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*Mark Gard*

From: Mark Gard, Sacramento Fish and Wildlife Office

Subject: Monitoring Of Restoration Projects In Merced River Annual Report

Attached for your information is a copy of the second annual report for the U.S. Fish and Wildlife Service's Merced River Restoration Project Investigations. During the past year, we completed field work and started modeling work on fall-run chinook salmon juvenile rearing and spawning habitat modeling sites on the Merced River. Restoration activities are scheduled to take place in summer 2002 after which time data will again be collected at each of the modeling sites. These data will be used to evaluate whether the restoration activities are successful at increasing the quality and quantity of chinook salmon rearing and spawning habitat in the Merced River.

If you have any comments or questions about the attached report or our investigations, please feel free to contact me at (916) 414-6588.

Attachment

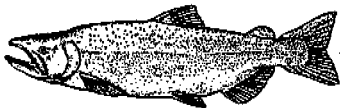
**MONITORING OF RESTORATION PROJECTS  
IN THE MERCED RIVER, CALIFORNIA**

**Annual Progress Report  
Fiscal Year 2001**

U.S. Fish and Wildlife Service  
Sacramento Fish and Wildlife Office  
Room W-2605  
2800 Cottage Way  
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Prepared by staff of  
The Energy Planning and Instream Flow Branch



## **PREFACE**

The following is the second annual progress report prepared as part of the Merced River Restoration Project Monitoring Investigations, a three year effort which began in August 2000. Funding has been provided under the Anadromous Fish Restoration Program of the Central Valley Project Improvement Act, P.L. 102-575, for channel restoration of the Merced River to provide spawning, incubation, and rearing habitat for fall-run chinook salmon. The purpose of this investigation is to evaluate the success of these restoration activities.

The fieldwork described herein was conducted by Jennifer Bain, Ed Ballard, Peter Epanchin, Mark Gard and Jerry Hatler.

Written comments or questions about this report or these investigations should be submitted to:

**Mark Gard, Senior Fish and Wildlife Biologist  
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## **Introduction**

The decline of fall-run chinook salmon in the Merced River over the last decade is attributed to many factors including habitat degradation. The existing habitat appears inadequate for either spawning or rearing. Funding has been provided under the Anadromous Fish Restoration Program of the Central Valley Project Improvement Act, P.L. 102-575, for channel restoration of the Merced River to provide spawning, incubation, and rearing habitat for fall-run chinook salmon. The study described herein involves the use of the Service's Instream Flow Incremental Methodology to compare total weighted usable area of salmonid habitat before and after channel restoration utilizing 2-D modeling. The Merced River Study is a four year effort to be completed in two phases (pre-restoration and post-restoration) by 2003, depending on the schedule of restoration construction.

The restoration reach is approximately one and a half miles long and is located at River Mile 42-43.5, approximately ten miles downstream of Crocker-Huffman Dam.

## **Habitat Mapping**

The entire restoration reach was habitat-typed on January 30 and March 21, 2001. The habitat types used were run, pool, glide, low gradient riffle, high gradient riffle, sheet flow and gravel pit. During the habitat typing, the distribution of habitat types in the four study sites was mapped. The habitat mapping will be used to extrapolate the results from the four study sites to the entire restoration reach.

## **Hydraulic and Structural Data Collection**

### ***Chinook salmon spawning and rearing habitat***

Hydraulic and structural data collection for the pre-restoration phase, which began in August 2000, was completed in October 2000.

The collection of water surface elevations was completed in FY-2001, with the collection of water surface elevations at three flow levels (approximately 500, 800, and 1,000 cfs) at all four sites. Velocity sets were collected at all four sites in FY-2001 at a discharge of approximately 500 cfs, while wading with a wading rod equipped with a Marsh-McBirney<sup>R</sup> Model 2000 velocity meter or a Price AA velocity meter equipped with a current meter digitizer. In addition, discharges were measured at three of the four study sites at a discharge of approximately 800 cfs.

To validate the velocities predicted by the 2-D model within a study site, depth, velocity, substrate and cover measurements were collected at representative points by wading with a wading rod equipped with a Marsh-McBirney<sup>R</sup> Model 2000 velocity meter or a Price AA velocity meter equipped with a current meter digitizer. The horizontal locations and bed elevations of each representative point were

measured using a total station. A minimum of 50 representative points were measured per site. The collection of validation velocities was completed in FY-2001 with the collection of validation velocities at one remaining site.

Hydraulic and structural data will be collected in the same manner after the completion of restoration activities which are scheduled for the summer of 2002.

### **Biological Validation Data Collection**

Surveys for fall-run chinook salmon redds were conducted in all four study sites on November 13, 2000 in order to collect depth, velocity, and substrate data to be used for validating the combined chinook salmon spawning habitat suitability that will be determined by the 2-D models. Redds were located on foot and all active redds (those not covered by periphyton growth) within a given site were measured. Horizontal location data for all redds observed were recorded using a total station. Only five redds were observed.

Snorkel surveys for fall-run chinook salmon juveniles were conducted in all four sites on January 31-February 1, 2001. All four sites were surveyed for a second time on March 19-20, 2001. Depth, velocity, adjacent velocity, and cover data were collected at each location where juveniles were observed. Approximate numbers of juveniles by size class for each observation were also recorded. Horizontal location data for all observations were recorded using a total station. This data will be used for validating the combined habitat suitability for rearing juvenile chinook salmon that will be determined by the 2-D models. A total of 57 observations of juveniles were made in the four sites during the two snorkel surveys.

### **Hydraulic Model Construction and Calibration**

All data for the spawning and juvenile habitat sites have been compiled and checked, and PHABSIM data decks, hydraulic calibration and final 2-D modeling files for the pre-restoration work will be completed for all sites by March 2002. After post-restoration data collection in fall 2002, 2-D modeling files will be developed again and a final report evaluating the success of restoration activities in providing more spawning and rearing habitat for salmon will be completed by May 2003.

### **Habitat Suitability Criteria (HSC) Development**

HSC data will not be collected during this study. HSC previously developed on the Merced River for spawning and on other streams for rearing will be used to predict the amount of spawning and rearing habitat present over a range of discharges in the restoration site prior to and after restoration actions.