

Chapter 1

Introduction

Actions associated with the Vernalis Adaptive Management Plan (VAMP) were implemented between May 1 and May 31, 2006 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 on the survival of marked juvenile Chinook salmon migrating through the Sacramento – San Joaquin Delta. Initially the Delta Smelt workgroup recommended not installing the HORB but as the planning progressed the HORB could not be installed for the 2006 VAMP period due to high river flows. The VAMP period was postponed 15 days from previous years in an effort to maintain stable flows and to allow for maturation of the experimental fish. The water districts attempted to maintain stable flow in accordance with the SJRA throughout the May study period, however ongoing flood control activities limited the effort. Studies conducted in 2006, represent the seventh year of the VAMP experiment. Results from previous VAMP experiments are available in San Joaquin River Agreement Technical Reports, for each respective year.  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, fishery monitoring within the San Joaquin River and Old River in the absence of the Head of Old River Barrier (HORB), 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 April-May juvenile salmon outmigration period that provide estimates of salmon survival under each set of conditions. During 2006, a total of 200,000 juvenile Chinook salmon were made available from the Merced River Hatchery (MRH) annual production for the VAMP survival studies. 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 (CDRR) are also calculated with the CDRR's used in relationships between survival and San Joaquin River flow and CVP and SWP exports.

As described the SJRA and VAMP is an experimental/management program designed to protect juvenile Chinook salmon migrating from the San Joaquin River while at the same time conducting a scientific experiment to determine how salmon survival changes in response to alterations in San Joaquin River flows, SWP/CVP export rates, and the installation of the HORB. 2006 resulted in flow conditions that would not allow the HORB to be installed and made Vernalis flows difficult to control. The SJRA recognizes there

may be years when the existing flow would be greater than 7,000 cfs, the HORB could not be in place due to high flows, and it may not be possible to maintain a constant flow rate at Vernalis. In such events of high flows the Technical Committee will develop an alternate plan pursuant to which those studies would be conducted under the SJRA as a VAMP experiment. This annual technical report describes the flow and HORB conditions encountered in 2006, the alternative experimental plan, and the findings.

With the high Vernalis flows and lack of the HORB the SJRA technical committee took advantage of these conditions in recommending two distinct levels of SWP/CVP export rates between the first and second release of test fish. A change in the export rate between the first and second half of the VAMP pulse period provided for the collection of survival estimates under two export/flow ratios without the HORB.

Due to a decline of the delta smelt population in the Bay-Delta estuary the delta Smelt workgroup recommended the HORB not be installed in 2006. Ultimately high flows in the San Joaquin River prohibited installation of the barrier. The 2006 VAMP experimental design included both multiple release locations (Mosssdale, Dos Reis and Jersey Point), and multiple recapture locations (Antioch, Chipps Island, SWP and CVP salvage operations, and in the ocean fisheries; Figure 1-1, Inside Front Cover). Since the barrier was not installed Dos Reis was selected as an alternate



release site immediately downstream of the HOR. The absence of the HORB in 2006 provided the opportunity to conduct Kodiak Trawls in both the San Joaquin River and Old River near the vicinity of the Head of Old River. Data from these fishery surveys has been used to assess the movement of juvenile Chinook salmon from the San Joaquin River (e.g., released upstream of Old River at Mossdale) into Old River when the HORB is not installed.

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 (Mossdale, Dos Reis and Jersey Point) and recapture locations (Antioch and Chipps Island, SWP and CVP salvage) are consistent with some previous years, 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 HORB. The recovery of marked fish in the ocean fishery also greatly 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. The survival estimates prior to 2004 used in this report have been calculated based on recoveries at all three locations (Antioch, Chipps Island, and the ocean fishery). Releases at Jersey Point serve as controls for

recaptures at Antioch, Chipps Island and the ocean fishery, thereby allowing the calculation of survival estimates based on the ratio of recovery rates from marked salmon recaptured from upstream (e.g., Mossdale and Dos Reis) and downstream (control release at Jersey Point) releases. The use of ratio estimates as part of the VAMP study design factors out the potential differential gear efficiency at Antioch and Chipps Island and ocean survival from ocean recoveries within and among years.

During the 2006 VAMP period an Acoustic Telemetry pilot study was conducted to evaluate the viability of using acoustic tagged fish and acoustic receivers to track San Joaquin River smolts. A total of 100 fish from the MRH were released at Mossdale and Dos Reis over the VAMP period. Five acoustic receivers located along the lower San Joaquin River, Old River, and in south Delta channels were used to track smolt movement throughout the south Delta.

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. In addition, the 2006 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 2006 relative to measuring flow in the San Joaquin River downstream of the confluence with Old River.