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CHAPTER 1

Introduction

Actions associated with the Vernalis Adaptive Management Plan (VAMP) were implemented between April 15 and May 15, 2004 to protect juvenile Chinook salmon and evaluate the relationship between San Joaquin River flow and State Water Project (SWP) and federal Central Valley Project (CVP) water project exports, with the HORB, on the survival of marked juvenile Chinook salmon migrating through the Sacramento–San Joaquin Delta. Studies conducted in 2004, represent the fifth year of the VAMP experiment. Results from previous VAMP experiments are available in San Joaquin River Agreement Technical Report and San Joaquin River Group Authority, Technical Reports dated 2000, 2001, 2002, and 2003. Similar experiments were conducted prior to the official implementation of VAMP with results available in South Delta Temporary Barriers Annual Reports (DWR 2001 and DWR 1998). This report will describe the experimental design of VAMP, the hydrologic planning and implementation, the additional water supply arrangements and deliveries, the Head of Old River Barrier (HORB) design, installation, operation and fisheries monitoring, the salmon smolt survival investigation and complimentary studies related to VAMP. Conclusions and recommendations for future VAMP studies are also included.

EXPERIMENTAL DESIGN ELEMENTS

The VAMP experimental design measures salmon smolt survival through the Delta under six different combinations of flow and export rates. The experimental design includes two mark-recapture studies performed each year during the mid-April to mid-May juvenile salmon outmigration period that provide estimates of salmon survival under each set of conditions. During

2004, the reduced number of juvenile Chinook salmon produced at the Merced River Fish Facility limited the VAMP survival studies to one set of releases. Chinook salmon survival indices under the experimental conditions are calculated based on the number of marked salmon released and the number recaptured. Absolute survival estimates and combined differential recovery rates are also calculated and used in relationships between survival and San Joaquin River flow and CVP and SWP exports.

The VAMP 2004 experimental design included both multiple release locations (Durham Ferry, Mossdale, and Jersey Point), and multiple recapture locations (Antioch, Chipps Island, SWP and CVP salvage operations, and in the ocean fisheries; Figure 1-1). One release was made during the 2004 VAMP study at Durham Ferry, Mossdale, and Jersey Point as a consequence of the limited number of juvenile salmon available from the MRFF. The use of data from multiple release and recapture locations allows for a more thorough evaluation of juvenile Chinook salmon survival as compared to recapture data from only one sampling location and/or one release location. The VAMP coded-wire tag (CWT) releases (Durham Ferry, Mossdale, and Jersey Point) and recapture locations (Antioch and Chipps Island) are consistent from one year to the next, providing a greater opportunity to assess salmon smolt survival over the range of Vernalis flows, SWP/CVP exports, and with and without the presence of the Head of Old River Barrier (HORB). The recovery of marked fish at both Antioch and Chipps Island also improves the precision associated with the individual survival estimates, and improves confidence in detecting differences in salmon smolt survival as a function of Vernalis flows and SWP/CVP exports. Releases at Jersey Point serve as controls for recaptures at Antioch and Chipps Island, thereby allowing the calculation of survival estimates based on the ratio of survival indices from marked salmon recaptured from upstream (e.g., Durham Ferry

and Mossdale) and downstream (control release at Jersey Point) releases. The combined differential recovery rates are calculated in a similar manner. The use of ratio estimates as part of the VAMP study design factors out the potential differential gear efficiency at Antioch and Chipps Island within and among years.

A quality assurance/quality control program has been used as a routine part of VAMP tests, and includes quantifying the number of marked fish successfully clipped and tagged. Coordination with the local landowner to curtail operation of an agricultural diversion pump located immediately downstream

of Durham Ferry, coincident with the Durham Ferry release was continued in 2004. In addition, the 2004 VAMP program continued use of the net pen studies and physiological testing to assess overall condition and health of marked fish used in VAMP experiments. Improvements were also made in 2004 relative to measuring flow in the San Joaquin River downstream of the confluence with Old River. But additional improvements are needed before measurements of San Joaquin River flow downstream of the HORB are used to evaluate the relationship between San Joaquin River flow and juvenile Chinook salmon survival.

FIGURE 1-1
Sacramento–San Joaquin Estuary



*Location of VAMP 2004
Release Sites*