

Staff Memo to File

From: A. L. Riley and Setenay Bozkurt Frucht
Subject: San Francisquito Creek Flood Control Project, Place ID No. 757384
Date: October 26, 2015

This is a review of the assumptions regarding sediment transport and deposition through the San Francisquito project reach (Hwy 101 to the Bay) that were provided as the basis for JPA's Operation and Maintenance Plan. These assumptions were stated in a memorandum dated May 26, 2015 and submitted to the Army Corps as a response to the information request letter sent by the NMFS on November 3, 2014. We hope that the summary of our analysis of the May 26 memo and the O&M Plan, as well as the questions we raise here, can inform the feedback provided to the JPA.

The basis of the O&M Plan is that there will not be the need to remove sediment from the Hwy 101 area or below. The assumption that there will be no future sediment removal needs from the project area appears to be based on an overly simplistic view of the environment below highway 101 and without adequate or clear consideration for what drives sediment transport.

The JPA states that based on an USACE study dated 2011 ... "the average bed elevation between the Bay and Hwy 101 will increase by 1.24 feet over the next 70 years based on existing conditions. Post project conditions will provide more efficient sediment transport than existing conditions." The existing conditions considered in the 2011 report did not account for the new culvert under 101, and thus did not account for an increase of flows of approximately 2000 cfs above existing conditions. The report also assumed breakout of flows in Palo Alto and Menlo Park at the bridges and therefore modeled for a lower discharge through the reach. Currently the JPA is looking at floodwalls and bridge modifications to reduce breakout flows. It follows that there will be a much higher 100-yr flow discharge through the project reach under project conditions. Therefore existing conditions (especially as modeled in the 2011 report) cannot be used to forecast with-project conditions.

JPA also states that sediment transport will be more efficient under project conditions. There are no clear explanations provided to support this statement especially given that energy slopes, which are a critical factor driving sediment transport and which are primarily controlled by the downstream boundary conditions (tide levels) are the same as existing conditions and the high flow channel is wider. There is no analysis or evidence to support that sediment transport will be more efficient under project conditions and therefore there will not be any need for maintenance.

Sediment deposition records also challenge the assumption of no future maintenance. Information from Santa Clara Valley Water District maintenance records shows removal of approximately 1,700 cubic yards of sediment every three years on average between 1997 and 2007. This translates to an average of 700 tons a year (assuming a bulk density of 1.22 tons/cy). We also note that the recent analysis and report prepared by URS for Stanford University to plan new Searsville reservoir modifications uses a sediment transport model to estimate about 20,000 tons deposition over 50 years or about an average of 400 tons/yr. Another estimate of sediment

deposition is a USGS analysis (Phillips, 2000) on sedimentation of the flood tidal delta of San Francisquito Creek. Phillips reported that about 30,000 to 40,000 cy or 35,000 to 50,000 tons deposited on the delta during the 1997-98 El Nino storm. Significant deposition also occurred during the 1982 storm and more than 80,000 cy (100,000 tons) deposited since 1950s. Their analysis would suggest an average annual deposition rate of 2,800 tons. All these sources then suggest a range of average annual sediment deposition from 400 to 2,800 tons. This is an average annual amount but it also should be noted that sediment will deposit episodically and that storms have resulted in depositions up to 50,000 tons in one storm.

Therefore, we submit the following issues and questions with regard to the two stated assumptions that 1) the low flow channel feature of the project will efficiently transport sediment; and 2) no deposition is anticipated through the reach during high flows as sediment will be transported all the way to the Bay;

1. The change in hydrology i.e. an additional 2000 cfs that will be delivered to the project reach with the new Hwy 101 culvert will increase sediment loads to the project reach. The analysis and the O&M Plan appear to assume that this additional flow will be clear water flow during floods and will not add sediment loads greater than existing conditions to the project area.
2. The proposed project low flow channel dimensions are comparable to those of the existing low flow channel. We have records of deposition following floods and records of maintenance after the 97-98 flood by the District in the lower channel. Yet, the analysis assumes that the low flow channel will be able to transport any sediment delivered to the reach.
3. A combination of channel slope, channel geometry, discharge, and sediment loads and size are important interacting factors in the determination of sediment transport. No effort is made to describe these interacting variables and how they may affect sediment loads. The other factor which also has crucial influence on sediment transport is the tide level; the effect of tide levels on sediment transport is also not acknowledged or discussed in the analysis. The size of the sediment reaching the area is a critical unknown.
4. Project conditions will be substantially different than existing conditions because:
 - a. The project will be subject to increased discharges (due to upstream changes that are implemented now and that are planned in the future);
 - b. The project has larger width of the marsh plain and larger widths under high flows
 - c. The project has energy slopes that are very comparable to existing conditions under high flows
 - d. Future releases of sediment from Searsville will affect sediment loads to the project area.

Therefore, project conditions are substantially different than existing conditions.

5. The May 26, 2015 letter seems to imply that the JPA does not consider the additional sediment from upstream to be their responsibility in the design of this project. While they cannot control the operations of Searsville, the JPA does have an obligation to recognize how the

submitted design can respond to different expected watershed scenarios so that the proposed design anticipates a realistic (and anticipated) range of future conditions.

6. Since sediment deposition is primarily an episodic event (for instance up to 50,000 tons/yr during a large storm), a more realistic future maintenance plan that will consider scenarios other than average annual conditions is needed. It appears that considering only average annual conditions will not provide an adequate forecast to prepare the JPA or the District for what the project maintenance may entail.