

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD  
CENTRAL VALLEY REGION

RESOLUTION NO. R5-2005-0146

AMENDING THE WATER QUALITY CONTROL PLAN  
FOR  
THE SACRAMENTO RIVER AND SAN JOAQUIN RIVER BASINS  
FOR THE CONTROL OF MERCURY IN CACHE CREEK,  
BEAR CREEK, SULPHUR CREEK, AND HARLEY GULCH

WHEREAS, the California Regional Water Quality Control Board, Central Valley Region, (hereafter Central Valley Water Board) finds that:

1. In 1975 the Central Valley Water Board adopted a Water Quality Control Plan for the Sacramento River and San Joaquin River Basins (hereafter Basin Plan), which has been amended occasionally.
2. The Basin Plan may be amended in accordance with the California Water Code Section 13240, et seq.
3. Water Code section 13241 authorizes the Central Valley Water Board to establish water quality objectives and Water Code section 13242 sets forth the requirements for a program for implementation for achieving water quality objectives.
4. Cache Creek, Bear Creek, Sulphur Creek, and Harley Gulch (hereafter Cache Creek watershed) have been identified under the federal Clean Water Act section 303(d) as impaired water bodies due to either elevated concentrations of mercury in water, methylmercury in fish tissue, or the existence of a fish consumption advisory. Pursuant to Clean Water Act section 303(d), a total maximum daily load (TMDL) is required to be developed that will bring the impaired water bodies into compliance with water quality standards.
5. The Central Valley Water Board recognizes that the Basin Plan does not include numeric water quality objectives for mercury or a plan to reduce mercury concentrations in the Cache Creek watershed, therefore, a Basin Plan amendment to adopt water quality objectives and an implementation program necessary to protect beneficial uses is appropriate.
6. The Central Valley Water Board has developed a water quality management program as a Basin Plan amendment to reduce the concentrations of methylmercury in fish tissue that is based on reducing the overall mercury and methylmercury loads to the Cache Creek watershed.

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7. The proposed amendment modifies Basin Plan Chapter II (Existing and Potential Beneficial Uses) to include commercial and sport fishing as a beneficial use designation for Cache Creek, North Fork Cache Creek, and Bear Creek.
8. The proposed amendment modifies Basin Plan Chapter III (Water Quality Objectives) to establish site-specific numeric objectives for methylmercury in fish in Cache Creek, Bear Creek, and Harley Gulch.
9. The proposed amendment modifies Basin Plan Chapter IV (Implementation) to establish a water quality management program to reduce mercury and methylmercury loads into the Cache Creek watershed.
10. The proposed amendment modifies Basin Plan Chapter V (Surveillance and Monitoring) to include a water, sediment, and fish tissue monitoring program to monitor progress in achieving mercury and methylmercury concentration reductions
11. The water quality objectives and water quality management program fulfill requirements set by the Clean Water Act Section 303 for TMDLs for Cache Creek, Bear Creek, and Harley Gulch. The water quality objectives are the TMDL targets for these water bodies.
12. The proposed amendment requires the owners of inactive mines to develop and implement plans to reduce mercury discharges from the mines, and it requires federal, state, and local agencies to develop and implement plans to reduce mercury and methylmercury loads from areas with mercury-contaminated sediments or methylmercury sources.
13. The Central Valley Water Board has considered the factors set forth in Water Code section 13241, including economic considerations, in developing this proposed amendment.
14. Central Valley Water Board staff developed a draft staff report and draft Basin Plan Amendment for external scientific peer review in November 2004 in accordance with Health and Safety Code Section 57004 and the draft final staff report and amendment have been modified to conform to the recommendations of the peer reviewers or staff has provided an explanation of why no modification was made in response to the comments.
15. The Central Valley Water Board finds that the scientific portions of the Basin Plan Amendment are based on sound scientific knowledge, methods, and practices in accordance with Health and Safety Code section 57004.
16. Central Valley Water Board staff developed a report for public comment and peer review and held a California Environmental Quality Act (CEQA) scoping meeting on

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2 June 2004, the Central Valley Water Board held a workshop on 18 March 2005, and the Central Valley Water Board held public hearings on 23 June 2005 and 21 October 2005 to consider the proposed amendment.

17. The basin planning process has been certified as “functionally equivalent” to CEQA requirements for preparing environmental documents and is, therefore, exempt from those requirements (Public Resources Code, section 21000 et seq. and Title 23 California Code of Regulations Division 3, Chapter 27, Article 6, beginning with Section 3775).
18. Central Valley Water Board staff completed an environmental checklist and functional equivalent document in compliance with the provisions of CEQA that concluded that the proposed amendment will have no potential for adverse effects, either individually or cumulatively, on wildlife or the environment.
19. Central Valley Water Board staff has circulated a Notice of Public Hearing, Notice of Filing, a written staff report, an environmental checklist, and a draft proposed amendment to interested individuals and public agencies for review and comment in accordance with state and federal environmental regulations (23 CCR section 3775, 40 CFR part 25, and 40 CFR part 131).
20. The proposed amendment will not result in degradation of Cache Creek water quality with respect to water quality currently achieved or provided for in the water body and maintains the level of water quality necessary to protect existing and anticipated beneficial uses.
21. The proposed amendment requires actions to be taken to reduce loads of total mercury and methyl mercury in the Cache Creek watershed. Such actions are of maximum benefit to the people of the state. Reduction of total mercury and methylmercury is necessary to protect human health that is affected by consumption of fish containing mercury and is necessary to protect wildlife, in particular certain birds, that consume fish containing mercury. The proposed amendment will not unreasonably affect present and anticipated beneficial uses nor result in water quality less than described in applicable policies because the amendment is intended to reduce over time levels of mercury in order to protect beneficial uses and achieve water quality objectives. The actions to be taken are not expected to cause other impacts on water quality.
22. This proposed amendment must be approved by the State Water Resources Control Board, the Office of Administrative Law, and the U.S. Environmental Protection Agency before becoming effective.
23. This regulatory action meets the “Necessity” standard of the Administrative Procedures Act, Government Code, section 11353, subdivision (b).

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THEREFORE BE IT RESOLVED:

1. The Central Valley Water Board certifies the staff report and environmental checklist as a functional equivalent document pursuant to CEQA for the Basin Plan amendment.
2. Pursuant to Water Code sections 13240, et seq., the Central Valley Water Board, after considering the entire record, including oral testimony at the hearing, hereby approves the staff report and adopts an amendment to the Basin Plan to include commercial and sport fishing as a beneficial use, to establish site-specific numeric water quality objectives for methylmercury, and to establish a water quality management strategy to reduce mercury and methylmercury loads Cache Creek, Bear Creek, Sulphur Creek, and Harley Gulch as set forth in Attachment 1.
3. The Executive Officer is directed to forward copies of the Basin Plan amendment to the State Water Resources Control Board in accordance with the requirements of Water Code Section 13245.
4. The Central Valley Water Board requests that the State Water Resources Control Board approve the Basin Plan amendment in accordance with the requirements of Water Code Sections 13245 and 13246 and forward it to the Office of Administrative Law and the U.S. Environmental Protection Agency.
5. If during its approval process the State Water Resources Control Board, or Office of Administrative Law, or U.S. Environmental Protection Agency determines that minor, non-substantive corrections to the language of the amendment are needed for clarity or consistency, the Executive Officer may make such changes, and shall inform the Central Valley Water Board of any such changes.
6. The Executive Officer is authorized to sign a Certificate of Fee Exemption and following approval of the Basin Plan amendment by the Office of Administrative Law submit this Certificate in lieu of payment of the Department of Fish and Game filing fee to the Secretary for Resources.
7. Following approval of the Basin Plan amendment by the Office of Administrative Law, the Executive Officer shall file a Notice of Decision with the State Clearinghouse.

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I, THOMAS R. PINKOS, Executive Officer, do hereby certify that the forgoing is a full, true, and correct copy of a Resolution adopted by the California Regional Water Quality Control Board, Central Valley Region, on 21 October 2005.

Original Signed By  
THOMAS R. PINKOS, Executive Officer

Attachment: Attachment 1 Resolution No. R5-2005-0146

ATTACHMENT 1  
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Text additions to the existing Basin Plan language are indicated by underline and text deletions are indicated by ~~striketrough~~. Minor, non-substantive changes to the Basin Plan Amendment language made by the Central Valley Water Board's Executive Officer on 13 July 2006 are indicated by double underline and ~~double striketrough~~. Revise Basin Plan sections as follows:

**Revise Chapter II (Existing and Potential Beneficial Uses), Table II-1 to add a footnote for Cache Creek Clear Lake to Yolo Bypass:**

Cache Creek Clear Lake to Yolo Bypass (d)

Footnote: “(d) In addition to the beneficial uses noted in Table II-1, COMM exists for Cache Creek from Clear Lake to Yolo Bypass and in the following tributaries only: North Fork Cache Creek and Bear Creek.”

**Revise Chapter III (Water Quality Objectives), Methylmercury, as follows:**

For Clear Lake (53), the methylmercury concentration in fish tissue shall not exceed 0.09 and 0.19 mg methylmercury/kg wet weight of tissue in trophic level 3 and 4 fish, respectively. ~~Compliance with these objectives shall be determined by analysis of fish tissue as described in Chapter V, Surveillance and Monitoring.~~

For Cache Creek (Clear Lake to Yolo Bypass) (54), North Fork Cache Creek, and Bear Creek (tributary to Cache Creek), the average methylmercury concentration shall not exceed 0.12 and 0.23 mg methylmercury/ kg wet weight of muscle tissue in trophic level 3 and 4 fish, respectively. For Harley Gulch (tributary to Cache Creek), the average methylmercury concentration shall not exceed 0.05 mg methylmercury/ kg wet weight in whole, trophic level 2 and 3 fish.

Compliance with the methylmercury fish tissue objectives shall be determined by analysis of fish tissue as described in Chapter V, Surveillance and Monitoring.

**Revise Chapter IV (Implementation) to add:**

**Cache Creek Watershed Mercury Program:**

The Cache Creek watershed methylmercury and total mercury implementation program applies to Cache Creek (from Clear Lake to the Settling Basin outflow and North Fork Cache Creek from Indian Valley Reservoir Dam to the main stem Cache Creek), Bear Creek, Sulphur Creek, and Harley Gulch. This implementation program is intended to reduce loads of methylmercury and total mercury to achieve all applicable water quality standards for mercury and methylmercury, including the site-specific water quality objectives for

methylmercury in fish tissue. Guidance for monitoring mercury in fish, water, and sediment is provided in Chapter V, Surveillance and Monitoring.

Historic mining activities in the Cache Creek watershed have discharged and continue to discharge large volumes of inorganic mercury (termed total mercury) to creeks in the watershed. Much of the mercury discharged from the mines is now distributed in the creek channels and floodplain downstream from the mines. Natural erosion processes can be expected to slowly move the mercury downstream out of the watershed over the next several hundred years. However, current and proposed activities in and around the creek channel can enhance mobilization of this mercury. Activities in upland areas, such as road maintenance and grazing and timber activities can add to the mercury loads reaching Cache Creek, particularly when the activities take place in areas that have elevated mercury levels.

Total mercury in the creeks is converted to methylmercury by bacteria in the sediment. The concentration of methylmercury in fish tissue is directly related to the concentration of methylmercury in the water. The concentration of methylmercury in the water column is controlled in part by the concentration of total mercury in the sediment and the rate at which the total mercury is converted to methylmercury. The rate at which total mercury is converted to methylmercury is variable from site to site, with some sites (i.e., wetlands and marshes) having greatly enhanced rates of methylation.

Since methylmercury in the water column is directly related to mercury levels in fish, the following methylmercury load allocations are assigned to tributaries and the main stem of Cache Creek.

#### **Methylmercury Load Allocations**

Tables IV-7 and 8 provide methylmercury load allocations for Cache Creek, its tributaries, and instream methylmercury production. Allocations are expressed as a percent of existing methylmercury loads. The methylmercury allocations will be achieved by reducing the annual average methylmercury (unfiltered) concentrations to site-specific, aqueous methylmercury goals, which are 0.14 ng/L in Cache Creek, 0.06 ng/L in Bear Creek, and 0.09 ng/L in Harley Gulch. The allocations in Tables IV-7 and IV-8 apply to sources of methylmercury entering each tributary or stream segment. In aggregate, the sources to each tributary or stream segment shall have reductions of methylmercury loads as shown below.

Table IV-7  
Cache Creek Methylmercury Allocations

<u>Source</u>	<u>Existing Annual Load (g/yr)</u>	<u>Acceptable Annual Load (g/yr)</u>	<u>Allocation (% of existing load)</u>
<u>Cache Creek (Clear Lake to North Fork confluence)</u>	<u>36.8</u>	<u>11</u>	<u>30%</u>
<u>North Fork Cache Creek</u>	<u>12.4</u>	<u>12.4</u>	<u>100%</u>
<u>Harley Gulch</u>	<u>1.0</u>	<u>0.04</u>	<u>4%</u>
<u>Davis Creek</u>	<u>1.3</u>	<u>0.7</u>	<u>50%</u>
<u>Bear Creek @ Highway 20</u>	<u>21.1</u>	<u>3</u>	<u>15%</u>
<u>Within channel production and ungauged tributaries</u>	<u>49.5</u>	<u>32</u>	<u>65%</u>
		<u>7 (a)</u>	<u>10% (a)</u>
<u>Total of loads</u>	<u>122</u>	<u>66</u>	<u>54%</u>
<u>Cache Creek at Yolo (b)</u>	<u>72.5</u>	<u>39</u>	<u>54%</u>
<u>Cache Creek Settling Basin Outflow (c)</u>	<u>87</u>	<u>12</u>	<u>14%</u>

- The allocation includes a margin of safety, which is set to 10% of the acceptable loads. In terms of acceptable annual load estimates, the margin of safety is 7 g/yr.
- Cache Creek at Yolo is the compliance point for the tributaries and Cache Creek channel for meeting the allocations and aqueous goals. Agricultural water diversions upstream of Yolo remove methylmercury (50 g/year existing load).
- The Settling Basin Outflow is the compliance point for methylmercury produced in the Settling Basin.

Table IV-8 provides the load allocation within Bear Creek and its tributaries to attain the allocation for Bear Creek described in Table IV-7. The inactive mines listed in Table IV-10 are assigned a 95% total mercury load reduction. Reductions in mercury loads from mines, erosion, and other sources in the Sulphur Creek watershed are expected to reduce in channel production of methylmercury to meet the Sulphur Creek methylmercury allocation.

Table IV-8  
Bear Creek Methylmercury Allocations

<u>Source</u>	<u>Existing Annual Load (g/yr)</u>	<u>Acceptable Annual Load (g/yr)</u>	<u>Allocation (% of existing load)</u>
<u>Bear Creek @ Bear Valley Road</u>	<u>1.7</u>	<u>0.9</u>	<u>50%</u>
<u>Sulphur Creek</u>	<u>8</u>	<u>0.8</u>	<u>10%</u>
<u>In channel production and ungauged tributaries</u>	<u>11.4</u>	<u>1</u>	<u>10%</u>
		<u>0.3 (a)</u>	<u>10% (a)</u>
<u>Total of Loads</u>	<u>21.1</u>	<u>3</u>	<u>15%</u>
<u>Bear Creek at Hwy 20 (b)</u>	<u>21.1</u>	<u>3</u>	<u>15%</u>

- The allocation includes a margin of safety, which is set to 10% of the acceptable loads. In terms of acceptable annual load estimates, the margin of safety is 0.3 g/yr.
- Bear Creek at Highway 20 is the compliance point for Bear Creek and its tributaries.



To achieve the water quality objectives and the methylmercury allocations listed in Tables IV-7 and IV-8, the following actions are needed: 1) reduce loads of total mercury from inactive mines, 2) where feasible, implement projects to reduce total mercury inputs from existing mercury-containing sediment deposits in creek channels and creek banks downstream from historic mine discharges, 3) reduce erosion of soils with enriched total mercury concentrations, 4) limit activities in the watershed that will increase methylmercury discharges to the creeks and, where feasible, reduce discharges of methylmercury from existing sources, and 5) evaluate other remediation actions that are not directly linked to activities of a discharger. Because methylmercury is a function of total mercury, reductions in total mercury loads are needed to achieve the methylmercury load allocations. Methylmercury allocations will be achieved in part by natural erosion processes that remove mercury that has deposited in creek beds and banks since the start of mining.

Table IV-9 summarizes implementation actions, affected watersheds, and agencies or persons assigned primary responsibility for mercury load reduction projects, and required completion dates for the projects. For purposes of this Basin Plan Implementation Program, the term "project" refers to actions or activities that result in a discharge of mercury to Cache Creek or are conducted within the 10-year floodplain.

Table IV-9 Implementation Summary

<u>Implementation Activity</u>	<u>Affected Watersheds</u>	<u>Assigned Responsibility</u>	<u>Action</u>	<u>Completion Date</u>
<u>Inactive Mines</u>	<u>Bear Creek, Harley Gulch, Sulphur Creek</u>	<u>Mine owners and other responsible parties, USBLM</u>	<u>Cleanup mines, sediment, and wetlands</u>	<u>2011</u>
<u>Creek Sediments- Harley Gulch Delta</u>	<u>Harley Gulch</u>	<u>USBLM</u>	<u>Conduct additional studies</u> <u>Submit report on engineering options</u> <u>Conduct projects, as required</u>	<u>2006</u> <u>2008</u> <u>2011</u>
<u>Creek Sediments- Upper Watershed</u>	<u>Bear Creek, Davis Creek, Harley Gulch, Sulphur Creek, and Cache Creek (Harley Gulch to Camp Haswell)</u>	<u>USBLM, SLC, CDFG, Colusa, Lake, and Yolo Counties, private landowners</u>	<u>Conduct additional studies</u> <u>Feasibility studies</u> <u>Conduct Projects (as required)</u>	<u>2007</u> <u>(Scope and time schedule for plan and reports determined as needed)</u>
<u>Erosion Control- Upper Watershed</u>	<u>Sub-watersheds with "enriched" mercury. Includes areas of Bear Creek, Sulphur Creek, and Cache Creek (Harley Gulch to Camp Haswell)</u>	<u>USBLM, SLC, CDFG, Colusa, Lake, and Yolo Counties, private landowners</u>	<u>Conduct additional studies</u> <u>Identify activities that increase erosion</u> <u>Submit erosion control plans, as required</u> <u>Implement erosion control plans, as required</u>	<u>2006</u> <u>2007</u> <u>2009</u> <u>2011</u>
<u>Erosion Control from New Projects, 10-yr Floodplains</u>	<u>Cache Creek (Harley Gulch to Settling Basin), Bear and Sulphur Creeks, Harley Gulch</u>	<u>Yolo County, Reclamation Board, private landowners, US Army Corps of Engineers</u>	<u>Implement management practices and monitoring for erosion control</u>	<u>During and after project construction</u>
<u>New Reservoirs, Ponds, and Wetlands</u>	<u>Cache Creek watershed</u>	<u>Yolo County or project proponents</u>	<u>Submit plans to control methylmercury discharges</u>	<u>Prior to project construction</u>
<u>Anderson Marsh</u>	<u>Cache Creek at Clear Lake</u>	<u>California Department of Parks and Recreation</u>	<u>Conduct additional studies</u> <u>Submit report on management options</u> <u>Conduct Project (as required)</u>	<u>2006</u> <u>2008</u> <u>2011</u>

**Inactive Mines**

By [two years after the date of final approval of this amendment], the Regional Water Board shall adopt cleanup and abatement orders or take other appropriate actions to control discharges from the inactive mines (Table IV-10) in the Cache Creek watershed. Responsible parties shall develop and submit for Executive Officer approval plans, including a time schedule, to reduce loads of mercury from mining or other anthropogenic activities by 95% of existing loads consistent with State Water Resources Control Board Resolution 92-49. The

goal of the cleanup is to restore the mines to pre-mining conditions with respect to the discharge of mercury. Mercury and methylmercury loads produced by interaction of thermal springs with mine wastes from the Turkey Run and Elgin mines are considered to be anthropogenic loading. The responsible parties shall be deemed in compliance with this requirement if cleanup actions and maintenance activities are conducted in accordance with the approved plans. Cleanup actions at the mines shall be completed by 2011.

Cache Creek Watershed Inactive Mines (a)

<u>Mine</u>	<u>Average Annual Load Estimate, kg mercury/year (b)</u>
<u>Abbott and Turkey Run Mines</u>	<u>7</u>
<u>Rathburn and Rathburn-Petray Mines</u>	<u>20</u>
<u>Petray North and South Mines</u>	<u>5</u>
<u>Wide Awake Mine</u>	<u>0.8</u>
<u>Central, Cherry Hill, Empire, Manzanita, and West End Mines</u>	<u>5</u>
<u>Elgin Mine</u>	<u>3</u>
<u>Clyde Mine</u>	<u>0.4</u>

- a. The mines are grouped by current landowner. Although cleanup requirements apply to each mine, a single owner or responsible party having adjacent mines may apply the 95% reduction to the total discharge from their mines.
- b. Estimates of average annual loads are preliminary, based on data collected by the California Geological Survey (Rathburn, Rathburn-Petray, Petray North, and Petray South mines) and Regional Water Board staff (other mines). Load estimates do not include mercury that would be discharged in extreme erosional events. Responsible parties may be required to refine the load estimates.

The wetland immediately downstream from the Abbott and Turkey Run mines in Harley Gulch contains mercury and is a source of methylmercury. After mine cleanup has been initiated, the responsible parties and owners of the wetland shall develop and submit for Executive Officer approval a cleanup and abatement plan to reduce the wetland's methylmercury loads to meet the Harley Gulch aqueous methylmercury allocation. The wetland cleanup and abatement shall be completed by 2011. Cleanup and abatement at the wetland should not be implemented prior to cleanup actions at the upstream mines.

The Sulphur Creek streambed and flood plain directly below the Central, Cherry Hill, Empire, Manzanita, West End and Wide Awake Mines contains mine waste. After mine cleanup has been initiated, the responsible parties and owners of the streambed and floodplain shall develop and submit for Executive Officer approval a cleanup and abatement plan to reduce anthropogenic mercury loading in the creek.

**Creek Sediment – Upper Watershed**

There are areas downstream from mines in Harley Gulch, Bear Creek, Sulfur Creek, Davis Creek and Cache Creek that have significant deposits of mercury-containing sediment that were derived, at least in part, from historic discharges from the mines. Where feasible, sediment discharges from these deposits need to be reduced or eliminated.

The Regional Water Board and the USBLM will conduct additional studies to determine the extent of mercury in sediment at the confluence of Harley Gulch and Cache Creek. The

Regional Water Board will require the USBLM to evaluate engineering options to reduce erosion of this material to Cache Creek. If feasible projects are identified, the Regional Water Board will require USBLM to cleanup the sediment.

At other sites, further assessments are needed to determine whether responsible parties should be required to conduct feasibility studies to evaluate methods to control sources of mercury and methylmercury. The Executive Officer will, to the extent appropriate, prioritize the need for feasibility studies and subsequent remediation actions based on mercury concentrations and masses, erosion potential, and accessibility. Staff intends to complete the assessments by [two years of final approval of this amendment]. Where applicable, the Executive Officer will notify responsible parties to submit feasibility studies. Following review of the feasibility studies, the Executive Officer will determine whether cleanup actions will be required. Responsible parties that could be required to conduct feasibility studies include the US Bureau of Land Management (USBLM); State Lands Commission (SLC), California Department of Fish and Game (CDFG); Yolo, Lake, and Colusa Counties, mine owners, and private landowners. Assessments are needed of stream beds and banks in the following areas: Cache Creek from Harley Gulch to Camp Haswell, Harley Gulch, Sulphur Creek, and Bear Creek south of the Bear Valley Road crossing.

#### **Erosion Control – Upper Watershed**

Activities in upland parts of the watershed (i.e., outside the active floodplain), such as road construction and maintenance, grazing, timber management and other activities, can result in increased erosion and transport of mercury to the creeks, especially in parts of the watershed where the soils have enriched levels of mercury. Enriched soil and sediment is defined as having an average concentration of mercury of 0.4 mg/kg, dry weight in the silt/clay fraction (less than 63 microns). Provisions described below are applicable in the following areas: the Cache Creek watershed (Harley Gulch to Camp Haswell), Harley Gulch and Sulphur Creek watersheds, and the Bear Creek watershed south of the Bear Valley Road crossing. Some projects subject to this implementation plan may be subject to permits, including general stormwater permits. This implementation plan does not preclude the requirement to obtain any applicable federal, state, or local permit applicable to such projects.

#### **Road Construction and Maintenance:**

Management practices shall be implemented to control erosion from road construction and maintenance activities in parts of the watershed identified above. All California Department of Transportation (Caltrans) road construction projects or maintenance activities that result in soil disturbance shall comply with the Caltrans statewide Storm Water Management Plan and implement best management practices to control erosion, including pre-project assessments to identify areas with enriched mercury and descriptions of additional management practices that will be implemented in these areas. Water quality and sediment monitoring may be required to ensure compliance with these requirements. For paved roads, entities maintaining or constructing road shall implement the Caltrans or equivalent management practices to comply with these requirements. For unpaved roads, entities maintaining or constructing road shall implement all reasonable management practices to control erosion during construction and maintenance activities. By [two years of final approval of this amendment], county and agency road departments shall submit information describing the management practices that will be implemented to control erosion.

Other Activities:

A goal of the Regional Water Board is to minimize erosion from areas with enriched mercury concentrations. Further studies are needed to identify specific upland sites within the watershed areas described above that have enriched mercury concentrations and to evaluate whether activities at these sites could result in increased erosion (i.e., grazing, timber harvest activities, etc.) or contribute to increases in methylmercury production. Staff will identify areas with enriched mercury concentrations by [one year after the date of final approval of this amendment]. After the studies are complete, the Executive Officer will require affected landowners and/or land managers to 1) submit reports that identify anthropogenic activities on their lands that could result in increased erosion and 2) implement management practices to control erosion. As necessary, erosion control plans will be required no later than [four years from final approval of this amendment]. Entities responsible for controlling erosion include the US Bureau of Land Management (USBLM); State Lands Commission (SLC); California Department of Fish and Game (CDFG); Yolo, Lake, and Colusa Counties; and private landowners.

Landowners implementing new projects or proposing change in land use on land in the enriched areas shall implement practices to control erosion and minimize discharges of mercury and methylmercury. If the dischargers are not implementing management practices to control erosion or methylmercury discharges, the Regional Water Board may consider individual prohibitions of waste discharge. For proposed changes in land use or new projects, landowners shall submit a plan including erosion estimates from the new project, erosion control practices, and, if a net increase in erosion is expected to occur, a remediation plan.

**Erosion Control in the 10-Year Floodplains**

Sediment and soil in the depositional zone of creeks downstream of mines in the Cache Creek watershed contains mercury. A goal of this plan is to minimize erosion of the mercury-containing sediment and soil due to human activities in order to protect beneficial uses in Cache Creek and to reduce loads of mercury moving downstream to the Settling Basin and the Delta. Some projects subject to this implementation plan may be subject to permits, including general stormwater permits. This implementation plan does not preclude the requirement to obtain any applicable federal, state, or local permit applicable to such projects.

The following requirements for erosion control apply to all projects conducted within the 10-year floodplains of Cache Creek (from Harley Gulch to the Settling Basin outflow), Bear Creek (from tributaries draining Petray and Rathburn Mines to Cache Creek), Sulphur Creek, and Harley Gulch. ~~The 10-year floodplain is defined as the portion of the creek channel where a Clean Water Act section 401 Water Quality Certification would be needed prior to beginning the project.~~

Project proponents are required to: 1) implement management practices to control erosion and 2) conduct monitoring programs that evaluate compliance with the turbidity objective, and submit monitoring results to the Regional Water Board. The monitoring program must include monitoring during the next wet season in which the project sites are inundated. In general, there must be monitoring for each project. However, in cases where projects are being implemented as part of a detailed resource management plan that includes erosion control practices, monitoring is not required as a condition of this amendment for individual projects. Instead, the project proponent may conduct monitoring at designated sites up and downstream of the entire management plan area.

Upon written request by project proponents, the Executive Officer may waive the turbidity monitoring requirements for a project, or group of projects, if the project proponents submit an alternative method for assessing compliance with the turbidity objective.

Whenever practicable, proponents should maximize removal of mercury enriched sediment from the floodplain. Sediment removed from the channel or the Settling Basin must be placed ~~outside of the floodplain~~ so that it will not erode into the creek. For projects related to habitat restoration or erosion control consistent with a comprehensive resource management plan, the project proponent may relocate sediment within the channel if the proponent uses the sediment to enhance habitat and provides appropriate erosion controls.

Some projects may not be able to meet the turbidity objectives even when all reasonable management practices will be implemented to control erosion. These projects may still be implemented if project proponents implement actions (offset projects) in some other part of the watershed that would reduce or otherwise prevent discharges of sediment containing mercury in an amount at least equivalent to the incremental increases expected from the original project. Removal of sediment from the Settling Basin would be an acceptable offset project.

All bridge, culvert, or road construction or maintenance activities that may cause erosion within the 10-year flood plains must follow the Caltrans management practices or equivalent to control erosion.

The Executive Officer may waive, consistent with State and federal law, the requirement for erosion control from a project conducted in the 10-year floodplain for habitat conservation or development activities for bank swallows that are proposed under the State's adopted Bank Swallow Recovery Plan (Department of Fish and Game, 1992).

#### **New Reservoirs, Ponds, and Wetlands**

Reservoirs, ponds, impoundments and wetlands generally produce more methylmercury than streams or rivers. Building new impoundments and wetlands that discharge to creeks in the Cache Creek watershed can add to the existing loads of methylmercury in Cache Creek and its tributaries. New impoundments, including reservoirs and ponds, and constructed wetlands shall be constructed and operated in a manner that would preclude an increase in methylmercury concentrations in Cache Creek, Bear Creek, Harley Gulch, or Sulphur Creek. This requirement applies to all new projects in the watershed, including gravel mining pits in lower Cache Creek that are being reclaimed as ponds and wetlands, for which physical construction is started after the approval of this implementation plan. "Preclude an increase in methylmercury concentrations" shall be defined as a measurable increase in aqueous concentration of methylmercury downstream of the discharge relative to upstream of the discharge.

Any entity creating an impoundment or constructed wetland that has the potential through its design to discharge surface water to Cache Creek, Bear Creek, Harley Gulch, or Sulphur Creek (uncontrollable discharge after inundation by winter storm flows is excepted) must submit plans to the Regional Water Board that describe design and management practices that will be implemented to limit the concentration of methylmercury in discharges to the creek.

The Executive Officer will consider granting exceptions to the no net increase requirement in methylmercury concentration if: 1) dischargers provide information that demonstrates that all reasonable management practices to limit discharge concentrations of methylmercury are

being implemented and 2) the projects are being developed for the primary purpose of enhancing fish and wildlife beneficial uses. In granting exceptions to the no net increase requirement, the Executive Officer will consider the merits of the project and whether to require the discharger to propose other activities in the watershed that could offset the incremental increases in methylmercury concentration in the creek. The Regional Water Board will periodically review the progress towards achieving the objectives and may consider prohibitions of methylmercury discharge if the plan described above is ineffective.

The Cache Creek Nature Preserve (CCNP), which includes a wetland restored from a gravel excavation, currently minimizes any methylmercury discharges to Cache Creek by holding water within the wetlands. If water management in the CCNP wetlands is changed significantly, the operator must submit plans describing management practices that will be implemented to limit methylmercury discharge to Cache Creek.

#### **Anderson Marsh Methylmercury**

The Regional Water Board, in coordination with California Department of Parks and Recreation (DPR), will continue to conduct methylmercury studies in Anderson Marsh. If the Regional Water Board finds that Anderson Marsh is a significant methylmercury source to Cache Creek, the Regional Water Board will require DPR to evaluate potential management practices to reduce methylmercury loads. The Regional Water Board will then consider whether to require DPR to implement a load reduction project.

#### **Cache Creek Settling Basin**

Although the Cache Creek settling basin retains about one half of the total mercury attached to sediment that enters the basin, there is a net increase in methylmercury discharged from the settling basin. Methylmercury loads are expected to decrease as inflow mercury concentrations decline. The Regional Water Board will continue to conduct methylmercury studies in the basin and work with the Reclamation Board and the US Army Corps of Engineers to develop settling basin improvements to retain more sediment and reduce methylmercury loads. The Sacramento-San Joaquin Delta mercury implementation plan will include ~~methyl~~ total mercury load reduction requirements for the settling basin.

#### **Geothermal and Spring Sources**

In general, geothermal springs that discharge mercury and sulfate may not be controllable. However, geothermal discharges adjacent to Sulphur Creek are potential candidates for remediation or mercury offset projects. As needed, the Executive Officer will make a determination of the suitability of geothermal source controls for offset or remediation projects.

Thermal springs used by the Wilbur Hot Springs resort are a source of mercury and methylmercury to Sulphur Creek. Discharges of mercury or methylmercury from springs used or developed by the Wilbur Hot Springs resort shall not exceed current loads.

#### **Potential Actions**

This control plan focuses on reducing mercury discharges from mercury mines, controlling activities that mobilize past discharges from the mines, controlling activities that enhance methylation of mercury, and implementing cleanup and abatement activities at sites where sediment rich in mercury has accumulated. Responsibility for these actions may be assigned to responsible parties. There are a number of other actions that may be considered that would reduce loads of mercury in the creek that are not directly the responsibility of a discharger. The following actions are recommended for further evaluation:

- Construction of a settling basin upstream of Rumsey. The facility could trap mercury enriched sediment, reduce downstream loads and preserve space in the existing settling basin in Yolo Bypass.
- Methylmercury reduction plans for Bear Creek
- Load reductions from Davis Creek

#### **Mercury Offset Program and Alternative Load Allocations**

The Regional Water Board recognizes that cleanup of mines and non-point sources will require substantial financial resources. The Regional Water Board, therefore, will allow entities participating in approved mercury offset programs to conduct offset projects in the Cache Creek watershed. Offset programs shall be focused on projects where funding is not otherwise available. Subject to approval by the Executive Officer, entities participating in an offset program may partner with agencies in mercury control actions. The framework for offset programs will be developed in future Basin Plan amendments.

The methylmercury load allocations in Tables IV-7 and 8 are assigned to watersheds. To allow offset program proponents to conduct projects within the watersheds to reduce loads, the Regional Water Board may consider alternative load allocations that will achieve the water quality objectives.

#### **Public Education**

The local county health departments should provide outreach and education regarding the risks of consuming fish containing mercury, emphasizing portions of the population that are at risk, such as pregnant women and children.

#### **Adaptive Implementation**

The Regional Water Board will review the progress toward meeting the water quality objectives and the Basin Plan requirements at least every five years. The Regional Water Board recognizes that it may take hundreds of years to achieve the fish tissue objectives. The Regional Water Board considers entities to be in compliance with this mercury reduction plan if they comply with the above requirements for mercury, methylmercury, and erosion controls. The Regional Water Board recognizes that there are uncertainties with the load estimates and the correlation between reductions in loads of total mercury, methylmercury uptake by biota, and fish tissue concentrations. Using an adaptive management approach, however, the Regional Water Board will evaluate new data and scientific information to determine the most effective control program and allocations to reduce methylmercury and total mercury sources in the watershed.

#### **Monitoring and Review**

The monitoring guidance for Cache Creek is described in Chapter V, Surveillance and Monitoring. Regional Water Board staff will oversee the preparation of detailed monitoring plans and resources to conduct monitoring of sediment, water, and fish to assess progress toward meeting the water quality objectives. Regional Water Board staff will take the lead in determining compliance with fish tissue objectives for Cache Creek. Monitoring for cleanup of mines or compliance with the erosion control requirements is the responsibility of the entity performing the cleanup or erosion control.



**Revise Chapter V (Surveillance and Monitoring) to add:**

**Clear Lake Methylmercury**

~~The Regional Water Board will use the following criteria to determine compliance with the methylmercury fish tissue objectives in Clear Lake. Mercury will be measured in fish of the species and sizes consumed by humans and wildlife. The objectives are based on the average of methylmercury concentrations in muscle tissue of trophic level 3 and 4 fish. Because greater than 85% of total mercury in muscle tissue of fish of these sizes is methylmercury, analysis of muscle tissue for total mercury is acceptable for assessing compliance. Fish from the following species will be collected and analyzed every ten years. The representative fish species for trophic level 4 shall be largemouth bass (total length 300-400 mm), catfish (total length 300-400 mm), brown bullhead (total length 300-400 mm), and crappie (total length 200-300 mm). The representative fish species for trophic level 3 shall be carp, hitch, Sacramento blackfish, black bullhead, and bluegill of all sizes; and brown bullhead and catfish of lengths less than the trophic level 4 lengths.~~

~~Fish tissue mercury concentrations are not expected to respond quickly to remediation activities at Sulphur Bank Mercury Mine, Clear Lake sediments, or the tributaries. Adult fish integrate methylmercury over a lifetime and load reduction efforts are not expected to be discernable for more than five years after remediation efforts. Therefore to assess remedial activities, part of the monitoring at Clear Lake will include indicator species, consisting of inland silversides and largemouth bass less than one year old, to be sampled every five years. Juveniles of these species will reflect recent exposure to methylmercury and can be indicators of mercury reduction efforts.~~

~~Average concentrations of methylmercury by trophic level should be determined in a combination of the identified species collected throughout Clear Lake. The number of fish collected to determine compliance with this objective will be based on the statistical variance within each species. The sample size will be determined by methods described in USEPA's Guidance for Assessing Chemical Contaminant Data for Use in Fish or other statistical methods approved by the Executive Officer.~~

~~Total mercury in tributary sediment, lake sediment, and water will be monitored to determine whether loads have decreased. The water and sediment monitoring frequency will be every five years.~~

**Mercury and Methylmercury**

The Regional Water Board will use the following criteria to determine compliance with the methylmercury fish tissue objectives. Site-specific criteria for various water bodies are described below.

The number of fish collected to determine compliance with the methylmercury objective will be based on the statistical variance within each species. The sample size will be determined by methods described in USEPA's Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories (Third Edition, 2000) or other statistical methods approved by the Executive Officer.

Analysis of fish tissue for total mercury is acceptable for assessing compliance. Compliance with the fish tissue objective is achieved when the average concentrations in local fish are equivalent to the respective objective for three consecutive years.

### **Clear Lake**

Fish from the following species will be collected and analyzed every ten years. The representative fish species for trophic level 4 shall be largemouth bass (total length 300-400 mm), catfish (total length 300 – 400 mm), brown bullhead (total length 300-400 mm), and crappie (total length 200-300 mm). The representative fish species for trophic level 3 shall be carp, hitch, Sacramento blackfish, black bullhead, and bluegill of all sizes; and brown bullhead and catfish of lengths less than the trophic level 4 lengths.

Fish tissue mercury concentrations are not expected to respond quickly to remediation activities at Sulphur Bank Mercury Mine, Clear Lake sediments, or the tributaries. Adult fish integrate methylmercury over a lifetime and load reduction efforts are not expected to be discernable for more than five years after remediation efforts. To assess remedial activities, part of the monitoring at Clear Lake will include indicator species, consisting of inland silversides and largemouth bass less than one year old, to be sampled every five years. Juveniles of these species will reflect recent exposure to methylmercury and can be indicators of mercury reduction efforts.

Average concentrations of methylmercury by trophic level should be determined in a combination of the identified species collected throughout Clear Lake.

Total mercury in tributary sediment, lake sediment, and water will be monitored to determine whether loads have decreased. The water and sediment monitoring frequency will be every five years.

### **Cache Creek, Bear Creek, and Harley Gulch**

The Regional Water Board will use the following criteria to determine compliance with the methylmercury fish tissue objectives in Cache and Bear Creeks. Compliance with the respective objectives shall be determined based on fish tissue analysis in Cache Creek from Clear Lake to the Settling Basin, North Fork Cache Creek, and Bear Creek upstream and downstream of Sulphur Creek.

The representative fish species for each trophic level shall be:

- Trophic Level 3: green sunfish, bluegill, and/or Sacramento sucker (rainbow trout also an option for North Fork Cache Creek);
- Trophic Level 4: Sacramento pikeminnow, largemouth bass, smallmouth bass and/or channel catfish.

The sample sets will include at least two species from each trophic level (i.e., bass and Sacramento pikeminnow, for TL4) collected at each compliance point or stream section. The samples will include a range of sizes of fish between 250 and 350 mm, total length, with average length of 300 mm. If green sunfish and bluegill are not available in this size range; those sampled should be greater than 125 mm total length. If two species per trophic level are not available and are unlikely to be present given historical sampling information, one species is acceptable (the only TL4 species typically in North Fork is Sacramento pikeminnow).

Compliance with the Harley Gulch methylmercury water quality objective will be determined using hardhead, California roach, or other small (TL2/3), resident species in the size range of 75-100 mm total length.

Aqueous methylmercury goals are in the form of the annual, average concentration in unfiltered samples. For comparison of methylmercury concentration data with aqueous methylmercury goals, water samples are recommended to be collected periodically throughout the year and during typical flow conditions as they vary by season, rather than targeting extreme low or high flow events. Aqueous methylmercury data may be collected by Regional Water Board staff or required of project proponents.

Monitoring for mine cleanups or other projects that are expected to significantly affect methylmercury or mercury loads are recommended to include the following parameters. The data may be collected by Regional Water Board staff or required of project proponents.

- Monitoring parameters for soil and sediment: concentration of total mercury in soil or sediment in the silt/clay (<63 microns) fraction.
- Monitoring parameters for water: methylmercury (if project is methylmercury source), total mercury, total suspended solids, turbidity, and stream flow. Water sampling in major tributaries is recommended to include high flow events for mercury and total suspended solids. More frequent monitoring (two to four significant storm events for three consecutive years) is recommended after cleanup to evaluate the effectiveness of cleanup actions.
- Monitoring of mercury in suspended sediment: The ratio of concentrations of mercury in suspended sediment (Hg/TSS) is a useful measure of mercury contamination. Effectiveness of cleanup of the mines may be assessed by comparing concentration of mercury in fine-grained sediment discharging from the mines to the average concentration in background (not affected by mining activities) soil or sediment.