INTEGRATED RIVER MORPHOLOGY AND VEGETATION MODELING OF THE SACRAMENTO RIVER

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Abstract: Reclamation is considering altering water supply management in the Sacramento River Basin. Because the Sacramento River is integral to the aquatic and riparian habitat as well as to the water supply of California, it is necessary to understand the impact of alternative water supply management on the Sacramento River corridor. For this objective, the Mid-Pacific Region and the Technical Service Center of Reclamation are developing an integrated suite of predictive models that can be used to evaluate the effects of the proposed water supply management scenarios on the geomorphic conditions of the Sacramento River between Red Bluff and Colusa, California.

The models will include a watershed scale sediment budget and analysis tool called SIAM (Sediment Impact Analysis Model). It simulates the movement of sediment through a drainage network from source to outlet to assess the connectivity of sediment sources and sinks and so estimate the effect of sediment dynamics on channel morphology. Results identify areas of short and long term instability and provide information on the quantity and source of sediment loads in selected reaches of the fluvial system.

A one-dimensional sediment transport model called GSTAR-1D (Generalized Sediment Transport for Alluvial Rivers – One Dimension) will model the sediment transport and vertical channel changes at a reach scale. It will also simulate the river stage.

The migration process will be analyzed using analytical methods in conjunction with historical aerial photography. The detailed hydraulics and sediment transport in particular meander bends will also be analyzed using U2RANS (Unsteady and Unstructured Reynolds Averaged Navier-Stokes solver). It will be able to assess areas of scour and deposition in a bend.

Vegetation growth and survival will be simulated using results from an unsaturated flow model that tracks soil moisture content. It will use the river stage results from GSTAR-1D as a boundary condition. It will also account for the extensive groundwater pumping in the area.

The linked models will be used collaboratively to evaluate the benefits and impacts of proposed operational strategies including:

- Natural river processes (channel migration and point bar formation)
- Riparian vegetation establishment and survival
- Erosion and deposition processes on Tribal Trust Lands

The suite of models will be used to predict future geomorphic trends, including cottonwood recruitment, under various operational, hydrologic, and land use scenarios. The study will

evaluate the potential reasons that cottonwood recruitment has been successful at some locations, but not others, during specific years.

This poster will describe the conceptual models of river, groundwater and vegetative processes that occur on the Sacramento River. It will also describe data linkages between the models, and how output from each model will be used to support the impact analysis.