Sediment Transport and Effects of Restoration Flows and Subsidence on Predicted Levee Capacities

Susan Cundiff, Chad Morris and Stuart Trabant
Tetra Tech Inc., Fort Collins, CO

Abstract. The San Joaquin River Restoration Program (SJRRP) was initiated to restore salmon runs to the San Joaquin River. One issue facing implementation of the restoration flows for the program is the impacts of subsidence on the levee capacities and the effects of subsidence on sedimentation. The study reach is located in the central valley of California in the reaches of the San Joaquin River identified as Reaches 2A, 2B, 3, 4A and the Bypass system. A sediment-transport study was conducted to help decision makers understand the potential need to reduce Restoration Flows or implement sediment removal projects in the "near-term" over the next 13 years prior to the implementation of the Reach 4B, Eastside Bypass, and Mariposa Bypass Channel and Structural Improvements Project (Reach 4B Project) due to the potential for reduced channel capacity. The study will also provide information for future studies of sedimentation and subsidence with alternatives of the Reach 4B Project.

HEC-RAS Mobile Bed Sediment Transport Model was used to simulate various hydrologic scenarios related to the restoration program with and without subsidence. Levee capacity analyses were then conducted using the predicted end of simulation model geometry to run steady state discharges through the system.

Overall, the results suggest that subsidence is the primary cause for the predicted reductions in capacity. In the case of Reach 4A, sediment transport associated with the rerouting of flows will not likely change capacities significantly beyond the impact of subsidence. In the Middle Eastside Bypass, sediment deposition is predicted to further reduce capacities beyond the impact of subsidence alone. Furthermore, assuming that subsidence is likely to continue to occur, and that the hydrology is likely to be somewhere between the Dry and Wet extremes that were evaluated, the results indicate that the capacity of Reach 4A is likely to decrease regardless of flow conditions (existing versus restoration).