Wastewater Treatment/Industrial Facility Upgrades</u>

During the installation of new treatment facilities it is possible that both naturally occurring hazards and anthropogenic contaminated soils and groundwater may be encountered. Any such encounters would require site-specific mitigation measures to implement BMPs to prevent contamination of surface and ground water and to remove hazardous materials where possible. In any areas where natural hazards or contaminated soils or groundwater is anticipated or discovered local planning agencies should require proper mitigation measures, including erosion control measures and the proper removal and disposal of contaminated soils.

Additionally, any change in treatment may involve new or different hazardous materials or hazardous chemicals to operate and maintain the facility. Proper health and safety protocols should be followed to minimize the hazards.

<u>Sediment Control</u>
Sediment control for legacy mines sites could involve handling and management of soil and sediment that could contain high concentrations of mercury. Determining whether soil and sediment has concentrations of mercury that are high enough that the sediment should be categorized as hazardous waste and removed from the mining site is beyond the scope of the Provisions, but is within the Water Boards existing authority to issue clean up and abatement orders.

Summary
Adhering to applicable laws and regulations should mitigate any potentially significant hazard to the public.

<u>8.4.9 HYDROLOGY and WATER QUALITY</u>

Would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Violate any water quality standards or waste discharge requirements?	☐	☐	☐	☑
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (*e.g.*, the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	☐	☐	☐	☑
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?	☐	☐	☐	☑
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?	☐	☐	☑	☐

e)	Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	☐	☑
f)	Otherwise substantially degrade water quality?	☐	☐	☐	☑
g)	Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	☐	☐	☐	☑
h)	Place within a 100-year flood hazard area structures which would impede or redirect flood flows?	☐	☐	☐	☑
i)	Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam?	☐	☐	☐	☑
j)	Inundation by seiche, tsunami, or mudflow?	☐	☐	☐	☑

Impacts and Mitigation

The Provisions are intended to improve water quality through the prevention or removal of mercury in surface water. The Provisions would establish water quality standards, to be implemented through waste discharge requirements (WDRs), waivers of WDRs, or Certifications and therefore would not violate any water quality standards or WDRs (item a) or otherwise degrade water quality (item f). The Provisions would not increase the use of ground water (item b), and if anything they could help increase groundwater recharge (item b). A major component of reducing mercury into water bodies from storm water runoff involves a series of potential sediment control measures. An effective method of sediment control is the construction of storm water capture basins that capture and hold storm water for infiltration into ground water. The Provisions would not increase run off, rather they should decrease run off (item e).

Compliance with the Provisions would not place housing or other structures within a 100-year flood hazard area (item g and h), nor would it expose people and structures to a significant risk of loss, injury, or death by flooding, seiche, tsunami, or mudflow (item i and j)

Sediment Controls

Possible changes to drainage patterns (item c and d) could result from the installation of erosion and sediment control measures. Temporary earthmoving operations could result in short-term, limited erosion. Changes to drainage networks would be localized and would be intended to isolate mining waste from surface water runoff and reduce overall erosion. As explained below, there are no foreseeable alterations of the course of a stream or river in a manner that would result in substantial soil erosion.

Specific compliance projects would be subject to the review and/or approval of the Water Boards, which would require implementation of routine and standard erosion control BMPs and proper construction site management. At a minimum, future projects must comply with standard permit conditions in the U.S. Army Corps of Engineers' Nationwide Permits nos. 13 (Bank Stabilization) and 27 (Stream and Wetland Restoration Activities). Under federal Clean Water Act section 401, every applicant for a federal permit or license for any activity which may result in a discharge to a water body must obtain State Water Quality Certification (Certification) that the proposed activity will comply with state water quality standards. Most Certifications are issued in connection with U.S. Army Corps of Engineer Clean Water Act section 404 permits for dredge and fill discharges. Certifications often include conditions that are more stringent than the federal requirements. Federal permit conditions require, for instance, implementation of routine and standard erosion control BMPs and proper construction site management.

Installment of sediment controls should not substantially increase impervious surface area, or peak flow releases in any part of the watershed.

Summary

The potential impacts from sediment controls in altering drainage patterns are anticipated to be less than significant. There were no other foreseeable impacts to Hydrology or Water Quality directly anticipated from the adoption and implementation of the Provisions.

8.4.10 LAND USE AND PLANNING

Would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Physically divide an established community?	☐	☐	☐	☑
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to, the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☑
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?	☐	☐	☐	☑

Impacts and Mitigation

Adoption of the Provisions would not divide an established community, conflict with any land use planning, nor conflict with any conservation plans.

Wetland Features or Measures to Reduce Methylation

The Provisions include features or measures to reduce methylmercury generation in projects that create or restore wetlands, but that should not create conflict with the goal of creating new wetlands. The cost and resources involved in including these feature or measures should be relatively minor compared to the cost of the entire project, and should not prevent the project from being conducted.

Summary

Adoption of the Provisions would have no impact on land use or planning.

8.4.11 MINERAL RESOURCES

Would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Result in the loss of availability of a known mineral resource that would be of future value to the region and the residents of the State?	☐	☐	☐	☑
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?	☐	☐	☐	☑

Impacts and Mitigation

Although mercury was used during gold mining in the past, mercury is no longer used on an industrial scale. Small scale miners (e.g. suction dredge miners) may still use mercury, but this project does not have any requirements that would foreseeably affect such small scale mining operations. Suction dredge mining may be permitted in the future by the Water Boards. This would be a separate project that would also include environmental analysis.

Wastewater Treatment/Industrial Facility Upgrades

A currently operating gold or mercury mine with a discharge that flows directly into surface waters may need to meet the effluent limitation for wastewater treatment and industrial dischargers. If the mine was not able to meet the effluent limitations, it may force the mine to upgrade, the cost of which may result in a shutdown of the mine. However, this is unlikely since most modern operating gold mines no longer use mercury and mercury itself is not in demand as a mineral resource in the U.S. Mercury has not been produced as a principal mineral commodity in the United States since 1992, although it has been recovered as a byproduct from processing of gold- and silver-ore at several mines in Nevada (Wilburn 2013). Mines that are significant sources of mercury pollution are usually historic and abandoned.

Summary

Implementation of the Provisions would not impact any potential mineral resources.

8.4.12 NOISE and VIBRATION

Would the project result in:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Exposure of persons to, or generation of, noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☑	☐
b) Exposure of persons to, or generation of, excessive groundborne vibration or groundborne noise levels?	☐	☐	☑	☐
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☑	☐
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☑	☐	☐	☐
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing in or working in the project area to excessive noise levels?	☐	☐	☐	☑
f) For a project within the vicinity of a private airstrip, would the project expose people residing in or working in the project area to excessive noise levels?	☐	☐	☐	☑

Background (General Setting)

Noise

California Health and Safety Code section 46022 defines noise as “excessive undesirable sound, including that produced by persons, pets and livestock, industrial equipment, construction, motor vehicles, boats, aircraft, home appliances, electric motors, combustion engines, and any other noise-producing objects”. The degree to which noise can affect the human environment range from levels that interfere with speech and sleep (annoyance and nuisance) to levels that cause adverse health effects (hearing loss and psychological effects). Human response to noise is subjective and can vary greatly from person to person. Factors that influence individual response include the intensity, frequency, and pattern of noise; the amount of background noise present before the intruding noise; and the nature of work or human activity that is exposed to the noise source.

Existing noise environments vary considerably based on the diversity of land uses and densities. In most urban environments automobile, truck, and bus traffic is the major source of noise. Traffic generally produces background sound levels that remain fairly constant with time. Individual high-noise-level events that can occur from time to time include honking horns, sirens, operation of construction equipment, and travel of noisy vehicles like trucks or buses. Air and rail traffic and commercial and industrial activities are also major sources of noise in some areas. In addition, air conditioning and ventilating systems contribute to the noise levels in residential areas, particularly during the summer months.

Sound results from small and rapid changes in atmospheric pressure. These cyclical changes in pressure propagate through the atmosphere and are often referred to as sound waves. The greater the amount of variation in atmospheric pressure (amplitude) leads to a greater loudness (sound level). Sound levels are most often measured on a logarithmic scale of decibels (dB). The decibel scale compresses the audible acoustic pressure levels which can vary from 20 micropascals (μPa), the threshold of hearing and reference pressure (0 dB), to 20 million μPa, the threshold of pain (120 dB) (Air & Noise Compliance 2006). Table 8-3 provides examples of noise levels from common sounds.

Table 8-3 Common Sound Levels

Outdoor Sound Levels	Sound Pressure (μPa)	Sound Level A-weighted decibels (dBA)	Indoor Sound Level
	6,324,555	110	Rock Band at 5m
Jet Over-flight at 300m		105	
	2,000,000	100	Inside NY Subway Train
Gas Lawn Mower at 1m		95	
	632,456	90	Food Blender at 1m
Diesel Truck at 15m		85	
Noisy Urban Area (daytime)	200,000	80	Garbage Disposal at 1m
		75	Shouting at 1m
Gas Lawn Mower at 30m	63,246	70	Vacuum Cleaner at 3m
Suburban Commercial Area		65	Normal Speech at 1m
	20,000	60	
Quiet Urban Area (daytime)		55	Quiet Conversation at 1m
	6,325	50	Dishwasher in Adjacent Room
Quiet Urban Area (nighttime)		45	
	2,000	40	Empty Theater of Library
Quiet Suburb (nighttime)		35	
	632	30	Quiet Bedroom at Night

Quiet Rural Area (nighttime)		25	Empty Concert Hall
Rustling Leaves	200	20	
		15	Broadcast and Recording Studios
	63	10	
		5	
Reference Pressure Level	20	0	Threshold of Hearing

Source: Air & Noise Compliance 2006.

To determine ambient (existing) noise levels, noise measurements are usually taken using various noise descriptors. The following are brief definitions of typical noise measurements:

Community Noise Equivalent Level

The community noise equivalent level is an average sound level during a 24-hour day. The community noise equivalent level noise measurement scale accounts for noise source, distance, single-event duration, single-event occurrence, frequency, and time of day. Humans react to sound between 7:00 p.m. and 10:00 p.m. as if the sound were actually 5 bB higher than if it occurred from 7:00 a.m to 7:00 p.m. From 10:00 p.m. to 7:00 a.m., humans perceive sound as if it were 10 A-weighted decibels (dBA) higher than if it occurred from 7:00 a.m. to 7:00 p.m. due to the lower background noise level. Hence, the community noise equivalent level noise measurement scale is obtained by adding an additional 5 dBA to sound levels in the evening from 7:00 p.m. to 10:00 p.m., and 10 dBA to sound levels in the night after 10:00 p.m. and before 7:00 a.m. Because community noise equivalent level accounts for human sensitivity to sound, the community noise equivalent level 24-hour figure is always a higher number than the actual 24-hour average.

Equivalent Noise Level

Equivalent noise level is the average noise level on an energy basis for any specific time period. The equivalent noise level for 1 hour is the energy average noise level during the hour. The average noise level is based on the energy content (acoustic energy) of the sound. Equivalent noise level can be thought of as the level of a continuous noise that has the same energy content as the fluctuating noise level. The equivalent noise level is expressed in units of dBA.

Sound Exposure Level

Sound exposure level is a measure of the cumulative sound energy of a single event. This means that louder events have greater sound exposure level than quieter events. Additionally, events that last longer have greater sound exposure level than shorter events.

Audible Noise Changes

Studies have shown that the smallest perceptible change in sound level for a person with normal hearing sensitivity is approximately 3 dB. A change of at least 5 dB would be noticeable and likely would evoke a community reaction. A 10-dB increase is subjectively heard as a doubling in loudness and would most certainly cause a community response. Noise levels decrease as the distance from the noise source to the receiver increases. Noise generated by a stationary noise source, or “point source,” would decrease by approximately 6 dB over hard surfaces and 9 dB over soft surfaces for each doubling of the distance. For example, if a noise source produces a noise level of 89 dBA at a reference distance of 50 feet, then the noise level would be 83 dBA at a distance of 100 feet from the noise source, 77 dBA at a distance of 200 feet, and so on over hard surfaces. Generally, noise is most audible when traveling along direct line-of-sight. Barriers, such as walls, berms, or buildings that break the line-of-sight between the source and the receiver greatly reduce noise levels from the source because sound can reach the receiver only by bending over the top of the barrier (diffraction). Sound barriers can reduce sound levels by up to 20 dBA. If a barrier, however, is not high or long enough to break the line-of-sight from the source to the receiver, its effectiveness is greatly reduced.

Sensitive Receptors

Land uses that are considered sensitive to noise impacts are referred to as “sensitive receptors.” Noise-sensitive receptors consist of, but are not limited to, schools, religious institutions, residences, libraries, parks, hospitals, and other care facilities.

Vibration

In contrast to airborne noise, ground-borne vibration is not a common environmental problem. It is unusual for vibration from sources such as buses and trucks to be perceptible, even in locations close to major roads. Some common sources of groundborne vibration are trains, buses on rough roads, and construction activities such as blasting, pile-driving and operating heavy earth-moving equipment. The effects of ground-borne vibration include feelable movement of the building floors, rattling of windows, shaking of items on shelves or hanging on walls, and rumbling sounds. In extreme cases, the vibration can cause damage to buildings. A vibration level that causes annoyance would be well below the damage threshold for normal buildings.

Major sources of groundborne vibration would typically include trucks and buses operating on surface streets, and freight and passenger train operations. The most significant sources of construction-induced groundborne vibrations are pile driving and blasting – neither of which would be involved in the installation or maintenance of structural implementation alternatives. Currently, the state of California has no vibration regulations or guidelines.

The background vibration velocity level in residential areas is usually 50 vibration decibels (VdB) or lower, well below the threshold of perception for humans which is around 65 VdB. Most perceptible indoor vibration is caused by sources within buildings such as operation of mechanical equipment, movement of people or slamming of doors. Typical outdoor sources of perceptible ground-borne vibration are construction equipment, steelwheeled trains, and traffic on rough roads. If the roadway is smooth, the vibration from traffic is rarely perceptible. The range of interest is from approximately 50 VdB to 100 VdB. Background vibration is usually well below the threshold of human perception and is of concern only when the vibration affects very sensitive manufacturing or research equipment. Electron microscopes and high-resolution lithography equipment are typical of equipment that is highly sensitive to vibration.

Noise Guidelines

The no longer extant California Office of Noise Control, California Department of Health Services developed guidelines showing a range of noise standards for various land use categories in the 1976 Noise Element Guidelines. These guidelines are now found in Appendix C of the State of California General Plan Guidelines (Governor's Office of Planning and Research 2003). Cities within the state have generally incorporated this compatibility matrix into their General Plan noise elements. These guidelines are meant to maintain acceptable noise levels in a community setting based on the type of land use. Noise compatibility by different types of land uses is a range from "Normally Acceptable" to "Clearly Unacceptable" levels. The guidelines are used by cities within the state to help determine the appropriate land uses that could be located within an existing or anticipated ambient noise level.

Some of the reasonably foreseeable methods of compliance have the potential to affect noise levels. Noise within counties and cities are regulated by noise ordinances, which are found in the municipal code of the jurisdiction These noise ordinances limit intrusive noise and establish sound measurements and criteria, minimum ambient noise levels for different land use zoning classifications, sound emission levels for specific uses, hours of operation for certain activities (such as construction and trash collection), standards for determining noise deemed a disturbance of the peace, and legal remedies for violations.

Mitigation: Standard methods to address noise and vibration

Increases in noise levels during construction and/or maintenance activities would vary depending on the existing ambient levels at each site. Once a site has been selected, project-level analysis to determine noise impacts would involve: (i) identifying sensitive receptors within a quarter-mile vicinity of the site, (ii) characterizing existing ambient noise levels at these sensitive receptors, (iii) determining noise levels of any and all installation and maintenance equipment, and (iv) adjusting values for distance between noise source and sensitive receptor. In addition, the potential for increased noise levels due to construction activities is limited and short-term. Given the size of the individual projects and the fact that installation would occur in small discrete locations, noise impacts during installation would not foreseeably be greater, and would likely be less onerous than, other types of typical construction activities in urbanized areas, such as ordinary road and infrastructure maintenance activities, building activities, etc. These short-term noise impacts can be mitigated by implementing commonly-used noise abatement procedures, standard construction techniques such as sound barriers, mufflers and employing restricted hours of operation. Applicable and appropriate mitigation measures could be evaluated when specific projects are determined, depending upon proximity of construction activities to receptors.

Overall, noise levels for construction would be governed primarily by the noisiest pieces of equipment. For most construction equipment the engine is the dominant noise source. Typical maximum noise emission levels (Lmax) are summarized, based on construction equipment operating at full power at a reference distance of 50 feet, and an estimated equipment usage factor based on experience with other similar installation projects. The usage factor is a fraction that accounts for the total time during an eight-hour day in which a piece of installation equipment is producing noise under full power. Although the noise levels in Table 8-4 represent typical values, there can be wide fluctuations in the noise emissions of similar equipment based on two important factors: (1) the operating condition of the equipment (e.g., age, presence of mufflers and engine cowlings); and (2) the technique used by the equipment operator (aggressive vs. conservative).

Table 8-4. Typical Installation Equipment Noise Emission Levels

Equipment	Maximum Noise Level, (dBA) 50 feet from source	Equipment Usage Factor	Total 8-hr Leq exposure (dBA) at various distances	
			50ft	100ft
Foundation Installation			83	77
Concrete Truck	82	0.25	76	70
Front Loader	80	0.3	75	69
Dump Truck	71	0.25	65	59
Generator to vibrate concrete	82	0.15	74	68
Vibratory Hammer	86	0.25	80	74
Equipment Installation			83	77
Flatbed Truck	78	0.15	70	64
Forklift	80	0.27	74	69
Large Crane	85	0.5	82	76

Source: Los Angeles Water Board 2007

Contractors and equipment manufacturers have been addressing noise problems for many years, and through design improvements, technological advances, and a better understanding of how to minimize exposures to noise, noise effects can be minimized. An operations plan for the specific construction and/or maintenance activities could be developed to address the variety of available measures to limit the impacts from noise to adjacent homes and businesses. To minimize noise and vibration impacts at nearby sensitive sites, installation activities should be conducted during daytime hours to the extent feasible. There are a number of measures that can be taken to reduce intrusion without placing unreasonable constraints on the installation process or substantially increasing costs. These include noise and vibration monitoring to ensure that contractors take all reasonable steps to minimize impacts when near sensitive areas; noise testing and inspections of equipment to ensure that all equipment on the site is in good condition and effectively muffled; and an active community liaison program. A community liaison program should keep residents informed about installation plans so they can plan around noise or vibration impacts; it should also provide a conduit for residents to express any concerns or complaints.

The following measures would minimize noise and vibration disturbances at sensitive areas during installation:

- Use newer equipment with improved noise muffling and ensure that all equipment items have the manufacturers' recommended noise abatement measures, such as mufflers, engine covers, and engine vibration isolators intact and operational. Newer equipment will generally be quieter in operation than older equipment. All installation equipment should be inspected at periodic intervals to ensure proper maintenance and presence of noise control devices (e.g., mufflers and shrouding).

- Perform all installation in a manner to minimize noise and vibration. Use installation methods or equipment that will provide the lowest level of noise and ground vibration impact near residences and consider alternative methods that are also suitable for the soil condition. The contractor should select installation processes and techniques that create the lowest noise levels.
- Perform noise and vibration monitoring to demonstrate compliance with the noise limits. Independent monitoring should be performed to check compliance in particularly sensitive areas. Require contractors to modify and/or reschedule their installation activities if monitoring determines that maximum limits are exceeded at residential land uses.
- Conduct truck loading, unloading and hauling operations so that noise and vibration are kept to a minimum by carefully selecting routes to avoid going through residential neighborhoods to the greatest possible extent. Ingress and egress to and from the staging area should be on collector streets or higher street designations (preferred).
- Turn off idling equipment.
- Temporary noise barriers should be used and relocated, as practicable, to protect sensitive receptors against excessive noise from installation activities. Consider mitigation measures such as partial enclosures around continuously operating equipment or temporary barriers along installation boundaries.
- The installation contractor should be required by contract specification to comply with all local noise and vibration ordinances and obtain all necessary permits and variances.
- These and other measures can be classified into three distinct approaches as outlined in Table 8-5.

Table 8-5. Noise Abatement Measures

Type of Control	Description
Source Control	*Time Constraints* – Prohibiting work during sensitive nighttime hours *Scheduling* – performing noisy work during less sensitive time periods *Equipment Restrictions* – restricting the type of equipment used *Substitute Methods* –using quieter equipment when possible *Exhaust Mufflers* – ensuring equipment have quality mufflers installed *Lubrication and Maintenance* – well maintained equipment is quieter *Reduced Power Operation* – use only necessary power and size *Limit equipment on-site* – only have necessary equipment onsite *Noise Compliance Monitoring* – technician on-site to ensure compliance
Path Control	*Noise barriers* – semi-portable or portable concrete or wooden barriers *Noise curtains* – flexible intervening curtain systems hung from

	supports *Increased distance* – perform noisy activities further away from receptors
Receptor Control	*Community participation* –open dialog to involve affected parties *Noise complaint process* – ability to log and respond to noise complaints

Source: Adapted from Thalheimer 2000.

Impacts

The Provisions is not a project located within an airport land use plan (item e) or in the vicinity of a private airstrip (item f). The Provisions may cause an increase in noise or vibration on temporary and permanent bases (items a, b and d). The increases are anticipated to be small, as described below. No substantial permanent increase in noise is anticipated (item c).

<u>Waste Collection and Education</u>

Implementation of the Provisions could cause a very minor permanent increase in ambient noise levels. This would be from increasing the frequency of trucks used by municipalities to pick up mercury containing waste.

<u>Sediment Controls, Alternative Dredging Procedures, Wetland Features or Measures to Reduce Methylation, Wastewater Treatment/Industrial Facility Upgrades</u>

For a variety of activities, there could be a temporary increase in the use of heavy vehicles or heavy equipment for earth moving or construction. The increase in noise is anticipated to be small on a statewide level since most of these activities would occur without the Provisions. The Provisions are anticipated to cause an increase in vehicle use, which is difficult to predict, as described for air quality (Section 8.4.3).

Summary

Noise or vibration from construction and earth moving activities would be intermittent. The noise thresholds may be exceeded for limited durations depending on the location and ambient noise levels at specific sites. The State Water Board cannot guarantee that mitigation measures would be employed. The impact from temporary activities is therefore determined to be potentially significant. Measures, however, are available that should be applied to reduce and/or eliminate these impacts as described above. Permanent increases in ambient noise levels from small increases in vehicle use are expected to be less than significant.

<u>8.4.13 POPULATION AND HOUSING</u>

Would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

a) Induce substantial population growth in an area either directly (*e.g.*, by proposing new homes and businesses) or indirectly (*e.g.*, through extension of roads or other infrastructure)?	☐	☐	☑	☐
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☑
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☑

Impacts and Mitigation

It is not reasonably foreseeable that the Provisions would directly induce population growth, affect housing, or displace individuals. Indirect effects are discussed in Section 8.6, on Growth Inducing Impacts and are anticipated to be less than significant.

Summary

Implementation of the Provisions should have a less than significant impacts on population or housing.

8.4.14 PUBLIC SERVICES

Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Fire protection?	☐	☐	☑	☐
b) Police protection?	☐	☐	☑	☐
c) Schools?	☐	☐	☐	☑
d) Parks?	☐	☐	☑	☐
e) Other public facilities?	☑	☐	☐	☐

Impacts and Mitigation

The expected location of the reasonably foreseeable methods of compliance is generally not in the vicinity of schools (item c). Although it is possible that a project developed as a method of compliance for the Provisions could be located near governmental facilities. Potential effects to parks are described below. The Provisions would not require the establishment of new or altered government facilities, except that the Provisions may require construction of new wastewater treatment facilities if necessary to comply with the Provisions' implementation requirements. The Provisions may result in construction in and around public services pertaining to installation of Sediment Control measures related to storm water, such as building retaining walls, grading hillsides, installing riprap or storm water capture basins, or adding and maintaining vegetation, as further described in Section 8.4.17. Also, response times for fire and police protection may be temporarily affected during construction activities, depending on where and when they occur.

Wastewater Treatment/Industrial Facility Upgrades

There is potential for temporary delays in response times of fire and police vehicles due to road closure/traffic congestion during construction activities. To mitigate potential delays, the responsible agencies could notify local emergency and police service providers of construction activities and road closures, if any, and coordinate with the local fire and police providers to establish alternative routes and traffic control during the construction activities. Most jurisdictions have in place established procedures to ensure safe passage of emergency and police vehicles during periods of road maintenance, construction, or other attention to physical infrastructure, and there is no evidence to suggest that installation of these structural devices would create any more significant impediments than other such typical activities. Any construction activity would be subject to applicable building and safety codes and permits. Therefore, the potential delays in response times for fire and police vehicles after mitigation are less then significant.

Since construction activities would not result in development of land uses for residential, commercial, and/or industrial uses nor would the compliance methods result in an increase of growth, it is reasonably foreseeable that the compliance methods would not result in a need for new or altered fire or police protection services. In addition, Emergency Preparedness Plans could be developed in consultation with local emergency providers to ensure that the structural compliance methods would not contribute to an increase in the cumulative demand for fire and police emergency services.

Several state parks include historic gold mines and some of them have in the past had evaluated levels of mercury in the discharge from the mine. If the party responsible for the park must take actions to meet a numeric effluent limitation for mercury, it could affect the budget for the park and since parks have limited funding, the park's ability to remain open to the public could be affected. Specifically, a mine that has an individual NPDES permit (a mine with a direct discharge to surface waters) could be issued a numeric effluent limitation for mercury. Compliance with the new effluent limitations may require substantial new treatment ponds or BMPs that could be costly.

Sediment Controls

Similar to above (for Wastewater Treatment/Industrial Facility Upgrades), any construction associated with sediment controls could block traffic, but traffic disruptions can be avoided as described above.

Also, as described above, several state parks include historic gold mines and some of them have in the past had evaluated levels of mercury in the discharge from the mine. If the party responsible for the park must add sediment control to control mercury in the discharge, it could affect the ability of the patrons to use the park and view the mine. This could be due to physically blocking patrons access to the park with construction equipment or an altered landscape, or because the park cannot afford to perform the remediation and must close the park or part of the park.

In regards to compliance methods specific to sediment controls for mine closures, in most cases the Provisions are unlikely to add much beyond what would already be required by existing programs. If anything, the Provisions may keep costs down by stipulating that monitoring for mercury may not be necessary. Rather the Provisions allow that sediments controls are an appropriate bassline level of control for mercury because mercury binds to sediments. In a few cases more intensive controls may be necessary. Sediment controls may also be required for nonpoint sources and wetland projects. Many abandoned historic gold mines or mine tailings are located on public lands which may be part of state or federal parks. The installation of sediment controls is not anticipated to cause any park closures, or to significantly affect the operation of parks.

Summary

Construction and earth moving activities could result in environmental impacts with regard to public services, by potentially blocking traffic and emergency vehicles. Adhering to local regulations and ordinances, however, should reduce and/or eliminate any potential impacts, as described above. The Provisions may require construction of new wastewater treatment facilities or new storm water drainage facilities, which may have a potentially significant environmental impact, as described in Section 8.4.17.

<u>8.4.15 RECREATION</u>

Would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☑
b) Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?	☐	☐	☑	☐

Impacts and Mitigation

The Provisions do not require construction or expansion of recreational facilities. The Provisions could have a small indirect effect on the use of regional parks as described below.

Wastewater Treatment/Industrial Facility Upgrades, Sediment Controls
If a park closed due to the cost to control mercury coming from a historic mine (see section on Public Services, above), that may affect the use of other parks, but the effects would be very small on a statewide basis and fairly speculative, and should not cause deterioration of any park.

Wastewater Treatment/Industrial Facility Upgrades and Sediment Controls
Installation of controls may temporarily impact the use of existing recreational sites. For instance, bike lanes or parking locations for recreational facilities may be temporarily unavailable during installation of structural controls. These potential impacts would be short in duration and have a less-than-significant effect on recreation.

Summary
The Provisions are anticipated to have less than significant impact on recreation. In addition, the Provisions are designed to improve the quality of the affected water bodies, to support fish and wildlife. This would likely create a positive impact and increase recreational opportunities throughout the watersheds.

8.4.16 TRANSPORTATION / TRAFFIC

Would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Exceed the capacity of the existing circulation system, based on an applicable measure of effectiveness (as designated in a general plan policy, ordinance, etc.), taking into account all relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?	☑	☐	☐	☐
b) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?	☐	☐	☐	☑

c) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?	☐	☐	☐	☑
d) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that result in substantial safety risks?	☐	☐	☐	☑
e) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☐	☑
f) Result in inadequate emergency access?	☑	☐	☐	☐
g) Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?	☐	☐	☐	☑

Impacts and Mitigation

The Provisions do have the potential to increase traffic (item a) and affect emergency access (item f) as described below. Implementation of the Provisions do not conflict with any policies, plans for effective traffic circulation (item b), congestion management (item c), or programs supporting alternative transportation (item g). The Provisions would not result in a change in air traffic patterns (item d). The Provisions would not result in new design features or incompatible uses (item e).

Sediment Controls, Wastewater Treatment/Industrial Facility Upgrades

Sediment controls, wastewater treatment facility upgrades and industrial facility upgrades involve construction or earth moving, which could necessitate alteration or excavation of roadways or block traffic. To the extent that site-specific projects entail excavation in roadways, such excavations should be marked, barricaded, and traffic flow controlled with signals or traffic control personnel in compliance with authorized local police or California Highway Patrol requirements. These methods would be selected and implemented by responsible local agencies considering project level concerns. Standard safety measures should be employed including fencing, other physical safety structures, signage, and other physical impediments designed to promote safety and minimize pedestrian/bicyclists accidents. It is not foreseeable that the Provisions would result in significant increases in traffic hazards to motor vehicles, bicyclists or pedestrians, especially when considered in light of those hazards currently endured in an ordinary urbanized environment.

In order to reduce the impact of construction traffic, implementation of a construction management plan for specified facilities could be developed to minimize traffic impacts upon the local circulation system. A construction traffic management plan could address traffic control for any street closure, detour, or other disruption to traffic circulation. The plan could identify the routes that construction vehicles would use to access the site, hours of construction traffic, and traffic controls and detours. The plan could also include plans for temporary traffic control, temporary signage, location points for ingress and egress of construction vehicles, staging areas, and timing of construction activity which appropriately limits hours during which large construction equipment may be brought on or off site. Potential impacts could also be reduced by limiting or restricting hours of construction so as to avoid peak traffic times and by providing temporary traffic signals and flagging to facilitate traffic movement. It is anticipated that impacts after mitigation would be less than significant.

There is potential for temporary delays in response times of fire and police vehicles due to road closure/traffic congestion during construction activities. To mitigate potential delays, the responsible agencies could notify local emergency and police service providers of construction activities and road closures, if any, and coordinate with the local fire and police providers to establish alternative routes and traffic control during the construction activities. Most jurisdictions have in place established procedures to ensure safe passage of emergency and police vehicles during periods of road maintenance, construction, or other attention to physical infrastructure, and there is no evidence to suggest that installation of these structural devices would create any more significant impediments than other such typical activities. Any construction activity would be subject to applicable building and safety codes and permits. Therefore, the potential delays in response times for fire and police vehicles after mitigation are less then significant.

<u>Mercury Monitoring, Waste Collection and Public Education, Educating Auto Dismantlers, Mercury Pollution Prevention</u>

Several other compliance methods would likely or possibly increase vehicle use and therefore traffic. However they would not increase traffic to the point of causing traffic congestion or exceeding the capacity of the street system.

Summary

Construction and earth moving activities measures could impact emergency access. However, by following local ordinances and polices, impacts should be less than significant. Other compliance method would likely cause a small increase in traffic that is anticipated to be a less than significant impact.

<u>8.4.17 UTILITIES AND SERVICE SYSTEMS</u>

Would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☐	☐	☐	☑

b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental impacts?	☑	☐	☐	☐
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental impacts?	☑	☐	☐	☐
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	☐	☐	☐	☑
e) Result in a determination by the wastewater treatment provider that serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☑
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☐	☐	☑	☐
g) Comply with federal, state, and local statutes and regulations related to solid waste?	☐	☐	☐	☑

Impacts and Mitigation

The Provisions would not exceed wastewater treatment requirements (items a and e), but the Provisions may require construction of new wastewater treatment facilities (item b), as described below. The Provisions may result in construction of new storm water drainage facilities or expansion of existing facilities (item c). However, the implementation of the Provisions would not result in the development of any large residential, retail, industrial or any other development projects that would significantly increase the demand on the storm water infrastructure (item c) or require new water supply facilities (item d). Implementation of the Provisions would not result in the need for new, nor alterations of existing sewer or septic tank systems (item e). Implementation of the Provisions could affect solid waste disposal, but it should not result in the generation of significant amounts of solid waste (item f), as described below. The Provisions would not conflict with solid waste regulations.

<u>Sediment Controls</u>

Potential impacts related to storm water drainage facilities due to implementation of possible compliance methods include the construction of sediment controls. Construction of the new storm water sediment controls should be of a short duration and should have minimal impacts, especially if they are conducted during the dry season. Potential impacts related to construction activities are discussed above in previous sections. Sediment controls, such as earthmoving equipment to create barriers, berms, hillside grading, and installation of riprap (barriers made of large loose rock) to direct and slow flows. Silt fences can be used to catch and help prevent sediments from washing into nearby waterbodies.

Sediment controls are designed to reduce erosion. Some erosion occurs from storm water drainage. In order to comply with the Provisions, structural controls, such as barriers, berms, grading, silt fences, and vegetation may be installed to prevent excessive erosion. In some cases prior construction activities, removal of vegetation, or other land alterations have resulted in significant erosion control issues. In such cases sediment and erosion control measures may be required even without the requirements in the Provisions.

Wastewater Treatment/Industrial Facility Upgrades

Possible compliance methods include the construction of facility upgrades for wastewater treatment and industrial facilities, which is a significant impact as listed in item b. Construction of the facility upgrade would be in the vicinity of an existing facility in urban areas. Such project upgrades would need to include environmental analyses and consider alternatives and mitigation measures for any potentially significant impacts. Also, the potential impacts related to construction activities are discussed above in previous sections.

Overall, very few of the 308 facilities in the scope of the Provisions are anticipated to upgrade in the foreseeable future as result of the Provisions. No upgrades are anticipated for the Sport Fish Water Quality Objective, the Prey Fish Water Quality Objective, or the California Least Tern Prey Fish Water Quality Objective, for dischargers needing to meet an effluent limitation of 12 ng/L total mercury (discharges to flowing waters). Few discharges may need to meet an effluent limitation of 4 ng/L total mercury (discharges to slow moving waters), which is more likely to prompt a facility upgrade. For the Tribal Subsistence Fishing Water Quality Objective, some upgrades would be anticipated from effluent limitations of 1 to 4 ng/L. A rough estimate suggests that 8 facilities could need to upgrade in the foreseeable future (See Chapter 7). It is too difficult to anticipate how many faculties might need to upgrade as a result of the Subsistence Fishing Water Quality Objective, as no waters have been designated with for the Subsistence Fishing beneficial use and no site-specific water quality objectives or translation of the proposed narrative objective have been assigned to any water body. Since the water quality objective for the Subsistence Fishing (SUB) beneficial use is a narrative, and site-specific water quality objectives for SUB have not been developed, data is lacking to discern potential effluent limits for dischargers. However, such effluent limits may be similar to effluent limits for the Tribal Subsistence Fishing Water Quality Objective, which, if so, would likely result in effluent limitations between 1 to 4 ng/L. Data available from 2009 through 2015 shows that about 73 percent of facilities statewide are meeting an annual average of 4 ng/L of mercury in their effluent and 27 percent of facilities statewide are meeting an annual average of 1 ng/L of mercury in their effluent (See Appendix N, Tables N-6 and N-7). Therefore, if a wastewater treatment facility must meet the Subsistence Fishing Water Quality Objective in the future, the facility may need to upgrade to tertiary treatment to achieve the objective.

Mercury Monitoring

Mercury Monitoring would likely or possibly increase the solid waste generated from conducting laboratory analysis, which would need to be disposed of in a landfill (item f). However, the increase is anticipated to be less than a significant. Although the amount of waste and resource use may increase for a given discharger, the impacts from this limited number of facilities that would see an increase in laboratory supplies and waste are expected to be less than significant overall.

<u>Waste Collection and Education, Educating Auto Dismantlers, Mercury Pollution Prevention</u>
Collecting and properly disposing of mercury containing items could increase solid waste disposal (item f). However, improper disposal could still include disposal in a landfill and would also have a greater environmental impact if the mercury escapes the landfill. Therefore, proper disposal of mercury contain items is not anticipated to generate waste above baseline conditions. Mercury containing waste (universal waste), however may require special disposal and there may be a limited capacity for such waste.

Summary
The main potential impacts related to utilities and services are wastewater treatment facility upgrades and sediment controls for storm water drainage facilities. Since the State Water Board cannot guarantee what those projects might be or what mitigation may be implemented the impact is determined to be potentially significant. Such project would need to include environmental analyses and, the project must consider alternatives and mitigation measures to minimize any potentially significant impact.

8.5 Mandatory Findings of Significance

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☑	☐	☐

b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)	☑	☐	☐	☐
c) Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	☐	☑

The analysis at Sections 8.4.4 through 8.4.12 found that the Provisions may have potentially significant impacts on the following resource areas: Biological Resources, Geology/Soils, Greenhouse Gas Emissions, Noise and Vibration, Utilities/Service Systems. Cumulative impacts of the Provisions and other projects combined could be potentially significant, as described in Section 8.7. The Provisions would not, in any way, cause substantial adverse effects on human beings.

Where environmental impacts have been identified in this document (i.e., greenhouse gases from vehicle use), mitigation measures have also been identified to reduce those impacts to less-than-significant levels. These mitigation measures identified in this analysis are within the responsibility and jurisdiction of the responsible agencies subject to the Provisions and can or should be adopted by them. The State Water Board does not direct which compliance methods responsible agencies choose to adopt or the mitigation measures they employ. The State Water Board does, however, recommend that appropriate measures be applied to reduce or avoid potential environmental impacts.

Significant Environmental Effects Which Cannot be Avoided

While some identified potentially significant impacts could likely be reduced to less than significant with mitigation, with some specific methods of compliance projects, such as construction activities related to wastewater treatment plant upgrades or stormwater erosion controls, earth moving and grading activities to prevent erosion, and mine site clean-up activities there is the possibility that there may be significant environmental effects which cannot be avoided if the Provisions are adopted and implemented (Cal. Code Regs., tit. 14, §15126.2(b)).. These activities are likely to create noise and result in greenhouse gas emissions. In some areas there is the possibility that such activities may disturb threatened or endangered plant or animal species. For example, a very large sediment control project may have significant effects on biota by disturbing and altering a large area of habitat. In the Sierra Nevada Mountains, this could include habitat of an endangered species, the California red-legged frog (*Rana draytonii*). The overall goal of the sediment control project would be to protect biota (and humans) by reducing the mercury discharging from the mine site. If wastewater treatment or industrial facilities are required to upgrade to achieve effluent limitations the facilities may need to modify or expand their facility which may require construction or earth moving equipment. Neighbors may be affected by noise from construction and if any threatened or endangered species are located in or near the construction area they may also be affected.

Significant Irreversible Environmental Changes

Significant irreversible environmental changes which would be caused by the Provisions (Cal. Code Regs., tit. 14, §15126.2 (c)) are also possible. Again, all of the significant impacts could likely be reduced to less than significant with mitigation. An example of a significant irreversible environmental change would be consumption of fossil fuels for vehicle use or during construction projects. These effects could be minimized to less than significant with low emission vehicles and BMPs to reduce emissions. On the other hand, releasing mercury into the environment is an irreversible impact. The goal of Provisions is to reduce the amount of mercury entering California's waters.

The overall effect of the Provisions would be a reduction in the amount of mercury entering the water bodies in the State thereby improving water quality and protecting the beneficial uses of those waters.

8.6 Growth Inducing Impacts

This section describes the potential for the Provisions to cause environmental impacts through the inducement of growth, in compliance with the requirements of the CEQA Guidelines (Cal. Code of Reg., tit. 14, § 15126(d)) and CEQA (Pub. Resources Code, § 21100 (b)(5)). Growth inducement[8] occurs when projects affect the timing or location of either population or land use growth, or create a surplus in infrastructure capacity. (See also Section 8.4.13 on impact to Population and Housing.)

This analysis is organized into the primary types of growth that occur: (1) development of land, (2) population growth, and (3) the removal of existing obstacles to growth. The first two types of grown can occur either directly or indirectly, as described later, while the removal of existing obstacles to growth is an indirect impact. Economic growth, such as the creation of additional job opportunities, also could occur; however, such growth generally would lead to population growth and, therefore, is included indirectly in population growth.

[8] The State CEQA Guidelines describe growth-inducing impacts as follows:

> …[T]he ways in which a proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. Included in this are impacts which would remove obstacles to population growth…Increases in the population may tax existing community service facilities, requiring construction of new facilities that could cause significant environmental effects... [In addition,] the characteristics of some projects...may encourage and facilitate other activities that could significantly affect the environment, either individually or cumulatively. It must not be assumed that growth in any area is necessarily beneficial, detrimental, or of little significance to the environment. (14 CCR § 15126.2(d).)

8.6.1 Growth in Land Development

Growth in land development considered in this analysis is the possible physical development of residential, commercial, and industrial structures in and around where implementation of the Provisions and reasonably foreseeable methods of compliance may be located. Land use growth is subject to general plans, community plans, parcel zoning, and applicable entitlements and is dependent on adequate infrastructure to support development. Direct growth in land development occurs when, for example, a project accommodates populations in excess of those projected by local or regional planning agencies.

Potential Impact:

The Provisions would not result in the construction of new housing, commercial facilities, or industries. The Provisions would not result in new roads or water supply utilities. Therefore, the Provisions would not directly induce growth. Indirect effects by removing obstacles to growth through development, however, are discussed in Section 8.6.3.

8.6.2 Population Growth

Possible population growth considered in this analysis is the possible growth in the number of persons that live and work in the areas in and around where the Provisions are implemented and reasonably foreseeable methods of compliance may be located. Population growth occurs from natural causes (births minus deaths) and net emigration from or immigration to other geographical areas. Emigration or immigration can occur in response to economic opportunities, life style choices, or for personal reasons. Although land use growth and population growth are interrelated, land use and population growth could occur independently from each other. This has occurred in the past where the housing growth is minimal, but population within the area continues to increase. Such a situation results in increasing population densities with a corresponding demand for services, despite minimal land use growth.

Indirect population growth inducement occurs when, for example, a project that accommodates unplanned growth consequently (i.e., indirectly) establishes substantial new permanent employment opportunities (for example, new commercial, industrial, or governmental enterprises). Another example of indirect population growth is if a construction project generates substantial short-term employment opportunities that indirectly stimulate the need for additional housing and services.

Overall development in the state is governed by local General Plans (developed by counties or cities), which are intended to plan for land use development consistent with California law. The General Plan is the framework under which development occurs, and, within this framework, other land use entitlements (such as variances and conditional use permits) can be obtained.

Potential Impact:

The methods of compliance for the Provisions such as sediment controls or construction of new facilities (e.g. wastewater treatment plant upgrades to meet effluent limitations) could generate economic opportunities in an area or region, but such the methods of compliance is not expected to result in or induce substantial growth or significant growth related to population increase or land use development. The methods of compliance would be new activities that the responsible agency (or responsible party) must staff, however, the majority of the new work opportunities or duties that would be created to comply with the Provisions are expected to be filled by persons already employed by the responsible agency. This is because most of these type of duties are already being conducted, the Provisions are expected to somewhat increase the workload in some cases. Overall, the impact is anticipated to be less than significant.

The construction activities associated with methods of compliance for the Provisions may increase the economic opportunities in an area or region. However, most projects would be small (installing sediment controls) or infrequent. Therefore, this construction is not expected to result in or induce substantial or significant growth related to population increase or land use development. The majority of the new jobs that would be created by this construction are expected to be filled by persons already employed and residing in the area or region.

New economic opportunities could be maintaining a new portion of a wastewater treatment plant resulting from a treatment upgrade. Installing new treatment processes such as nitrification and denitrification may require new expertise, which would result in the hiring of new staff. The number of new staff required to maintain approximately 15 facility upgrades (Based on estimates in Section 7.2) is unlikely to be noticeable increase the population.

Implementing Mercury Minimization Plans in wastewater treatment plants or industrial facilities or implementing Mercury Pollution Prevention activities by municipal storm water is expected to be performed largely by existing staff. Most of these activities are probably already being conducted by current staff.

8.6.3 Existing Obstacles to Growth

The environmental analysis is required to discuss ways in which the proposed project could foster economic or population growth or the construction of additional housing. Included in this analysis is consideration as to whether the Provisions (or the reasonably foreseeable methods of compliance) remove obstacles to population growth or may encourage and facilitate other activities that could significantly affect the environment (see Cal. Code Regs., tit. 14, § 15126.2(d)). Obstacles to growth could include such things as inadequate infrastructure or public services, such as an inadequate water supply that results in rationing, or inadequate wastewater treatment capacity that results in restrictions in land use development. Policies that discourage either natural population growth or immigration also are considered to be obstacles to growth.

Potential Impact

The Provisions do not require an increase infrastructure or public services, or otherwise require the removal of obstacles to growth. Yet, the Provisions require a level of treatment of waste water or storm water that may result in construction of new facilities (e.g. wastewater treatment plant upgrades to meet effluent limitations). The Provisions do not require an increase in treatment capacity. However, a municipality (or responsible party) performing a construction project to comply with the Provisions, could logically consider including in the project an increase in capacity to accommodate expected increases in population. The California population is expected to grow 18 percent by 2030, compared to 2010 estimates (California Department of Finance 2014). The estimates vary from 44 percent expected growth for Imperial County to a 9 percent expected decrease in population expect for Sierra County. In this way the Provisions may encourage the development of a project that also increases the capacity of city infrastructure if the Provisions do require a municipal wastewater treatment facility to upgrade their treatment process in order to meet new water quality objectives and the facility upgrade results in an increased capacity for the facility to treat a larger volume of wastewater. Therefore, the Provisions may have a potentially significant impact through the removal of obstacles for growth.

8.7 Cumulative Impacts Analysis

8.7.1 Introduction

This section describes the potential for the Provisions to cause a considerable contribution to a cumulatively significant impact[9], to fulfil requirements of CEQA in preparing the SED. The purpose of the cumulative impacts analysis is to ensure that the potential environmental impacts of any individual project are not considered in isolation. Impacts that may be individually less than significant on a project specific basis, could pose a potentially significant impact when considered with the impacts of other past, present, and probable future projects.

The cumulative impact analysis need not be performed at the same level of detail as a "project level" analysis but must be sufficient to disclose potential combined effects that could constitute a cumulative significant adverse impact. The CEQA Guidelines direct that the cumulative impacts analysis either include a list of the past, present and probable future projects producing related or cumulative impacts or provide a summary of projections and cumulative impact analysis contained in an applicable adopted plan or related planning document. (Cal. Code Regs., tit. 14, § 15130 (b)(1)).

This section discusses whether the Provisions' incremental effect is cumulatively considerable and, where that is the case, describes the significant cumulative impacts of the proposed project in combination with past, present, and probable future projects. CEQA Guidelines direct that this cumulative impact analysis be either provided through the "list approach" of "projections approach". The cumulative impacts from implementation of the Provisions are discussed, for this statewide analysis, through analyzing the possible projects that could occur to cause impacts in combination with the Provisions in relation to existing land use planning throughout the state, in the following two sections: (1) the program level cumulative impacts, and (2) the project level cumulative impacts. On the program level, impacts from reasonably foreseeable statewide water quality actions and regional activities, including multiple TMDLs and permit requirements may in combination have cumulative impacts. It is not possible to provide a quantitative measure of the impact from all probable method of compliances from the Provisions and other projects combined. The cumulative impacts analysis entails a general consideration of the major activities that could produce cumulative impacts: construction, earth moving activities and vehicle use.

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[9] The State CEQA Guidelines (Cal. Code Regs., tit. 14, § 15355) define cumulative impacts as follows:

> "Cumulative impacts" refers to two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts:
>
> (a) The individual effects may be changes resulting from a single project or a number of separate projects.
>
> (b) The cumulative impact from several projects is the change in the environment, which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time."

8.7.2 List of Related Statewide and Regional Projects

The State Water Board has adopted and is currently developing a wide range of Statewide Policies and Significant General Permits. The entire list of Statewide Policies and Significant General Permits can be found in the State Water Board's Executive Director's report, which is updated on a monthly basis.[10] In the August 16, 2016 Executive Director's Report, the active Statewide Policies and Significant General Permits are listed in Appendix B of the report (State Water Board 2016). While some of these actions are not yet formally proposed, they are considered reasonably foreseeable probable future projects, within the temporal scope of implementation of the Provisions.

Of the Statewide Polices and Significant General Permits, several projects have potential nexus to the methods of compliance for the Provisions. These projects could cause environmental impacts that may, in conjunction with impacts of the Provisions, cause a cumulative impact. In general, these projects would likely require either 1) higher level of wastewater treatment (wastewater treatment plants upgrades), 2) sediment controls, or 3) pollutant monitoring. These projects are described in more detail below.

Reservoir Program

Formal Title: Amendment to the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California Mercury Provisions for Reservoirs

Description: The State Water Board and Regional Water Boards are developing a project to address fish mercury impairments in about 150 reservoirs around the state (referred to as the Reservoir Program elsewhere in this report and described in Section 1.6). Some proposed requirements of the Reservoir Program are similar to requirements of the Provisions, including sediment controls for mines, and effluent limitations for wastewater treatment plants.

Additionally, the Reservoir Program may require studies on methods to manage mercury in reservoirs, referred to here as Reservoir Management Actions. These Reservoir Management Actions include oxygen addition, nutrient addition, and fisheries management decisions. Oxygen addition is achieved through automated mechanical equipment that delivers air or oxygen gas to a reservoir at a specified depth. Oxygen addition to a reservoir would involve installation of the equipment, followed by periodic maintenance and possible restocking of supplies of oxygen gas. Adding nutrients (e.g., nitrogen and phosphorus) would likely include periodic trips to deliver a payload via motor vehicle (truck) or through drops from aircraft. Fisheries management decisions would likely include an increase or decrease in fish stocking levels and the associated increase or decrease in vehicle trips to the reservoir as fish are physically put into a reservoir or removed. Because the effectiveness of these methods of

[10] State Water Board Executive Director's Reports are accessible at: http://www.waterboards.ca.gov/board_info/exec_dir_rpts/

compliance still needs to be validated with field studies (as is currently planned in the Reservoir Program), the degree to which these methods would be used is speculative.

Related Impacts: Many of the methods of compliance for the Provisions could be similar to those required for the Reservoir Program, including sediment controls, possible wastewater treatment plant upgrades, and mercury monitoring. For these methods of compliance there would be similar impacts, as described in Section 8.4. Reservoir Management Actions are different methods of compliance not required by the Provisions, but some of the impacts could be similar as the impacts of the Provisions. Installation of equipment that will add oxygen to the reservoir could affect the aesthetics permanently. The equipment would be visible above the surface of the water and would be about the size of a small boat. The installation of the oxygen addition equipment could cause a disturbance to the wildlife in and around the reservoir. Nutrient addition or oxygen addition to a reservoir would also increase vehicle use and therefore emissions of air pollutants, greenhouse gas emissions, and traffic. Some of the Reservoir Management Actions would need to be conducted indefinitely (nutrient addition or fisheries management) so any associated noise, for example, from the vehicles used to adding nutrients would be permanent. However, it may be a very small disturbance, such as one truck trip per year. In the case of fisheries management, agencies may already be performing such actions and may not need to add additional truck trips. Because these methods of compliance for the Reservoir Program have not yet been validated through field studies, the additional amount of impact is uncertain and speculative.

State Implementation Policy (SIP)
Formal Title: Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California

Description: Adopted in 2005, the State Implementation Policy (SIP) applies to discharges of toxic pollutants into the inland surface waters, enclosed bays, and estuaries of California subject to regulation under the State's Porter-Cologne Water Quality Control Act and the federal Clean Water Act. Such regulation may occur through the issuance of National Pollutant Discharge Elimination System permits or other relevant regulatory approaches. The SIP establishes a standardized approach for permitting discharges of toxic pollutants to non-ocean surface waters in a manner that promotes statewide consistency.

Related Impacts: The SIP is used to derive effluent limitations for wastewater and industrial dischargers for priority pollutants. This policy in combination with other projects and the Provisions could prompt additional upgrades to wastewater and industrial facilities.

Toxicity Provisions
Formal Title: Proposed Toxicity Amendment to the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California

Description: The State Water Board anticipates creating the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries with the adoption of Toxicity Provisions.

The goals of the Toxicity Provisions include: (a) a new method to determine the toxicity of discharges, (b) statewide numeric objectives, and (c) further standardization of toxicity provisions for NPDES dischargers and facilities subject to WDR and conditional waivers.

Related Impacts: The Toxicity Provisions could demand a higher level of wastewater treatment from wastewater and industrial dischargers. The Toxicity Provisions, in combination with other projects and the Provisions could prompt additional upgrades to wastewater and industrial facilities. The Toxicity Provisions may also require an increase in vehicle use and laboratory supplies for the toxicity monitoring.

<u>Bacteria Amendments</u>
Formal Title: Statewide Water Contact Recreation Bacteria Objectives Amendments To Water Quality Control Plans for Inland Surface Waters, Enclosed Bays and Estuaries and the Ocean Waters Of California

Description: The State Water Board is developing proposed statewide bacteria water quality objectives and a proposed control program to protect human health in waters designated for water contact recreation (REC-1) from the effects of pathogens. The bacteria objectives are proposed to be adopted as amendments to the Statewide Inland Surface Waters, Enclosed Bays and Estuaries Plan, and the California Ocean Plan.

Related Impacts: The Bacteria Amendments could demand a higher level of wastewater treatment from wastewater and industrial dischargers. The Bacteria Amendments, in combination with other projects and the Provisions could prompt additional upgrades to wastewater and industrial facilities. Also, in some cases bacteria can be controlled by controlling sediments. Therefore, impacts from sediment controls could be cumulative, or the controls required for one project may be an acceptable method of compliance for other projects.

<u>Biostimulatory Substances Project</u>
Description: State Water Board staff is developing a project to address biostimulatory substances in wadeable streams, including nutrients.

Related Impacts: The Biostimulatory Substances Project could demand a higher level of wastewater treatment from wastewater and industrial dischargers. The Biostimulatory Substances Project, in combination with other projects and the Provisions could prompt additional upgrades to wastewater and industrial facilities. Also in some cases, nutrients can be controlled by controlling sediments. Therefore, impacts from sediment controls could be cumulatively considerable, or the controls required for one project may be an acceptable method of compliance for other projects.

<u>Recycled Water Policy</u>
Description: Adopted in 2009, the purpose of the Recycled Water Policy is to increase the use of recycled water from municipal wastewater sources that meet the definition in Water Code

section 13050, subdivision (n), in a manner that implements state and federal water quality laws. The Recycled Water Policy provides direction regarding the appropriate criteria to be used by the State Water Board and the Regional Water Boards in issuing permits for recycled water projects. Additionally, the Recycled Water Policy encourages every region in California to develop a salt/nutrient management plan by 2014 that is sustainable on a long-term basis and that provides California with clean, abundant water. State Water Board staff is drafting a resolution for the State Water Board's consideration in late 2016 regarding updating the Recycled Water Policy.

Related Impacts: The Recycled Water Policy could demand a higher level of wastewater treatment from wastewater and industrial dischargers, so that the water may be reused. The Recycled Water Policy, in combination with other projects and the Provisions could prompt additional upgrades to wastewater and industrial facilities.

Procedures for Dredged and Fill Materials (Formerly the Wetlands Policy)
Formal Title: Procedures for Discharges of Dredged or Fill Materials to Waters of the State (Proposed for Inclusion in the Water Quality Control Plan for Inland Surface Waters and Enclosed Bays and Estuaries)

Description: The Procedures for Dredged and Fill Materials has the goal of developing: 1) a wetland definition; 2) wetland delineation procedures; and 3) procedures for applications, and the review and approval of Water Quality Certifications, Waste Discharge Requirements, and waivers of Waste Discharge Requirements for discharges of dredged and fill materials.

Related Impacts: Wetlands can be a source of methylmercury. The Provisions affirm that features or measures to reduce methylation may be required. Also, the Provision may result in requirements for alternative dredging procedures to be used to control mercury contaminated sediments. This requirement is not anticipated to result in significant impacts to specific resource areas (Section 8.4). While there is a nexus between the projects there should not be considerable cumulative impacts.

The Trash Amendments
Formal Titles: Amendment to the Water Quality Control Plan for the Ocean Waters of California to Control Trash and Part 1 Trash Provisions of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California.

Description: The State Water Board adopted the Trash Amendments April in 2015 and Office of Administrative Law and U.S. EPA approved them in December 2015 and January 2016, respectively. The Trash Amendments include six elements: (1) a water quality objective, (2) applicability, (3) prohibition of discharge, (4) implementation provisions, (5) time schedule, and (6) monitoring and reporting requirements. The Trash Amendments apply to all surface waters of the state, with the exception of those waters within the jurisdiction of the Los Angeles Water Board with trash or debris TMDLs that are in effect prior to the effective date of the Trash Amendments.

Related Impacts: The Trash Amendments require dischargers to control litter and will be implemented through NPDES storm water permits (MS4s, Department of Transportation, Industrial General Permit, and Construction General Permit), Waste Discharge Requirements (WDRs), and waivers of WDRs.. Similarly, the Provisions includes requirements for MS4s that may increase household hazardous waste collection programs and education of public on proper disposal of items, which could if anything help reduce litter. Both the Trash Amendments and the Provisions identify cumulative project impacts regarding the potential increase in vehicle use for litter/solid waste collection, and the vehicle use could have a significant cumulative impact.

<u>*General Storm Water Permits*</u>
Description: Major statewide permits for storm water pertain to industry, construction, or MS4s. Municipalities serving between 100,000 and 250,000 people are required to apply for Phase I MS4 permits, while smaller municipalities and non-traditional permittees (e.g. some state parks) are enrolled in the general Phase II MS4 permit. Storm water discharges arising from projects carried out by the California Department of Caltrans are regulated under the unique statewide Caltrans Permit. Construction projects that disturb one or more acres of soil are required to enroll in the Construction General Permit. A defined set of industrial dischargers are required to enroll in the Industrial General Permit. These permits are revised every serval years and the requirements are updated. Also, requirements for recently adopted TMDLs, including mercury TMDLs are incorporated into the permits periodically.

Related Impacts: Responsible parties may be required to perform activities such as monitoring or outreach and source control, which could increase vehicle use and impacts greenhouse gases and air quality. Additionally, in light of all requirements in the revised permit, statewide projects listed above, and compliance with the Provisions, the responsible partly may decide to upgrade storm water infrastructure treatments systems. These methods of compliance would result in earth moving activities, construction and vehicle use. These activities could have impacts to biota, greenhouse gases, geology, noise and utilities, as described for “Sediment Controls” in Section 8.4. Cumulative impacts could result from statewide implementation and compliance with the Provisions. Briefly, cumulative impacts could arise from: 1) wastewater treatment plant upgrades, 2) sediment controls, and 3) methods of compliance that result in increased vehicle use, such as pollutant monitoring. A complete discussion is below in Section 8.7.3.

<u>*Regional Water Board TMDLs*</u>
Description: In addition to the State Water Board developing or adopted projects, the Regional Water Boards have recently adopted and are in the process of developing a variety of amendments to their respective basin plans including TMDLs for different pollutants, as well as issuing various permits throughout the state. Examples include: TMDL for Sediment and Temperature in the Scott River Watershed (North Coast Water Board), Napa River Watershed - Sediment TMDL (San Francisco Bay Water Board), Guadalupe River Watershed - Mercury TMDL (San Francisco Bay Water Board), Napa River Watershed – Pathogens (San Francisco

Bay Water Board), TMDLs for Nitrogen Compounds and Orthophosphates in the Lower Salinas River Watershed (Central Coast Water Board), Implementation Plans for the TMDLs for Metals in the Los Cerritos Channel and for Metals and Selenium in the San Gabriel River and Impaired Tributaries (Los Angeles Water Board), Central Valley Salinity Alternatives for Long-Term Sustainability (Central Valley Water Board), Truckee River Sediment TMDL (Lahontan Water Board), Coachella Valley Storm Water Channel Bacterial Indicators TMDL (Colorado River Water Board), Recreation Standards for Inland Fresh Surface Waters (Santa Ana Water Board), Revised TMDL Daily Loads for Indicator Bacteria (San Diego Water Board), and Rainbow Creek Nitrogen and Phosphorus TMDLs (San Diego Water Board).

Related Impacts: The main goal of all of the Water Boards' actions is to protect and improve the quality of the State's waters. Implementation measures identified during the development of these policies, amendments, and basin plan amendments, as well as the reasonably foreseeable methods of compliance for these actions, may have similar potential impacts as those identified for the Provisions, for example, a higher level of treatment of wastewater, sediment controls, and pollutant monitoring.

Probable Future Mercury TMDLs

The Water Boards are likely to undertake additional mercury TMDL projects in the future. The reasonably foreseeable compliance methods for the probable future mercury TMDLs are similar to the compliance methods for the Provisions (listed below). This is because the primary mercury sources identified in the TMDL project would be similar to the sources considered in the Provisions. Major mercury sources are those from legacy mining (i.e., mine tailings and storm water runoff) and atmospheric deposition. Any probable future TMDLs for the control of mercury are anticipated to have similar requirements for those sources as those required for the Provisions, but perhaps to a greater extent.

8.7.3 Cumulative Impacts of the Provisions and Other Water Board Projects

The cumulative impacts of other developing or adopted State Water Board statewide projects in combination with the Provisions are anticipated to have cumulative impacts. The cumulative impacts are discussed below by the methods of compliance: 1) wastewater treatment plant upgrades, 2) sediment controls, and 3) methods of compliance that result in increased vehicle use, such as pollutant monitoring.

Wastewater treatment and industrial facility upgrades are less likely to result from the Sport Fish Water Quality Objective, the Prey Fish Water Quality Objective, and the California Least Tern Water Quality Objective, and there may only be a handful of upgrades resulting for the Subsistence Fishing Water Quality Objective and Tribal Subsistence Fishing Water Quality Objective. However, such upgrades are much more likely a result of the cumulative effects of multiple new effluent limitations for mercury and other pollutants from other statewide projects (listed above) that are expected to be adopted and integrated into the state permitting programs over the next ten years. Additionally, in a state with a high water demand such as California, water reuse is becoming a high priority, and the State Water Board has adopted the Policy for

Water Quality Control for Recycled Water (Recycled Water Policy) to aggressively pursue development of recycled water projects. This Recycled Water Policy established a mandate to increase recycled water use to 300,000 acre-feet annually by 2030, and requires that the water used be treated to tertiary standards. The combination of forthcoming statewide water quality standards, plus the demand for higher levels of water quality for new initiatives such as the Recycled Water Policy, will increase demands for tertiary treatment across the state. If every wastewater treatment plant in the state upgraded to tertiary treatment (every plant that does not already provide tertiary treatment) it would result in over a hundred construction projects and earth moving activities throughout the state.

Sediment controls can be used to control a number of pollutants, including mercury, bacteria, nutrients, and sediments (turbidity). Sediment controls may be required by a number of statewide and regional projects. The geographic location that may be the focus of each project will likely vary and it is assumed for this analysis that more sediments controls will be required throughout the state as each project develops. Therefore, impacts from sediment controls could be cumulative. When multiple projects require control of pollutants in storm water, it will put more pressure on storm water dischargers to implement a higher level of control of pollutants in the discharge. This may prompt construction of more robust permanent erosion controls or storm water treatment structures (e.g. retaining walls, culverts, detention basins). The construction and related activities could have a significant cumulative impact on biota, noise, greenhouse gases, and hydrology.

Increased vehicle use may result from a variety of methods compliance for all statewide projects. Vehicles are used to ship samples, perform maintenance and for any construction or earth moving projects. Vehicle use will also result from a wide variety of other projects occurring in the state from either new government policies or regulations that require monitoring and enforcement or from development of new housing, commercial facilities, or public infrastructure. All projects together could have a significant vehicle usage increase which could have a significant cumulative impact on air quality, increase traffic, and increase greenhouse gases. However, these effects can be decreased with fuel efficient vehicles and other measures as described in Section 8.4.

9. Project Alternatives

9.1 Alternatives Analysis

State Water Board certified regulatory programs require that the Staff Report contain "An analysis of reasonable alternatives to the project and mitigation measures to avoid or reduce any significant or potentially significant adverse environmental impacts" (Cal. Code Regs., tit. 23, § 3777, subd. (b)(3)). The alternatives should feasibly meet the project objectives (stated in Section 2.2), but avoid or substantially reduce any potentially significant adverse environmental impacts (Cal. Code Regs., tit. 14, § 15126.6 (a)).

9.1.1 Alternative 1- No Project

The purpose of assessing a No Project Alternative in an environmental document such as this Staff Report is to allow decision makers and the public to compare the impacts of approving the Provisions with the impacts of not approving the Provisions. The No Project Alternative would involve the State Water Board deciding not to approve the Provisions.

The No Project Alternative would not meet any of the five project objectives of the Provisions. (See Section 2.2.) However, a consent decree does require that the U.S. EPA fulfill the second objective of protecting wildlife from the elevated levels of mercury. (See Section 1.2.) In 2014, the United States District Court for the Northern District of California issued a consent decree requiring that U.S. EPA is obligated to propose water quality criteria for wildlife by June 30, 2017, initiate required endangered species consultation with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service within nine months of the proposal, and then promulgate a final rule within six months of the conclusion of the consultation (Consent Decree: Our Children's Earth Foundation and Ecological Rights Foundation, vs. U.S. EPA, et al., No. 3:13-cv-2857-JSW (N.D. Cal., Aug 25 2014). The U.S. EPA can also achieve the requirement to establish water quality criteria for the protection of wildlife in California if water quality objectives are adopted by the Water Boards and approved by U.S. EPA by June 30, 2017. Therefore, if the State Water Board fails to adopt a water quality objective to protect wildlife, then the U.S. EPA will promulgate such criteria (See Section 3.5).

The consent decree only requires U.S. EPA to establish water quality criteria that protect wildlife. The first project objective of the Provisions, which is to recognize the beneficial uses of water made by California Native Americans and subsistence fishers, would not be accomplished. The third objective, which is to adopt water quality objective(s) for mercury to protect recreational fishers, subsistence fishers, and California tribes from consumption of fish with elevated levels of mercury, since the consent decree does not require U.S. EPA to promulgate human health criteria, would also not be accomplished. Establishing protective criteria for wildlife would indirectly protect recreational fishing and perhaps ceremonial fish consumption by tribes, which is part of the third objective of the Provisions. This is because a meal a week of fish consumption should also be protected by criteria that protect wildlife (see Appendix K, Section K.6.7, which explains how the Prey Fish Water Quality Objective and the

California Least Tern Prey Fish Water Quality Objective are roughly consistent or perhaps slightly more protective than the Sport Fish Water Quality Objective).

The U.S. EPA would not provide a program of implementation to control mercury discharges, which is the fourth project objective of the Provisions. After the U.S. EPA promulgates new mercury criteria, the Regional Water Boards would need to implement the criteria through permits. The Regional Water Boards would likely require actions to control mercury in permits that are similar to the requirements of the Provisions. It is unlikely that consistent implementation requirements would be applied statewide since there would be no statewide policy, which would fail to meet the fifth objective of the Provisions of statewide consistency.

In terms of environmental impacts, the No Project Alternative could somewhat lessen the impact of the Provisions by omitting the beneficial uses of Tribal Subsistence Fishing, Tribal Tradition and Culture, and Subsistence Fishing, and the corresponding mercury water quality objectives, thus reducing the reasonably foreseeable methods of compliance for wastewater treatment facilities to install upgrades. However, because the Water Boards would be required to implement criteria through permits by the U.S. EPA, and implementation of those permit requirements would use the same set of implementation activities as discussed in Chapter 7. Therefore similar potential environmental impacts due to implementation would be expected, but to a lesser degree. However, this alternative would not provide statewide consistency in how mercury criteria are implemented, resulting in more uncertainty regarding the magnitude of potential environmental impacts. .

The State Water Boards cannot accurately evaluate the potential water quality criteria that U.S. EPA would ultimately establish to protect wildlife because such national criteria have not been developed. It is assumed that the wildlife criteria would be as protective as the water quality objectives that protect wildlife in the Provisions, at minimum. The U.S. EPA may include more conservative assumptions or may be able to include new information on exposure pathways that was not available at the time of development of the Provisions (e.g., additional uncertainty factors in calculating the reference dose, exposure for insectivorous wildlife). Thus, it is possible that the U.S. EPA could promulgate criteria for wildlife that are more stringent than those included in the Provisions. If the U.S EPA promulgates criteria for wildlife that are three to four times as protective as those included in the Provisions, then the criteria would be roughly as stringent as the Tribal Subsistence Fishing Water Quality Objective and the Subsistence Fishing Water Quality Objective. In this case, the potential environmental impacts due to implementation of the U.S EPA criteria would be greater since more stringent criteria would apply to all waters (designated with the wildlife beneficial use), whereas the water quality objectives in the Provisions pertaining to subsistence uses may only apply to a fraction of the surface waters in the foreseeable future. The environmental impacts would presumably primarily result from increases in the installation of upgrades to wastewater treatment facilities. Again, because U.S. EPA would not establish a statewide program of implementation, this alternative would there would not provide statewide consistency in how mercury criteria are implemented, resulting in more uncertainty regarding final potential environmental impacts. , Because the reasonably foreseeable methods of compliance for implementation through individual permits are functionally the could potentially be similar to the Provisions, similar environmental impacts would expected. However, the No Project Alternative would fail to meet most of the objectives of the Provisions. The No Project Alternative is not the preferred alternative.

9.1.2 Alternative 2 - Sport Fish and Prey Fish Water Quality Objectives Only

This alternative omits the Subsistence Fishing Water Quality Objective and the Tribal Subsistence Fishing Water Quality Objective, to reduce the environmental impacts. This alternative includes the beneficial uses of Tribal Subsistence Fishing, Tribal Tradition and Culture, and Subsistence Fishing, the Sport Fish Water Quality Objective, the Prey Fish Water Quality Objective and the California Least Tern Water Quality Objective, and the corresponding implementation requirements. The Subsistence Fishing Water Quality Objective and the Tribal Subsistence Fishing Water Quality Objective would likely result in upgrades to wastewater treatment plants and industrial facilities that need to achieve the effluent limitations (see Section 8.4.17). These upgrades could result in impacts to air quality, greenhouse gases, noise and vibration, and traffic. In Alternative 2, these impacts would not occur. Mercury monitoring of the effluent, and mercury minimization plans would decrease under this alternative. Potential impacts to air quality, greenhouse gases, and traffic (due to increased vehicle use) would decrease.

However, Alternative 2 does not meet the first and third project objectives of the Provisions (see Section 2.2) to protect human health, including populations that consume more fish than the typical recreational angler, such as subsistence fishers and tribes. The Subsistence Fishing and Tribal Subsistence Fishing beneficial uses currently occur in California (see reports in Appendix G). Therefore, with this alternative, water quality objectives to protect these uses would need to be developed in the future. Also the Water Board is developing other water quality standards and corresponding programs of implementation, such as those to control bacteria, nutrients and toxicity (Section 8.7.2) and any of these may result in the upgrades to the same facilities that would be avoided under Alternative 2. This alternative is anticipated to delay attainment of beneficial uses. Alternative 2 is not the preferred alternative.

9.1.3 Alternative 3 – Omit Implementation Requirements for Storm Water, Wetlands, Dredging Activities, Mines and Nonpoint Sources

This alternative would be the same as the Provisions, but omit the requirements for municipal and industrial storm water permittees, requirements for wetlands, dredging activities, nonpoint sources, and mines. Some of the storm water or nonpoint source discharges currently have mercury requirements through existing policies and permits (see section 6.9 through 6.11). For some dischargers, no new requirements are anticipated from the Provisions, while other dischargers would need to perform a new or enhanced version of the activities that are already being performed. These requirements could feasibly be omitted from the Provisions. Omitting these requirements could reduce some of the environmental impacts by reducing temporary noise increases due to vehicle use and possible use of construction equipment, as well as possible impacts due to the construction of new storm water drainage facilities or expansion of existing facilities. (Federal regulations require water quality based requirements for wastewater and industrial discharges, therefore the requirements for wastewater and industrial discharges cannot feasibly be omitted.)

Alternative 4 would not provide total fulfilment of the fourth project objective of the Provisions, which is to provide a program of implementation to control mercury discharges and achieve the Mercury Water Quality Objectives in California waters. (See Section 2.2.) Alternative 4 would also fail to provide the same level of statewide consistency as the Provisions, which is the fifth project objective of the provisions. The requirements in the Provisions for storm water are intended to have all MS4s conduct a similar level of mercury controls. The nonpoint sources requirements (including those for mines, wetlands and dredging activities) are also intended to provide clarity as to an appropriate level of baseline mercury control. If the Provisions were silent as to how to control mercury in nonpoint sources, then the Regional Water Boards may derive a wide range of varying requirements. Finally, considering that storm water and nonpoint sources are primary sources of mercury, achieving the water quality objectives will depend on the control of these sources. While the requirements in the Provisions may not be very different than exiting permits and polices, these requirements provide a somewhat higher level of mercury control in some cases and these requirements provide better statewide consistency. Alternative 4 lacks these requirements, and is, therefore, not the preferred alternative.

10. Other Required Considerations

This section addresses considerations required by Water Code section 13241 for the development of water quality objectives. This section also discusses the elements a program of implementation to achieve the Mercury Water Quality Objectives must include and addresses required considerations for antidegradation and the human right to water.

10.1 Considerations Required by Water Code Section 13241

In accordance with Water Code section 13241, the Water Boards are required to establish water quality objectives to “ensure the reasonable protection of beneficial uses and the prevention of nuisance[.]” In doing so, the following factors must be considered:

- Past, present, and probable future beneficial uses of water.
- Environmental characteristics and water quality of the hydrographic unit under consideration.
- Water quality conditions that could be reasonably attained through coordinated control of all factors affecting water quality.
- Economic considerations.
- The need for developing new housing.
- The need to develop and use recycled water.

(Wat. Code, § 13241, subds. (a)-(f).)

10.1.1 Past, Present and Future Beneficial Uses of Water

In general, the five Mercury Water Quality Objectives are designed to help support the past, present and future beneficial uses of water as described in Chapter 5. The Provisions would support the Water Boards’ existing water quality control plans and policies, and provide additional means to ensure that any future beneficial uses that could be impaired by the presence of mercury or methylmercury are protected. However, some of the Mercury Water Quality Objectives have no applicability to either past, present, or future beneficial uses. The Subsistence Fishing Water Quality Objective and the Tribal Subsistence Water Quality Objective would not apply to any beneficial use currently in the state until designated by a Water Board. Furthermore, protecting present uses from impairments from mercury is challenging, given the nature of the sources. These topics are described below.

Past Uses

The Tribal Subsistence Fishing Water Quality Objective, if applied to a beneficial use by a Water Board, could help to protect past beneficial uses of water. The Tribal Subsistence Fishing Water Quality Objective for mercury was calculated from the amount of fish consumed currently, and the objective does not specifically aim to attain the past use. However, attaining the Tribal Subsistence Fishing Water Quality Objective would be a movement towards attaining the past uses of water (i.e., those uses practiced by California tribes). This water quality objective likely goes further in attaining past uses in comparison to attaining the COMM beneficial use protected by the Sport Fish Water Quality Objective. This is because although past fish consumption by California tribes is difficult to ascertain, it was likely significantly higher than present levels of consumption (Shilling et al. 2014). In addition, the Sport Fish Water Quality Objective could help protect past ceremonial uses involved fish consumption, although these uses are not well understood by the Water Boards (Section 6.6).

Present Uses

Elevated levels of mercury in certain fish species impair the established beneficial uses adopted in basin plans related to fish consumption by humans and wildlife, as discussed in detail in Sections 5.1 through 5.5. The Mercury Water Quality Objectives and the implementation procedures included in the Provisions are intended to protect those beneficial uses. For many areas in the state, there is doubt that the water quality objectives that correspond to the present uses are achievable due to historic mining and atmospheric deposition. Still, it is anticipated that the beneficial uses of COMM and WILD could be attainable in many areas after the coordinated control of all factors that affect mercury discharges and bioaccumulation. The beneficial uses of T-SUB and SUB WILD could be attainable after the coordinated control of all factors in some waters, but these uses will be more difficult to attain than COMM and WILD. Staff recognizes that it may take a significant period of time to attain the objectives by implementing the mercury controls in the Provisions and other water quality control programs, such as TMDLs. In addition, the levels of mercury vary greatly by fish species and some fish species, such as rainbow trout and anadromous salmonids, are safe to eat at the consumption rate included for the Sportfish Water Quality Objective. In other species, however, such as bass, the mercury levels tend to be high and the consumption of these species should be limited.

Future Uses

Waters where the COMM or WILD beneficial uses apply and are currently impaired due to elevated levels of mercury, could meet their corresponding water quality objectives in the future through efforts to reduce mercury entering into water bodies and efforts to reduce methylation of mercury within those waters. Similarly if waters are designated with either the Tribal Tradition and Culture, Tribal Subsistence Fishing, or Subsistence Fishing beneficial uses and the corresponding water quality objectives (Section 6.5 through Section 6.7), although the objectives may not be currently achievable, the designation could be used to protect future uses where not currently attained.

10.1.2 Environmental Characteristics and Water Quality of the Hydrographic Unit under Consideration

The legacy of mercury left by historic gold and mercury mining is an important factor that should be considered when developing the Mercury Water Quality Objectives or implementation programs. Human activity may prevent attaining the Mercury Water Quality Objectives for many fish species for the next century in many waters, but there is no way to know this for certain. This legacy mercury contamination is described in the environmental background in

Chapter 4. Similarly, mercury from atmospheric emissions may be a significant source of mercury that will prevent attainment of the Mercury Water Quality Objectives (also discussed in Chapter 4). Otherwise, the environmental characteristics of all hydrographic units that would be affected by the Provisions are described in Appendix D. The difficultly in achieving more protective options for the Mercury Water Quality Objectives (discussed in Sections 6.2 through Section 6.6) is due to the legacy mercury contamination and atmospheric emissions. Finally, Section 6.9 discusses how the Provisions should to address legacy mines.

10.1.3 Water Quality Conditions that Could Reasonably be Achieved through Coordinated Control of All Factors Affecting Water Quality

The Water Boards are required to ensure that all discharges, regardless of type, comply with all water quality control plans and policies. To achieve the Mercury Water Quality Objectives, the Provisions include implementation requirements for major surface water discharge types that are regulated by the Water Boards, including: historic mines (Section 6.9), nonpoint sources, wetlands, dredging activities (Section 6.10), storm water (Section 6.11), and municipal and industrial discharges (Section 6.13).

The legacy of mercury left by historic gold and mercury mining is not easily controlled and may prevent attaining the Mercury Water Quality Objectives for many fish species for the next century in many waters. In addition, mercury has been discharged from legacy mines for decades or even centuries, contaminating sediments in soils along the lengths of associated attendant water bodies. Given the absence of the original mine owners, the diffuse distribution of the mercury, and the large number of stakeholders surrounding such water bodies, coordinated control of contaminants is extremely challenging. Another factor that affects the coordinated control of water quality is mercury emissions to the atmosphere. Mercury TMDLs developed by the Water Boards have calculated atmospheric deposition from mercury on an individual water body or watershed basis. The Water Boards do not regulate mercury emission to the atmosphere, however, ARB and the federal government are working to control atmospheric mercury emissions. These federal programs and other government programs that help control mercury are listed in Appendix E.

It may take a significant period of time to attain the objectives by implementing the mercury controls in the Provisions and developing and implementing other water quality control programs, such as TMDLs. Additionally, the Tribal Subsistence Fishing Water Quality Objective and the Subsistence Fishing Water Quality Objective may be very difficult to achieve in most waters as discussed in Section 6.5. However, the levels of mercury vary greatly by fish species and in some waters some fish species, such as rainbow trout and anadromous salmonids, are safe to eat at the consumption rate included for the Tribal Subsistence Fishing Water Quality Objective and the Subsistence Fishing Water Quality Objective. Moreover, it is anticipated that the coordinated control of all factors can improve water quality in many waters.

10.1.4 Economic Considerations

Under the requirements of Water Code sections 13170 and 13241, subdivision (d), and the California Code of Regulations, title 23, section 3777, subdivisions (b)(4) and (c), the State Water Board must consider economics when establishing water quality objectives. This consideration of economics is not a cost-benefit analysis and, particularly with respect to the analysis required by the certified regulatory program, the board is not required to engage in speculation or conjecture and the consideration of economics should include consideration of potential costs of the reasonably foreseeable measures to comply with the Provisions. An economic analysis of the Provisions is included as Appendix R (hereafter referred to as the economic analysis).

The economic analysis estimated the statewide cost of the Provisions would be 9 to 15 million dollars annually, over 20 years. This estimate is based on the projected costs associated with reasonably foreseeable methods of compliance for municipal wastewater and storm water dischargers. Although the economic analysis did not directly estimate costs for compliance with effluent limits of 1 ng/L or lower, possibly driven from the Tribal Subsistence or Subsistence beneficial uses, the costs would be similar to those analyzed for compliance with the effluent limits derived from the other water quality objectives to protect COMM and WILD. It is anticipated that the Water Boards would not require treatment beyond that required to meet an effluent limit of between 1-4 ng/L and would issue either longer compliance schedules associated with a site specific objective of a variance. Appendix R recognizes that variances or site-specific compliance schedules are likely for point course dischargers subject to potentially very low effluent limits. The bulk of the costs would be for upgrades to tertiary treatment for wastewater facilities with observed mercury effluent levels above the anticipated effluent limitations. The cost estimates also include municipal wastewater and storm water dischargers conducting pollution prevention activities. See Appendix R for details. It was not possible to quantify costs to abandoned mines, dredging, wetlands, and other nonpoint sources. However, these costs are anticipated to be minor compared to the quantified costs, since the methods of compliance for abandoned mines, dredging, wetlands, and other nonpoint sources would already be conducted under existing programs in many cases.

The economic analysis analyzed data from 67 POTWs with monitoring data for mercury in effluent out of the approximately 300 facilities that would be subject to the Provisions (See Appendix N for details). Of these, 15 POTWs (22 percent) were achieving an effluent mercury concentration of 1 ng/L or less. Forty-two POTWs (63 percent) achieved an effluent concentration of 4 ng/L or less. Fifty-four POTWs (80 percent) achieved an effluent concentration of 12 ng/L or less. The remaining 13 facilities did not achieve a concentration of mercury less than 12 ng/L. The economic analysis also analyzed data for 20 industrial facilities. Of these, eight facilities (45 percent) achieved an in-effluent concentration of 1 ng/L or less. Eleven facilities (55 percent) achieved an effluent concentration of 4 ng/L or less. All 9 remaining industrial facilities discharged mercury at a concentration of greater than 12 ng/L.

Based on these samples, POTWs and industrial facilities are capable of meeting an effluent limit of 1 ng/L or less of water column mercury. A larger number are already meeting an effluent limit of 4 ng/L or less. However, to meet a 1 ng/L limit for mercury, an estimated 80 percent of all

POTWs in the state and 60 percent of all industrial NPDES dischargers would have to build treatment upgrades. To meet a 4 ng/L limit, approximately 37 percent of POTWs and 45 percent of industrial facilities would have to build treatment upgrades. To achieve the highest proposed water quality objective water column concentration, 12 ng/L, approximately 20 percent of POTWs and 45 percent of industrial facilities would have to build treatment upgrades. It is unknown how many facilities will need the meet the effluent limitations of 1 ng/L and 4 ng/L, since it is unknown where the beneficial uses of SUB and T-SUB will be designated in the future and it is uncertain which water bodies will be categorized a “slow moving waters” (see discussion in Section 7.2.8 through Section 7.2.10).

While the economic analysis (Appendix R) provides details of the anticipated costs of the Provisions, cost is a consideration in many policy recommendations involved in developing the Provisions (each “Issue” discussed in Section 6). Specifically, in Section 6.4, the recommendation to adopt the T-SUB and SUB beneficial uses could focus resources on areas where there is the greatest need for very protective water quality objectives because designating waters with a tiered use of consumption of fish is tailored to those higher consumptive fishers. By comparison, the other option evaluated was to have the COMM use incorporate subsistence fishing, which would result in a very stringent water quality objective that would be applied to most waters throughout the state which are designated with the COMM use. The approach of developing separate beneficial uses (T-SUB and SUB) will reduce costs statewide, for wastewater treatment faculties that would need to meet the effluent limitations associated with the Mercury Water Quality Objectives. There are implications of the costs of the Mercury Water Quality Objectives in Section 6.2 through Section 6.5 in discussions of which options for the water quality objectives can be achieved.   A main concern associated with the ability to achieve a water quality objective is the cost of doing so, although is not certain that objectives that are more difficult to achieve will result in greater costs. The economic analysis (Appendix R) is intended to identify where actual costs may be incurred.

Economic considerations were included in the development of the two prey fish water quality objectives. The California Least Tern Prey Fish Water Quality Objective only applies to that habitat of the tern and not statewide to save resources and reduce costs (Section 6.7). The need for the monitoring of the Prey Fish Water Quality Objective was limited to waters that lack trophic level 4 fish, to save resources and reduce costs. Similarly if a water body was listed based on sport fish, monitoring of prey fish is not required in order to save resources and reduce costs (Section 6.8).

The costs are also considered in the discussion on the implementation requirements for the Provisions (Section 6.9 through Section 6.13). Costs are considered in the requirements for municipal wastewater and industrial dischargers, including an exception for small disadvantaged communities and insignificant dischargers to reduce costs from monitoring for such dischargers (Section 6.13, Option 1). Also, the economic consequences for industrial storm water discharges were considered in the development of the updated Numeric Action Level (Section 6.11, option 3). The Provisions also included an option that could reduce costs for MS4s by allowing a substitute method of mercury control, instead of those listed in the Provisions, with approval of the Regional Water Board (Section 6.11, option 2). Costs are also considered with respect to the human right to water (Section 10.4).

In addition to the cost of implementing the Provisions, the economic and social impact of mercury contamination in fish should be considered. This impact may include lost revenue from sport fishing (see Section 6.3, Option 3). Another impact is to the people that have been exposed to elevated mercury as children. Detrimental health effects, especially the loss of intelligence due to neurological damage from methylmercury, causes diminished economic productivity that persists over the entire lifetime of these children. For the U.S. the cost was estimated to be $8.7 billion annually (range, $2.2–43.8 billion; in 2000 US dollars (Trasande et al. 2005). However, U.S. EPA estimated a much lower cost, a maximum of $580 million (Griffiths et al. 2006). A great deal of this estimated cost was the result of global mercury emissions. There is also a cost to California Native American tribes since locally caught fish are often used for trading, and knowledge of negative impacts to fish supplies due to water quality issues is one reason tribe members fish less frequently (Shilling et al. 2014).

10.1.5 The Need for Developing Housing

The adoption of the Provisions is not expected to constrain housing development in California. The implementation requirements do not directly affect the cost of housing, but can increase the cost of city utility services, mainly sewer. The costs associated with the requirements are anticipated to be minimal in comparison to the overall costs of housing development.

10.1.6 The Need to Develop and Use Recycled Water

The adoption of the Provisions is not expected to have a major effect on the need to develop and use recycled water. The Provisions do not include new requirements for recycled water. The intent of the Provisions is to improve water quality and reduce mercury levels in surface waters, including rivers, streams, estuaries, reservoirs, lakes, and bays. Since high quality water is better for reuse, the Provisions are consistent with the need to develop and use recycled water.

Recycled water can be put to many uses: crop or landscape irrigation, cooling, ground water replenishment and other uses. Also a possible use of recycled water is for fish hatcheries. Recycled water must meet the recycled water criteria (Cal. Code Regs., tit. 22, § 60301 et seq.). If the recycled water could eventually be used for drinking, such as for ground water replenishment, the water must meet drinking water criteria. The relevant drinking water threshold for mercury is 2 µg/L (2,000 ng/L), which is much higher than the concentrations considered for use as effluent limitations in the Provisions. The Provisions would not affect drinking water criteria.

It seems unlikely that implementation of the Provisions would change the amount of water recycled. This is because the mercury requirements for recycled water would not be more stringent than the requirements for discharge into surface water. In some cases, it may be easier to meet the requirements for recycled water than to meet the effluent limitations in the

Provisions. In those cases this implementation of the Provisions may promote water recycling because treatment cost would be lower with regard to mercury. In addition, the Provisions may indirectly increase the amount of water available for recycling. This could happen if dischargers upgrade to tertiary treatment in order to consistently meet the water quality objectives. The result of more dischargers with tertiary treatment would be more high quality treated wastewater being available for reuse.

In Southern California, recycled water is used to create ponds or lakes for recreation, including fishing. An example is Santee Lakes near San Diego which are supported by recycled water from Padre Dam Municipal Water District. Santee Lakes are stocked with trout for fishing and taking, and bass for catch and release only. Although this is a recreational area where people may catch and eat fish from lakes, the lakes are officially part of the wastewater treatment facility. The lakes are not included in the San Diego Regional Water Board's basin plan or in the waters within the board's region. Therefore, the requirements from the Provisions would not apply in the Santee Lakes or the use of recycled water in the lakes. However, the discharge from the lakes to the nearby creek is regulated as an NPDES discharge, and requirements for the Provisions could apply to that discharge.

10.2 Considerations Required by Water Code Section 13242

California Water Code section 13242 requires a program of implementation for achieving a water quality objective to include: a description of the nature of the actions which are necessary to achieve the objective, time schedules for actions to be taken, and a description of surveillance to be undertaken to determine compliance with the water quality objective. (Wat. Code, § 13242, subd. (a)-(c).) In compliance with California Water Code section 13242, the Provisions includes a program of implementation in order to achieve the water quality objectives and monitoring and reporting requirements, as described in the draft Provisions (Appendix A). The time schedule for compliance would be determined on a discharge-by-discharge basis by the Water Boards. Timelines for compliance are already established by existing programs and in the State Water Board's *Policy for Compliance Schedules in National Pollutant Discharge Elimination System Permits* (Resolution 2008-0025). After the effective date of the Provisions, the requirements to implement the Provisions would be incorporated into permits and Certifications as they are adopted, reissued, or modified. Most existing permits should have all applicable new mercury requirements incorporated within five to ten years after the date of adoption of the Provisions. This is because NPDES permits and waivers of Waste Discharge Requirements expire every five years and the new requirements should be added to each permit at the time of their renewal. However, in some cases, the permits can be administratively extended which results in a delay in reissuing the permits. Also Waste Discharge Requirements are scheduled to be reissued every five, ten, or fifteen years depending on the threat to water quality, and the new requirements of the Provisions will be incorporated primarily upon reissuance.

10.3 Antidegradation

Federal and state antidegradation policies are specified in both 40 Code of Federal Regulations section 131.12 and in State Water Board Resolution No. 68-16, respectively. Antidegradation policies impose additional levels of protection for waters within the state, depending on the highest quality of the water achieved since 1968 – the year that the State Water Board adopted California's antidegradation policy. Where a receiving water is of higher quality than applicable water quality standards, that higher water quality must be maintained unless certain conditions are met.

The State Water Board does not anticipate any degradation of water quality as a result of the adoption and implementation of the Provisions. The Provisions are intended to enhance water quality. Upon adoption of the Provisions, the state would have a more protective water quality objective for mercury to support the COMM beneficial use compared to the current statewide criteria in the California Toxics Rule and, for the first time, the Mercury Water Quality Objectives would apply statewide to support the beneficial uses pertaining to wildlife habitat: WILD, MAR, WARM, COLD, EST, SAL, RARE. Additionally, once the beneficial uses of SUB, T-SUB are designated additional protection fro water quality would apply for those uses. Since the implementation requirements in the Provisions would not supersede the implementation program of adopted mercury TMDLs, the Provisions could not result in a degradation of water quality standards in waters where mercury TMDLs have been established.

Antidegradation is considered during permit issuance and reissuance. The analysis is done on a discharge-by-discharge basis. An increase in mercury in a discharge is not lawful even if the water body is meeting standards. Antidegradation provisions require that where the quality of the waters exceed levels necessary to meet water quality objectives that quality shall be maintained unless the State finds the discharge is necessary to accommodate important economic or social development (40 CFR § 131.13).

A case where the implementation requirements of the Provisions may be less stringent than existing requirements is for the municipal wastewater and industrial discharger effluent limitations (Section 6.13), since effluent limitations are derived on a case-by case basis and depend on many factors. This could occur for example if a facility is granted a dilution credit, while the facility previously had no dilution credit factored into the effluent limitation (dilution credits for bioaccumulative compounds may be restricted according to existing policy). Another example could be if a facility is granted the small disadvantaged community or insignificant discharger exception by the Regional Water Board resulting in no effluent limitation, while the facility previously had a mercury effluent limitation. However, when modifying or reissuing permits with existing water quality based effluent limitations for mercury, permit writers must ensure compliance with Clean Water Act anti-backsliding requirements. For modified or reissued permits with existing effluent limitations for mercury, any less stringent effluent limitation must be consistent with anti-backsliding requirements within the Clean Water Act section 402(o)(1), unless a specific exception applies under anti-backsliding requirements (33 U.S.C. § 1342(o)(2); 40 C.F.R. § 122.44(l)), or antidegradation requirements (33 U.S.C. §

1313(d)(4)). Therefore, if the effluent limitation that would result from the Provisions is less stringent that the existing limitation, the previous effluent limitation may need to be retained from the previous permit by the permit writer to adhere to anti-degradation or anti-backsliding requirements.

10.4 The Human Right to Water

California Assembly Bill 685 (AB 685) declares that "every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes" (Wat. Cod, § 106.3, subd. (a)) and promotes the adoption of policies, regulations, and grant criteria pertinent to those uses of water (ibid., § 106.3, subd. (c)). State Water Board Resolution 2016-0010 adopts the human right to water as a core value, adopts the realization of the human right to water as a top priority for the Water Boards, and directs staff, when submitting a recommendation to the board pertinent to the human right to water, to describe how the right was considered. The Provisions do not directly pertain to drinking water. The Provisions primarily concern mercury in fish tissue and the associated risk to human and wildlife that eat locally caught fish. The mercury levels that are a concern in drinking water are much higher than the mercury levels that impact fish consumption due to the bioaccumulation/ biomagnification that happens as mercury moves through the food web. Therefore, the goals of the Provisions are more protective than needed for safe drinking water. Since the Provisions do not apply to drinking water, any effects on the affordability or accessibility of safe clean drinking water would be indirect.

The requirements of the Provisions may indirectly increase accessibility of safe clean drinking water. This is because the treatment that removes mercury in wastewater treatment plants (settling, flocculation, and filtration) tends to also remove other constituents that are a concern for drinking water, such as sediments, nutrients, and bacteria. Many wastewater treatment plants discharge the effluent indirectly upstream of drinking water intake structures. Surface water that is used for drinking is usually treated before it is distributed to residents and businesses to remove pathogens and sediments. If sediments and pathogens are lower in surface water to begin with, it is easier to provide safe clean drinking water.

The requirements of the Provisions may also indirectly decrease accessibility of safe clean drinking water by increasing the costs for residential customers for the water in their home. This could happen because the Provisions would impose new requirements for wastewater treatment plants. In response to the Provisions, plants may need to perform mercury minimization programs activities or possibly add new treatment steps. The increased costs to wastewater treatment plants may be passed on to the customers. Since the municipal water and sewer service are combined in many areas, this could indirectly increase the cost of drinking water. The increased cost could make water and sewer service unaffordable for some residents, in particular, residents in small disadvantage communities.

In consideration of the financial constraints of some small communities, the Provisions include an exception for small disadvantaged communities for some of the requirements for municipal wastewater (Section 6.13.3, option 1). The development of the Provisions will also consider social and economic impacts of the implementation requirements (see Section 10.1.4).

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