

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

Winter 2004

This was the sixth quarter of this CALFED project to demonstrate the utility of the Spawning Habitat Integrated Design Approach (SHIRA). In the previous quarter, SHIRA was used for site-specific assessment of project outcome for the 2003 site, adaptive assessment of SHIRA as a rehabilitation framework, and new SHIRA-based projects on the Yuba and Trinity Rivers. Following on that work, this quarter was spent performing data analysis, writing up findings, and presenting information to the public and partner groups. The two primary papers explaining the SHIRA framework went to press this quarter in the journal *International Journal of River basin management*.

There were two foci of data analysis this quarter. The first topic of interest was developing, testing, and evaluating tools for use in preparing a gravel-augmentation sediment budget for the Lower Mokelumne River. We have been using theoretical equations, our own DEM differencing analyses, and historical cross-section re-surveys to evaluate how much gravel is needed to maintain the available habitat. A manuscript based on this work is now in preparation. The second topic of interest has been developing, testing, and evaluating new tools for the assessment and incorporation of habitat heterogeneity in river rehabilitation projects. To better understand this issue we have been working on two aspects. The first has been to use GIS proximity measures to assess spawning utilization of heterogeneity features. This has resulted in the submission of a manuscript for a peer review conference proceeding for the 5th International Symposium on Ecohydraulics taking place in Madrid, Spain, where we will also be giving an oral presentation on our work. A key finding from that work has been that the increased heterogeneity for the 2002 pilot SHIRA site was highly effective in terms of redd utilization—with 70 redds located in close proximity to 93% of the available structural cover, and 42 redds located in close proximity to 90% of the available shear zone refugia. The second aspect of habitat heterogeneity that we have been studying is the larger scale distribution of redds throughout the lower Mokelumne and how the distribution is related to flow conditions. We have now undertaken to import our data into ArcGIS for a complete array of spatial analyses of physical habitat conditions in relation to our geomorphic and hydraulic research. A presentation on the 2003 SHIRA demonstration project was given at the Salmon Restoration Federation conference in Davis, CA.

An important consequence of the first year of this project was that it led to the adoption of SHIRA for use on the Trinity River below Lewiston Dam and on the Yuba River below Englebright Dam. On the Trinity River, a baseline pre-project study has been performed and 4 alternative river rehabilitation scenarios are being developed for potential implementation summer 2004. During this quarter a presentation about SHIRA as applied on the Trinity River was given to an audience of government agencies, interest groups and research contractors. In comparison to the Mokelumne River application of SHIRA, that for the Trinity River involves a significantly bigger reach, biological assessment of multiple fish species and life stages, and assessment of a wider range of flows. On the Yuba River, a baseline study is underway and in this case the emphasis is on large-scale sediment transport and channel change. During this quarter, 29170 sediment tracers weighing a total of 858 kg were prepared for use in the Yuba River. Also, a stage recorder was installed at one of the baseline study sites. Each of these three

rivers- Mokelumne, Trinity, and Yuba- is representative of a broad class of conditions found in California, and together they provide a comprehensive check on the utility of SHIRA for regulated rivers in the state.