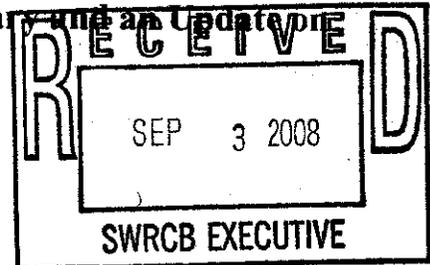


## United States Department of the Interior

### Comments Regarding the California State Water Resources Control Board's Notice of Public Workshops for the San Joaquin River Flow Objectives for the San Francisco/Sacramento-San Joaquin Delta Estuary and an Update on Southern Delta Salinity

*September 3, 2008*



#### **I. Introduction**

The United States Department of the Interior (Interior) on behalf of the Bureau of Reclamation (Reclamation) and the Fish and Wildlife Service (Service) is pleased to participate in the State Water Resources Control Board (SWRCB or the Board) workshops regarding the San Joaquin River Flow Objectives for the San Francisco/Sacramento-San Joaquin Delta Estuary and southern Delta salinity. With the impending end of the San Joaquin River Agreement (SJRA), also comes the end of the Reclamation agreement to "backstop" San Joaquin River flow objectives at Vernalis, in lieu of the Board assigning responsibility to all water users of the San Joaquin and its tributaries. However, as evidence mounts regarding declining fisheries, Interior is committed to assisting the Board with resolving San Joaquin River flow issues, especially with how those flows impact the San Francisco/Sacramento-San Joaquin Delta Estuary (Delta) and San Joaquin River fisheries.

For the September 17, 2008, workshop, Interior provides the written comments below regarding the two items for discussion as set forth in the August 11, 2008 Notice of Public Workshops:

- 1) Background and information regarding the Department of Fish and Game (DFG) San Joaquin River Salmon Escapement Model.
- 2) Background and information regarding the Vernalis Adaptive Management Plan (VAMP) study, including the upcoming peer review.

In addition, Interior submits the additional written comments below in order to assist the Board with focusing the scope of subsequent workshops relating to the San Joaquin River flow objectives. Interior will also be supplementing these written comments with oral presentations at the September 17, 2008 workshop.

#### **II. Salmon Escapement Model**

The Service has been working with the California Department of Fish and Game (CDFG), National Marine Fisheries Service (NMFS) and other partners and stakeholders to implement the Anadromous Fish Restoration Program (AFRP) in an attempt to restore and

double salmonid abundance in Central Valley rivers and streams, including the San Joaquin River Basin tributaries (e.g. the Stanislaus, Tuolumne, and Merced rivers). The Service commends the CDFG and recognizes the level of effort expended to analyze the biological and hydrological information available from these tributaries and develop a fall-run Chinook salmon model that would be available to help all the interested parties improve our understanding of the role of spring flows in the lower San Joaquin River and its tributaries and the survival of juvenile salmon through the Delta, and the number of Chinook salmon returning to those tributaries to spawn in the fall. We hope that the San Joaquin Basin salmon model could be seen as part of an ongoing adaptive management process. Consequently, the Service will review and evaluate the salmon model and coordinate with CDFG on further model refinements that may be necessary.

At the time of these comments, the salmon model was not yet made available to Interior and, therefore, Interior has not yet begun a formal evaluation of the model.

### **III. Vernalis Adaptive Management Plan (VAMP) Study**

When the Board contemplates how to implement current or future San Joaquin flow objectives, one source of information available to the Board is the data generated from implementation of the VAMP. VAMP was agreed to as an element of the SJRA in 1999, by essentially the same parties. VAMP was developed to gather better scientific information on the lower San Joaquin River, including information on the relative effects of flows in the San Joaquin River, CVP and SWP export operations, and operation of a fish barrier at the head of Old River on the survival and passage of salmon smolts through the Delta. The Service has been working with the VAMP Technical Team to collect and analyze the data generated by VAMP implementation, and is facilitating the peer review effort described below.

The Service is working with other interested parties to finalize the VAMP peer review process and the peer review panel's scope of work which includes the panel's charge and questions for the panel to address.

A Draft VAMP Summary Report is being developed to provide background on the VAMP and to assist the peer review panel. The final version of the outline for the summary report was agreed to by the VAMP Biology sub-group in May. Contributions to the summary report have been made by individuals within the VAMP Technical Group: Mike Archer, MBK Engineers; Bruce Herbold, US Environmental Protection Agency; Pat Brandes, US Fish and Wildlife Service; and Andrea Fuller, FISHBIO. Our goal is to have the summary report reviewed and finalized soon, with the goal of completing the peer review prior to the November 5<sup>th</sup> SWRCB workshop. We will give an update of our progress on September 17<sup>th</sup>, and again on November 5<sup>th</sup>.

Attached is a summary of modeling completed by Dr. Ken Newman of the Service, using the VAMP and previous south Delta coded wire tag studies (Attachment 1). Dr. Newman conducted the modeling under a CALFED Science grant that incorporated reviewing four juvenile salmon survival studies in the Delta. VAMP was one of the four studies reviewed. The completed CALFED report dated March 31, 2008 is available on CALFED's website. As part of

the project, Dr. Newman fit Bayesian Hierarchical Models (BHM) to data from the VAMP and earlier south Delta studies. The benefits of the BHMs are that the modeling framework explicitly accounts for sampling and between release pair variation. Although the BHMs do not definitively explain what affects juvenile salmon survival through the Delta, Dr. Newman has identified some "robust" conclusions, most of which were consistent with conclusions from previous analyses. Dr. Newman plans to evaluate other approaches to determining the "best" model and submit a manuscript to a peer-reviewed journal within the next year.

#### **IV. Subsequent Workshops**

As stated above, at the end of the SJRA, Reclamation will no longer agree to "backstop" the San Joaquin River flow objectives for all water users. As the Board contemplates implementation of the current and any future amended flow objectives, Interior believes that the Board should consider declining fisheries as well as the inter-relationships between Vernalis flow objectives and other beneficial uses of the San Joaquin, as well as the interior Delta.

##### **A. Fisheries**

Despite the efforts of the VAMP parties, San Joaquin salmonid populations have experienced significant reductions during the 2000 - 2007 period. The Service remains very concerned about the continued decline of the San Joaquin basin fall--run Chinook salmon. In-river adult salmon escapement into the three main San Joaquin tributaries (Stanislaus, Tuolumne, and Merced rivers) has precipitously declined since the fall of 2000, when an estimated 37,500 adult Chinook salmon returned to spawn. Last year (fall of 2007) fewer than 1,000 adult Chinook salmon returned, which represents a reduction of over 97% in the last seven years. While the Service recognizes that ocean conditions have likely been a factor in the reduction of 2007 spawners, ongoing long-term studies on Chinook salmon survival indicate that lower instream flow conditions in the San Joaquin River system seems to be related to the lower number of adult salmon that return to spawn, 2 ½ years later. However, as set forth below, an accurate analysis of the available water supplies of the San Joaquin River Basin must be accomplished. We hope CDFG's salmon model and the VAMP peer review will contribute to our further understanding of these factors.

Interior will be providing additional information to the Board at the September 17, 2008 workshop, including the attached power point presentation regarding the San Joaquin Basin Chinook salmon decline. (Attachment 2).

##### **B. Other Seasonal and Beneficial Use Considerations**

The management of flow in the lower San Joaquin River at Vernalis is an important consideration for both fishery and agricultural (salinity) beneficial uses. The current flow objectives at Vernalis include a base flow for fishery habitat quality (winter and spring), pulse flows for outmigration of salmon (spring), and a pulse flow for attraction (fall). Salinity

objectives at Vernalis include both non-irrigation season salinity dilution (fall and winter) and irrigation season salinity dilution (spring and summer).

The collective beneficial use objectives encompass year-round flow management considerations at Vernalis, and inherent tradeoffs with other beneficial use considerations. The seasonal distribution of these objectives affects other beneficial use considerations, including: 1) south Delta salinity (year round); 2) dissolved oxygen (summer and fall); 3) general delta outflow contribution from the San Joaquin; and 4) export water quality. In addition, the more that stored water is relied upon to meet the collective flow objectives, the less stored water is available for future consumptive use purposes and drought protection.

Other significant lower San Joaquin River beneficial use considerations include water levels or stage issues needed for south Delta water users in order to access irrigation water. In addition, water levels or stage issues at Vernalis are an important factor to water circulation patterns of the south Delta barrier program management for water level protection and salinity management. The stage and salinity conditions at Vernalis are yet other considerations in the overall management strategy for the lower San Joaquin River.

The current collective flow objectives at Vernalis were established without an accurate analysis of the available water supplies of the San Joaquin River basin. Because the Board adopted the current flow based objectives at Vernalis without an accurate analysis of the water availability in the San Joaquin basin, unknown amounts of stored water reserves are necessary to meet the collective beneficial use objectives. This is true despite the Board's belief that Reclamation can draw upon other sources of water in the Basin to meet the objectives. This uncertain water availability has resulted in flow based objectives that cannot be consistently met in certain hydrologic circumstances, and poses a risk to future supplies.

Reclamation has sought temporary urgency change orders from the Board in all years from 2002-2005, in order to get reasonable flexibility in implementing the Vernalis Base Flow objectives due to the uncertainty of continuing dry conditions. As predicted by Reclamation, and acknowledged by the Board in its environmental analysis of D-1641, the Vernalis Base Flow objectives and the southern Delta agricultural objectives, as well as water stage conditions cannot be met in certain circumstances without significant risk to future water supplies in the San Joaquin basin, including stored water, to meet all the potential future flow based beneficial use objectives in all hydrologic conditions. Inherently, stored water supplies are a key reasonable beneficial use tradeoff consideration for many beneficial use considerations during extended drought periods.

Future management of lower San Joaquin River flows at Vernalis, especially if the lower San Joaquin is managed for the benefit of both Fishery and Delta agriculture objectives, needs to take into account an accurate water analysis and water budget for the San Joaquin basin, and needs to consider the seasonal timing of each beneficial use general water demand. Under the current objectives, Fishery and Delta agriculture objectives compete for scarce and potentially limited water resources. Reasonable, achievable, and flexible or adaptive objectives are important for meaningful and measurable improvements to the fishery objectives in the San Joaquin. The Board's previous stance that the objectives can and will be met by Reclamation

from any water source is not a reasonable or responsible Board plan, especially with the impending end of the SJRA. In addition, it places Reclamation in the position of determining how to best utilize waters of the State in the public interest, and making beneficial use tradeoffs. These determinations are a State Board duty, not a federal duty. In addition, it places Reclamation in the position of seeking relief from rigid objectives that the Board knows cannot be met in all hydrologic circumstances.

For future workshops, Interior recommends that the Board's first order of business should be to determine an accurate water budget for the lower San Joaquin. For future management of the lower San Joaquin, the Board should consider the following questions:

- 1) What is an accurate water budget for the lower San Joaquin?
- 2) What is an appropriate baseline set of beneficial use assumptions to compare management alternatives for the lower San Joaquin?
- 3) How should beneficial use tradeoffs be assessed?
- 4) How much stored water should be relied upon to meet objectives?
- 5) How should drought protection be assessed for beneficial use objectives, and what is the appropriate drought risk for stored water?

Interior believes that if the Board considers the above questions in detail, the Board should arrive at a more reasonable approach to meeting a set of collective beneficial use flow objectives that are adaptable to real-time fishery conditions, and to available water supply conditions.

Interior will be providing additional information to the Board at the September 17, 2008 workshop, including the attached power point presentation regarding water supply management of the lower San Joaquin. (Attachment 3).

## V. SJRA

The SJRA was entered into by Reclamation and the Service in 1999 as a result of negotiations with the California Department of Water Resources (DWR), fishery agencies and various San Joaquin River interests (the San Joaquin River Group Authority). The SJRA expires on December 31, 2009. Interior agencies have been evaluating several alternatives available to all parties after the expiration of the Agreement at the end of 2009. In particular we have been considering ways by which we and other parties could continue to provide Target Flows at Vernalis during the Pulse Flow Period through 2011.

By executing the original SJRA in 1999, the Parties to the agreement have relieved the Board of its obligation to apportion responsibility for meeting the flow standards at Vernalis to other users in the San Joaquin Basin. However, due to water supply availability issues, as well as financial considerations, Interior cannot continue to relieve the Board of its obligation to apportion responsibility for an indefinite period into the future. Since 1999, approximately \$67 million federal and state dollars have been spent under the SJRA (approximately \$55 million in federal and \$12 million state dollars). (Attachment 4).

However, Interior is willing to meet and confer with the other parties to the SJRA about the possibility of extending the SJRA and VAMP for a two year period so as to provide the target Vernalis flows through 2011. If the agreement is extended, we would urge the Board to use the two years to collect sufficient data and information to accurately understand the hydrology, fishery needs, water supply availability and other dynamics of the San Joaquin Basin in order to adopt and implement appropriate flow standards for the San Joaquin River. The end result of such analysis, in our view, would be to put the Board in a position where it could adopt, implement and enforce a workable plan for apportioning responsibility for flow standards on the San Joaquin River among all basin water users and diverters.

## **VI. Conclusion**

Interior looks forward to participating in the Board's September 17, 2008 San Joaquin workshop, as well as subsequent workshops held by the Board regarding important lower San Joaquin/south Delta issues. Our goal is to provide the Board with meaningful information regarding Interior's knowledge and experience with managing water supplies and studying fishery needs in the lower San Joaquin River, its tributaries, and the south Delta. Although the SJRA is coming to an end, Interior remains committed to assisting the Board with better future regulation and management of the beneficial uses of the San Joaquin/south Delta, as these resources are critical to the State of California and the Nation.

# **ATTACHMENT 1**

## Attachment 1

Summary of the VAMP portion of modeling  
contained within the Calfed Science report entitled:

"An evaluation of four Sacramento-San Joaquin River Delta juvenile salmon survival studies" by Dr. Ken B. Newman, dated March 31, 2008

(1) **General approach** : A statistical analysis of recoveries from 35 pairs, or groupings, of CWT'd juvenile salmon releases in the San Joaquin River and the Delta, spanning 22 years, was carried out. The analysis procedure was a multi-level or hierarchical model which accounted for sampling variation and between-group environmental variation. The middle level of the model included reach-specific models for survival, where each reach's survival could depend on different covariates (independent variables).

(2) **Peer review** : An interim draft report on the model was peer-reviewed by 3 individuals, a fisheries scientist (David Hankin) and two statisticians (Bryan Manly, Russell Millar). Many changes were made as a result of suggestions from the reviewers.

(3) **Model Selection incomplete** : Several different covariates were tried and different measures of model quality were examined. However, the model selection procedures are not completely satisfying and more will be done for a manuscript that will be submitted for publication in a peer reviewed publication. I received a couple helpful suggestions along these lines at the Int'l Biometrics Conference, where this work was presented in July.

(4) **Conclusions to-date** :

(a) The predicted survival in Old River was consistently lower than the predicted survival for fish that stayed in the San Joaquin River. Thus, assuming that HORB is effective at keeping outmigrating juveniles from entering Old River, the HORB increases survival.

(b) Increases in flow between Dos Reis and Jersey Point are associated with increases in predicted survival in that reach.

(c) There was no strong evidence that export levels were associated with changes in survival probabilities.

(d) The variation in apparent survival between groups released under quite similar conditions (namely, flows, HORB position, and exports) can be huge. For example, the 2006 releases had apparently low survival despite quite high flows. But, according to the model, survival should be relatively high. Thus, there are other factors at play that we have not identified.

(5) **Recommendation:**

(a) continue model selection analyses for the CWT data.

(b) continue refining the use of acoustic tags so as to better determine the actual migration paths and reach-specific survival probabilities under a wide range of flows and export levels.

# **ATTACHMENT 2**



## Status of San Joaquin Basin Fall-run Chinook

- Interior is concerned about the continued decline of San Joaquin Basin fall-run Chinook salmon.
- In-river adult escapement into the three main San Joaquin tributaries (Stanislaus, Tuolumne, and Merced Rivers) has declined since 2000 when an estimated 37,500 adult Chinook returned to spawn.
- Last year (fall 2007) fewer than 1,000 adult Chinook salmon returned, which represents a 97% decrease in the last seven years.
- While the Service recognizes that ocean conditions have likely been a factor in the 2007 decline, ongoing long-term studies indicate that lower instream flows in the San Joaquin system are related to low numbers of adult salmon returning to spawn 2 ½ years later.

DRAFT 03-13-08

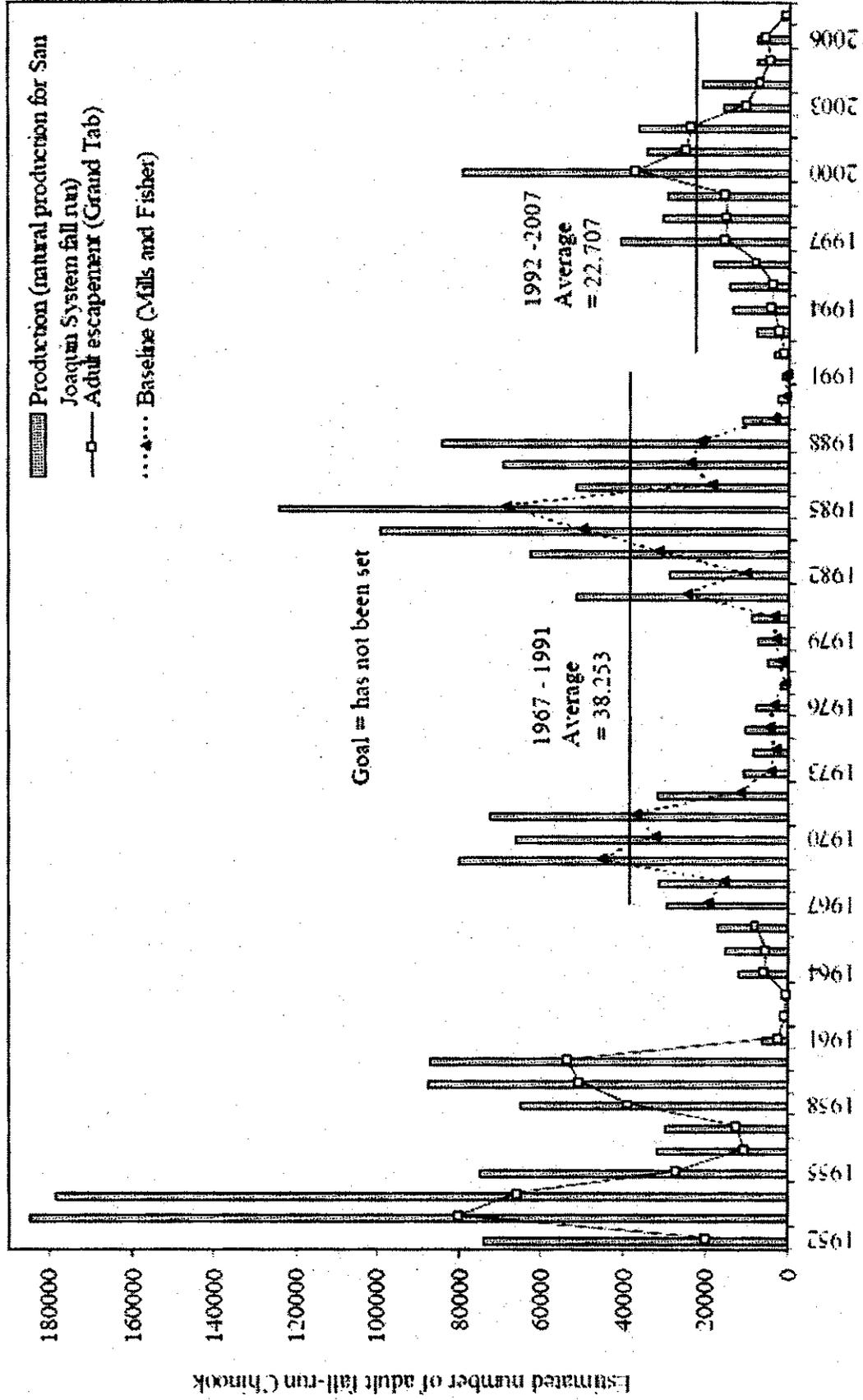


Figure 37. Estimated yearly natural production, and in river escapements of San Joaquin System adult fall-run Chinook salmon. The San Joaquin System is the sum of the Stanislaus, Tuolumne, and Merced Rivers, 1952 - 1966, and 1992 - 2006 numbers

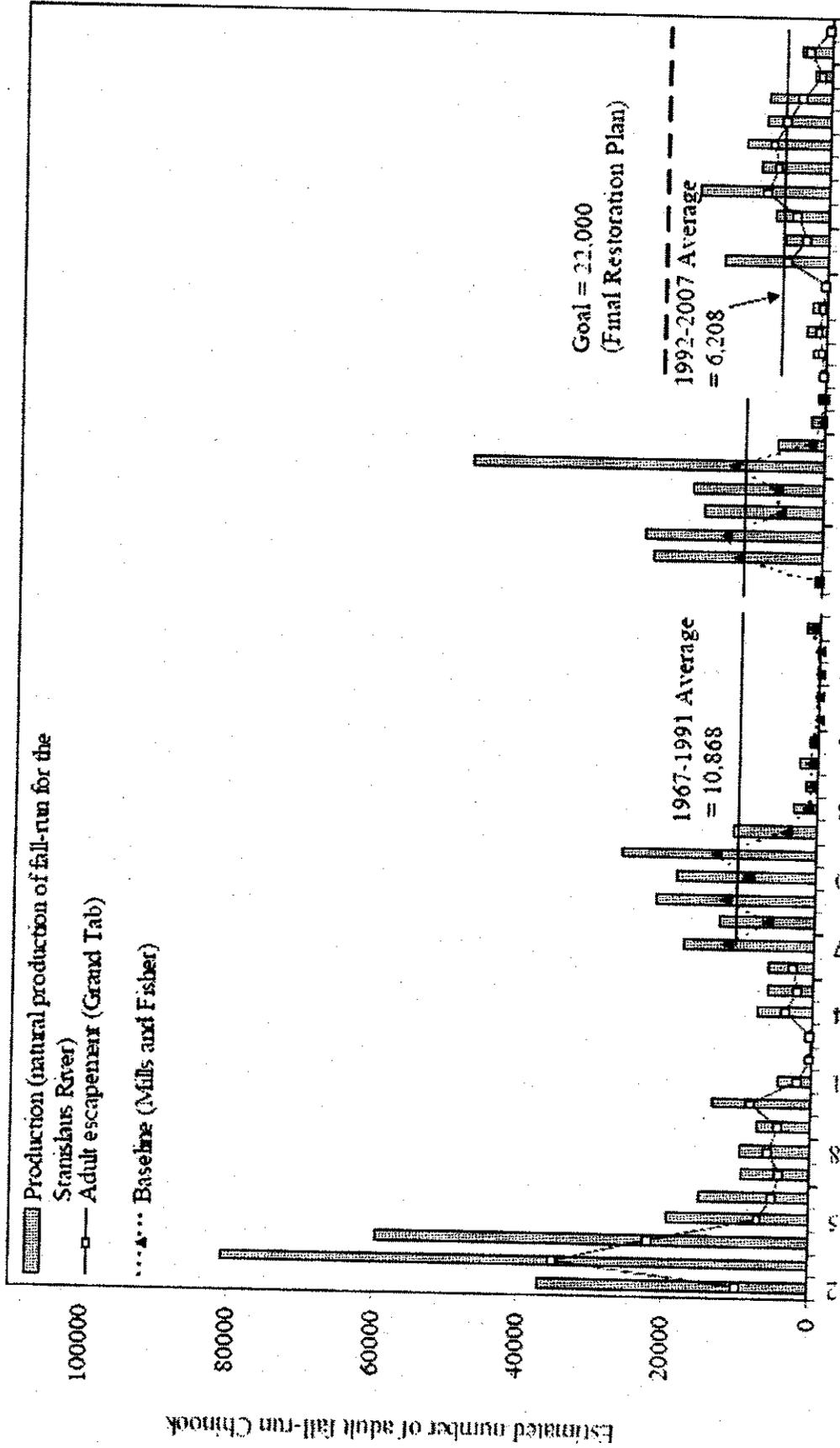


Figure 34. Estimated yearly natural production, and in river escapements of Stanislaus River adult fall-run Chinook salmon. 1952 - 1966, and 1992 - 2007 numbers are from CDFG Grand Tab (March 1, 2008). Baseline numbers (1967 - 1991) are from Mills and Fisher (CDFG, 1994). □ = data was not available for 1982.

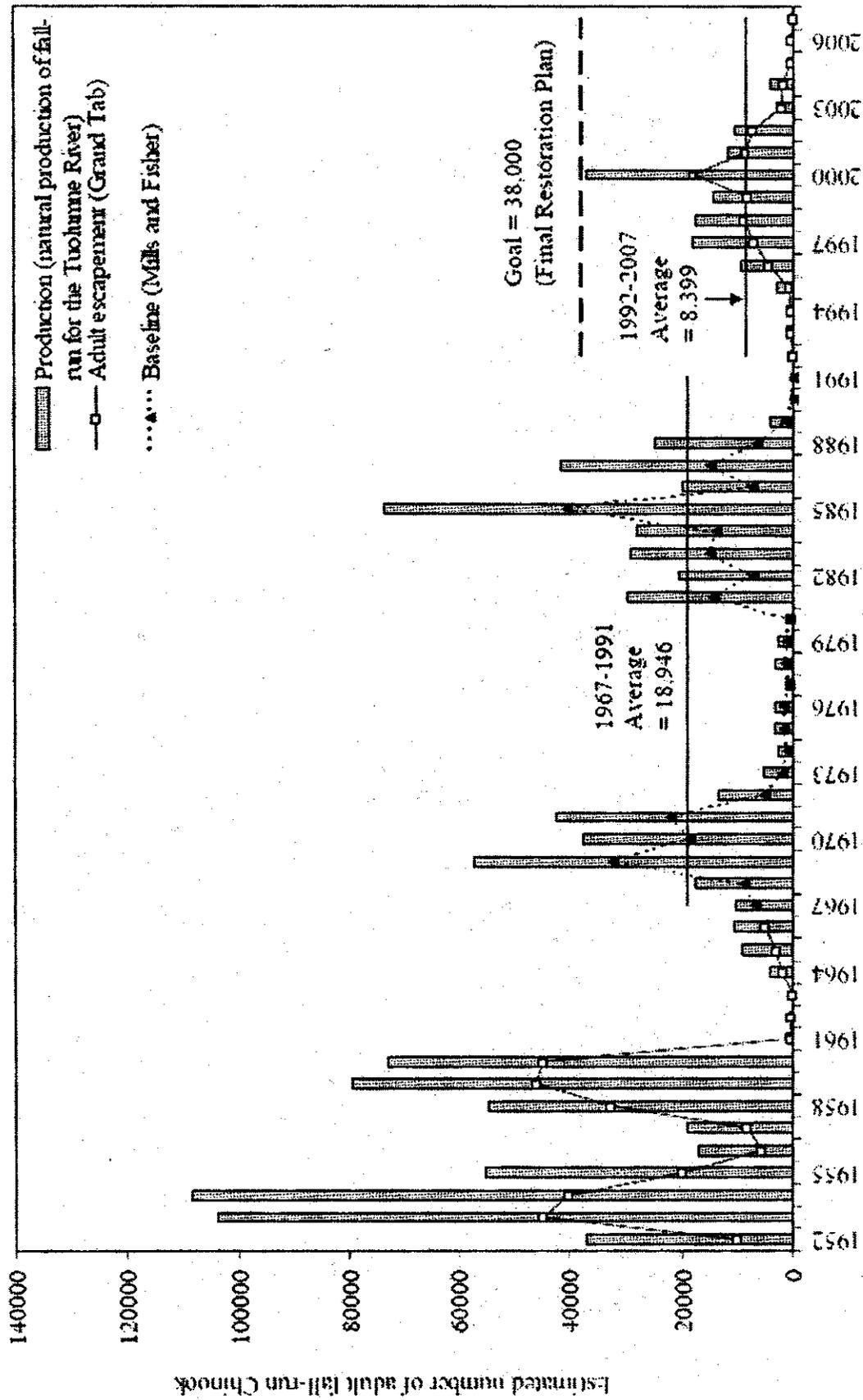


Figure 35. Estimated yearly natural production, and in river escapements of Tuolumne River adult fall-run Chinook salmon, 1952 - 1966, and 1992 - 2007 numbers are from CDFG Grand Tab (March 1, 2008). Baseline numbers (1967 - 1991) are from Mills and Fisher (CDFG, 1994).

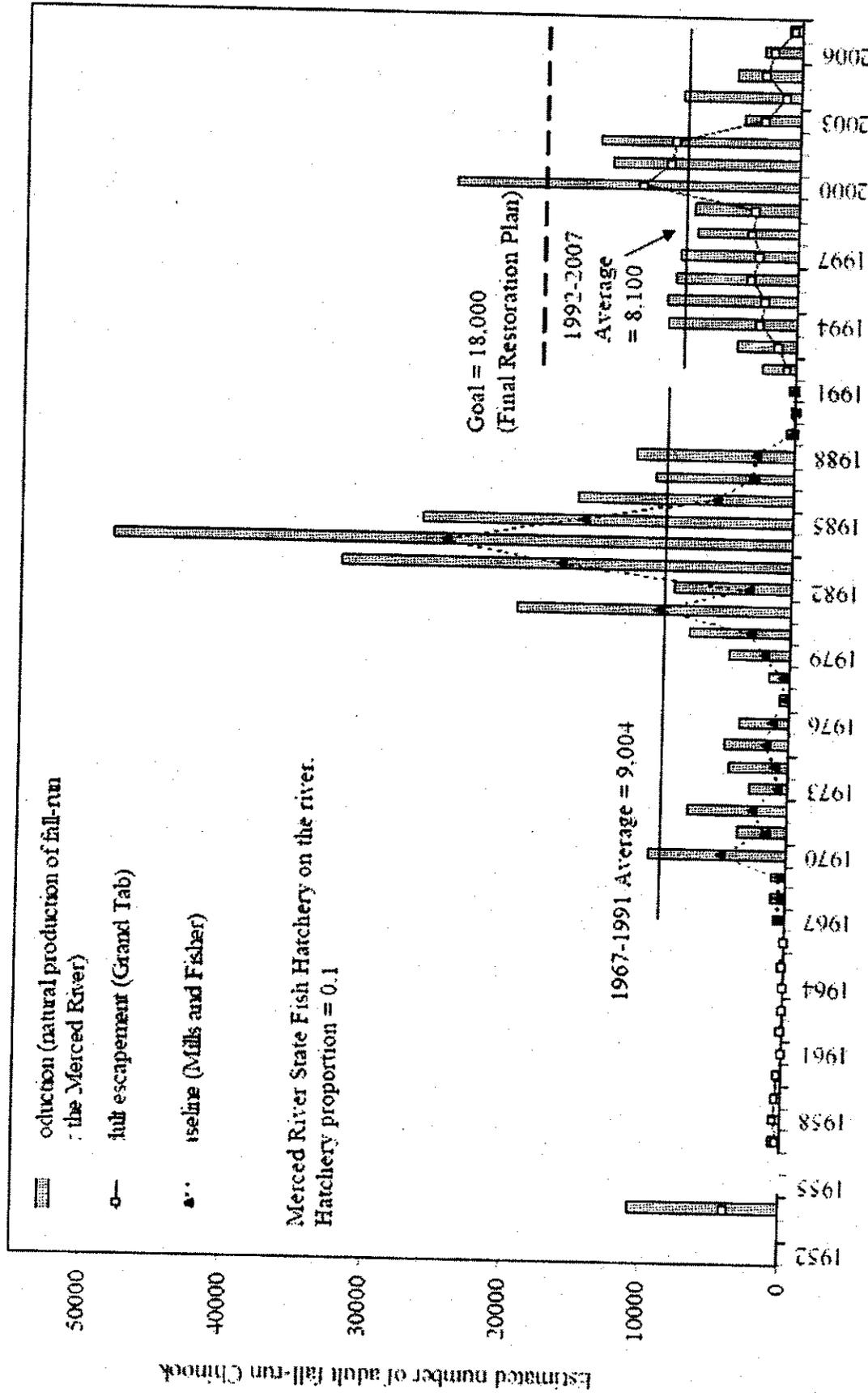
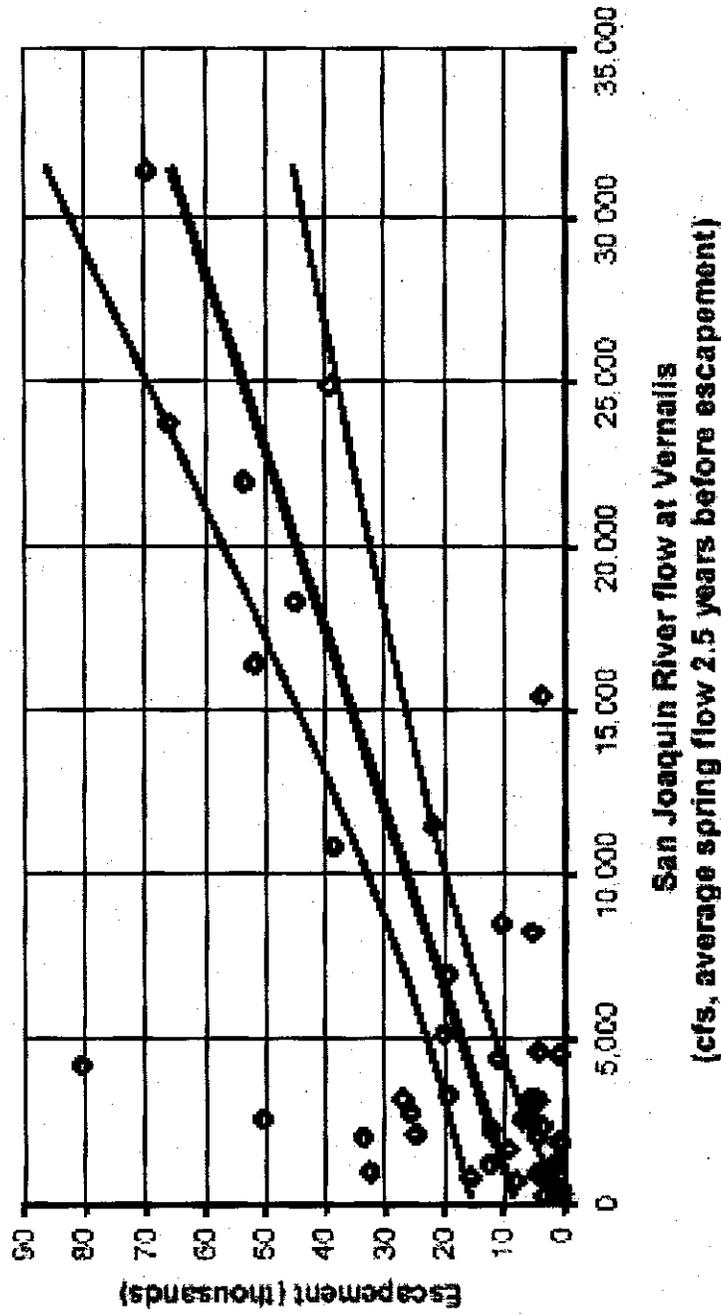


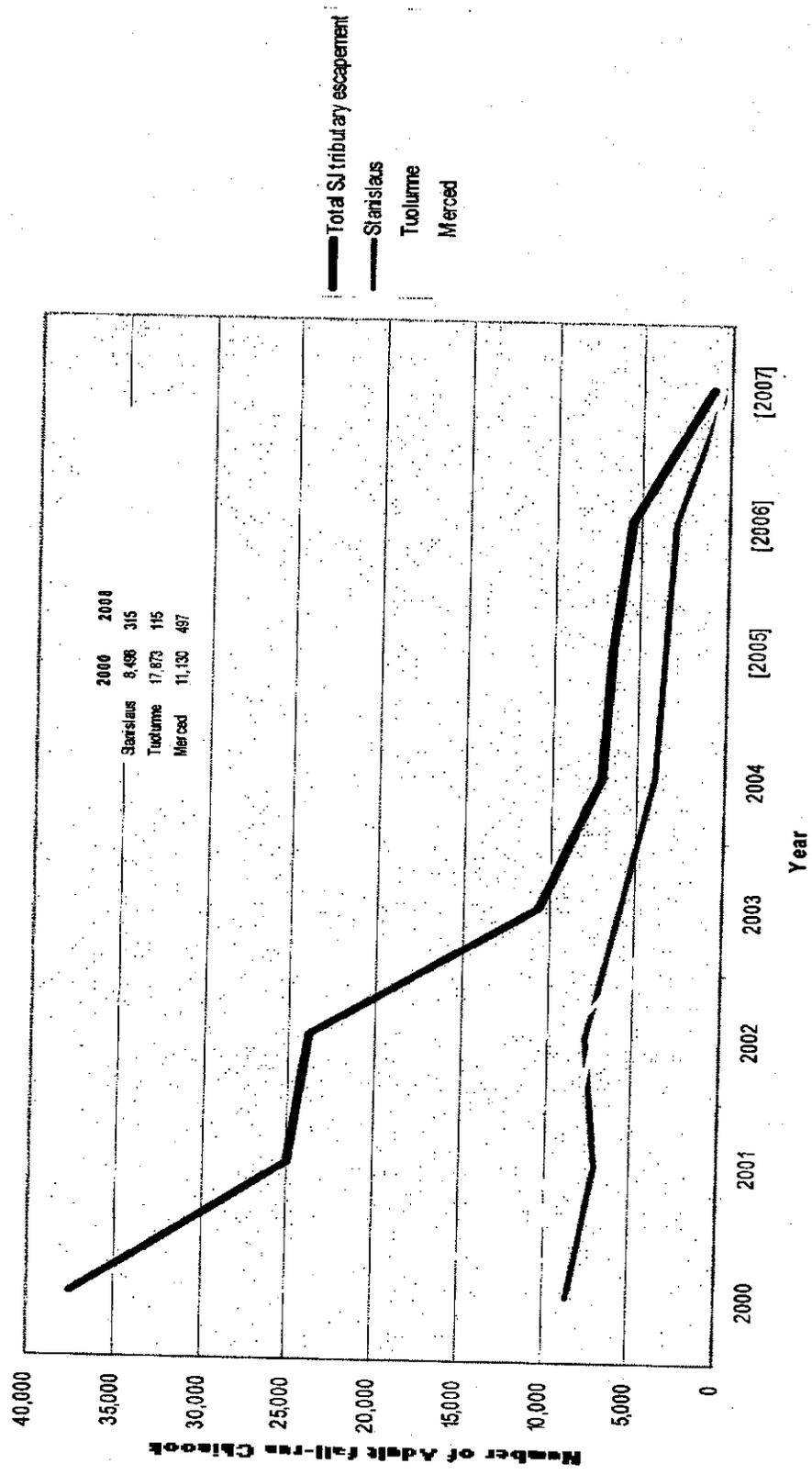
Figure 36. Estimated yearly natural production, and in river escapements of Merced River adult fall-run Chinook salmon, 1952 - 1966, and 1992 - 2007 numbers are from CDFG Grand Tab (March 1, 2008). □ = data was not available for 1952 - 1953, and 1955 - 1956. Baseline numbers (1967 - 1991) are from Mills and Fisher (CDFG, 1994).

# Survival of Chinook salmon smolts in the Sacramento-San Joaquin Delta and Pacific Ocean. Baker and Morhardt, 2001.



# San Joaquin Fall-run Escapement (in-river)

(data from draft GrandTab 03-01-08)



# **ATTACHMENT 3**

# **San Joaquin Basin Water Budget and Analysis Issues**

**DWR PLANNING SIMULATION MODEL (DWRSIM) ASSUMPTIONS FOR  
SWRCB STUDY WITH MAY 1995 WQCP DELTA STANDARDS  
(FLOW ALTERNATIVE 3) 1995C6F-SWRCB-506**

Study 469 (Joint POD Alternative 3) assumptions are modified in accordance with the SWRCB Revised Modeling Request dated April 5, 1997. The Central Valley Project and the State Water Project are operated to achieve full compliance with all objectives in the 1995 Bay-Delta Plan.

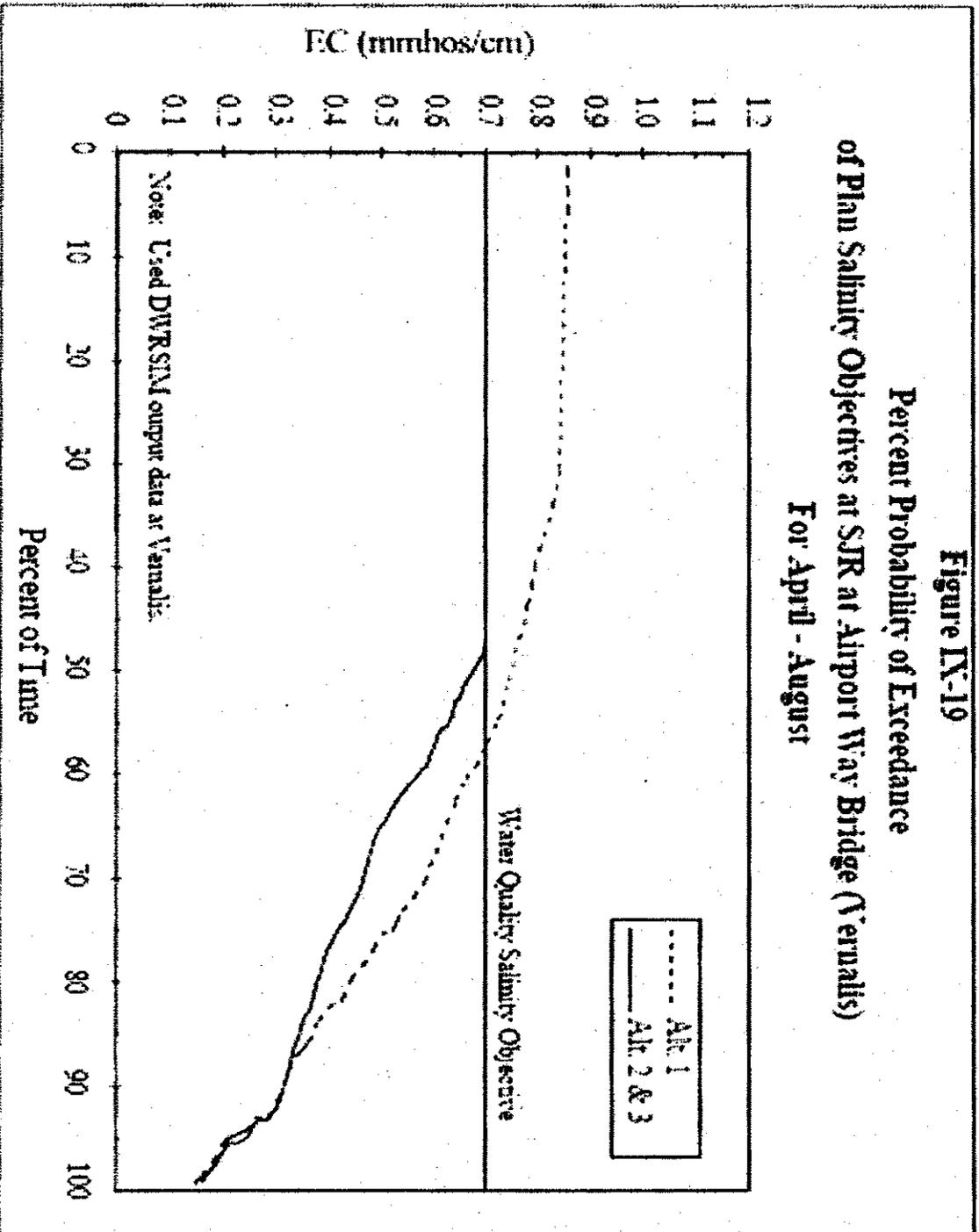
1. San Joaquin River flow is modified with revised releases from New Melones, Don Pedro, Lake McClure, Eastman Lake and Hensley Lake as per Table No's 1 to 5 for Alternative 3, provided in the Request. These quantities of water must be released at these reservoirs and conveyed to Vernalis and the Delta.
2. San Joaquin River flow is modified by holding back monthly quantities of water which are not cleared in the San Joaquin Basin as a result of curtailment of direct diversion as per Table No's 10 to 15 for Alternative 3, provided in the Request. The values in these tables are subtracted from actual diversions at the indicated Control Points. If the values in these tables exceeded the modeled diversions, the modeled diversions are set to Zero.
3. If the additional water provided upstream of the Stanislaus is insufficient to meet the SWRCB's May 1995 Water Quality Control Plan flow objectives at Vernalis, additional releases are made from New Melones Reservoir.
4. If years when New Melones Reservoir approaches its minimum storage of 80 TAF, additional water is not provided to meet salinity requirements and violations are possible.

Alternative 3 - Supplemental Water for Vernalis Objective (Add(3)) (TAF)

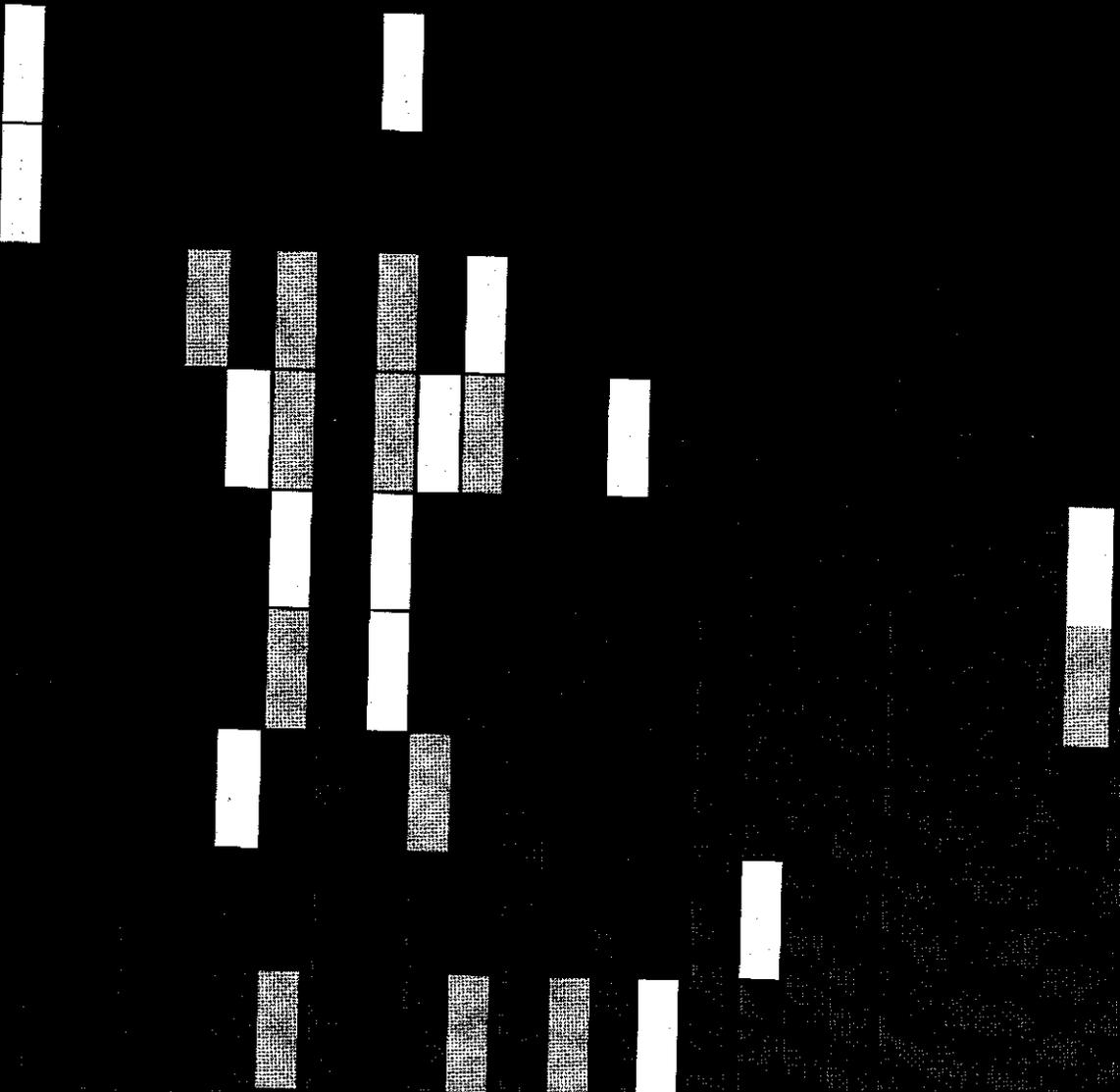
Add Water from Don Perry and Lake McClure (C2 677 Downstream Flow) + New Melones Release for Vernalis Pulse and X2 Flow

YEAR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
1922	0	0	0	0	0	0	29	102	0	0	0	0	143
1923	0	0	0	0	0	52	52	108	0	0	0	0	213
1924	0	0	0	0	0	0	18	43	0	0	0	0	61
1925	27	0	0	0	0	0	23	70	0	0	0	0	120
1926	27	0	0	0	0	32	54	88	2	0	0	0	189
1927	27	0	0	0	0	0	24	113	92	0	0	0	254
1928	0	0	0	0	0	0	39	91	2	0	0	0	132
1929	27	0	0	0	0	0	0	23	0	0	0	0	50
1930	27	0	0	0	0	0	15	26	0	0	0	0	62
1931	0	0	0	0	0	0	23	45	0	0	0	0	68
1932	0	0	0	0	0	0	0	68	32	0	0	0	100
1933	0	0	0	0	0	0	31	57	23	0	0	0	111
1934	27	0	0	0	0	0	10	42	0	0	0	0	79
1935	27	0	0	0	0	0	0	0	0	0	0	0	27
1936	0	0	0	0	0	0	0	49	13	0	0	0	62
1937	0	0	0	0	0	0	0	0	0	0	0	0	0
1938	0	0	0	0	0	0	0	0	0	0	0	0	0
1939	0	0	0	0	0	0	0	45	12	0	0	0	57

Figure IX-19  
Percent Probability of Exceedance  
of Plan Salinity Objectives at SJR at Airport Way Bridge (Vernalis)  
For April - August



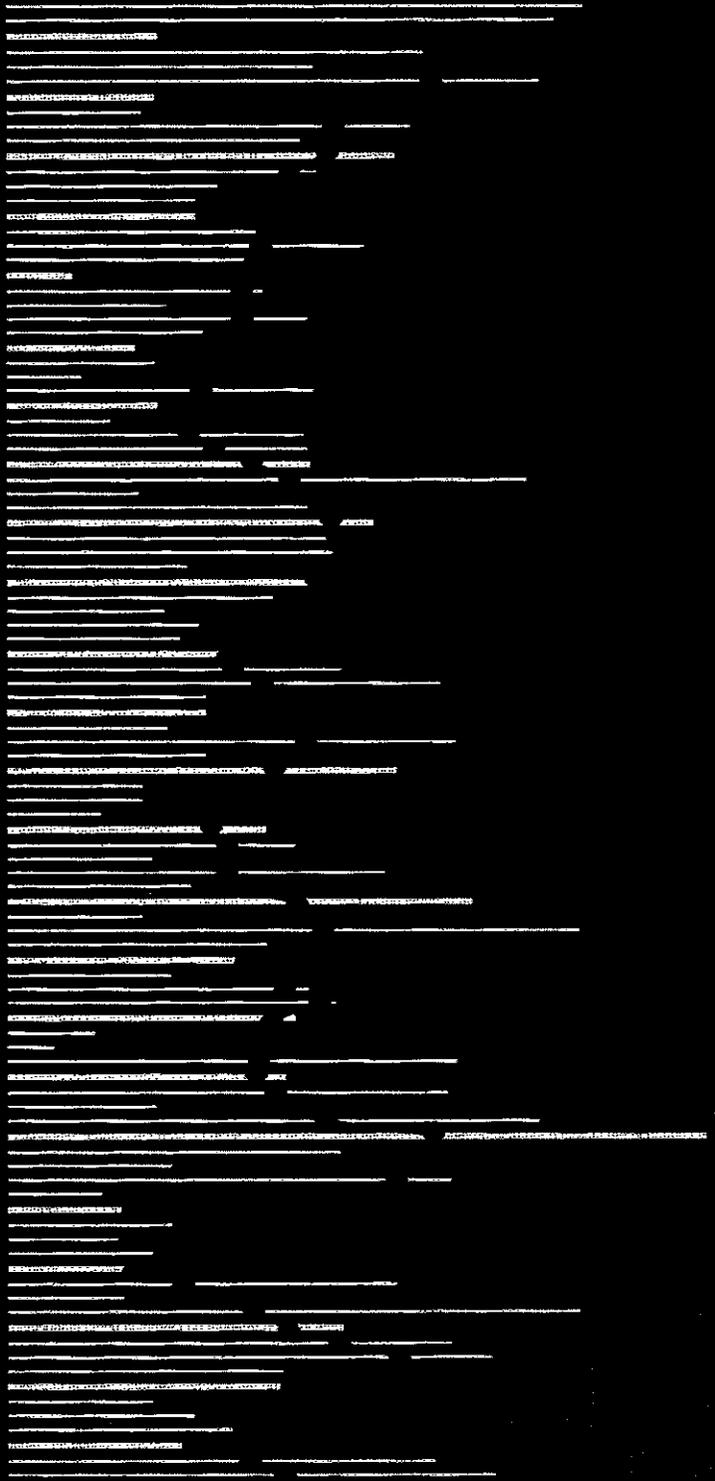
# Seasonality of San Joaquin Basin Objectives



RECLAMATION

# San Joaquin Basin Hydrology

6 YR Drought Deficit  Annual SJ Basin Runoff  6 Yr Avg. SJ Runoff 



RECLAMATION

# Water Budget Issues

- Previous analysis had seriously flawed techniques and assumptions to draw any meaningful conclusion on beneficial use.
- Seasonality of flow needs for fishery and salinity objectives are different.
- New information and tools exist today to better characterize these key relationships.

# New Analysis

- New analysis will be required in order to understand key beneficial use seasonal flow dynamics and tradeoffs.
  - Well scoped basin wide approach
  - Systematic analysis approach

# **ATTACHMENT 4**

**SAN JOAQUIN RIVER AGREEMENT/VAMP PROGRAM SUMMARY**  
**FROM PRESENT - 1999**  
**BY YEAR**

CONTRACTING ENTITY	AGREEMENT NUMBER	BEGIN	TERM THROUGH	WATER TYPE	CONTRACT QTY (af)	DELIVERED QTY (af)	PRICE (per af)	TOTAL COST	REMARKS
<b>2008-2009</b>									
San Joaquin River Group Authority	01-WC-20-1797	03/01/99	12/31/09	Supplemental	110,000	75,250	See Remarks	\$4,997,397.20	Compensation for providing the VAMP pulse flow pursuant to the San Joaquin River Agreement.
San Joaquin River Group Authority	01-WC-20-1797	03/01/99	12/31/09	Supplemental	15,000	15,000	\$60.00	\$900,000.00	Water acquired from Oakdale ID pursuant to the San Joaquin River Agreement.
San Joaquin River Group Authority	01-WC-20-1797	03/01/99	12/31/09	Supplemental	11,000	3,740	\$60.00	\$224,400.00	"Difference" water acquired from Oakdale ID pursuant to the San Joaquin River Agreement.
San Joaquin River Group Authority	01-WC-20-1797	03/01/99	12/31/09	Supplemental	12,500			\$0.00	Fall flows acquired from Merced ID pursuant to the San Joaquin River Agreement.
<b>TOTAL</b>					<b>148,500</b>	<b>93,990</b>		<b>\$6,121,797.20</b>	
<b>2007-2008</b>									
San Joaquin River Group Authority	01-WC-20-1797	03/01/99	12/31/09	Supplemental	110,000	33,330	See Remarks	\$4,800,573.70	Compensation for providing the VAMP pulse flow pursuant to the San Joaquin River Agreement. State reimbursed \$1,332M.
San Joaquin River Group Authority	01-WC-20-1797	03/01/99	12/31/09	Supplemental	15,000	15,000	\$60.00	\$900,000.00	Water acquired from Oakdale ID pursuant to the San Joaquin River Agreement.
San Joaquin River Group Authority	01-WC-20-1797	03/01/99	12/31/09	Supplemental	11,000	8,815	\$60.00	\$528,900.00	"Difference" water acquired from Oakdale ID pursuant to the San Joaquin River Agreement.
San Joaquin River Group Authority	01-WC-20-1797	03/01/99	12/31/09	Supplemental	12,500	12,500	\$72.01	\$900,125.00	Fall flows acquired from Merced ID pursuant to the San Joaquin River Agreement.
<b>TOTAL</b>					<b>148,500</b>	<b>69,645</b>		<b>\$7,129,598.70</b>	
<b>2006-2007</b>									
San Joaquin River Group Authority	01-WC-20-1797	03/01/99	12/31/09	Supplemental	110,000	0	See Remarks	\$4,683,486.62	Compensation for providing the VAMP pulse flow pursuant to the San Joaquin River Agreement. State reimbursed \$1,332M.
San Joaquin River Group Authority	01-WC-20-1797	03/01/99	12/31/09	Supplemental	15,000	15,000	\$60.00	\$900,000.00	Water acquired from Oakdale ID pursuant to the San Joaquin River Agreement.
San Joaquin River Group Authority	01-WC-20-1797	03/01/99	12/31/09	Supplemental	11,000	11,000	\$60.00	\$660,000.00	"Difference" water acquired from Oakdale ID pursuant to the San Joaquin River Agreement.
San Joaquin River Group Authority	01-WC-20-1797	03/01/99	12/31/09	Supplemental	12,500	12,500	\$17.56	\$219,600.00	Fall flows acquired from Merced ID pursuant to the San Joaquin River Agreement.
<b>TOTAL</b>					<b>148,500</b>	<b>38,500</b>		<b>\$6,462,986.62</b>	

**SAN JOAQUIN RIVER AGREEMENT/VAMP PROGRAM SUMMARY**  
**FROM PRESENT - 1999**  
**BY YEAR**

CONTRACTING ENTITY	AGREEMENT NUMBER	TERM		WATER TYPE	CONTRACT QTY (af)	DELIVERED QTY (af)	PRICE (per af)	TOTAL COST	REMARKS
		BEGIN	THROUGH						
<b>2005-2006</b>									
San Joaquin River Group Authority	01-WC-20-1797	03/01/99	12/31/09	Supplemental	110,000	0	See Remarks	\$4,529,483.60	Compensation for providing the VAMP pulse flow pursuant to the San Joaquin River Agreement. State will reimburse \$1.332M per their cost share.
San Joaquin River Group Authority	01-WC-20-1797	03/01/99	12/31/09	Supplemental	15,000	15,000	\$60.00	\$900,000.00	Water acquired from Oakdale ID pursuant to the San Joaquin River Agreement.
San Joaquin River Group Authority	01-WC-20-1797	03/01/99	12/31/09	Supplemental	11,000	11,000	\$60.00	\$660,000.00	"Difference" water acquired from Oakdale ID pursuant to the San Joaquin River Agreement.
San Joaquin River Group Authority	01-WC-20-1797	03/01/99	12/31/09	Supplemental	12,500	12,500	\$16.99	\$212,375.00	Fall flows acquired from Merced ID pursuant to the San Joaquin River Agreement.
<b>TOTAL</b>					<b>148,500</b>	<b>38,500</b>		<b>\$6,301,858.60</b>	
<b>2004-2005</b>									
San Joaquin River Group Authority	01-WC-20-1797	03/01/99	12/31/09	Supplemental	110,000	65,591	See Remarks	\$4,384,785.74	Compensation for providing the VAMP pulse flow pursuant to the San Joaquin River Agreement. State will reimburse \$1.334M per their cost share.
San Joaquin River Group Authority	01-WC-20-1797	03/01/99	12/31/09	Supplemental	15,000	15,000	\$60.00	\$900,000.00	Water acquired from Oakdale ID pursuant to the San Joaquin River Agreement.
San Joaquin River Group Authority	01-WC-20-1797	03/01/99	12/31/09	Supplemental	11,000	5,120	\$60.00	\$307,200.00	"Difference" water acquired from Oakdale ID pursuant to the San Joaquin River Agreement.
San Joaquin River Group Authority	01-WC-20-1797	03/01/99	12/31/09	Supplemental	12,500	12,500	\$65.77	\$822,125.00	Fall flows acquired from Merced ID pursuant to the San Joaquin River Agreement.
<b>TOTAL</b>					<b>148,500</b>	<b>88,211</b>		<b>\$6,414,110.74</b>	
<b>2003-2004</b>									
San Joaquin River Group Authority	01-WC-20-1797	03/01/99	12/31/09	Supplemental	110,000	58,065	See Remarks	\$4,303,028.20	Compensation for providing the VAMP pulse flow pursuant to the San Joaquin River Agreement. State will reimburse \$1.334M per their cost share.
San Joaquin River Group Authority	01-WC-20-1797	03/01/99	12/31/09	Supplemental	15,000	15,000	\$60.00	\$900,000.00	Water acquired from Oakdale ID pursuant to the San Joaquin River Agreement.
San Joaquin River Group Authority	01-WC-20-1797	03/01/99	12/31/09	Supplemental	11,000	5,961	\$60.00	\$357,660.00	"Difference" water acquired from Oakdale ID pursuant to the San Joaquin River Agreement.

**SAN JOAQUIN RIVER AGREEMENT/VAMP PROGRAM SUMMARY**  
**FROM PRESENT - 1999**  
**BY YEAR**

CONTRACTING ENTITY	AGREEMENT NUMBER	TERM		WATER TYPE	CONTRACT QTY (af)	DELIVERED QTY (af)	PRICE (per af)	TOTAL COST	REMARKS
		BEGIN	THROUGH						
San Joaquin River Group Authority	01-WC-20-1797	03/01/99	12/31/09	Supplemental	12,500	12,500	\$64.55	\$806,875.00	Fall flows acquired from Merced ID pursuant to the San Joaquin River Agreement.
<b>TOTAL</b>					<b>148,500</b>	<b>91,526</b>		<b>\$6,387,563.20</b>	
<b>2002-2003</b>									
San Joaquin River Group Authority	01-WC-20-1797	03/01/99	12/31/09	Supplemental	110,000	33,430	See Remarks	\$4,202,176.00	Compensation for providing the VAMP pulse flow pursuant to the San Joaquin River Agreement. State reimbursed \$1.334M per their cost share.
San Joaquin River Group Authority	01-WC-20-1797	03/01/99	12/31/09	Supplemental	15,000	15,000	\$60.00	\$900,000.00	Water acquired from Oakdale ID pursuant to the San Joaquin River Agreement.
San Joaquin River Group Authority	01-WC-20-1797	03/01/99	12/31/09	Supplemental	11,000	7,205	\$60.00	\$432,300.00	"Difference" water acquired from Oakdale ID pursuant to the San Joaquin River Agreement.
San Joaquin River Group Authority	01-WC-20-1797	03/01/99	12/31/09	Supplemental	12,500	12,470	\$63.03	\$785,984.10	Fall flows acquired from Merced ID pursuant to the San Joaquin River Agreement.
<b>TOTAL</b>					<b>148,500</b>	<b>68,105</b>		<b>\$6,320,460.10</b>	
<b>2001-2002</b>									
San Joaquin River Group Authority	01-WC-20-1797	03/01/99	12/31/09	Supplemental	110,000	78,850	See Remarks	\$4,138,000.00	Compensation for providing the VAMP pulse flow pursuant to the San Joaquin River Agreement. State reimbursed \$1.334M per their cost share.
San Joaquin River Group Authority	01-WC-20-1797	03/01/99	12/31/09	Supplemental	15,000	15,000	\$60.00	\$900,000.00	Water acquired from Oakdale ID pursuant to the San Joaquin River Agreement.
San Joaquin River Group Authority	01-WC-20-1797	03/01/99	12/31/09	Supplemental	11,000	3,635	\$60.00	\$218,100.00	"Difference" water acquired from Oakdale ID pursuant to the San Joaquin River Agreement.
San Joaquin River Group Authority	01-WC-20-1797	03/01/99	12/31/09	Supplemental	12,500	12,500	\$62.04	\$775,500.00	Fall flows acquired from Merced ID pursuant to the San Joaquin River Agreement.
<b>TOTAL</b>					<b>148,500</b>	<b>109,785</b>		<b>\$6,029,600.00</b>	
<b>2000-2001</b>									
San Joaquin River Group Authority 2	00-WC-20-1653	03/30/00	02/01/01	Supplemental	110,000	77,660	See Remarks	\$4,000,000.00	Compensation for providing the VAMP pulse flow pursuant to the San Joaquin River Agreement. State reimbursed \$2.668M per their cost share for 1999 & 2000.

**SAN JOAQUIN RIVER AGREEMENT/VAMP PROGRAM SUMMARY**  
**FROM PRESENT - 1999**  
**BY YEAR**

CONTRACTING ENTITY	AGREEMENT NUMBER	TERM		WATER TYPE	CONTRACT QTY (af)	DELIVERED QTY (af)	PRICE (per af)	TOTAL COST	REMARKS
		BEGIN	THROUGH						
San Joaquin River Group Authority	00-WC-20-1653	03/01/89	12/31/09	Supplemental	15,000	15,000	\$60.00	\$900,000.00	Water acquired from Oakdale ID pursuant to the San Joaquin River Agreement.
San Joaquin River Group Authority	00-WC-20-1653	03/01/89	12/31/09	Supplemental	11,000	3,700	\$60.00	\$222,000.00	"Difference" water acquired from Oakdale ID pursuant to the San Joaquin River Agreement.
San Joaquin River Group Authority	00-WC-20-1653	03/30/00	02/01/01	Supplemental	12,500	12,500	\$61.32	\$766,500.00	Fail flows acquired from Merced ID pursuant to the San Joaquin River Agreement.
<b>TOTAL</b>					<b>148,500</b>	<b>108,680</b>		<b>\$5,888,500.00</b>	
<b>1999-2000</b>									
San Joaquin River Group Authority <sup>2</sup>	9-07-20-W1551	04/12/99	02/01/00	Supplemental	110,000	110,000	See Remarks	\$4,000,000.00	Compensation for providing the VAMP pulse flow pursuant to the San Joaquin River Agreement. (State reimbursed per their cost share recvd in 2001.
San Joaquin River Group Authority	9-07-20-W1603	04/17/99	05/17/99	Supplemental	47,000	37,500	\$60.00	\$2,250,000.00	Acquisition to achieve the Double Step Target Flow
San Joaquin River Group Authority	9-07-20-W1551	04/12/99	02/01/00	Supplemental	15,000	15,000	\$60.00	\$900,000.00	Water acquired from Oakdale ID pursuant to the San Joaquin River Agreement.
San Joaquin River Group Authority	9-07-20-W1551	04/12/99	02/01/00	Supplemental	12,500	11,998	\$60.00	\$719,880.00	Fail flows acquired from Merced ID pursuant to the San Joaquin River Agreement.
<b>TOTAL</b>					<b>184,500</b>	<b>174,498</b>		<b>\$7,869,880.00</b>	
VAMP Monitoring/Environmental Documentation	08FC-20-15930 03FG202001 08FG200033	1998	2008					\$1,848,755.34	Federal share of VAMP monitoring and environment costs not including in-kind services
<b>GRAND TOTAL <sup>1</sup></b>					<b>1,521,000</b>	<b>891,840</b>		<b>66,755,112</b>	

<sup>1</sup> Total Cost includes State cost share of \$12,000,000  
<sup>2</sup> One Year Funding Agreements