

**STATE OF CALIFORNIA  
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD  
CENTRAL COAST REGION**

**STAFF REPORT FOR REGULAR MEETING OF SEPTEMBER 20, 2002**

Prepared on August 21, 2002

**ITEM: 24**

**SUBJECT: Adoption of the San Lorenzo River Total Maximum Daily Load for Sediment (Including Carbonera Creek, Lompico Creek, and Shingle Mill Creek) as a Basin Plan Amendment**

**SUMMARY**

Total Maximum Daily Load (TMDL) development involves watershed-scale analysis of complex ecosystems and water quality information to define problems and identify sources. Developing implementation plans and solutions for watershed-scale problems requires coordination and cooperation by multiple stakeholders, including landowners, industry groups, agencies and responsible waste or pollution dischargers. Solutions also demand artful selection and integration of appropriate regulatory programs, strategies, permits and enforcement tools.

Regional Board staff seek to develop these solutions based on scientific methods and on data that are often limited, due to the state of the science or technology, or to limitations on funding. However, staff is successfully developing meaningful TMDLs by relying on appropriate scientific expertise, best professional judgment, and by acknowledging the inherent scientific uncertainty and assumptions used, coupled with adaptive management strategies. There will always be more data collection desired, new technologies emerging, and/or new partnerships evolving, following adoption of a TMDL and the implementation plan to achieve it. In response to this dynamic situation, staff has developed an informative tracking, reporting and monitoring plan for achieving the TMDL for the San Lorenzo River, Lompico Creek, Carbonera Creek, and Shingle Mill Creek. This provides the adaptive framework necessary to re-evaluate assertions, assumptions, and implementation strategies

that are currently based on the best available information at the time of TMDL development.

This approach is called “adaptive management” and while different people and organizations have somewhat differing views on the best definition for their purposes, we will use a standard working definition as follows: *Adaptive management is a systematic process that uses scientific information to help formulate management policies and practices, then allows for continually improving those policies and practices by learning from the outcomes of implementation and monitoring programs.*

The San Lorenzo River and three of its tributaries, Carbonera Creek, Lompico Creek and Shingle Mill Creek, have been placed on California’s list of impaired waterbodies in accordance with Section 303(d) of the Federal Clean Water Act for impairment due to siltation. Staff recommends the adoption of a sediment Total Maximum Daily Load (TMDL) for these waterbodies as an amendment to the *Water Quality Control Plan, Central Coast Basin* (Basin Plan). The purpose of this amendment is to specify a maximum annual load for sediment that protects beneficial uses, to establish numeric targets that indicate load reduction, to adopt an implementation plan to achieve these targets, and to establish a monitoring plan to evaluate compliance and effectiveness of implementation actions.

The TMDL report (Attachment B) addresses water quality impacts from siltation within the San Lorenzo River watershed, establishes numeric targets for sediment, calculates sediment loading and allocates necessary reductions in total loading, and identifies implementation actions that are expected to bring about load reductions and attainment of the numeric targets. Proposed Resolution RB3-2002-0063, Attachment A, will amend the TMDL into the Basin Plan.

## **DISCUSSION**

The TMDL Report contains a Problem Statement, Source Analysis, Numeric Targets, Total Maximum Load, Load Allocation, an

Implementation Plan, and a Monitoring Plan. Staff received Public input during analysis and development of the TMDL Report. The TMDL report is summarized below.

### **Description of the San Lorenzo River Watershed**

The San Lorenzo River Watershed is approximately 138 square miles in area and is located in Santa Cruz County. The river drains into Monterey Bay with its mouth located in the City of Santa Cruz (See Figure 1 in TMDL Report, Attachment B of this Staff Report).

### **Problem**

The natural processes of erosion and sedimentation have been accelerated in the San Lorenzo River watershed by land use disturbance accompanying human settlement. The dominant cause of disturbance remains the extensive road network. Unpaved and poorly maintained roads that are used for year-round access continue to be the most persistent sources of stream- and river-bed sedimentation. Increasing use and disturbance of the roadway surfaces as well as inadequate roadway drainage appear to be the primary immediate sources. Numerous small-scale failures of cut and fill slopes and culvert blowouts also introduce much debris along roads. Sidecasting of storm debris during road maintenance contributes to stream sedimentation. Road drainage practices accelerate flow to and within headwater creeks

and induce considerable road-related erosion downstream from the road.

### **Impacts to Beneficial Uses**

The main impacts from sediment are to anadromous fish habitat, including spawning gravels, pools, and riffles. Fine sediments in spawning gravels can affect the survival of eggs by limiting flow of water through the gravels, thereby reducing oxygen supply to the eggs and interfering with the removal of metabolic wastes. Fines can also impede emergence of fry from the spawning gravels. Pools that are used for oversummering habitat may become filled with fine sediment, reducing their volume, which in turn affects their overall usefulness as rearing habitat. Riffles are a source area of food for fish since they provide habitat for benthic invertebrates (aquatic insects that live on the river/stream bed) on which the fish feed. Sediment can reduce or eliminate habitat for benthic invertebrates by partially or completely covering riffles.

Anadromous fisheries in the San Lorenzo River have seen dramatic decreases in populations of coho salmon (from 5,000 in 1960 to <100 in 1980) and steelhead (from 20,000 in 1964 to 750 in 1980). These population declines have been attributed to the loss of suitable habitat for spawning, rearing and oversummering due to excessive sedimentation from the extensive road system, urban and suburban development and natural and man-induced landslides within the watershed. Current populations remain at early 1980 levels for steelhead, and it is possible that no coho remain in the river system.

### **Sources of Sediment**

The TMDL identifies sources of sediment that contribute to the degradation of fish habitat within the river and its tributaries. Table 1 summarizes the contributions of different sediment sources.

Mass wasting contributes the majority of material to the stream channels (approximately 42% of the total). The San Lorenzo River Watershed has a naturally high rate of mass wasting due to the steep slopes, naturally

unstable geology and high rainfall. Human activities, such as road building, can reduce the stability of slopes when the roads are cut into hillsides, thereby increasing mass wasting.

Roads have been found to contribute approximately 29% of the sediment that enters the river and stream channels. Of this amount about 19% can be attributed to roads associated with timber harvest roads and skid trails, and about 10% can be attributed to public and private roads.

Channel/Bank erosion contributes about 14% of the total amount of material reaching stream channels. Erosion related to land use activities other than roads accounts for approximately 15% of the total amount of material reaching the streams. Table 2 describes how these loads are distributed among the subwatersheds of the San Lorenzo River Watershed. The subwatersheds are depicted in Figure 4 of the TMDL Report, Attachment B to this staff report

Table 1: Sediment Sources

Sediment Source Category	Estimated Contribution (tons/yr)	Percent of Total
Mass Wasting	174,749	41.7%
Timber Harvest Roads	77,924	18.6%
Rural/Urban Lands	61,910	14.8%
Channel/Bank Erosion	60,143	14.3%
Public/Private Roads	43,135	10.3%
Timber Harvest Lands	1,508	0.4%

Table 2: Estimated Sediment Yield by Subwatershed and Source Category

Subwatershed	ROADS				DEVELOPED LAND		OTHER		Total Sediment Yield (tons/yr)	Percent of Total
	Upland THP (tons/yr)	Streamside on steep slopes THP (tons/yr)	Upland Public/Private (tons/yr)	Streamside on steep slopes Public/Private (tons/yr)	THP (tons/yr)	Other Urban and Rural (tons/yr)	Mass Wasting (tons/yr)	Stream Channel/Bank Erosion (tons/yr)		
Upper San Lorenzo River	5,915	2,683	2,260	951	134	5,491	32,085	4,712	54,231	12.93%
Kings Creek	10,677	4,842	1,921	1,317	319	4,648	17,419	5,172	46,315	11.04%
Boulder Creek	7,708	3,496	2,003	1,176	232	4,839	10,580	5,312	35,346	8.43%
Ben Lomond	4,143	1,879	3,147	1,509	106	5,005	23,499	4,964	44,252	10.55%
Mid. S. Lorenzo Riv.	2,284	1,036	3,291	1,294	71	8,284	12,215	8,190	36,665	8.74%
Shingle Mill Creek	0	0	275	150	0	391	0	358	1,174	0.28%
Bear Creek	9,230	4,186	2,566	1,638	246	7,368	12,975	6,422	44,631	10.64%
Newell Creek	1,539	698	590	79	49	1,018	1,503	935	6,411	1.53%
Zayante Creek	6,924	3,140	3,376	1,432	207	6,393	28,110	5,254	54,836	13.08%
Bean Creek	1,753	795	2,804	1,499	49	5,416	13,937	6,134	32,387	7.72%
Lompico Creek	883	401	896	582	23	1,378	7,156	1,236	12,555	2.99%
Carbonera Creek	878	398	2,583	295	33	3,687	4,464	3,728	16,066	3.83%
Branciforte Creek	1,676	760	2,051	1,744	39	5,223	10,688	5,088	27,269	6.50%
Pasatiempo Creek	0	0	348	0	0	442	87	0	877	0.21%
Santa Cruz	0	0	1302.4	54	0	2,327	31	2,638	6,352	1.51%
Total Sed./ Yield	53,610	24,314	29,415	13,720	1,508	61,910	174,749	60,143	419,369	100.00%
Percent of Total	12.78%	5.80%	7.01%	3.27%	0.36%	14.76%	41.67%	14.34%	100.00%	

Elevated turbidity levels during and after storm events can impact municipal water supplies that obtain their water directly from the river and its tributaries. Intake and treatment systems for municipal water supply may be required to shut down when turbidity levels are as low as 10 Nephelometric Turbidity Units (NTU). Although this is an issue of concern, there is not enough hard data to determine the magnitude of the impacts of turbidity to municipal water supply. Staff proposes monitoring turbidity as part of the Implementation and Monitoring Program to form a better understanding of the dynamics of turbidity within the San Lorenzo River Watershed. No numeric target or allocations will be set for turbidity until more information has been gathered through monitoring. Staff expects the implementation strategy for erosion control will mitigate, at least in part, the problems associated with turbidity.

**Numeric Targets**

Because the sediment objectives in the Basin Plan are narrative, rather than numeric, this TMDL establishes numeric targets as indicators of water quality that are supportive of beneficial uses (Table 3). The numeric targets serve to interpret the narrative water quality objectives and provide a measure with which to determine if the objectives and the TMDL are being met. No single parameter is expected to reflect accurately either reductions in sediment loading, or attainment of beneficial uses. Therefore, this TMDL uses multiple numeric targets. Used together these indicators account for uncertainty associated with using a single parameter to assess the complex in-stream sediment impacts and processes that drive sediment loading.

The relationship of load reduction to these numeric targets is indirect. For example, gravel size in a particular reach is determined by a variety of factors—not just the total load transported through the stream system.

Staff has determined that monitoring for these parameters over time, in lieu of directly

measuring sediment loading to the River from its tributaries, is an effective strategy to evaluate trends in the effects of sedimentation on beneficial uses. The parameters selected characterize effect by targeting specific habitat requirements for aquatic organisms. The natural variability inherent in annual sediment loads in this region is large enough to suggest that clear trends in total loading could not be identified through data collection in the near term.

Table 3: Numeric Targets

Parameter	Numeric Target
Residual Pool Volume	V* (a ratio) = Mean values • 0.21 Max values • 0.45
Median Diameter (D <sub>50</sub> ) of Sediment Particles in Spawning Gravels	D <sub>50</sub> = Mean values • 69 mm Minimum values • 37 mm
Percent of Fine Fines (< 0.85 mm) in Spawning Gravels	Percent fine fines • 21%
Percent of Coarse Fines (< 6.0 mm) in Spawning Gravels	Percent coarse fines • 30%

**TMDL Calculation and Load Allocations**

The Total Maximum Loads for the San Lorenzo River, Lompico, Carbonera, and Shingle Mill Creeks are the loads of sediment that these waterbodies can accept while supporting their identified beneficial uses. While the term TMDL stands for “total maximum daily load,” this total load is expressed as a maximum annual load. The common term TMDL continues to be used, however, for consistency and familiarity.

$$\text{TMDL} = \bullet (\text{Load from Nonpoint Sources}) + \bullet (\text{Load from Implicit Background or Natural Sources and Margin of Safety})$$

For the listed waterbodies of the San Lorenzo River Watershed, the TMDL is expressed in tons per year in Table 4 below.

Table 4: TMDL and Load Allocations

Sediment Source Category	Waterbody Load Allocation (tons/yr)			
	Shingle Mill	Carbonera	Lompico	San Lorenzo
Upland THP Roads	0	413	362	25,197
Streamside THP Roads on Steep Slopes	0	179	164	10,941
Upland Public/Private Roads	129	1,214	367	13,825
Streamside Public/Private Roads on Steep Slopes	68	133	239	6,174
THP Land	0	23	16	1,056
Other Urban and Rural Land	274	2,581	965	43,337
Mass Wasting	0	4,018	6,440	157,274
Channel/Bank Erosion	286	2,982	989	48,114
<b>Total Allocation</b>	<b>757</b>	<b>11,543</b>	<b>9,542</b>	<b>305,918</b>
<b>TMDL</b> Based on target of 27% reduction from current estimated load; 24% reduction for Lompico Creek	<b>857</b>	<b>11,728</b>	<b>9,542</b>	<b>306,139</b>

**Public Involvement**

Regional Board Staff have conducted TMDL outreach by coordinating with forums and events in the San Lorenzo River Watershed and in Santa Cruz County, as well as by conducting direct outreach to the San Lorenzo River Technical Advisory Committee. The Committee is County-led and comprised of representatives of local, state and federal government and watershed stakeholders such as water districts and the County Resource Conservation District. Committee members provided review and comment on drafts of the TMDL technical report and the implementation plan. In addition, public review and comment through this Board hearing process provides another formal opportunity for public input on adoption of this TMDL as a Basin Plan Amendment.

**Implementation Plan**

The TMDL will be implemented in the context of other on-going cooperative planning activities for watershed protection and salmonid, recovery. On-going efforts of state and local entities as well as non-governmental stakeholder organizations are addressing all known sources of sediment through a broad array of approaches, encompassing planning, and on-the-ground erosion control projects.

The County of Santa Cruz has completed the update to the San Lorenzo Watershed Plan, which identifies the complete assortment of erosion control activities and makes recommendations for additional measures. The County of Santa Cruz, using funds from the California Coastal Conservancy, is also preparing the Salmonid Enhancement Strategy, an overall strategy to protect and enhance the steelhead population and restore a viable Coho salmon population in the River. The California Department of Fish and Game is also preparing a Steelhead Recovery Plan for the San Lorenzo River that identifies actions that should be undertaken to secure the viability of the steelhead population.

Each of these efforts recognizes the role of sediment in fisheries protection and identifies strategies to both reduce known sources of sediment, and improve information on other sources and their effects on San Lorenzo River fisheries. These efforts combined with this Sediment TMDL present an opportunity to focus resources and improve the likelihood of success in restoring the fishery.

The overall intent of this Implementation Plan is to reduce sediment loading into the San Lorenzo

River and its tributaries. Because the sediment load of the San Lorenzo River Watershed derives from nonpoint sources, the Implementation Plan will emphasize the three-tier framework for nonpoint source pollution control (CWC §13369), and incorporate concepts set forth in the Plan for California's Nonpoint Source Pollution Control Program, adopted by the State Board in January 2000. The Plan provides for integration of the three-tiers such that self-determined, voluntary Tier 1 activities coincide with continued implementation of regulatory controls on point sources, including storm water, which are Tier 3 activities.

The listing of the San Lorenzo River and three of its tributaries prompted a watershed-scale analysis of sedimentation in this TMDL. Similarly, the Implementation Plan includes a broad selection of actions, which are to be implemented throughout the entire watershed. The conditions in the San Lorenzo River are a reflection of conditions in all tributaries, not just the three listed tributaries, Lompico Creek, Carbonera Creek, and Shingle Mill Creek. Thus, load reductions are necessary in all major tributaries and from all sources. The TMDL, as a Basin Plan amendment, requires implementation throughout and in any appropriate waterbody in the San Lorenzo River Watershed. The Regional Board will determine compliance with this amendment by monitoring representative locations in certain tributaries and the Bay and by tracking implementation actions taken.

#### **Implementation Actions**

Implementation actions to achieve the TMDL emphasize reduction of chronic fine sediments generated from road networks and parcels by means of both general and specific implementation actions. These actions, identified as "Trackable Implementation Actions," will be performed by implementing parties and responsible dischargers and are listed on Table 8-1 of the TMDL Report, Attachment B to this staff report.

Implementing Parties would be expected to select from available strategies and measures to reduce erosion and chronic sediment in developing specific strategies for on-the-ground treatments. Examples of such measures are included in Table 8-2 of the TMDL Report, Attachment B to this Staff report.

In the following discussion of specific Trackable Implementation Actions, letters in parentheses correspond to those actions identified in Table 8-1 of the TMDL Report, Attachment B to this Staff Report.

#### **Roads (Upland and Streamside)**

For timber harvest plans, the Regional Board will increase staff presence at Pre-Harvest Inspections where Class I and Class II watercourses are affected by road crossings or significant harvest operations (A). The Regional Board will also maintain the option to perform post-harvest inspections three to five years after harvest on these same timber harvest plans (B). Regional Board staff will coordinate post-harvest inspections with the County's enforcement of the erosion control ordinance following the 3-year timber harvest plan maintenance period (D). The County Planning Department will also develop a strategy for more effective enforcement of County code violations pertaining to erosion control, which would improve enforcement on timber harvest plans as well as throughout the watershed (E).

The County of Santa Cruz Planning Department will convene a Working Group involving representatives of the Regional Board, the National Marine Fisheries Service, the California Department of Fish and Game, and the Department of Forestry and Fire Protection, and Santa Cruz-based timberland owners and foresters (C). The Working Group will convene to develop specific timber harvesting management practices that will ensure compliance with the Sediment TMDL for the San Lorenzo River.

Portions of the Interim Forest Practice Rules for Protection and Restoration in Watersheds with Threatened or Impaired Values (§916.9 of 2001 Forest Practice Rules) are directly applicable to controlling erosion and sedimentation through Timber Harvesting Best Management Practices (BMPs) for timber harvest plans in the San Lorenzo River Watershed. Regional Board staff have interpreted the language in the 2001 Forest Practice Rules such that the requirements apply to any *planning watershed* in which timber operations could contribute pollutants or stressors limiting water quality in a listed water body; these planning watersheds are the subwatersheds identified in this TMDL.

The Regional Board may require evidence of implementation of BMPs during Pre-Harvest Inspections and in subsequent post-harvest inspections (F). Should the Board of Forestry at some future date adopt final rules that are more restrictive than those identified in the Interim Rules, or should the Working Group (above) identify specific measures that are more restrictive, the more restrictive practices would replace those identified in the TMDL.

The County Department of Public Works, Caltrans, and the cities of Santa Cruz and Scott's Valley will create a public road database to identify and prioritize maintenance and improvement projects (G). The entities will complete road assessments on inner gorge roads and in sandy-soils areas first, then complete the rest of the Watershed, concentrating in areas of high erosion hazard.

Continuing with implementation of recommendations from the County Public Works' Erosion Control Manual, the County Department of Public Works will develop a Road Maintenance Best Management Practices (BMP) Program to improve maintenance (H). The Department will continue training of maintenance crews, and develop regular training for staff. Working with Caltrans, the Department will improve spoils management and disposal by identifying a spoils disposal site(s) in or near the San Lorenzo Watershed (I).

California State Parks will assess roads and trails for erosion into the San Lorenzo River and its tributaries. The agency will also develop a program for funding and addressing any identified problems.

The Santa Cruz Resource Conservation District will establish a private road improvement program (K). The program will implement cost effective private road demonstration projects utilizing BMPs; develop long-term maintenance agreements that may establish a formal County Service Area or other formal contractual agreement; and develop a monitoring plan to assess project effectiveness in improving water quality.

Developed Parcels (THP Land and Other Urban and Rural Land)

In addition to certain Trackable Implementation Actions identified to address the Roads source category (including A-F, S), several actions for developed parcels are identified. First, the County and the Cities will evaluate the need to revise the erosion control and grading ordinances to include more specific regulations and guidelines for sandy-soils areas. (L, M, N).

Also, the County Resource Conservation District, the Santa Cruz Horsemen, County Planning, and County Environmental Health Services will promote improved livestock management practices to reduce discharge of sediment (O).

Additionally, the County Planning Department, the Department of Fish and Game, and the Cities of Scotts Valley and Santa Cruz will take the lead in implementing education programs and will modify policies and procedures to improve riparian corridor protection, maintain channel integrity, implement alternatives to hard bank protection, and retain woody material (P). As part of their education effort, the County will revise the Santa Cruz County Stream Care Guide.

Mass Wasting

Mass wasting sources of sediment require site-by-site assessments to develop an appropriate strategy for stabilization. The County and the City of Scotts Valley will develop a strategy to reduce erosion from point sources, including the Mount Hermon slide, the Bean Creek Road slides, and slides on McEnergy Road, Skypark, Rancho Rio and Monte Fiore (Q). County Planning and the California Division of Mines and Geology will develop a strategy to address accelerating the mitigation of quarry impacts at Hanson Aggregates site (R).

Streambanks

Streambank erosion will be addressed by several of the actions identified here, including Implementation Actions A-H, J-N, and P.

All Roads and Developed and Developing Parcels

The Implementation Plan includes an action (S) requiring the County, the Cities of Scott Valley and Santa Cruz, as well as construction site owners and operators to develop and implement Storm Water Management Plans (SWMPs) and Storm Water Pollution Prevention Plans (SWPPPs) consistent with NPDES Phase II Storm Water regulations. This is simply a restatement of what is

already required of these entities under these regulations. The SWMP (anticipated to be prepared jointly by the County and the Cities) is further required to identify the San Lorenzo Watershed as a priority for site inspection and enforcement of control measures (T). This will require the entities to establish a mechanism by which operators and owners of one-acre and greater construction projects are notified of the requirement to prepare SWPPPs. Additionally, during development of current and future updates of the SWMP, the agencies are required to consider incorporation of sediment control programs and projects into the SWMP (U).

### **Demonstrating Compliance**

#### *Measures of Success*

Two measures of success are proposed: 1) water quality monitoring indicating numeric target attainment, and 2) evidence of performance of trackable implementation actions. Because it will be several years before we are able to evaluate the effectiveness of implementation using water quality indicators (due to the anticipated lag time in response), in the initial phase of implementation the emphasis will be on demonstrating completion of trackable implementation actions.

#### *Failure Scenarios*

There are two “failure scenarios” in which implementation of the TMDL would be considered unsuccessful, and Regional Board action would be required. The first of these is a failure to achieve the numeric targets and corresponding load reductions while at the same time completing trackable implementation actions. Under this failure scenario, the Regional Board’s action would be to re-evaluate the numeric targets and implementation actions and to adjust them as necessary. This scenario would not prompt enforcement action by the Regional Board and would be consistent with Tier 1, self-determined implementation of management practices.

The second failure scenario involves failure to meet numeric targets coupled with failure to achieve trackable implementation actions. Under this scenario, the Regional Board will consider more stringent regulatory mechanisms, consistent with the Three-Tier Framework for Nonpoint Source Pollution Control. For example, the Regional Board would identify responsible

dischargers and would require them to individually report on progress and effectiveness of implementing actions pursuant to Section 13267 of the California Water Code (Tier 3).

#### *Compliance Assurance and Enforcement*

If the Regional Board were to find that significant discharges or threatened discharges of sediment occur despite the implementation of trackable implementation actions, it would consider the need to revise the actions and would consider the issuance of a Cleanup and Abatement Order, Waste Discharge Requirements, or Basin Plan Waste Discharge Prohibitions to address the discharge (Tier 3). The Regional Board would not, in this case, impose administrative civil liabilities for violations of the existing waste discharge prohibitions. However if orders, requirements, or prohibitions are established and discharges or threats continue to occur, then the Regional Board may take enforcement for failure to comply.

### **Schedule of Compliance**

Estimates of controllable load were based on application of typical BMPs appropriate for local conditions (see *Allocations*). For each source category, Regional Board staff anticipate reductions would result from an aggressive approach to project implementation. The timeline for implementation will be 25 years. Within this period staff expects that Trackable Implementation Actions and the specific projects they drive, will result in substantial instream habitat improvements. At the same time, staff recognizes that within this 25-year period, extreme storms and episodic sediment loading will occur.

Because sediment loads are not to be directly measured over this 25-year period, the schedule of implementation for this TMDL tracks the completion of implementation milestones, and lays out a sequence of reviews and evaluations that form the basis of an adaptive management strategy. The Implementation Compliance Schedule is the second table in Attachment A. This schedule includes an initial period to develop baseline information not currently available and to review that information to support or modify the selected numeric targets. The 25-year schedule also acknowledges that many implementation actions taken in the near term are expected to take years to produce a response as measured by Numeric Target monitoring.

Regional Board staff and The San Lorenzo River Technical Advisory Committee will meet on an on-going basis at least annually to discuss progress. At the conclusion of the first year of implementation Regional Board staff and the Technical Advisory Committee will establish more specific time schedules for Implementation Actions and identify Tier 2 and 3 actions the Regional Board would take were schedules not met. Every three years, the implementing parties will report progress on action and Regional Board staff will consider modification of actions and reporting requirements. Modifications may include selection of additional Best Management Practices identified in the TMDL Report as Trackable Implementation Actions, or substitution of these by in-lieu practices.

If tracking of these actions through coordination with the San Lorenzo River Technical Advisory Committee is ineffective or not comprehensive, the Regional Board will identify responsible parties and request from them implementation-tracking reports, indicating that implementation actions are planned and/or completed, directly from responsible parties pursuant to Section 13267 of the California Water Code. The Regional Board will evaluate the need for this after the first report(s) three years after TMDL adoption.

**Cost of Implementation**

Staff evaluated the costs of installing and implementing the management practices to achieve sediment reduction. These fall into three broad categories: 1) Trackable Implementation Actions (e.g., revising erosion control ordinance, conducting assessment of road erosion problems); 2) BMPs for permanent to semi-permanent features (e.g., sediment basins) and for routine activities (e.g., road spoils removal) and operation and maintenance of semi-permanent BMPs; 3) TMDL Monitoring. Mandatory costs of stormwater management plans are not included in the cost estimate for implementing this TMDL.

The TMDL report indicates that these costs will be incurred by implementers but, to the extent possible, will be offset with grants, loans, in-kind donations and matching funds. Sources and funding strategies that are expected to support TMDL implementation, include:

- Private expenditures

- Permit fees
- Fees for service
- Cost-sharing
- Grants
- State and federal funding
- Local general funds
- Special districts
- Redevelopment agency
- Water bills
- Pooled resources among agencies
- Shift of existing funding

Adding the three cost categories of Trackable Implementation Actions, BMPs, and TMDL monitoring, the total cost for TMDL implementation is expected to be over \$16 million.

Trackable Implementation Actions:	\$465,000
BMPs:	\$15,879,707
TMDL Monitoring:	\$21,000
<b>TOTAL</b>	<b>\$16,405,707</b>

**Monitoring Plan**

The monitoring plan for this TMDL is designed to serve three purposes: 1) to determine whether numeric targets are met, 2) to track the completion of implementation actions required to achieve load reductions, 3) to expand the information base upon which future actions will be based.

Water quality monitoring will be performed by Regional Board staff and by other parties identified in the TMDL Monitoring Plan. The TMDL Monitoring Plan was developed in coordination with the Santa Cruz County Environmental Health Services Department. The Department has developed a separate monitoring program as part of the San Lorenzo River Watershed Management Plan. The County's plan and the monitoring plan of this TMDL will compliment each other and will be further integrated during the first year of TMDL implementation into a Comprehensive Monitoring Program.

**Regional Board Monitoring Requirements for TMDL**

The Comprehensive Monitoring Plan will compliment, but not replace, the Regional Board's monitoring requirements for this TMDL. Those requirements include triennial compliance point

monitoring of the numeric target parameters, and tracking of implementation actions.

*Numeric Target Monitoring at Compliance Points*

The Regional Board, or its designee, will perform numeric target monitoring on all listed waterbodies and at the mouths of tributaries into the mainstream.

Every three years Regional Board staff proposes to evaluate how well the individual targets indicate water quality improvements. This evaluation will rely on a ten-year rolling average of monitoring results for each parameter at each site, once ten years of data are available.

The Numeric Targets describe conditions believed to be representative of a system in dynamic equilibrium wherein sediment loading is on average 27 percent less than what it is today.

The targets should be achieved by year 25. Between now and then, the Regional Board will look for improving trends in the ten-year rolling average of monitoring data for each parameter.

*Regional Board Monitoring of Implementation Actions*

Implementation monitoring ensures that identified management actions are undertaken. The Regional Board will track implementation with the assistance of the San Lorenzo River Technical Advisory Committee. Regional Board staff and San Lorenzo River Technical Advisory Committee members will review progress of implementation activities annually and will assess compliance every three years.

The primary means by which implementation actions are tracked, will be reporting to the Regional Board at three-year intervals by Implementing Parties, and site inspections by Regional Board staff.

The Implementation Actions identified in the previous section may be interchanged with in-lieu practices deemed to be comparable in their effectiveness in addressing the major sources of sediment throughout the watershed. In evaluating implementation actions, the Regional Board will take into consideration the level of effort made by the Implementing Party, the portion of the action

completed, and the extent to which the action has achieved the desired outcomes.

Other Elements of Comprehensive Monitoring Plan

*County of Santa Cruz Streambed and Habitat Monitoring.* The County of Santa Cruz will establish a river- and stream-bed sedimentation monitoring program, performed at intervals of one to five years, to evaluate whether erosion control efforts are resulting in improved stream habitat conditions. Additionally, they will monitor stream geomorphology, bank erosion, and streamflow in the San Lorenzo River mainstem and its tributaries to gain a greater understanding of the physical factors that influence local sedimentation and salmonid habitat quality.

*Project Effectiveness Monitoring.* Effectiveness monitoring is used to assess whether specific erosion control projects or BMPs have had the desired effect. The County will work with project proponents to monitor specific projects to determine their immediate and medium term on-site effects.

*Turbidity Monitoring.* The City of Santa Cruz and the San Lorenzo Valley Water District will conduct turbidity trend monitoring to determine if, and to what degree, turbidity impairs the beneficial use of municipal water supply in their operation of water treatment facilities.

*Data Management and Quality Assurance.* Regional Board staff and the other contributors to the monitoring programs will provide data in a format compatible with the Central Coast Ambient Monitoring Program (CCAMP). CCAMP includes data from projects within the Regional Board's jurisdiction (northern Ventura to southern San Mateo counties). The availability of this data provides opportunities for valuable data comparisons between the San Lorenzo River Watershed and other similar areas. This database and selected analytic tools will be available on the Internet and linked to the RWQCB website.

**ENVIRONMENTAL SUMMARY**

An environmental assessment package has been prepared and is contained in Attachment C of this

report. The basin planning process has been determined to be functionally equivalent to the California Environmental Quality Act process in accordance with Section 21000 et seq. of the Public Resources Code. Appropriate notices and waiting periods have been provided. This process will satisfy environmental documentation requirements of both the California Environmental Quality Act, under Public Resources Code Section 21080.5 (Functional Equivalent), and the Federal Clean Water Act of 1977 (PL 92-500 and PL 95-217).

## **COMMENTS**

### **City of Santa Cruz Water Department**

#### **1. Turbidity monitoring:**

Water Resources Manager clarified the Department's commitments to monitoring turbidity and to erosion control/riparian protection-related outreach.

**Staff Response:** the text of the TMDL Report (Attachment B) was changed to reflect the comments.

### **Lompico Watershed Conservancy**

#### **1. Daily load attributed to Timber Harvest Lands**

Kevin Collins, in a facsimile letter, offered the Lompico Watershed Conservancy as an active stakeholder in the process to develop the TMDL and offered several comments on the TMDL Report. Mr. Collins asserts that the 0.4% of the daily load attributed to Timber Harvest Lands in the TMDL Report is a faulty estimate. He asserts that there is a significant level of sheet erosion, rilling, gullyng, debris sliding, and rain impact erosion derived from these lands. He sites hardwood removal and loss of tree canopy as principal causes for these erosion processes and suggest the 0.4% number be re-evaluated. Mr. Collins refers to research by two scientists (Robert Coates and Leslie Reid) that demonstrate the effects of tree removal and canopy removal on erosion and delivery of sediment to streams, and he anticipates new hydrologic and geomorphic information will effectively challenge the "orthodoxy regarding the effect of logging on soil erosion."

**Staff Response:** Staff considered three factors in developing the percent of total load attributable to THP lands: THP land area, the erosion rate for these lands, and the delivery ratio (the amount of

eroded material transported into streams). Appendix B of the TMDL report (pp. 14-16) describes the sediment production calculation methodology and the basis for both erosion rates (Cafferata, 1993) and delivery ratios (Swanson Hydrology & Geomorphology). Staff considers the methodology to be sound and the estimates of rate and delivery ratio to be reasonable at the scale of analysis employed in the TMDL report. Staff acknowledges that continuing research on hillslope erosion processes in timber harvest areas will improve our understanding of their effects on sediment loading. Staff asserts that the adaptive management approach employed in implementing a program of sedimentation reduction will incorporate this new understanding as it emerges. Staff also points out the aggressive erosion reduction goals (30%) for THP lands, as identified in the TMDL report and Load Allocations section of the TMDL report.

#### **2. Sediment Transport Monitoring**

Mr. Collins recommends that water column sediment transport be monitored to estimate the relationship of sediment transport to aquatic habitat.

**Staff Response:** Staff selected multiple indicators to measure the effects of sediment loading in the watershed. We consider these parameters to be an effective approach in lieu of directly measuring sediment loading to the River and its tributaries. The direct measurement of loads would not characterize the effect of those loads on beneficial uses, which is the water quality concern addressed in this TMDL report. The selected parameters do characterize effect by targeting specific habitat requirement for aquatic organisms. The natural variability inherent in annual sediment loads in this watershed is described at length in the TMDL report (Section 4, Source Analysis). Staff believes that this variability is large enough to preclude the collection of data from which clear trends could be identified in the near or medium term.

#### **3. Expanding classification of private roads**

Mr. Collins indicates that the classification of private roads should be expanded to include roads used both for timber haul routes and residential access.

**Staff Response:** Appendix B of the TMDL Report (pp. 8-14) describes how staff classified roads in

conducting the source analysis. Staff developed a robust analysis, previously unavailable, of the extent of THP roads. Staff relied on Santa Cruz County Environmental Management Information System spatial data to develop the analysis of private roads. While recognizing that multiple use of roads is common, staff is not aware of any quantitative information characterizing it and was unable to incorporate it as a unique category of erosion in the source analysis. Staff contends that these roads are likely to be captured by either the THP Roads class, or the Public/Private Roads class. Relative to addressing this source of sediment, staff is confident that the Implementation Plan does so. Appendix G: County Erosion Control Recommendations, in the TMDL report includes a recommendation to improve timber harvest and appurtenant roads that would address the problem. The County's efforts to implement this recommendation will coincide with Implementation Actions E-K (Table 2 Attachment A) of the Implementation Plan for achieving this TMDL.

**4. Strong regulatory response needed**

Mr. Collins states his opinion that while it is appropriate to seek voluntary compliance with the TMDL, a strong regulatory response is necessary.

**Staff Response:** The implementation plan relies on self-determined actions (voluntary) for some implementation actions, and on NPDES storm water permits for others. Additionally, in Section 8.6 Demonstrating Compliance, the report lays out the consequences for Implementing Parties who fail to implement actions. The Regional Board will use its authority where necessary to conduct investigations, identify responsible dischargers of sediment, and initiate enforcement action to address the problem.

**5. Support for increased RWQCB presence at pre- and post-harvest inspections of Timber Harvest Plans**

Mr. Collins states his strong support for increased RWQCB presence at pre- and post-harvest inspections of Timber Harvest Plans.

**Staff Response:** Comment noted.

**6. Management Agency Agreement with California Department of Forestry and Fire Protection**

Mr. Collins states his belief that the RWQCB should move to revoke the Management Agency Agreement between the State Water Resources Control Board and the California Department of Forestry and Fire Protection. This agreement establishes, among other things, the role of the RWQCBs in pre-harvest inspections of Timber Harvest Plans.

**Staff Response:** The Management Agency Agreement is currently under review as part of the State and Regional Board's broader review of its waiver policy, pursuant to requirements of Assembly Bill 390. The State Board is coordinating this activity with participation by the Central Coast and other Regional Boards. Staff recognizes the need to improve the surveillance and tracking of potential water quality impacts from timber harvest activities, and has identified actions to address this in the Implementation Plan for this TMDL (see comment above). However, staff suggests that it is not the purview of the TMDL report to address the broader policy direction relative to the Management Agency Agreement.

**Santa Cruz County Environmental Health Services**

**1. Need for flexibility to accommodate new findings:**

Environmental Health Services director John Ricker conveyed by email that new studies in progress in the San Lorenzo River watershed have bearing on the findings of the TMDL report and the Implementation Plan. The Draft Salmonid Enhancement Plan indicates a higher priority for sediment control in the middle River, which would lower the priority for sandy areas. The Draft Erosion Prevention Planning Project for selected roads in the watershed indicates failure-prone culverts are a more significant source of sediment than roadcuts and slides. Mr. Ricker indicates the need for "flexibility in the TMDL to allow us to accommodate new findings through adaptive management."

**Staff Response:** Staff concurs with the need for flexibility to accommodate new information. The Implementation Plan articulates the adaptive management approach of reviewing such information and making necessary corrections in implementation actions.

**Scientific Peer Review**

Staff received comments from two peer reviewers as required pursuant to Health and Safety Code Section 57004. The comments cover a broad range of technical issues addressed in the TMDL Report (Attachment B).

**Staff Response:** Attachment F contains the full text of peer reviewers' comments along with staff responses.

**RECOMMENDATION**

Adopt Resolution No. R3-2002-0063 contained in Attachment A as proposed.

**ATTACHMENTS**

- A. Resolution No. R3-2002-0063
- B. San Lorenzo River Total Maximum Daily Load for Sediment (Including Carbonera Creek, Lompico Creek, and Shingle Mill Creek)
- C. California Environmental Quality Act "Functional Equivalent" Report for Basin Plan Amendment (Resolution No. R3-2002-0063)
- D. Notice of Public Hearing / Notice of Filing
- E. Draft of Certificate of Fee Exemption/De Minimis Impact Finding.
- F. Peer Review Comments and Staff Responses

Attachments B-E are available at our website, [www.swrcb.ca.gov/rwqcb3/Board/2002meetings.htm](http://www.swrcb.ca.gov/rwqcb3/Board/2002meetings.htm) click on View Agenda for September 19-20, 2002, Item 24, attachments. Or we can send a hard copy via mail. Contact **Dominic Roques at (805) 542-4780** or [droques@rb3.swrcb.ca.gov](mailto:droques@rb3.swrcb.ca.gov) .