

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

STAFF REPORT FOR REGULAR MEETING OF DECEMBER 3, 2004

Prepared on October 19, 2004

ITEM: 29

SUBJECT: Status of Development of Regional Sediment Assessment Framework

Background

Watershed Assessment Unit staff of the Central Coast Regional Water Quality Control Board have embarked on the development of a Regional Sediment Assessment Framework. The framework is a systematic approach for establishing the proper context for evaluating problems associated with clean¹ sediment within the Central Coast Region. A primary objective of the framework is to provide a clear definition of sediment conditions affecting water quality throughout the Region. This will require assessment work at both a regional and site-specific scale, as well as support functions such as data management and training.

The framework will divide the region into separate areas based on erosion and sedimentation characteristics, it will develop the data sources that are needed to analyze sediment issues at the watershed level, and will provide the procedures that will allow staff to identify and monitor sediment conditions within a waterbody. The framework is not a monitoring program, but it can be used as the basis for developing sediment monitoring strategies at the regional or subregional level.

¹ The term "clean sediment" is used here to convey that the focus of this program is the effects of sediment transport and deposition, not the potentially toxic effects of contaminated sediments normally addressed by discussions of sediment "quality." Throughout this report "clean" is inferred.

The highly variable physical geography and climate of Region 3 presents an equally variable number of inherent sediment conditions affecting water quality. Due to the dynamic geologic and tectonic forces at play in this landscape, in conjunction with a highly erosive Mediterranean climate, erosion and sedimentation naturally occur at rapid rates in much of the region. The drought, fire and flood sequence that is symptomatic of a Mediterranean climate can cause natural erosion and sedimentation to "impair" waterbodies on a periodic basis.

Human alteration of the landscape introduces anthropogenic disturbance that is often difficult to discern from this natural, or, background, disturbance. In turn, it can be extremely difficult to distinguish the water quality effect of erosion and sedimentation caused by human disturbance from that caused by natural disturbance.

With the exception of salmonids, we have limited knowledge about how sediment affects aquatic life beneficial uses within the Region. The habitat requirements of salmonids (steelhead and coho salmon) and how they are impacted by sediment are well known. We fall short in our knowledge when we look at other aquatic species, especially in non-salmonid bearing streams. The framework looks to expand our knowledge base on how sediment may impact other aquatic species.

The Regional Sediment Assessment Framework would replace our current

approach of evaluating suspected sediment problems in isolation and through heavy reliance on best professional judgment, with a systematic approach that offers greater consistency and more informative outcomes. This would benefit staff in multiple programs and improve the basis for the Board's decisions about sediment-related issues.

Why do we need a Regional Sediment Assessment Framework?

There are four main reasons for developing the Regional Sediment Assessment Framework. They are:

1. Currently, no systematic monitoring of sediment parameters exists within the Region. The framework could support the development of monitoring strategies and provide the protocols required for instream monitoring.
2. To create a consistent approach for assessing sediment impacts to water quality in Region 3, particularly those impacts that have resulted in impairment of a waterbody and require a Total Maximum Daily Load to be developed;
3. To establish a regional context for prioritizing sediment-related work; and
4. To improve the technical basis for determining sediment-related problems (e.g. impairment or discharge violations) and judgments regarding the severity of those impacts.

There is no handbook or procedure for staff to use when they have to understand how sediment impacts water quality. The Basin Plan narrative water quality objectives for sediment provide no basis for deciding how much sediment is too much. The Regional Sediment Assessment Framework would help staff make more consistent decisions when assessing the impact of sediment to

beneficial uses by providing guidance on how to proceed and identifying which things to consider when performing an assessment.

In many cases, staff responsible for developing sediment TMDLs have been confronted with a dearth of quantitative and qualitative information on sediment impacts to beneficial uses. Typically, the documentation supporting the listing of waterbodies for sediment impairment provides little insight into the extent and magnitude of sediment impacts, or their link to, beneficial uses. By placing greater reliance on quantitative and qualitative measures that associate observable and/or measurable sediment parameters with beneficial uses the framework would provide a means for connecting the sediment condition to the beneficial use condition in a meaningful way (e.g., fine sediment < 0.85 mm in excess of 21% reduces spawning success of steelhead). Currently, because of the extensive body of work available on salmonids and sediment, these parameters have been identified for beneficial uses that include various life stages of salmonids. This knowledge needs to be expanded to other aquatic life (e.g., benthic macroinvertebrates or red-legged frogs).

Ultimately, the Regional Sediment Assessment would provide a set of tools that will allow staff to better understand the setting for sediment production, sediment delivery and sediment impacts to beneficial uses. Some examples of how these tools could be used by other programs, include: the stormwater program could use these tools when investigating grading and erosion control issues; permitting programs could use these tools for enforcement or when accidental discharges occur; the non-point source program could use these tools to prioritize its work and grant funding within the region; TMDLs would rely on the protocols for numeric target monitoring; and, some of the sediment monitoring protocols could be integrated into the Central Coast Ambient Monitoring Program (CCAMP).

What is the Regional Sediment Assessment Framework?

The Regional Sediment Assessment Framework is a systematic approach for organizing sediment related assessment techniques at the regional, watershed and reach scale. It is designed as a set of modules that can be developed independently as staff resources and funding are made available. To date, staff has developed the framework by designating 0.3 – 0.4 Personnel Years per year for the last two years. At the current level of effort it would take several years to complete. It should be noted that the framework does not propose to do any comprehensive monitoring. At this time, all monitoring performed as part of the assessment has been related to testing and refining the monitoring protocols and for comparison of region specific data to proposed numeric targets.

The framework is comprised of the following modules:

Module 1 — Framework guide: provides an overview of the framework and documents the reasoning behind it's development and usefulness.

Module 2 — Guide to accurate identification of sedimentation impacts in Region 3: ties sediment to Beneficial Use impacts and creates a method for interpreting sediment within the context of the surrounding landscape.

Module 3 — Sediment problems in Region 3: identifies known areas with sediment problems and provides a method for identifying what conditions to expect in the field

Module 4 — Sediment monitoring protocols: contains monitoring protocols that have been tested and refined by Region 3 staff.

Module 5 — Data storage and information management: provides tools for managing and analyzing data such as spreadsheets and databases.

Module 6 — Staff training plan: includes a strategy for training staff in the use of the sediment assessment tools.

The proposed content of these modules is presented in the Framework Outline (Attachment A). The development of the framework is in its infancy and most of the modules are only “proposed” at this time, although substantial progress has been made on testing and refining some of the protocols identified in Module 4 and developing the data management tools identified in Module 5.

Efforts (Work to Date)

A principal component of the framework is a compendium of sediment assessment and monitoring protocols (Module 4). Staff is currently developing this module, including refining and field-testing protocols for in-stream lotic systems and for site investigation, inspections and surveillance purposes. This work has also contributed to the development of the data analysis and management tool envisioned as part of Module 5 of the framework. The desired outcome of this work is a limited number of region-specific surveillance and monitoring protocols. The current project report for this module is included as Attachment B to this report.

The current fiscal year's (FY 2004-2005) work 1) continues the testing and refining of monitoring protocols that was begun last year, 2) addresses sandy substrate waterbodies to see if parameters are available for determining impacts to beneficial uses in these types of waterbodies, and 3) develops an “Expected Conditions” analysis procedure.

The work on the sandy substrate waterbodies is being pursued because we currently have not identified any practical methods for assessing sediment impacts to Beneficial Uses in these types of waterbodies. This type of waterbody represents many of our major waterbodies

(e.g., Pajaro River, Salinas River and the Santa Maria River) that are distinct from those waterbodies with large particle substrate on the North Coast of our Region (e.g., San Lorenzo River) and in the Santa Lucia Mountains (e.g., Big Sur River, Arroyo Seco River).

The Expected Conditions analysis identifies the sediment conditions that staff would expect to encounter within a waterbody based on the natural and man-made environment that influences that waterbody. The Expected Conditions analysis operates at three different scales:

1. Stratification at the regional level is based on natural factors such as rainfall and temperature and describes broadly the range and location of natural sediment production within the region.

2. Analysis at the watershed level is based on natural features such as geology (structure and rock type), measurement of watershed features (such as watershed geometry and stream density) and man-made features (such as roads, dams, groundwater extraction and land /urban development).
3. Monitoring/Data Collection at the reach level. This would include quantitative as well as qualitative techniques for describing sediment conditions within a waterbody and ascertaining if beneficial uses are impaired by sediment.

Table 1 gives an overview of the Expected Conditions for sediment that connects the scale to the tool, and the tool to the desired information.

Table 1 Overview of Expected Conditions for Sediment

Scale	Tool	Category	Data/Information
Regional	Stratification	Natural Setting Rainfall Temperature	Generalized expectation of what stream might look like. Long-term average suspended sediment concentration.
Watershed	Guide to Interpreting Sediment Conditions	Natural Setting Hydrology Geology Soils Vegetation Topography	Long-term sediment production. Recent sediment production. Identification of sediment production, transport and deposition zones.
		Natural Disturbance Drought Fire Flood Landslides	Natural sources with high sediment production. Time scale of sediment impacts from natural disturbance.
		Anthropogenic Stressors Hydromodification Gravel Mining Timber Harvest Agriculture Land/Urban Development Roads Groundwater Withdrawal Federal, State & Local Lands	Effects of anthropogenic stressors on sediment production.
		Variability System Stability Dynamic Equilibrium Meta-stable Equilibrium Interannual Variability Geomorphic Variability	Natural range of conditions.

Scale	Tool	Category	Data/Information
Reach (future would include estuaries, lakes, and lagoons)	Protocols	Protocols Substrate Water Column Hillslope	Procedures Quantitative and qualitative measures of instream sediment conditions and hillslope sources.

How the Regional Sediment Assessment Framework fits with other efforts in Santa Cruz County.

The Regional Sediment Assessment Framework can provide support for the current Board efforts in Santa Cruz County as well as incorporate knowledge generated by other entities to help fill out the picture of sediment problems in the Central Coast Region. Examples include:

- a. San Lorenzo River Sediment TMDL – Protocol testing and refinement will provide procedures for required instream monitoring of numeric targets and will help develop numeric target levels relevant to the Central Coast Region. Numeric target monitoring data would then build on knowledge of sediment problems throughout the region (Module 3).
- b. Timber Harvest General Waiver – The Expected Conditions analysis can help identify areas that are particularly sensitive to disturbance and could inform a risk-based or tiered approach to managing timber harvesting operations.
- c. Other entity reports/plans – Analysis and monitoring performed by other entities can be incorporated into the sediment assessment to build on the knowledge of sediment problems in the Central Coast Region as well as to inform the expected conditions analysis by quantifying sediment production for specific land uses. Examples of these types of information include the *San Lorenzo River Salmonid Enhancement Plan* sponsored by the County of Santa Cruz. The plan presents the current

status of salmonids in the San Lorenzo River and does an excellent job of identifying stressors on salmonids and places sediment amongst the top factors affecting salmonid populations within the San Lorenzo River. Another example is the Little Creek monitoring effort by California Polytechnic State University at San Luis Obispo. This effort will provide the most comprehensive event-based suspended sediment and turbidity monitoring data collected in the region to evaluate the effectiveness of timber harvest practices in protecting water quality. Other examples of these types of information can be found in Attachment 10 of Item 31 in the Board meeting packet.

Conclusion

The Regional Sediment Assessment Framework is structured to help support decision-making associated with identifying sources of sediment, predicting where sediment impacts may occur, and providing methods for identifying and quantifying instream impacts to beneficial uses by sediment. Over time, as the individual modules are developed, it will provide a formalized approach for evaluating the variety of sediment questions that staff and the Board are called upon to answer. Staff intends to continue to dedicate at least 0.3 to 0.5 Personnel Years to this effort annually in order to insure that we are expanding our knowledge base and decision-making capabilities with regard to sediment in our waterbodies. The success of the framework depends on long-term dedicated funding, recognition of its value by other programs

and a commitment to integrate the framework into program decision-making processes.

Recommendations

Discussion only.

Attachments

- 1 – Regional Water Quality Control Board, 2004, *Framework Outline, Regional Sediment Assessment Framework*. Spring 2004.

- 2 – Located at the following website under “Regional Sediment Assessment” (scroll to the bottom of page) <http://www.swrcb.ca.gov/rwqcb3/TMDL/303dandTMDLprojects.htm>
Regional Water Quality Control Board, 2004. *Regional Sediment Assessment, Project Report for Phase 1, Module 4*. September, 2004.

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