

Sedimentation in the Delta and Suisun Bay

I. Executive Summary

a. Project Title and Applicant

Sedimentation in the Delta and Suisun Bay
Dr. David Schoellhamer and Randal Dinehart, U.S. Geological Survey

b. Project Description and Primary Biological/Ecological Objectives

The primary objective of this study is to describe the movement and availability of sediment needed for habitat restoration. This project will allow CALFED and other ecosystem restoration programs to improve and increase aquatic and terrestrial habitats because sediment is the raw material for habitat restoration projects. Sediment is the creator, or destroyer, of all of the CALFED priority habitats. Floodplain, marshplain, and channel form changes are habitat stressors which can be counteracted by artificial and natural movement of sediment. The preferred option is natural sediment movement. CALFED can use information collected on sediment movement through stressed habitats to guide design of restoration projects.

Data on sediment movement can be used by water managers and CALFED to better evaluate the effect of restoration projects on water quality. Sediment carries toxic substances, provides habitat for benthic organisms, reduces light in the water column, and limits photosynthesis.

Data on sediment movement will identify replenishable sediment sources in the Delta for restoration and levee projects. Sediment removal may rob downstream areas of sediment required to maintain existing habitat.

c. Approach/Tasks/Schedule

To understand the availability and quantity of sediment movement through the Delta and Suisun Bay, sediment transport will be monitored at several sites. The two components of the sediment load we propose to evaluate are suspended load (fine sediments moving at the same speed as water) and bedload (sand moving at a slower rate along the bed). Suspended-sediment concentration will be continuously measured with an optical backscatterance sensor. Bedload transport will be estimated from bedform profiles by using the correspondence between transport rates and bedform geometry. Sediment discharge will then be calculated based on these measurements. The data will be analyzed to determine the variations in sediment transport that occur with seasonal changes in the watershed, flow magnitude, tidal cycles, and local fluctuations in sediment supply.

The phases of this proposed project are site installation, data collection, data analysis, and presentation of results.

First year: install sites, begin data collection, begin data analysis

Second year: continue monitoring, calculate sediment discharge, write data report

Third year: continue monitoring, write data and interpretive reports

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d. Justification for Project and Funding by CALFED

This proposed sedimentation project will provide information to help CALFED satisfy three of its four objectives: provide good water quality, improve and increase aquatic and terrestrial habitats, and reduce the risk from catastrophic failure of Delta levees. This project will provide information on sediment transport which is needed to 1) understand, monitor, and evaluate water quality effects of restoration activities, 2) restore habitats through artificial or natural sediment deposition, and 3) to identify replenishable sediment sources in the Delta.

e. Budget Costs and Third Party Impacts

The total cost of the 3 year project is \$1,046,200, with CALFED providing \$833,000 (80%) and the USGS Federal/State Cooperative Program providing \$213,200 (20%). We know of no third party impacts of the proposed project.

f. Applicant Qualifications

The applicants are research hydrologists for the U.S. Geological Survey. Dr. David Schoellhamer has been conducting sediment transport research in San Francisco Bay since 1993. Many publications and technical presentations have resulted from this work. From 1987 to 1993 he conducted a study of sediment resuspension in Tampa Bay, Florida, for the USGS. Randal Dinehart has 20 years of experience in riverine sediment transport measurement and analysis, including 12 years of applied research at Mount St. Helens, where he developed methods for measuring bedload transport from bedform migration rates.

g. Monitoring and Data Evaluation

Data collected by this project can be used to monitor changes in sediment transport caused by restoration projects. We envision this study as the beginning of a sediment monitoring program for the Delta that we hope will continue and improve as the Delta is restored.

h. Local Support/Coordination with other Programs/Compatibility with CALFED objectives

The Regional Monitoring Program for Trace Substances, US Army Corps of Engineers, San Francisco Regional Board, Interagency Ecological Program, and the US Geological Survey have supported sediment monitoring at eight sites in San Francisco Bay since 1991. This proposed project extends USGS sediment transport studies into the Delta. Proposed data collection sites are collocated with hydrodynamic and water quality measurements collected by USGS, DWR, and NOAA, and situated to assist proposed USGS Delta Smelt and DWR restoration projects. A USGS sediment transport monitoring project is included in the IEP monitoring plan presented to CALFED. This proposed sedimentation project will provide information to help CALFED satisfy three of its four objectives: provide good water quality, improve and increase aquatic and terrestrial habitats, and reduce the risk from catastrophic failure of Delta levees.