

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

RESOLUTION R2-2008-0103

**AMENDING THE WATER QUALITY CONTROL PLAN FOR THE SAN FRANCISCO BAY
REGION TO ESTABLISH A TOTAL MAXIMUM DAILY LOAD FOR SEDIMENT IN
SONOMA CREEK, AND AN IMPLEMENTATION PLAN TO ACHIEVE THE TMDL AND
RELATED HABITAT ENHANCEMENT GOALS**

WHEREAS the California Regional Water Quality Control Board, San Francisco Bay Region (Water Board), finds that:

1. An updated Water Quality Control Plan for the San Francisco Bay Region (Basin Plan) was adopted by the Water Board on January 21, 2004, approved by the State Water Resources Control Board (State Board) on July 22, 2004, and approved by the Office of Administrative Law (OAL) on October 4, 2005.
2. The Basin Plan may be amended in accordance with California Water Code § 13240, et seq.
3. The Basin Plan amendment, including specifications on its physical placement in the Basin Plan, is set forth in Exhibit A. The Basin Plan amendment will establish the following: a) a sediment total maximum daily load (TMDL) for Sonoma Creek at 125 percent of natural background (65,400 tons/year); b) numeric targets for spawning gravel permeability, substrate composition-percent fines, and pool filling (decreasing trend); c) allocations for all significant sediment sources; and d) an implementation plan to achieve the TMDL and related habitat enhancement goals.
4. Sonoma Creek is listed pursuant to federal Clean Water Act § 303(d) requirements as an impaired waterbody due to fine sediment deposition.
5. Sonoma Creek is not meeting narrative water quality objectives for sediment, settleable material, and population and community ecology, due to excess erosion and sedimentation in the Sonoma Creek watershed.
6. Under Clean Water Act § 303(d), the Water Board is required and authorized to establish a TMDL for those pollutants identified as causing impairment of waters on the § 303(d) list. Additionally, under California Water Code § 13242, the Water Board is authorized to develop an implementation program for achieving water quality objectives.
7. The scientific basis for the TMDL, described in Finding 3, was subjected to an independent, external peer review pursuant to the requirements of California Health and Safety Code §57004. Water Board staff revised the proposed Basin Plan amendment in response to the comments provided by the reviewers, or provided a written response that explained the basis for not incorporating their comments. The peer reviewers' responses confirmed that the rulemaking portions of the proposed TMDL and implementation plan are based on sound scientific knowledge, methods, and practices.
8. A draft Basin Plan amendment, Staff Report, and Environmental Checklist were prepared, publicly noticed, and distributed for public review and comment on February 08, 2008, in accordance with applicable State and federal laws and regulations.

9. On April 09, 2008, the Water Board held a public hearing to consider the Basin Plan amendment, after a 45-day public comment period.
10. Water Board staff initiated revisions to the February 08, 2008, draft Basin Plan amendment, Staff Report, and Environmental Checklist, and publicly noticed and distributed for public review and comment these revisions on September 05, 2008, in accordance with applicable State and federal laws and regulations.
11. On December 10, 2008, the Water Board held a second public hearing to consider the Basin Plan amendment, and the changes made thereto in response to public comments.
12. The process of basin planning has been certified by the State's Secretary for Resources as exempt from the requirements of the California Environmental Quality Act (CEQA) (Public Resources Code § 21000 et seq.) to prepare an Environmental Impact Report or Negative Declaration. The Basin Plan amendment package includes a Staff Report, an Environmental Checklist, an assessment of the potential environmental impacts of the Basin Plan amendment, and a discussion of alternatives. The Basin Plan amendment, Environmental Checklist, Staff Report, and supporting documentation serve as a substitute environmental document under the Water Board's certified regulatory program.
13. The Water Board has duly considered the Environmental Checklist, Staff Report, and supporting documentation with respect to environmental impacts. The documents conservatively state that the proposed project may have the potential to result in significant impacts to biological resources. Specifically, in the unlikely event that compliance projects affect special status species outside the Water Board's jurisdiction, other local, State, and federal agencies have the responsibility and jurisdiction to mitigate significant impacts. These agencies can and should mitigate such impacts, but until such time as that occurs, the impacts are considered significant and unavoidable. Such impacts are acceptable due to overriding considerations because expected project benefits outweigh any unavoidable adverse environmental impacts, as set forth below. The environmental documents also indicate that the proposed project has the potential to alter drainage patterns and otherwise affect hydrology; however, changes have been incorporated into the project in the form of a performance standard to effectively attenuate significant increases in storm runoff to lessen any environmental effects to less than significant levels.
14. Based on specific economic, social, and other considerations, the significant and unavoidable environmental impacts of the project discussed above are considered acceptable because the benefits of the project outweigh its unavoidable adverse environmental effects. These benefits include: the project's substantial enhancement of substrate quality; stream and riparian habitat complexity, connectivity, and function; fish passage; baseflow persistence; stream temperature; lower costs for road maintenance and repair since roads that are less erosive are less costly to maintain; reduction in the costs associated with damage to infrastructure and property within or adjacent to stream channels by re-establishing a balance between stream power and sediment supply from riparian habitat enhancement projects; enhanced recreational, aesthetic, and cultural experiences that are associated with healthy fisheries; overall enhancement of stream and riparian habitats and their functions; and supporting conservation of salmonid populations within the watershed for the benefit of current and future generations.

15. The Water Board has carefully considered all comments and testimony received, including responses thereto, on the Basin Plan amendment, as well as all of the evidence in the administrative record.
16. After Water Board adoption, the Basin Plan amendment must be submitted for review and approval by the State Board, OAL, and the United States Environmental Protection Agency (USEPA). Once approved by the State Board, the amendment will be submitted to OAL and USEPA. The Basin Plan amendment will become effective upon approval by OAL and USEPA.

NOW, THEREFORE BE IT RESOLVED THAT:

1. The Water Board adopts the Basin Plan amendment as set forth in Exhibit A hereto, that establishes the TMDL and Implementation Plan to achieve the TMDL and related habitat enhancement goals, and its supporting documentation.
2. The Executive Officer is directed to forward copies of the Basin Plan amendment to the State Board in accordance with the requirement of California Water Code § 13245.
3. The Water Board requests that the State Board approve the Basin Plan amendment, in accordance with the requirements of California Water Code § 13245 and § 13246, and forward it to the OAL and USEPA for approval.
4. If, during the approval process, Water Board staff, the State Board, or OAL determines that minor, non-substantive corrections to the language of the amendment and supporting documentation are needed for clarity or consistency, the Executive Officer may make such changes, and shall inform the Water Board of any such changes.

I, Bruce H. Wolfe, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of a Resolution adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on December 10, 2008.



Digitally signed
by Bruce Wolfe

Date:

2008.12.12

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BRUCE H. WOLFE
Executive Officer

Attachment

Exhibit A - Basin Plan Amendment to Establish a Total Maximum Daily Load for Sediment in Sonoma Creek and an Implementation Plan to Achieve the TMDL and Related Habitat Enhancement Goals

Exhibit A

Basin Plan Amendment

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Proposed Basin Plan Amendment

The following text is proposed for insertion into Chapter 7, Water Quality Attainment Strategies including Total Maximum Daily Loads (TMDLs). Because this text would be added in its entirety, it is not shown below in underline/strikeout.

Sonoma Creek Watershed Sediment TMDL and Habitat Enhancement Plan

The goals of the Sonoma Creek Watershed Sediment TMDL and Habitat Enhancement Plan (Plan) are to:

- Conserve the steelhead trout population
- Restore water quality to meet water quality standards, including attaining beneficial uses
- Enhance the overall health of the native fish community
- Protect and enhance habitat for native aquatic species
- Enhance the aesthetic and recreational values of the creek and its tributaries

To achieve these goals, specific actions are needed to:

1. Reduce sediment loads, and fine sediment in particular, to Sonoma Creek and its tributaries
2. Attain and maintain suitable gravel quality in freshwater reaches of Sonoma Creek and its tributaries
3. Reduce and prevent channel incision
4. Reduce erosion and sedimentation
5. Repair large sources of sediment supply (e.g., landslides)
6. Enhance channel complexity (e.g., by adding and encouraging retention of large woody debris and restoring riparian vegetation)

The following sections establish:

1. A sediment total maximum daily load (TMDL) defining the allowable amount of sediment that can be discharged into Sonoma Creek, expressed as mass, and as a percentage of the natural background sediment delivery rate to channels
2. An implementation plan to achieve the TMDL and related habitat enhancement goals

Problem Statement

Steelhead populations in the Sonoma Creek watershed have declined substantially since the late 1940s. Results of recent analyses of fisheries and sediment sources indicate that:

1. Excessive amounts of fine sediment have been deposited in the streambed at potential steelhead spawning and rearing sites. Excess fine sediment in the streambed can cause poor incubation conditions for fish eggs, resulting in high mortality prior to emergence. Fine sediment also compromises the quality of pools as rearing habitat, and reduces winter rearing habitat by filling the spaces between cobbles and boulders.
2. Changes in physical habitat structure that appear to be caused by erosion of bed and banks (incision) in Sonoma Creek are resulting in significant adverse changes to steelhead habitat. Analysis of in-stream shelter in Sonoma Creek yielded a low score when considering the watershed-wide average (38, which is 13 percent of the maximum score), indicating low quality of rearing habitat for juvenile steelhead. A steelhead census performed in 2002 indicates only 10 percent of steelhead are surviving past the juvenile rearing stage. These conditions are limiting the success of steelhead fish in Sonoma Creek.
3. Stressful water temperatures, low summer flows, and migration barriers also impact the health of Sonoma Creek's coldwater fishery.

Due to excess erosion and sedimentation in the Sonoma Creek Watershed, the narrative water quality objectives for sediment and settleable material are not being met and cold freshwater habitat, wildlife habitat, fish spawning, recreation, and preservation of rare and endangered species beneficial uses are impaired. In addition, channel incision has caused habitat simplification, which has reduced and quantity and quality of spawning and rearing habitat for salmonids and other native aquatic species. Channel incision is a controllable water quality factor that is contributing to a violation of the narrative water quality objective for population and community ecology.

Numeric Targets and Desired Condition

Meeting the numeric targets and desired condition listed in Table 1 will allow water quality in Sonoma Creek and its tributaries to achieve the Basin Plan's narrative water quality objectives for sediment, settleable material, and population and community ecology.

Table 1. TMDL sediment targets for Sonoma Creek and its Tributaries

Spawning gravel permeability	Median value ≥ 7000 cm/hr ^a
Pool filling	Decreasing trend in the volume of fine sediment deposited in pools
Substrate Composition- Percent Fines	Percent of fine sediment less than 0.85 mm in diameter is less than or equal to 14 percent of the total bulk core sample ($\leq 14\%$ fines < 0.85 mm) ^b
	Percent of fine sediment less than 6.40 mm in diameter is less than or equal to 30 percent of the total bulk core sample ($\leq 30\%$ fines < 6.40 mm) ^b
^a Target applies to all potential spawning sites for steelhead and salmon in Sonoma Creek and its tributaries. ^b Target applies to wadeable streams and rivers with gradient less than 3 percent. A wadeable stream is one which an average human can safely cross on foot during the summer, low flow season while wearing chest waders.	

Sources

Field assessments and sediment load modeling provide credible estimates of average rates of sediment delivery to Sonoma Creek. As shown in Table 2, the average annual sediment load to the freshwater reach of Sonoma Creek is estimated to be 117,000 tons per year, or 360 tons per km² per year. The natural background sediment delivery rate to Sonoma Creek is 52,000 tons per year, or 160 tons per km² per year. Therefore, the current sediment delivery rate is estimated to be 225 percent of the natural background rate.

Table 2. Average Annual Sediment Delivery to Sonoma Creek (tons/year)^a

Source Categories		Estimated Rate ^c (tons/year)
Natural Processes	Channel Erosion, Incision ^b	25,400
	Colluvial Bank Erosion (Soil Creep)	16,600
	Surface Erosion ^b	6,200
	Landslides ^b	4,100
	Total- Natural Processes	52,300
Human Actions	Channel Incision and Gully Erosion ^b	43,300
	Roads and Stream Crossings	11,200
	Surface Erosion ^b from vineyards, other row crops, and rangelands	8,600
	Urban Stormwater Runoff	1,100
	Landslides ^b	900
	Total- Human Actions	65,100
GRAND TOTAL		117,400
^a Sediment delivery rates are rounded to the nearest hundred. ^b Channel erosion and incision, surface erosion, and landslides are occur due to both Natural Processes and Human Actions. For these sources, each component (natural processes vs. human actions) is displayed separately. ^c The timeframe associated with the average annual rate varies from long-term average rates which were estimated for landslides, channel incision, and gully erosion to those for urban stormwater, surface erosion, and road-related erosion, which are estimated based on current/contemporary conditions.		

Total Maximum Daily Load and Allocations

The Sonoma Creek sediment TMDL is established at 65,400 tons per year, which is approximately 125 percent of natural background load. Natural background load depends upon natural processes, and varies significantly. Therefore, the TMDL and allocations are expressed both in terms of sediment mass and percent of natural background. The percentage based TMDL, 125% of natural background, applies throughout the watershed. In order to achieve the TMDL, controllable sediment delivery resulting from human actions needs to be reduced by

approximately 80 percent from current proportion of the total load (Table 3). TMDL attainment will be evaluated at the limit of tidal influence in the Sonoma Creek watershed, which approximates the downstream boundary of freshwater habitat for steelhead. Sonoma Creek has several tributaries that join the mainstem below the tidal limit; therefore, several points will be used to evaluate TMDL attainment. These points are: mainstem Sonoma Creek just downstream of the Fowler/Carriger Creek confluence, and the freshwater portions (above tidal influence) of Schell, Ramos, Carneros, and Merazo Creeks. Attainment of the TMDL will be evaluated over a 5-to-10-year averaging period. The TMDL equal to 125 percent of natural background load, can be achieved if human-related sources are reduced to the level of the allocations shown in Table 3.

Table 3. Sonoma Creek Sediment Load and Wasteload Allocations (tons/year)^a

	Source Category	Current (2005) Load ^b	Estimated Reductions Needed (Percentage)	Allocation	
				tons/year	Percent Natural Background
Load Allocations	Natural Processes				
	• Channel Erosion, Incision	25,400	0	25,400	49
	• Colluvial Bank Erosion (Soil Creep)	16,600	0	16,600	32
	• Surface Erosion	6,200	0	6,200	12
	• Landslides	4,100	0	4,100	8
	Human Actions				
	• Channel Erosion, Incision	43,300	81	8,100	15
	• Roads and Stream Crossings	11,200	81	2,100	4
	• Surface Erosion, including vineyards, grazed lands, unmanaged areas, and minor agriculture	8,600	81	1,600	3
	• Landslides	900	81	200	0.4
	TOTAL	116,300		64,300	123
Wasteload Allocations ^c	Municipal Stormwater - NPDES Permit No. CAS000004	600	0	600	1
	Construction Stormwater - NPDES Permit No. CAS000002	300	0	300	0.6
	Industrial Stormwater – NPDES Permit No. CAS000001	100	0	100	0.2
	Caltrans Stormwater – NPDES Permit No. CAS000003	100	0	100	0.2
	TOTAL	1,100		1,100	2
TOTAL ALLOCATIONS = TMDL = 125 % of Natural Background				65,400	125
^a Sediment loads and allocations are rounded to the nearest hundred. Some totals may not appear to add up due to rounding. ^b Table 5 also displays the estimated current (2005) sediment loads. Total current (2005) estimated sediment load = 117,400 tons/year. ^c Source categories included in the wasteload allocations (e.g., municipal stormwater) are described as “urban stormwater” in Table 5. The term “urban stormwater” in Table 5 incorporates municipal, construction, industrial, and Caltrans stormwater.					

IMPLEMENTATION PLAN

The implementation actions described below are to achieve TMDL targets and allocations and habitat enhancement goals. In addition, actions specified in this plan are expected to enhance steelhead population. It is important to note that the allocations in the TMDL are not directly enforceable. To demonstrate attainment of applicable allocations, responsible parties must demonstrate that they are in compliance with required implementation measures and any applicable waste discharge requirements (WDRs), WDR waiver conditions, or NPDES permits.

Regulatory Tools

The State's Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program requires regulation of nonpoint source discharges using the Water Board's administrative permitting authorities, including WDRs, waivers of WDRs, Basin Plan Discharge Prohibitions, or some combination of these. Consistent with this policy, Tables 4.1 – 4.4 specify actions and performance standards by nonpoint source category, as needed to achieve TMDL sediment targets and allocations in the Sonoma Creek watershed. The Water Board will consider adopting conditions for waiving WDRs that apply to the nonpoint sources (vineyards, grazing, roads, etc.) listed in Tables 4.1 – 4.4, address all pollutants of concern, protect all beneficial uses, and balance the agricultural, environmental, recreational, and residential needs of the watershed.

The wasteload allocations contained in Table 3 apply to point sources of sediment that are regulated by NPDES permits. Table 4.5 shows implementation measures required of these sources, which include municipal stormwater, runoff from state highways, and from industrial and construction sites.

Problems associated with channel incision, related rapid bank erosion, and loss of essential habitat features, reflect and integrate multiple historical and ongoing disturbances, some of which are local and direct, and others that are indirect and distal. Effectively addressing these issues will require cooperative and coordinated actions by multiple landowners, working with public agencies, over significant distances along the creek. The most effective means of controlling channel incision and reducing related fine sediment delivery to the creek is a channel restoration program that re-establishes width-to-depth ratios and sinuosity values conducive to formation of alternate bars and a modest flood plain. The Water Board will work with stakeholders along Sonoma Creek, through local stewardship groups, to implement such channel restoration/habitat enhancement projects. Tables 5.1 to 5.3 (Recommended Measures to Protect or Enhance Habitat), specify actions to address adverse impacts of channel incision on salmonid habitat quantity and quality, and to accomplish habitat enhancement goals for flow, temperature, and fish passage for steelhead.

Individual landowners or coalitions may work with "third parties" to develop and implement sediment pollutant control programs. With regard to achievement of actions to protect or enhance baseflow, fish passage, habitat complexity, and stream temperature, the effectiveness

of the recommended actions specified in Tables 5.1 through 5.3, will be evaluated as part of the adaptive implementation program.

Agricultural Water Quality Control Program Costs

Implementation measures for grazing lands and vineyards constitute an agricultural water quality control program and therefore, consistent with California Water Code requirements (Section 13141), the cost of this program is estimated herein. This cost estimate includes the cost of implementing all actions to reduce sediment discharges and enhance habitat complexity as specified in the implementation plan, and is based on costs associated with technical assistance and evaluation, project design, and implementation of actions needed to achieve the TMDL. In estimating costs, the Water Board has assumed that owners of agricultural businesses own 75 percent of total land area on hillside parcels, and 95 percent of the land along Sonoma Creek and lower reaches of its tributaries. Based on these assumptions, the estimated total cost for program implementation for agricultural sources is \$1.3-to-2.3 million per year throughout the 20-year implementation period. More than three-quarters of these potential costs are associated with addressing channel incision and enhancing habitat conditions (to reverse the impacts of channel incision) in Sonoma Creek and its tributaries. Considering potential benefits to the public in terms of ecosystem functions, aesthetics, recreation, and water quality, it is anticipated that at least 75 percent of the cost of these actions will be paid for with public funds. Therefore, the total cost to agricultural businesses associated with efforts to reduce sediment supply and enhance habitat in Sonoma Creek is \$300,000-\$600,000 per year over the 20-year implementation period.

Evaluation and Monitoring

In collaboration with stakeholders in the watershed, Water Board staff will develop a detailed monitoring program to assess progress of TMDL attainment and provide a basis for reviewing and revising TMDL elements or implementation actions. As an initial milestone, by fall 2011, the Water Board and watershed partners will complete monitoring plans to evaluate: a) attainment of water quality targets; and b) suspended sediment and turbidity conditions. Initial data collection, based on the protocols established in these monitoring plans is anticipated to begin in the winter of 2011-2012.

As a whole, the monitoring program will be designed to:

1. *Assess channel response and progress towards achieving water quality targets.* In-channel effectiveness monitoring will be conducted to evaluate: a) progress toward achieving water quality targets, and b) channel response to management measures and natural processes. Parameters that will be monitored to assess progress toward achieving water quality targets are streambed permeability, pool filling, and percent fines composition of the substrate. The number of sites to be monitored will be selected based on availability/presence of the applicable habitat feature (i.e., spawning gravels and pools), as well as the number of samples needed to have a high degree of statistical confidence in estimated values. Frequency of monitoring should be once every five years, at a minimum, for streambed permeability and pool filling. If resources are available, desired monitoring frequency for all TMDL target parameters is once every two to three years. Pool filling should be monitored

every two to three years to allow a trend analysis. The Water Board may establish alternative water quality parameters and/or numeric target values at a future date as part of the adaptive implementation process, when/if information becomes available to conclude with a high degree of confidence that one or more alternative parameters or target values provide a superior basis for determining attainment of water quality objectives for sediment, and the protection of fisheries-related beneficial uses.

2. *Further evaluate potential impacts of suspended sediment and related turbidity.* To further study potential impacts of suspended sediment and related turbidity, monitoring of turbidity should continue. The Sonoma Ecology Center maintains a continuous and automated monitoring station at the Sonoma Valley Watershed Station in Eldridge, CA. Monitoring of suspended sediment should continue to further understanding of turbidity and suspended sediment concentrations in ambient conditions, and during and after storms. Turbidity/suspended sediment data should be analyzed to determine the length of time it takes for turbidity levels to drop to pre-storm levels after a storm event.

It is expected that as sediment reduction and habitat enhancement measures (including reducing channel incision) are undertaken, suspended sediment concentrations and turbidity levels will decrease. This expectation should be confirmed with continued turbidity monitoring. In addition, turbidity monitoring can provide information regarding the effectiveness of sediment reduction measures because it is a sensitive measure of the effects of land use on streams.

3. *Assess whether required sediment reduction measures are undertaken.* Implementation monitoring will be conducted by landowners or designated agents, per the compliance monitoring and reporting provisions of applicable waivers of WDRs, WDRs, and NPDES permits.
4. *Evaluate effectiveness of selected sediment reduction measures (both structural and management-related).* The Water Board will conduct upslope effectiveness monitoring to evaluate sediment delivery to channels from land use activities and natural processes. The first sediment source analysis update will occur by 2020, when sediment delivery associated with human activities may be reduced by 25 percent or more. A subsequent update may occur, assuming the water quality targets for sediment are not already achieved, by 2025, when sediment supply associated with human activities may be reduced by 40 percent or more. An additional goal for future updates of the source analysis is to reduce uncertainty associated with estimates of sediment delivery rates.
5. *Evaluate effectiveness of recommended habitat enhancement measures and assess progress towards goals of the Habitat Enhancement Plan.* The Water Board and local partners should monitor habitat complexity-related water quality indicators to assess progress towards achievement of a balanced sediment budget (where the amount of fine and coarse sediment input to a given channel reach is equal to the amount that is transported downstream).

Monitoring should occur to determine whether there is an increasing trend in the percent of the length of mainstem of Sonoma Creek, and in the lower alluvial reaches of its tributaries, that attain the following conditions:

- a) The bankfull channel width-to depth ratio is $\geq 12:1$.

- b) The average spacing between alluvial and/or forced gravel bars within the active channel is ≤ 7 times the width of the bankfull channel.
- c) Available shear stress at bankfull flow does not exceed the amount required to initiate motion of the streambed by more than approximately 20 percent.
- d) Floodplain width is ≥ 4 times bankfull channel width.

Monitoring should also assess whether there is:

- e) An increasing trend through time in the mean area and frequency of riffles and gravel bars within the mainstem channel; and
- f) A decreasing trend through time in the percent of the length of the mainstem of Sonoma Creek, and in the lower alluvial reach of its tributaries, where banks or bed are hardened, and/or where constructed levees contribute to channel instability.

The information gained from monitoring will guide adaptive implementation.

Adaptive Implementation

In concert with the monitoring program, described above, the Sonoma Creek Watershed Sediment TMDL and Habitat Enhancement Plan will be regularly updated. Results of in-progress or anticipated studies that enhance understanding of the population status of steelhead trout in the Sonoma Creek watershed, and/or factors controlling those populations, may also trigger changes to the plan and TMDL. At a minimum, data in response to the following questions will be considered to guide research and monitoring efforts and focus each subsequent update of the TMDL.

Key Questions to be considered in the course of Adaptive Implementation:

- What is the population status of steelhead in the watershed? Is there an increase in the number or percentage of steelhead that survive past the juvenile rearing life stage as sediment reduction and habitat enhancement measures are implemented? An improved understanding of the current status of steelhead populations in the Sonoma Creek watershed is essential for guiding adaptive updates to the management actions recognized in this plan. Two types of monitoring data may be needed to evaluate the current population status in the watershed: 1) "smolt" production and sizes, and 2) adult spawning run-size. Smolt refers to the life stage when juvenile salmonids migrate from freshwater to the ocean. These two types of monitoring would provide a basis for assessing the influences of ocean and freshwater rearing habitat on steelhead run-size.
- Are Sonoma Creek and its tributaries progressing toward TMDL targets as expected? If there has not been adequate progress, how might the implementation actions, targets or allocations be modified?
- What are expected benefits of various actions to enhance habitat for steelhead? Which actions, and in which locations, would enhancement measures have the most benefit and be the most cost-effective?

- Are the specified sediment reduction measures and recommended habitat enhancement measures resulting in an improving trend in channel stability?
- What effect will climate change have on hydrology, sediment transport, and habitat for the watershed's aquatic species? Is there evidence that TMDL implementation actions, together with climate change, may affect Bay tidal habitats? How will climate change effect the outcome of required and recommended measures, and how should these measured be adjusted in response?
- Are there new data or information available that warrants revision of water quality targets, allocations, or implementation measures?

Table 4.1 Required and Trackable TMDL Implementation Measures for Sediment Discharges Associated with Vineyards¹

Performance Standards	Actions	Implementing Parties	Completion Dates
Surface Erosion associated with vineyards: Comply with the Sonoma County Vineyard Erosion and Sediment Control Ordinance (Sonoma County Code, Chapter 30, Article V) and minimize erosion from existing vineyards; and Roads: Design, construct, and maintain rural roads to minimize road-related sediment delivery to stream channels; and Gullies and/or shallow landslides: Promote natural recovery and minimize human-caused increases in sediment delivery from unstable areas; and Effectively attenuate significant increases in storm runoff. Runoff from vineyards shall not cause or contribute to downstream increases in rates of bank or bed erosion.	Submit a Report of Waste Discharge² to the Water Board that provides, at a minimum, the following: a description of the vineyard; identification of site-specific erosion control measures needed to achieve performance standard(s) specified in this table; and a schedule for implementation of identified erosion control measures. OR Implement farm plan certified under Fish Friendly Farming Environmental Certification Program or other farm plan certification program approved as part of a WDR waiver policy. All dischargers applying for coverage under a WDR waiver policy also will be required to file a notice of intent (NOI) for coverage, and to comply with all conditions of the WDR waiver policy ⁴.	Vineyard owner and/or operator	June 2014
	Comply with applicable waste discharge requirements (WDRs) or waiver of WDRs.	Vineyard owner and/or operator	As specified in applicable WDRs or waiver of WDRs
	Report progress on implementation of site specific erosion control measures. ³	Vineyard owner and/or operator	As specified in applicable WDRs or waiver of WDRs

¹As needed to achieve TMDL allocations and consistent with the State Board's *Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program*

²Or compliance with applicable conditional waivers of WDRs that may be adopted by the Water Board.

³ Reports may be submitted individually or jointly through a recognized third party.

⁴This Basin Plan amendment recognizes farm plans certified under the Fish Friendly Farming Environmental Certification Program as effective with regard to control of pollutant discharges associated with vineyards. Additional conditions will be required under a General WDR and/or waiver program consistent with the State Board's *Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program*, and/or as needed to avoid potentially significant environmental impacts.

Table 4.2 Required TMDL Implementation Measures for Sediment Discharges Associated with Grazing

Source(s) and Performance Standard(s)	Actions	Implementing Parties	Completion Dates
Surface erosion associated with livestock grazing: Attain or exceed minimal residual dry matter values consistent with University of California Division of Agriculture and Natural Resources guidelines; and Roads: Design, construct, and maintain rural roads to minimize road-related sediment delivery to stream channels; and Gullies and/or shallow landslides: Promote natural recovery and minimize human-caused increases in sediment delivery from unstable areas.	Submit a Report of Waste Discharge ¹ to the Water Board that provides, at a minimum, the following: description of the property; identification of site-specific erosion control measures to achieve performance standard(s) specified in this table; and a schedule for implementation of identified erosion control measures.	Landowner and/or ranch operator	June 2014
	Comply with applicable waste discharge requirements (WDRs) or waiver of WDRs.	Landowner and/or ranch operator	As specified in applicable WDRs or waiver of WDRs
	Report progress on implementation of site specific erosion control measures. ²	Landowner and/or ranch operator	As specified in applicable WDRs or waiver of WDRs
¹Or compliance with applicable conditional waivers of WDRs that may be adopted by the Water Board. ²These reports may be prepared individually or jointly or through a recognized third party.			

Table 4.3 Required TMDL Implementation Measures for Sediment Discharges Associated with Rural Lands¹

Sources and Performance Standards	Actions	Implementing Parties	Completion Dates
Roads: Design, construct, and maintain rural roads to minimize road-related sediment delivery to stream channels; and Gullies and/or shallow landslides: Promote natural recovery, and minimize human caused increases in sediment delivery from unstable areas.	Submit a Report of Waste Discharge ² to the Water Board that provides, at a minimum, the following: description of the property; identification of site-specific erosion control measures to achieve performance standard(s) specified in this table; and a schedule for implementation of identified erosion control measures.	Landowners	June 2014
	Comply with applicable Waste Discharge Requirements (WDRs) or waiver of WDRs.	Landowners	As specified in applicable WDRs or waiver of WDRs
	Report progress on implementation of-site specific erosion control measures. ³	Landowners	As specified in applicable WDRs or waiver of WDRs
¹ Rural lands include: non-farmed and non-grazing portions of parcels >10 acres that contain one or more residences, and/or a winery; vacant residential parcels >10 acres; and/or portions of 10-acres or larger parcels with secondary vineyard, orchard, and/or grazing. Parcels smaller than 10 acres, but that are identified by Water Board staff as posing a threat to water quality, may also be required to implement the specified actions. ² Or compliance with applicable conditional waivers of WDRs that may be adopted by the Water Board ³ These reports may be prepared individually or jointly or through a recognized third party.			

Table 4.4 Required TMDL Implementation Measures for Sediment Discharges associated with Parks and Open Space, and/or Municipal Public Works

Landowner Type	Sources and Performance Standards	Actions	Implementing Parties	Completion Dates
PARKS AND OPEN SPACE AND PUBLIC WORKS	Roads: Design, construct, and maintain rural roads to minimize road-related sediment delivery to stream channels; and Gullies and/or shallow landslides: Promote natural recovery, and minimize human caused increases in sediment delivery from unstable areas.	Submit a Report of Waste Discharge¹ to Water Board that provides, at a minimum, the following: description of the road network and/or segments; identification of erosion and sediment control measures to achieve performance standard(s) specified in this table; and a schedule for implementation of identified control measures. For paved roads, erosion and sediment control actions could primarily focus on road crossings to meet the performance standard.	Sonoma County Stormwater Management Program (SWMP) State of California, Department of Parks and Recreation State of California, Department of Transportation County of Sonoma Transportation and Public Works	June 2014
		Adopt and implement best management practices for maintenance of unimproved (dirt/gravel) roads, and conduct a survey of stream-crossings associated with paved public roadways, and develop a prioritized implementation plan for repair and/or replacement of high priority crossings/culverts to reduce road-related erosion and protect stream-riparian habitat conditions.		
		Comply with applicable Waste Discharge Requirements (WDRs) or waiver of WDRs.	Landowners	As specified in applicable WDRs or waiver of WDRs, and/or the SWMP

Landowner Type	Sources and Performance Standards	Actions	Implementing Parties	Completion Dates
		Report progress on development and implementation of best management practices to control road-related erosion. ²	Landowners	As specified in applicable WDRs or waiver of WDRs, and/or SWMP
¹ Or compliance with applicable conditional waivers of WDRs that may be adopted by the Water Board. ² These reports may be prepared individually or jointly or through a recognized third party.				

Table 4.5 Required TMDL Implementation Measures for Sediment Discharges associated with Urban Land Uses

Source	Performance Standards	Actions	Implementing Parties	Completion Dates
<i>Construction Stormwater Runoff</i>	Control and minimize sediment and erosion from construction sites through appropriate use of Best Management Practices.	Comply with the requirements of the General Permit for Discharges of Storm Water Associated with Construction Activity (NPDES Permit No. CAS000002) or updated versions of the Construction General Permit. Develop, maintain, and implement a Storm Water Pollution Prevention Plan (SWPPP) that describes BMPs to be used to control erosion and sedimentation. Develop and implement a sediment monitoring plan if the construction site discharges directly to Sonoma Creek or its tributaries.	Owners or Operators of Sites under Construction	As specified in the Construction General Permit (NPDES Permit No. CAS000002)
<i>Industrial Stormwater Runoff</i>	Control discharges from industrial facilities to the standard of “best available technology economically achievable” and the “best conventional pollutant control technology”.	Comply with the requirements of the General Permit for Discharges of Stormwater Associated with Industrial Activities (NPDES Permit No. CAS000001). Develop a SWPPP and monitoring plan to identify sources of pollutants (including sediment) and the means to control them to reduce	Owners or Operators of Industrial Facility Sites	As specified in the Industrial Stormwater General Permit (NPDES Permit No. CAS000001)

Source	Performance Standards	Actions	Implementing Parties	Completion Dates
		stormwater pollution.		
<i>Municipal Stormwater Runoff</i>	Reduce discharge of pollutants, including sediment, to the maximum extent practicable (MEP) ¹	Comply with approved stormwater management plans. Comply with Municipal Stormwater Permit (NPDES Permit No. CAS000004).	Sonoma County Water Agency, County of Sonoma, City of Sonoma, Sonoma Developmental Center, and any other designated entities	As specified in approved stormwater management plan and in applicable NPDES permit (NPDES Permit No. CAS000004).
	Attenuate peak flows and durations from new and redevelopment projects to MEP standards.	Amend and implement stormwater management plans to control peak flow rates and durations	Sonoma County Water Agency, County of Sonoma, City of Sonoma, Sonoma Developmental Center, and any other designated entities	No later than June 2014
<i>State Highways Stormwater Runoff</i>	Control runoff from state highways and associated construction activities.	Comply with the Caltrans Statewide Stormwater Permit (NPDES Permit No. CAS000003).	California Department of Transportation (Caltrans)	As specified in applicable NPDES permit (NPDES Permit No. CAS000003).
¹ MEP is the performance standard specified in Section 402(p) of the Clean Water Act. What constitutes MEP evolves with technology and feasibility, and therefore may change in the future. As of 2008, we consider MEP to be those standards specified in the Phase I Municipal Regional Stormwater Permit Revised Tentative Order (NPDES Permit No. CAS612008, provision C.3).				

Table 5.1 Recommended Actions to Reduce Sediment Load and Enhance Habitat Complexity in Sonoma Creek and its Tributaries

Recommended Action	Management Objective(s)	Actions	Implementing Parties	Completion Dates and Notes
Prevent and Reduce Channel Incision	Reduce rates of sediment delivery (associated with incision and associated bank erosion) to channels, by 80 percent. Enhance channel habitat as needed to support self-sustaining run of steelhead and enhance the overall health of the native fish community. Stabilize channel banks and riparian areas to reduce sediment loads from landslides.	Develop and prioritize channel restoration projects to address unstable areas, based on level of incision and/or landslide instability.	Landowners and/or designated agents, and reach-based stewardships	Comply with conditions of Clean Water Act Section 401 certifications
Enhance Physical Habitat Structure	Enhance quality of rearing habitat for juvenile salmonids by increasing riparian canopy, large woody debris, and frequency and depth of pool habitat.	Develop, prioritize, and implement plans to increase channel complexity, including increasing riparian canopy, pool habitat, and large woody debris.	Landowners and/or designated agents, and reach-based stewardships	

Table 5.2 Recommended actions to Protect or Enhance Baseflow

Recommended Action	Management Objective	Action(s)	Implementing Parties	Schedule/Notes
Enhance Summer Base Flows	Maintain suitable conditions for juvenile rearing, and smolt migration to Sonoma Creek estuary.	Implement a groundwater management plan to: 1) maintain groundwater levels for the support of beneficial uses, 2) increase water recycling and conservation in order to enhance summer base-flows, 3) identify and protect groundwater recharge areas, 4) enhance the recharge of groundwater where appropriate; and 5) protect against adverse interactions between groundwater and surface water flows. Identify potential groundwater recharge areas and develop pilot projects.	Sonoma County Water Agency, Valley of the Moon Water District, City of Sonoma, Basin Advisory Panel ¹ , and interested collaborators	<i>The Sonoma Valley Groundwater Management Plan</i>² was adopted by the Sonoma County Water Agency in November 2007. The plan includes an implementation schedule to achieve recommended actions to protect or enhance baseflow.
¹The Basin Advisory Panel was formed to act as the groundwater management plan stakeholder group for the Sonoma Valley Basin ² The <i>Sonoma Valley Groundwater Management Plan</i> (developed by the Sonoma County Water Agency, Valley of the Moon Water District, and City of Sonoma) is a non-regulatory plan aimed at locally managing, protecting, and enhancing groundwater resources.				

Table 5.3 Recommended Actions to Restore to Fish Passage

Recommended Action	Management Objective(s)	Action(s)	Implementing Parties	Schedule/Notes
Address Fish Passage Barriers	No significant structural impediments to salmonid migration or passage in mainstem or key tributaries.	Design, replace or retrofit road crossings to allow fish passage according to fish-friendly guidance such as those developed by FishNet 4C, Department of Fish and Game, or other appropriate entity with expertise in salmonid habitat restoration.	Local public agencies, watershed groups and landowners	
	Reduce the number of stream miles inaccessible to fish.	Develop, prioritize, and implement plans to remove identified barriers to fish passage.	Local public agencies, watershed groups, and landowners	