

Demonstration Project to Test a New Interdisciplinary Approach to Rehabilitating Salmon Spawning Habitat in the Central Valley

Spring 2003

This was the third quarter of this CALFED project to demonstrate the utility of the Spawning Habitat Integrated Design Approach (SHIRA). During this quarter the project was in a preliminary planning phase for the 2003 enhancement site, a post-project assessment phase for the 2002 enhancement site, and a long-term monitoring phase for the 1999, 2000, and 2001 enhancement sites. The predominant activity performed in all of these phases this quarter was collaborative (EBMUD and UCD) biological, geomorphic, and hydrodynamic monitoring. Such monitoring included an egg tube study of fry production, an aquatic vegetation survey, bathymetric channel bed surveys, water surface elevation surveys, vertical velocity profiles, gravel transport rates, and bed scour rates. In addition, an adaptive management experiment was performed in which a pulse of 2000 cfs was released from Camanche Dam and the biological and geomorphic effects were studied.

Preliminary planning for the 2003 site involved an assessment of the goals for the gravel addition and spawning riffle rehabilitation planned for August 2003. Based on monitoring data collected in autumn 2002, including a longitudinal river bed and water surface profile from Camanche Dam down to the 2002 project site, as well as an 8-yr database of GPS'd redd distributions downstream of Camanche, it appeared that the limiting factor for expanding spawning habitat has been available slope to drive channel hydrodynamics. Thus, EBMUD and UCD decided that the best function for year's project would be to create a new, steeper bed slope and associated geomorphic and hydrodynamic functioning in the reach immediately downstream of the Camanche Dam fish screen. Preliminary project calculations for this site were made and pre-project work was started, including the establishment of a surveying control network, bathymetric surveying, and water level monitoring.

Post-project assessment of the 2002 site was continued this quarter using the SHIRA Scientific Exploration Mode. Three scientific experiments were underway beyond the normal monitoring program. In the first experiment 15,000 painted tracer rocks were tracked with a total station to assess scour and sediment transport in relation to different hydrodynamic patterns. In the second experiment, more vertical velocity profiles were measured throughout the 2002 enhancement area to address several different questions reported in the previous report. In the third experiment, sediment transport and bed scour were monitored using Bunte bedload traps (prototype on loan from Kristin Bunte of Colorado State University), Electronic Scour Monitors (on loan from Paul Devries of R2 Resource Consultants), and Conventional Scour Monitors (on loan from Paul Devries of R2 Resource Consultants). Data from all of these studies were analyzed and are still undergoing further analysis and interpretation.

Long-term monitoring of the 1999, 2000, 2001, and 2002 sites was performed including a suite of biological monitoring (EBMUD), hydrodynamic monitoring (UCD), and geomorphic monitoring (EBMUD and UCD). As part of the long term monitoring, an adaptive management flood pulse experiment was performed. All project reaches were re-surveyed for topography before and after each event. Stage-discharge rating curves were monitoring using automated

water level recorders for 2 of the 4 sites. Vegetation scour was monitored throughout the lower Mokelumne River. Sediment transport conditions were monitored for the 2002 site. Data from that event are presently being monitored.

Significant outreach efforts were made this quarter. Presentations were made this quarter to the UC Davis Hydrologic Sciences Graduate Group and Philip Williams Associates, Inc. To test SHIRA beyond the Mokelumne River, a proposal was written, accepted, and contracted to use the method on the Trinity River below Lewiston Dam. Preliminary planning for the Trinity has commenced and pre-project data collection will be performed July-Sept 2003. Similarly, a proposal was made to apply SHIRA on the Yuba River and this is currently under review. We were invited to and participated in a technical strategy session on sediment management for the Trinity River.

Two manuscripts explaining SHIRA and illustrating scientific hypothesis testing under the SHIRA framework were submitted for scientific peer review to the journal Aquatic Conservation. A third manuscript describing the results of the fry production egg tube study is in preparation. A detailed SHIRA web site describes the methodology, including movies of computer simulations, field data, adaptive management strategies, and procedural flow charts. The URL is http://lawr.ucdavis.edu/faculty/gpast/shira/shira_contents.htm. This will serve as a one-stop source of information for anyone interested in making their rehabilitation projects objectively based.

This quarter Joe Wheaton completed his MS thesis at UC Davis on the development of SHIRA. The thesis is available upon request. Joe is the second MS student to complete a degree through this joint EBMUD-UCD collaboration on salmon spawning. Two new students- Eve Elkins and Rocko Brown- will begin working on the Mokelumne and Trinity SHIRA projects this summer. Eve will focus on enhancing the biological monitoring and integrated biological-geomorphic analysis components of SHIRA. Rocko will focus on enhancing the sediment transport monitoring and analysis components of SHIRA.

Through an on-going adaptive management process, SHIRA is now in its 5th generation.