Evaluation of Sedimentation and Erosion Trends in the Sacramento River near the M&T/Llano Seco Pump Station

James L. Woidt, Amanda L. Cox, and Christopher I. Thornton
Department of Civil and Environmental Engineering, Colorado State University

Abstract. Since the movement of the M&T/Llano Seco Pump Station and Fish Screening Facility from its previous location to a position downstream on the Sacramento River, changes in channel morphology have resulted in lateral migration of the west bank and formation of a large gravel bar that is migrating downstream and impairing pump function. A 1:100 Froude-scale physical model was constructed at the Colorado State University Hydraulics Laboratory to evaluate hydraulic conditions and long-term sedimentation patterns near the current pump intake location and two alternative relocation sites across a variety of discharges and river configurations. Mobile-bed sediment in the model was scaled based on an analysis of Shields parameter ratios, Rouse number ratios, and critical velocity ratios. Three channel configurations were modeled: existing channel conditions, current conditions with the inclusion of a gravel dredge material stockpile on the west bank, and realignment of a section of the east bank. Model results showed continued aggradation near the current M&T Pump intake if current conditions were not changed. Testing of the modeled gravel stockpile yielded negligible changes in hydraulic and sedimentation patterns. Straightening of the east bank of the river resulted in minor degradation near the current intake and aggradation in the vicinity of the upstream proposed pump alternative and the City of Chico Wastewater Outfall. Across all tests and discharges, the downstream proposed pump alternative remained the most stable, with negligible sedimentation and change in hydraulic conditions.