Chapter 7
Conclusions and Recommendations

The 2006 VAMP was implemented without the installation of the HORB due to high flow conditions described in Chapter 2. The start of the VAMP pulse flow period was delayed until May 1, with a resulting average flow between May 1 and May 31 of 26,020 cfs. Exports were separated in two rates of 1,559 cfs and 5,748 cfs for the period May 3 -17 and May 18 – June 2. Flow monitoring was conducted in the San Joaquin River downstream of the HOR and in the Old River. Kodiak trawling was again conducted in Old River in 2006, and compared with the regularly conducted sampling on the San Joaquin River at Mossdale. Estimates of juvenile Chinook salmon smolt survival were calculated based upon recoveries of CWT juvenile salmon produced in the MRH and released at Mossdale, Dos Reis, and Jersey Point. Marked salmon were recaptured in sampling at Mossdale, in Old River, at the SWP and CVP fish facilities, and at Antioch and Chipps Island. Based upon the data and experience gained during the VAMP 2006 investigations, conclusions and recommendations have been developed, and summarized in Table 7-1. The conclusions and recommendations include both technical and policy/ management issues that will affect the implementation of future VAMP operations and investigations.

Smolt survival in 2006 was low as it has been the past three years. There were greater flows in 2006 then in 2005 and we would have anticipated survival should have improved. Survival in 2006 for the first group releases (at low exports) was somewhat better than in 2005 although the second group released in 2006 (at high exports) was lower than in 2005 and more similar to that observed in 2003. The relationship of salmon survival to San Joaquin River flow has shown that survival increases as flows increase, with the HORB in place. This relationship is statistically significant when recovery from all available sources (Antioch, Chipps Island, and ocean fishery) are combined. The relationships are more variable comparing survival to flow without the HORB especially when including data from 2005 and 2006. Relationships of flow to adult escapement 2 1/2 years later, indicates these relationships are likely real and that survival is improved as flows and flows relative to exports increase.

The role of exports has been difficult to identify. During the 2006 test two distinct export rates were evaluated to collect more useful data. The role of exports will not be established with the HORB until at least two VAMP targets of 7,000 cfs flow with a HORB are obtained so that survival can be measured with exports at 1,500 and 3,000 cfs. The VAMP program provides increased flows at a wide range of flow and likely increases the survival of unmarked juvenile salmon migrating through the Delta during the VAMP period.

Table 7-1
Summary of VAMP 2006 conclusions and recommendations

CONCLUSIONS	RECOMMENDATIONS FOR 2007
Observed ungaged flows (accretions, depletions) between upstream measurement points and Vernalis varied significantly from those forecasted resulting in differences in forecasted and required supplemental flows.	Hydrology committee to continue refining estimates of ungaged flow and develop a management scheme to accommodate variability.
The flow data collected in 2006 at San Joaquin River near Lathrop and the Old River at Head provided useful information on the flow split at the Head of Old River	The 2005 and 2006 flow data should be compared against DWR-DSM2 modeling results. Continue to calibrate the stage and flow monitoring at the San Joaquin River near Lathrop station.
Short-term survival (48-hours post-transport) was high (99.9%) indicating that handling, transport, and release likely had no affect on short-term smolt survival.	Continue net pen studies and fish health inspections.
Some test fish obtained from Chipps Island Trawl to detect the presence of PKD were improperly fixed.	Recommend additional training of staff or different process for fixing of tissues used to detect presence of PKD.
The number of CWT salmon from Mossdale releases recovered at the SWP and CVP salvage facilities were much less than in prior years when there was no HORB.	Continue salvage monitoring to document direct losses at SWP/CVP export facilities.
VAMP has been designed to adaptively change within a few weeks, the VAMP test period each year	Continue to identify opportunities when it would be beneficial to delay the VAMP period to stabilize VAMP test conditions and to increase protection for juvenile Chinook salmon outmigrating from the San Joaquin basin.
Survival from Mossdale and Dos Reis in 2006 was lower with higher exports without the HORB installed.	It is anticipated that due to the decline in delta smelt the HORB will not be installed in the future. Continue to measure survival when there is no HORB to compare to past years and to better understand the role of flow and exports on survival without the HORB in place. The VAMP tests should be continued.
Further evaluation of survival rate versus export rate is needed. The VAMP is limited by lack of data at the target conditions of 7000 cfs flow with a HORB with exports at 1500 or 3000 cfs.	Evaluate the possibility of amending the San Joaquin River Agreement to achieve needed test conditions of 7000 cfs flow with a HORB at exports of 1500 or 3000 cfs. Prescribing target conditions will allow the most critical data to be obtained quickly so that the role of exports can be identified in the most efficient manner.
HOR Kodiak trawl, when the HORB is not installed, is an important component to understanding the distribution of out migrating salmon in the southern Delta.	Implement the HOR trawl during the spring out migration when the HORB is not installed.
Mossdale Kodiak trawl is an important component in determining distribution of juvenile salmon out migration from the San Joaquin basin.	Maintain the Mossdale Kodiak trawl at existing or higher level of effort throughout year.
During 2006 two CWT lots were mixed at MRH resulting in the need to correct release numbers to estimate survival.	Merced River Hatchery should safeguard against the mixing of CWT lots.
An Acoustic Telemetry pilot study was conducted in 2006 to determine the suitability to track the movement of out migrating salmon in the Lower San Joaquin River and southern Delta.	Implement a full-scale Acoustic Telemetry study to better understand the movement and survival of out migrating salmon from the San Joaquin River basin.
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.