

## Executive Summary

We propose to use restored reaches of the Merced River to generate knowledge for the design of river restoration throughout the CALFED domain and elsewhere. This proposal is designed to quantify the linkages between biotic and abiotic processes, and the degree to which complex ecosystem structures can arise from initially simple restored environments and can continue to support an abundance of native species without continual intervention. We will initially focus on the 1.4 mile-long Robinson Reach of the Merced River (Figure 1), within a 4.5 mile-long reach rehabilitated in the Merced River Salmon Habitat Enhancement Project, managed by the California Department of Fish and Game (CDFG), the California Department of Water Resources (CDWR), the CALFED Bay Delta Program, the U.S Fish and Wildlife Service (USFWS), the U.S. Bureau of Reclamation (USBR), and the Robinson Cattle Company, which owns the land. The research has been designed by a team of specialists, who are challenged by the need to collaborate across their disciplines in generating scientific understanding for the purposes of river restoration, and whose expertise includes the main four components of the restored ecosystem: • channel and floodplain hydrology, hydraulics, sedimentation, geomorphology, project design and construction (Dunne and Faulkenberry) • invertebrate food organisms (Lenihan) • salmonid and other fish populations (Healey and Kendall) • riparian and floodplain plants (Davis)

The proposal involves intensive field surveys of hydraulics, sedimentation processes, channel change, habitat conditions, invertebrate and fish communities and their interactions. It will also involve field experiments, and construction of mathematical models to explore, link, and generalize the results. It will focus on the response of the ecosystem to variables that can realistically be manipulated in river restoration and for which better quantitative biological and physical information is needed in planning and design. Although the initial stages of the project will be conducted in the Robinson reach and immediately upstream and downstream, we hope to gradually expand our results in later years through comparative studies in other rivers restored and un-restored rivers in the region. The overarching questions to be addressed are: • How do abiotic and biotic processes in a restored, simplified channel-floodplain system interact to develop the conditions that favor a set of native and endangered species of plants and animals? • How can knowledge of these relationships be translated into successful river management? • Can the restoration of these physical processes create self-sustaining habitats that support an abundance of native species with only limited interventions by management agencies? Each component of the study re-states these general questions in terms appropriate for specific scientific investigation, and each component is tightly linked to the others with joint data collection exercises, data analyses and modeling efforts (e.g. concerning hydrodynamics, geomorphology, and invertebrate distributions; or hydrodynamics, geomorphology and fish use of the channel; or floodplain plant community assembly related to floodplain microtopography and sedimentation).

The scientific investigation is designed to provide information that is directly useful for restoration design and other river management. Some of the experiments planned will explore ways of accelerating the development of ecosystem structure that might be incorporated into future designs for river and floodplain restoration. The opportunity for experiments at this initially simple site, and for comparisons with more complex neighboring sites that have received other treatments or that remain un-restored will be pursued in cooperation with agencies as knowledge accumulates from this project.

The questions relate to the PSP study topics inquiring (i) about processes and their relationships to water management and key species, and (ii) about improving tools for performance assessment and for evaluating implications of future changes. The questions also address one of the fundamental concepts underpinning the CALFED Program, namely that restoration of physical processes is the best way to restore habitat for desirable populations of organisms [CALFED Strategic Plan, 2000].

Give additional comments, information, etc. here.

The project is a collaboration between personnel from the University of California Santa Barbara, the University of British Columbia, and the California Department of Water Resources.