

CHAPTER 7 | CONCLUSIONS AND RECOMMENDATIONS

The 2002 VAMP experimental investigation of juvenile Chinook salmon survival, implemented during spring 2002, represents the third year under the SWRCB D-1641. The Vernalis target flow was 3200 cfs, with SWP and CVP export flow of 1500 cfs. The HORB was successfully installed and maintained throughout the VAMP test period. Estimates of juvenile Chinook salmon smolt survival were calculated based upon releases of CWT juvenile salmon produced in the Merced River Hatchery and released at Durham Ferry, Mossdale, and Jersey Point.

Marked salmon were subsequently recaptured in sampling at the HORB, SWP and CVP export facility salvage, and through intensive fishery sampling at Antioch and Chipps Island. Based upon the data and experience gained during the VAMP 2002 investigations, conclusions and recommendations have been developed, as summarized in Table 7-1. The conclusions and recommendations include both technical and policy/management issues that will affect the design and implementation of VAMP 2003 operations and investigations.

TABLE 7-1

Summary of VAMP 2002 Conclusions and Recommendations

CONCLUSIONS	RECOMMENDATIONS
Real-time flow data at Vernalis were improved by weekly flow measurements. 2002 funding provided by CALFED grant.	Continue weekly flow measurements. Investigate alternative flow measurement methods and/or locations. Obtain additional funding for USGS weekly Vernalis gage verification.
Estimation of ungaged flows (accretions, depletions) at Vernalis was improved.	Continue hydrology investigation to improve predictions of ungaged flows.
Disagreement over forecasting New Melones releases impacted planning for tributary flows and related operations.	Hydrology and/or management committee should resolve forecasting issues prior to 2003 VAMP and a set of written procedures for operational planning within each tributary should be established.
Coordination with upstream tributary operations was successful.	Continue coordination among tributary operators.
Maintenance frequency of the HORB was increased.	Continue frequent maintenance of HORB culverts.
HORB construction continued after barrier closure causing debris (rock) problems for fishery sampling after closure of HORB.	Delay CWT releases for five days after HORB closure to allow time for gravel to be flushed from the culverts.
Operation of the HORB was successful in maintaining south delta water levels.	Continue to refine operational criteria for culverts.
Closure of HORB is dependent on completion of other barriers. Construction of multiple barriers in south delta channels may delay HORB closure.	Schedule construction to avoid delay in HORB installation and closure.
An estimate of the flow through HORB culverts needs to be taken so that a continuous record of flow through the culverts can be reported.	Take flow measurements within each culvert and/or install water stage recorders upstream and downstream of the barrier.
HORB did not cause seepage impacts on upper Roberts Island.	Continue seepage monitoring.

CONCLUSIONS CONTINUED	RECOMMENDATIONS CONTINUED
The use of fyke nets was successful in collecting entrained fish at the culverts.	Continue monitoring culverts using fyke nets to document fish entrainment.
A larger number of CWT salmon than expected were collected at HORB.	Increase effort and budget for CWT processing.
The index of salmon entrainment at HORB was substantially higher in 2002 compared to 2001.	Continue barrier monitoring and analysis of factors affecting entrainment.
2002 studies were successful in determining salmon entrainment at HORB culverts, but did not estimate mortality associated with HORB.	Evaluate methods to estimate mortality associated with HORB
CWT loss rate remained similar to 2001 at a rate of about 9.5 percent with a range between 0.5 and 15.0 percent.	Continue CWT quality control to improve retention rates.
The release at Durham Ferry was improved by having the diversion pump at the site curtail operation.	Continue to curtail diversion pump operations during releases – coordinate release schedule with landowner.
Water temperatures were suitable during both sets of releases.	Avoid seasonal delays in barrier installation and survival testing to allow releases when most suitable water temperatures.
Results of net pen studies showed high survival of test fish.	Continue net pen studies and fish health inspections.
Physiological studies provided useful information on fish health and condition and indicated all test fish were healthy.	Re-evaluate physiological tests and modify protocol prior to 2003 VAMP to document fish health and condition within hatchery and at time of release.
Using current statistical methods, differences in survival rates among flows and export rates tested in 2000, 2001, and 2002 were not found to be statistically significant.	Continue to evaluate alternative statistical methods to assess differences in survival rates between release locations, flows, and export conditions.
Differences in survival from Durham Ferry in 2002 were not significantly different from 2000 or 2001. It appears greater differences in flow and export rate may be needed to detect differences in survival.	Conduct survival testing at VAMP flow and export extremes when water is available to do so. Recommend testing at 7,000 cfs flow and 1,500 cfs exports to determine survival under higher flow:export ratio.
San Joaquin River flow downstream of HORB is important to evaluating salmon survival.	Measure the flow in the San Joaquin River downstream of head of Old River.
Complimentary studies to evaluate mechanisms affecting survival of fish from tributaries and across the Delta were conducted .	Encourage an expansion of complementary studies to provide additional information on factors and mechanisms affecting salmon survival.
Relatively few CWT salmon from VAMP releases were recovered at the SWP and CVP salvage facilities.	Continue salvage monitoring to document direct losses at SWP/CVP export facilities.
Estimates of salmon survival rates under flow and export conditions tested in 2000, 2001, and 2002 have not been found to be significantly different. The VAMP program provides improved protection for juvenile salmon when compared to “pre-VAMP” conditions.	Continue VAMP test program. Further tests, over a wider range of flow and export conditions, are needed to evaluate the respective roles of San Joaquin River flow and SWP/CVP exports on juvenile Chinook salmon smolt survival.

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