State of California -The Natural Resources Agency
DEPARTMENT OF FISH AND GAME
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***ARNOLD SCHWARZENEGGER**, Governor*
***JOHN McCAMMAN**, Director*

1/6-7/11 Bd. Wrkshop
SJR Technical Report
Deadline: 12/6/10 by 12 noon

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DEC - 6 2010
SWRCB EXECUTIVE

December 6, 2010

Charles R. Hoppin
Chair
State Water Resources Control Board
1001 I Street
Sacramento, CA 95814

Subject: Draft Technical Report on the Scientific Basis for Alternative San Joaquin River Flow and Southern Delta Salinity Objectives

Dear Mr. Hoppin:

The Department of Fish and Game (Department) would like to thank the State Water Resources Control Board (SWRCB) for the opportunity to review the Draft Technical Report on the Scientific Basis for Alternative San Joaquin River Flow and Southern Delta Salinity Objectives (report) released on October 29, 2010.

As California's public trust agency for fish and wildlife resources, the Department is responsible for protecting the interests of all fish, wildlife, and native plants, and the ecosystems necessary to maintain sustainable and resilient populations of these organisms. We understand the SWRCB's strategy to address flow needs for the Delta and it's watershed in a phased approach and wish to reiterate our continued assistance to the SWRCB in providing scientific and biological expertise. The Department commends the SWRCB staff for their review of current scientific information and incorporation into the report and offers the following general comments along with more focused comments that discuss specific sections of the report. Should you have any questions or require clarification, please contact me at (916) 445-1231.

Sincerely,

Carl Wilcox

Carl Wilcox
Water Branch Chief

Enclosure

General Comments

There is now broad acceptance that considering ecosystems as users of freshwater is in society's best interests (Poff et al. 2010, Naiman et al. 2008, Arthington et al. 2006, Poff et al. 2003, Postel and Richter 2003). Recent policy documents regarding the Bay-Delta have stated that ecosystem needs are integral to the sustainability of the Delta and its watershed (CalFed 2000) and that the health of the ecosystem as a goal is co-equal to water supply (DVBRTF 2007, Delta Vision Committee 2008).

Natural Flow Regime

The Department supports the SWRCB's decision to use the natural flow-regime as its bases for developing alternatives. The natural flow-regime paradigm postulates that the structure and function of riverine ecosystems, and the adaptations of their constituent riparian and aquatic species, are dictated by patterns of temporal variation in river flows (Poff et al. 1997). As such, this paradigm considers the riverine ecosystem as a system, and not just a compilation of species and habitats. To protect freshwater biodiversity and maintain the essential goods and services provided by rivers, we need to mimic components of natural flow variability, taking into consideration the magnitude, frequency, timing, duration, rate of change, and predictability of flow events (Athington et al. 2006).

Although the Department is supportive of the SWRCB's use of a range of unimpaired flows, we are concerned that the February through June time frame may miss some key ecological services and functions and may not be comprehensive enough. The Department recommends that in using the natural flow regime as a basis for considering alternative flow criteria, that all the ecological functions of the system be protected. For instance, every tributary has water control facilities that either inhibit or preclude fish passage to important reaches with the result being that the amount of habitat available to various species and their life stages is limited. For steelhead in particular, this limitation on access to upper reaches requires attention to year-round flows downstream of rim dams so that all their requirements can be met.

Species Selection

The Department does support the SWRCB's reliance on fall-run Chinook salmon and steelhead as indicators of the ecosystems health due to their sensitivity. The populations of these species fit the key aspects of a policy-relevant indicator as defined by Dale and Beyeler (2001): (a) assesses both existing and emerging problems; (b) considers the anthropogenic stressors leading to impairments; (c) establishes the trends in condition for measuring environmental policy and program performance; (d) are easy to communicate to the public, and (e) are easily and routinely measurable. Although the Department has concerns with the condition of other ecological aspects of the Delta and the San Joaquin River (SJR), much can be accomplished by achieving sustainable and resilient fall-run Chinook salmon and steelhead populations. As with the limitations of using the natural flow regime as a basis for flow criteria, using only two species may miss some key ecological functions and services. We recommend that the SWRCB be aware of this limitation as they continue through this process.

<u>Focused Comments</u>

Hydrology

The report's coverage of the hydrology of the SJR system is quite comprehensive and clearly indicates that there is an immediate need to reduce the limited water dedicated for the legally recognized fishery and ecosystem beneficial uses in relation to other beneficial uses. As the report describes, the SJR basin has been substantially altered by water development over the last 100 years. Although the State has recently reinforced the concept that the ecosystem's beneficial uses of water are co-equal to water supply, successive rounds of water development over time has resulted in increasingly larger fractions of water being stored and diverted, creating a severe imbalance of water useable by or dedicated to ecological beneficial uses. For instance, in wet years that follow prolonged dry years, reservoir recharge is given priority over co-equal beneficial uses such as fishery protection. This imbalance of use and dedication of water to one beneficial use has maximized water use for one beneficial use (water diversion) while minimizing water for other beneficial uses (fisheries) resulting in substantial unmitigated and progressively greater impacts. In addition, continued increases in water storage and diversion capabilities have allowed water managers to substantially reduce spring flows in SJR tributaries (e.g. magnitude, duration, and frequency) resulting in less flow variability across years. In combination these effects have resulted in severe and progressively greater impacts to anadromous fish and other ecological resources in the SJR basin.

San Joaquin River Tributary and South Delta Flow Linkage

The SJR and the South Delta are not independent parts or separate systems; they are parts of the same system and are inextricably linked. The SJR and its watershed provide many ecological services to the Delta, and the Delta provides services back to the SJR. Flows from the SJR are the primary pathway for these ecological services and their value to the rest of the system varies through the year and between years. The dependency of the South Delta on flows and their ecological services is depicted in the report (page 23) where SJR tributaries comprise 68% of flow at Vernalis for observed flows from 1984-2009. It is important to also recognize that in drier years, the SJR tributary flow contribution to flow at Vernalis can exceed 80% (CDFG 2005) and that flows out of the SJR tributaries can be controlled to meet flow targets at Vernalis as documented by the studies conducted under the Vernalis Adaptive Management Program (VAMP) between 2000 and 2010, (per annual VAMP reports).

Ecological Fair Share Contribution

In reviewing the unimpaired-flow to observed-flow data in the report, there is a need to highlight two flow discrepancies. Given the extensive water storage and diversion that has occurred in the SJR basin, there is both across-tributary and within-tributary flow comparisons that should be made to inform the public of the flow imbalance that has accrued over time.

For across-tributary comparison, of the three primary watersheds in the SJR basin still supporting anadromous fish populations (i.e. Merced, Tuolumne, and Stanislaus Rivers) the Tuolumne River watershed is the largest, but it is releasing the least amount of water on a proportional (or ecological fair share) basis (Table 2-9 of SWRCB Report). For perspective, the Tuolumne River has historically produced the greatest amount of fall-run Chinook salmon (CDFG 2009b, Yoshiyama et al, 1996), and also has the widest fluctuation in adult population abundance over time. Given that flow has been shown to have a strong association with adult abundance in the Tuolumne River (CDFG 2010), and the Tuolumne has consistently been releasing the least amount of water proportionately across years, there is great restoration potential for fall-run in this tributary. This can be accomplished by requiring more water to be consistently released across years during key fall-run production time periods (e.g. spring).

For within tributary comparison, altered flow regimes (observed flows) have resulted in elevated fall flows (compared to unimpaired) in both the Stanislaus and Merced Rivers. However, for each of the three tributaries there has been a substantial reduction in river flow during the spring time period with the Tuolumne having the greatest discrepancy (11% of historical unimpaired flow) and the Stanislaus and Merced releasing a slightly higher percentage of historical unimpaired flow (31% and 17%, respectively). Further, each tributary's winter flow, which corresponds to the Chinook fall-run fry development and out-migration season, is the highest of both the winter and spring flow release seasons. In addition, Figures 2-10 thru 2-12 of the report indicate that the month with the highest peak flow has shifted substantially. Under unimpaired flow conditions (median), May is the peak flow month whereas in observed flow conditions March is peak flow month. This shift in peak flow period has had drastic affects upon the anadromous fish populations in these rivers. The reduction in spring pulse flow is reducing flood plain inundation, smolt production, and smolt survival. For instance, median May flows in the Stanislaus, Tuolumne, and Merced Rivers are 3644, 7206, and 3790 cfs respectively. This equates to a reduction in median May flow of 72% (Stanislaus), 91% (Tuolumne), and 82% (Merced). Comparisons of spring flow duration and frequency for unimpaired to observed flows to identify the reductions that have occurred here should also be reported. Substantial reduction in spring flow magnitude, duration, and frequency has had significant impacts upon anadromous fish populations in SJR tributaries.

Table 1. Impaired Flow Comparison-SJR Tributaries

San Joaquin River Tributary Flow Summary					
River	**Fall**	**Win**	**Spr**	**Sum**	**Total**
Stanislaus	**140%**	**40%**	**31%**	**239%**	47%
Tuolumne	**90%**	**28%**	**11%**	**56%**	26%
Merced	**146%**	**29%**	**17%**	**56%**	38%

Note: Source: Report. Values are median monthly observed flow (1984-2009) divided by unimpaired flow.

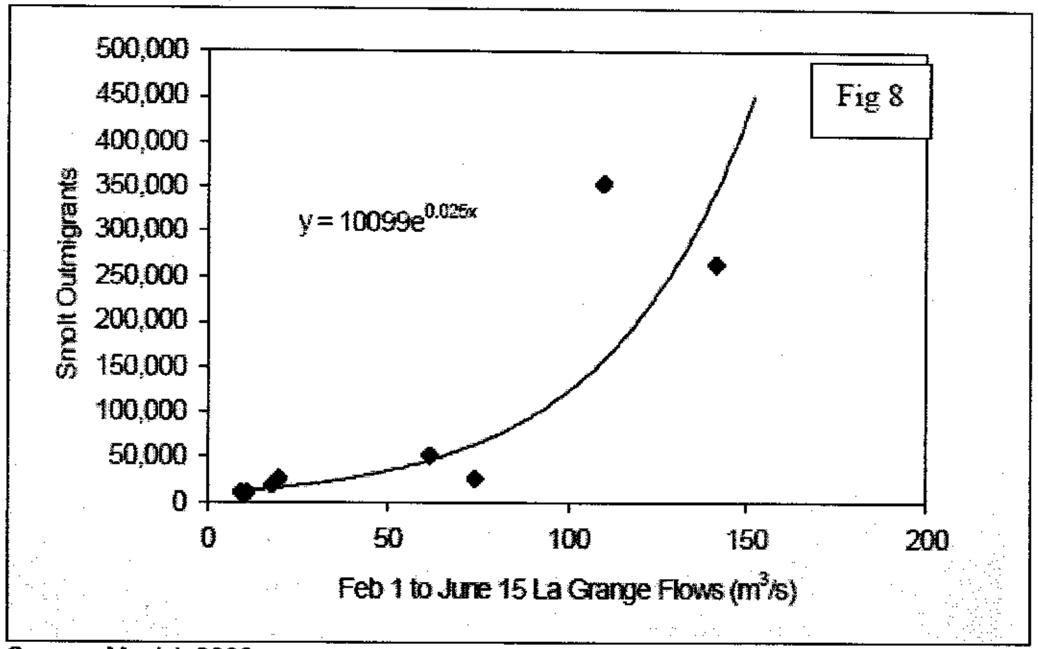
The Department believes that the SWRCB should include in Table 2-1 (Page 5) a row indicating average or typical Reservoir retention. For instance, Don Pedro usually retains a significant volume of water from year to year as multi-year storage supply. Knowing the typical amounts of water stored in the watershed beyond single year operations could be important in understanding potential alternative flow regimes.

Flow and Fish Production

In concept, the linkages between flow, juvenile production, and adult fish production in SJR tributaries are straight forward. Increasing late-winter and spring flows increases juvenile (smolt) production in SJR tributaries. Increasing juvenile production at the spawning areas within the tributaries increases the numbers of fish emigrating out of the tributaries. Increasing spring flows in the tributaries increases smolt survival as juveniles emigrate to the mainstem SJR (leaving the tributaries). Increasing the survival of juvenile fish leaving the SJR tributaries increases the numbers of juvenile fish reaching the South Delta. Increasing spring flows increases the smolt survival through the South Delta. And, increasing the number of juveniles surviving through the South Delta increases the numbers of adults being produced. The Department's (CDFG 2010), the U.S. Department of Interior's (DOI 2010), and the Nation Marine Fisheries Services' (NMFS 2010) previous submittals document the scientific findings that support these linkages. Although other factors have been studied to determine if there are other limiting conditions, the best evidence shows that flows (and their direct and indirect affects) are the main limiting factors at each of these steps.

This flow-fish production linkage can be seen in the following Figures. Late winter-spring flow has a substantial influence upon juvenile fish production in SJR tributaries as evidenced by Dr. Carl Mesick's testimony to the Federal Energy Regulatory Commission in 2010 (NMFS et al. 2010) (Figure 1).

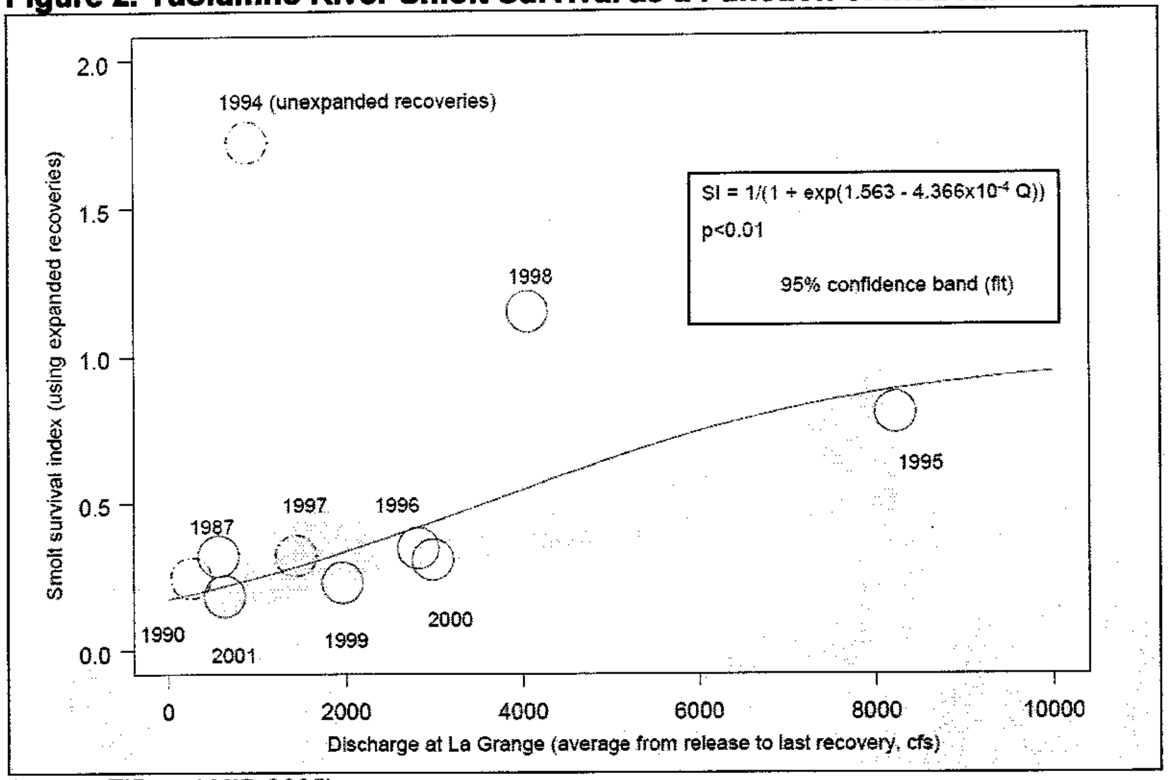
Figure 1. Late Winter-Spring Flow and Juvenile Salmon Production: Tuolumne River.



Source: Mesick,2009.

Smolt survival vs. spring flow studies have been conducted in each of the SJR tributaries. In each case, there is a relationship between flow and smolt survival that indicates that smolt survival increases with an increase in flow. This relationship is seen in the Tuolumne River (TID and MID 2009, TID and MID 2009) (Figure 2).

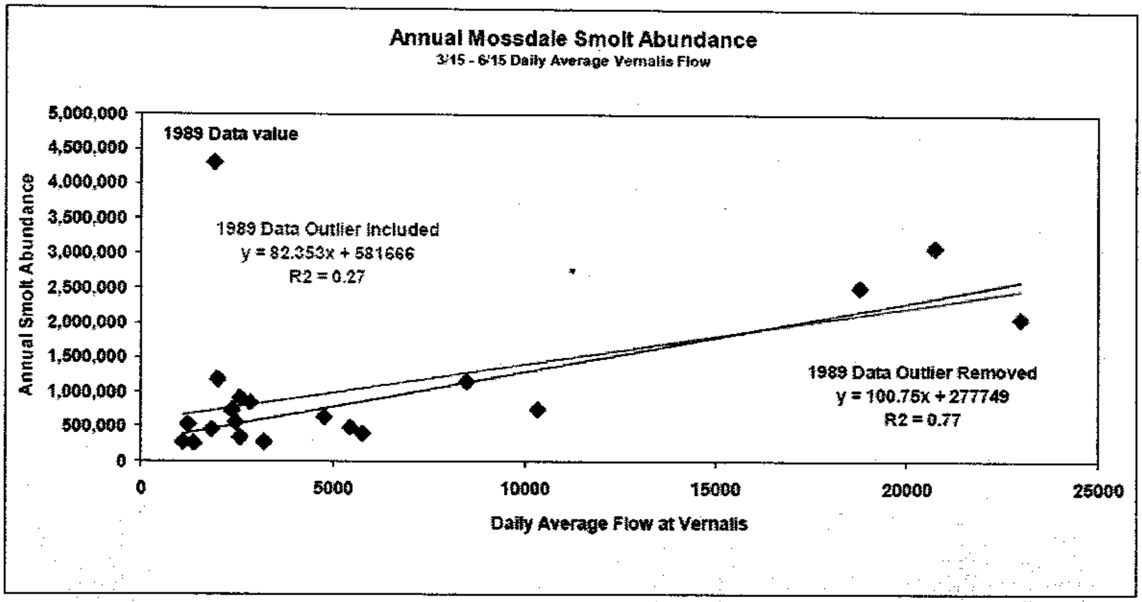
Figure 2. Tuolumne River Smolt Survival as a Function of Instream Flow.



Source: TID and MID 2005)

For more than 20 years the Department has conducted a Kodiak Trawl at Mossdale every spring to estimate out-migrating SJR juvenile fall-run Chinook salmon (smolts). The results of the annual Mossdale Trawl operations are that as spring flows increase at Vernalis, with associated increased flows in the SJR tributaries, juvenile salmon catch correspondingly increases. This relationship between average spring flow at Vernalis and season juvenile salmon catch at Mossdale in seen in Figure 3.

Figure 3. Relationship Between Vernalis Flow and Juvenile Salmon Production at Mossdale.

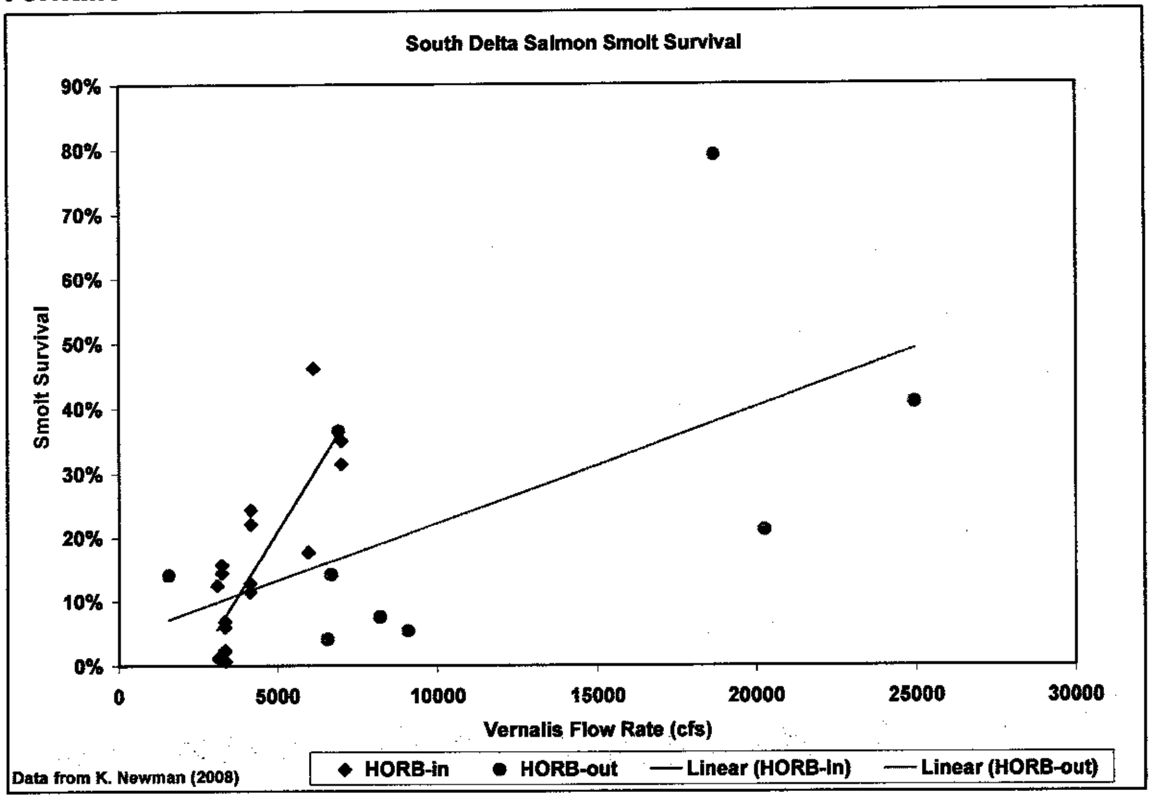


Source: CDFG 2009

Since the 1980's the juvenile (smolt) salmon survival vs. flow studies have been conducted in the South Delta. In 2010, a peer review panel was assembled to evaluate the results of these studies. The Panel concluded that statistical analysis conducted to date provide support for the contention that greater Vernalis flows have been associated with higher survival rates for juvenile Chinook salmon emigrating through the SJR (e.g. South Delta) (Dauble et al. 2010). The relationship of increased survival as a function of increased flow at Vernalis can be seen in Figure 4. Although the slopes for HORB-in and HORB-out relationships depicted in Figure 4 appear to be statistically different, they are not. The reason for this may be that the two data sets do not overlap one another (CDFG 2009). The Panel qualified their findings by indicating that:

i) conditions necessary for survival are dependent upon a complicated set of interacting hydraulic features of which the SJR flow of Vernalis is a single feature;
ii) Vernalis flow by itself cannot guarantee strong downstream survival;
iii) there is no statistically significant relation between smolt survival and SJR flow at Vernalis with the Head of Old River Barrier is not in place;
iv) though not compelling, but perhaps real, South Delta smolt survival across the overall flow range may be declining (Dauble et al. 2010).

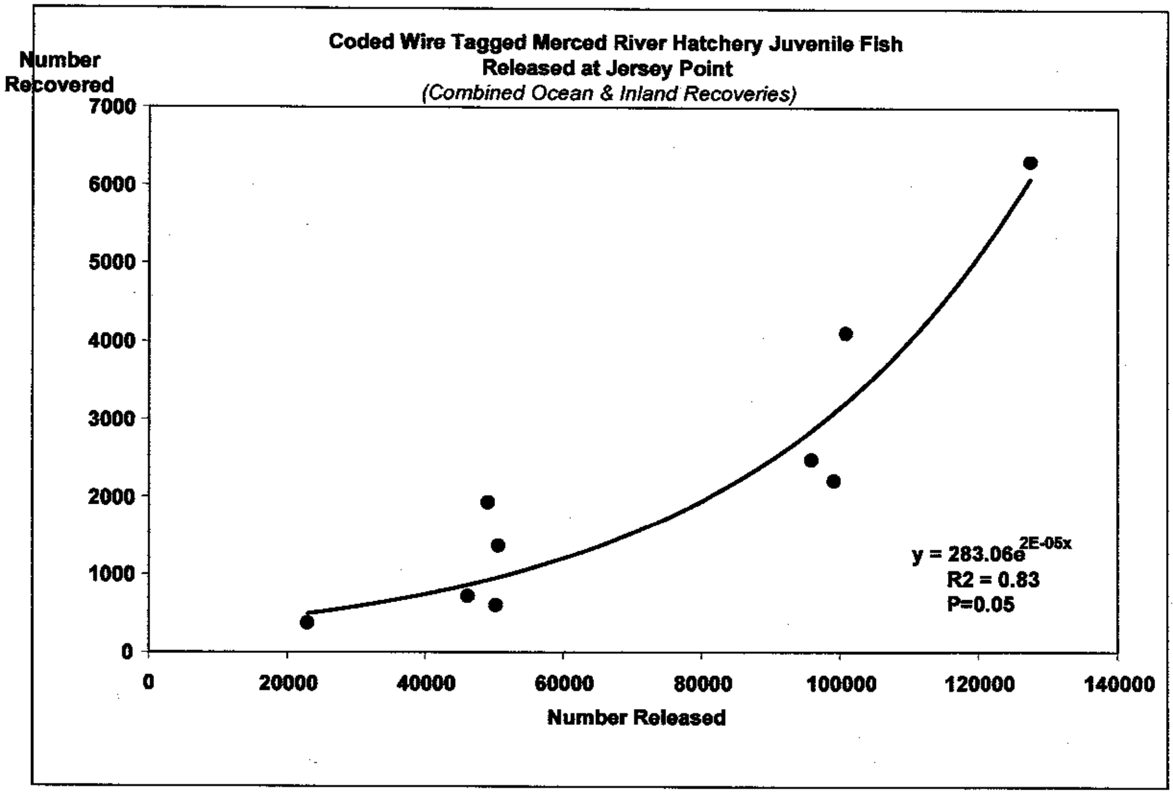
Figure 4. South Delta Juvenile Salmon Survival as a Function of Flow at Vernalis.



As part of the South Delta juvenile salmon survival studies, fish tagged with coded wire were released at Jersey Point which is considered to be the exit point of the South Delta. Later recoveries of these fish have occurred both in the ocean (sport and commercial harvest) and inland environments (escapement surveys). The analysis of the recovery data shows a positive relationship in that as number of fish released increases, the number of adult recoveries increases (Figure 5). Figure 5 indicates that 83% of the trend (variance) in number of adult fish produced is explained solely by number of fish released at Jersey Point. This shows a positive relationship of juvenile fall-run Chinook salmon surviving to Jersey Point to greater numbers of adults being harvested in the ocean and returning to spawn. Years from 2004 to 2006 are not included due to inland recoveries for tag groups not yet completed. If these years were included it is expected that the strength of the relationship may be reduced due to a down-turn in ocean conditions.

If both ocean conditions and ocean harvest (sport and commercial) are added as explanatory variables, and a multiple linear regression model if fitted to the data, the adjusted r-square does improve and the relationship is statistically significant (adjusted $r^2 = 0.88$ and $p = 0.05$). This finding infers that number of fish alone explains 76% of the variation, and that adding both ocean conditions and ocean harvest allows an additional 12% of the variation to be explained. Neither ocean conditions nor ocean harvest, when individually regressed against total number of fish recovered, is statistically significant (ocean conditions = adjusted $r^2 = 0.00$; ocean harvest = adjusted $r^2 = -0.05$).

Figure 5. 1995 to 2003[1] Coded Wire Tagged Adult Recoveries from Jersey Point Juvenile Releases.



[1] Years 1995 to 2003 were used since Merced River Hatchery fish were released at Jersey Point and both adult ocean and inland recoveries have been identified.

In summary, the increased flow from the Tuolumne River, combined with increased flow from the Merced and Stanislaus Rivers, would have a combined benefit of producing more juvenile salmonids in these tributaries, more juveniles reaching the South Delta, more juveniles surviving their migration through the South Delta, and more adult salmon returning. This shows a substantial cumulative effect of combined increased spring flows from the SJR tributaries.

The report should have a discussion of the operation of the radial gates at Clifton Court forebay which is solely the SWP facility. The operation of the forebay radial gates exacerbates the reverse flows within the adjacent channels, especially Old and Middle River (OMR). There are dramatic reverse flows relative to net reverse flows at OMR. The openings of these radial gates create 15,000 cfs flows into Clifton Court Forebay. This large and quick inflow of water gives fish an easy way in, but no way out. Studies by the Interagency Ecological Program have shown a 90 to 100% mortality for captured juvenile salmon (Kimmerer and Brown 2006, Gringas 1997). Although flow through the individual gates is not directly measured, DWR's Delta Field Division (DFD) indirectly measures inflow by calculating the difference in expected storage from the actual measured storage in the forebay. Another method of calculating inflow is to use stage data measured both inside and outside of the forebay gates and gate heights (Le 2004).

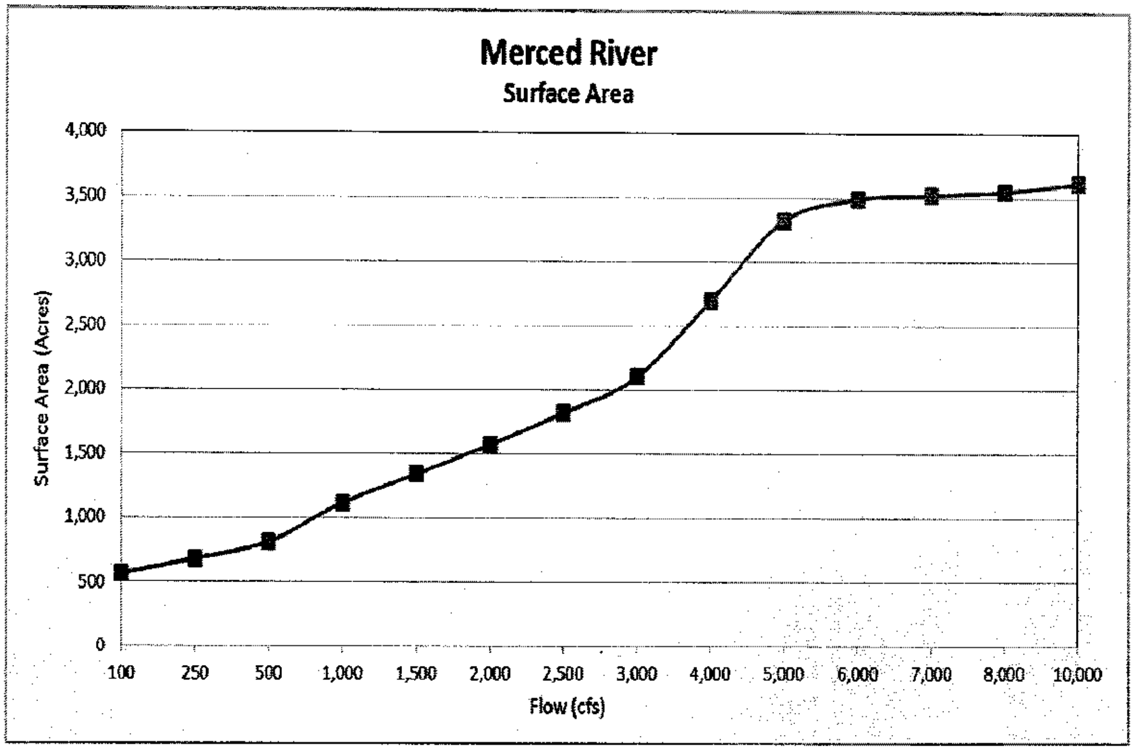
Life Stage Contribution to Adult Production

While a natural flow regime may encourage fry (as opposed to further developed fish) to leave the river under some water year scenarios, it is not expected that those fry will contribute years later, in large numbers, to the returning spawning salmon. The fry contribution to returning adults will maintain a small variation in life history strategies in a way similar to the small numbers of yearlings that occasionally contribute to the spawning runs; current data shows that it will not be a major contributor to the spawning runs. This is consistent with a long history of expectation by the fishery management agencies which have based planning on past coded-wire-tagged studies that indicate that the larger a fish is when it leaves the river, the better it's chances for survival through spawning adult. Those studies were performed with hatchery reared fish and while some concern has been expressed with how representative these results are for wild fish, a multi-agency study that is currently ongoing, which looks at otoliths of returning wild fish, is arriving at the same general result (Rachel Barnett-Johnson, pers. comm). Anecdotal evidence of this is that although the Tuolumne River releases flows on a "fry-friendly" schedule, its fall run population is neither at levels considered as healthy nor resilient to crashes. If focusing on fry production were the pathway to fall-run restoration success in the SJR basin, then evidence of this should be seen in the Tuolumne River's fall run population data...

Importance of Floodplain Flow

The report discusses the many benefits to floodplain flows. Inundating the floodplain is key to providing organic nutrients to the river ecosystem. Inundated floodplain provides cover, food and warmer temperatures in late winter through early spring for rearing and migrating juveniles. Connecting floodplain inundation to flow values is a complicated task requiring intimate knowledge of each tributary river system. Analyzing proposed flows as a percent of unimpaired becomes more arduous given that historical unimpaired flow estimates are reported on a monthly basis. However, the Department has analyzed cross-sectional data developed by the Army Corps of Engineers (ACOE) for their modeling efforts for the three tributaries and developed spreadsheets that calculate the estimated area of the length of wetted surface from the first upstream barrier downstream to each tributary's SJR confluence. As an example, Figure 6 shows a graph of the Merced River's wetted surface area from Crocker Huffman Dam downstream to the SJR confluence at flows ranging from 100 to 10,000 cubic feet per second. The Department has developed similar graphs for the other two tributaries.

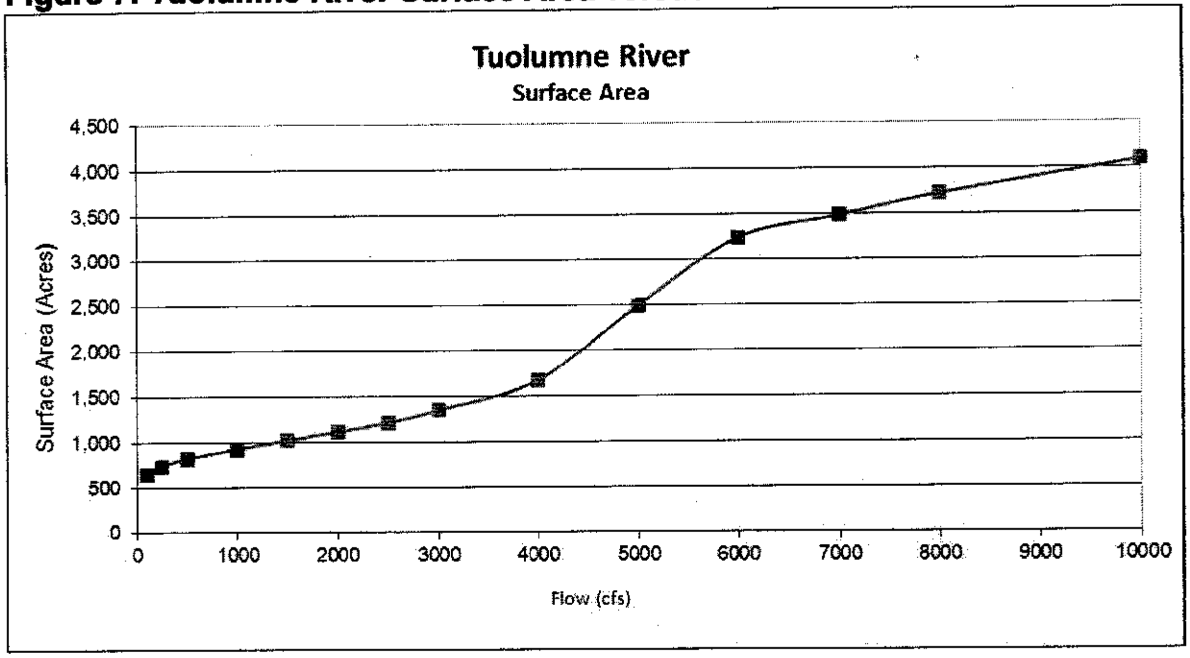
Figure 6. Merced River Surface Area versus Flow



From the graph you can see that the wetted surface area (which translates to the river's width as the length remains constant no matter the flow) increases more quickly from about 3,000 cubic feet per second to 5,000 cfs indicating a corresponding greater increase in width within these flow ranges. Using numbers from Table 2-12 in the report for May from 1984 to 2009 shows a median monthly unimpaired volume of 233,000 acre-feet, which equals roughly 3,790 cfs per day. At this flow, the wetted surface area is approximately 2,500 acres. In comparison, the observed median volume for May taken from the same table is 41,000 acre-feet or 670 cfs per day and a surface area of roughly 900 acres. Much less than the 2,500 acres estimated from the unimpaired flow (only 36 percent). What has not been determined is whether either of these flows generates inundated floodplain conditions. Because of the rapid increase in width with flows greater than 3,000 cfs, there is indication that some form of bank overtopping occurs or a strong likelihood for floodplain inundation.

Likewise, running a similar comparison on the Tuolumne River indicates flows ranging from 4,000 - 6,000 cfs provide a rapid increase in width (Figure 7).

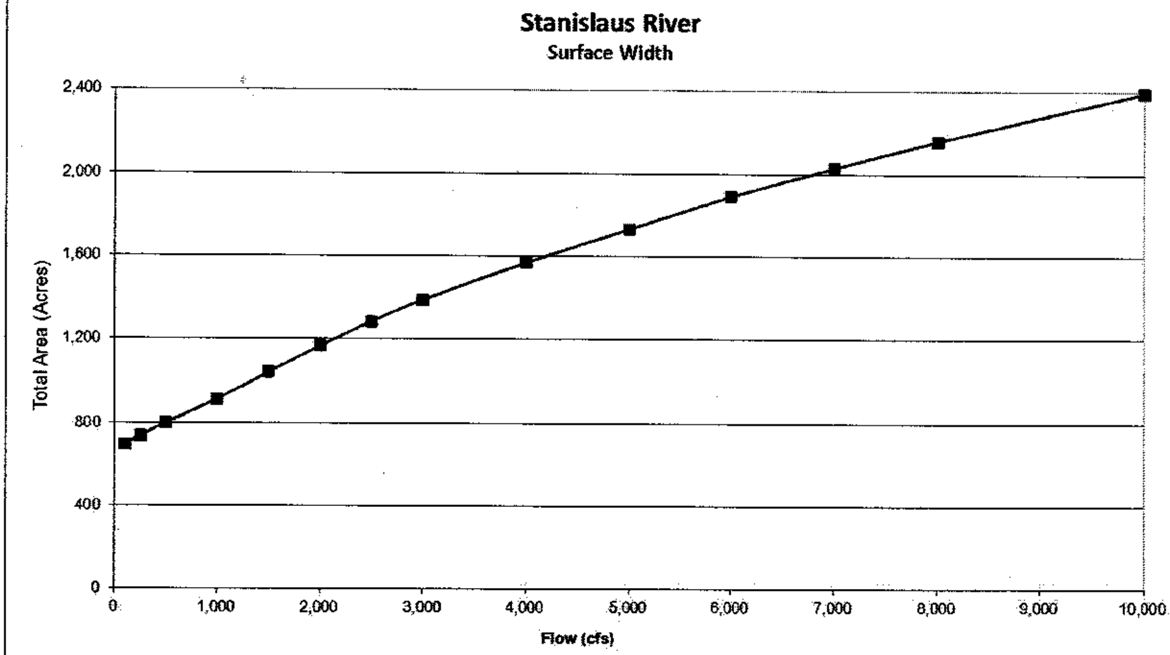
Figure 7. Tuolumne River Surface Area versus Flow



The median May unimpaired and observed flow data from Table 2-11 of the report indicates volumes of 443,000 and 42,000 acre-feet, respectively. These volumes equate to unimpaired and observed daily flows of 7,200 and 680 cfs, respectively. The unimpaired 7,200 cfs flow provides roughly 3,500 acres, while the observed 680 cfs flow provides about 870 acres. Therefore, during the spring when floodplains were historically inundated it is unlikely that 680 cfs provides for any floodplain inundation. Based on the graph, floodplain inundation likely occurs at flows greater than 4,000 cfs.

The Stanislaus River's channel does not appear to have a well-defined floodplain within the 100 to 10,000 cfs flow range. Figure 8 shows that the surface area to flow relationship for the Stanislaus River is fairly linear, with the area increasing more sensitively to flows less than 3,000 cfs.

Figure 8. Stanislaus River Surface Area versus Flow



The median May unimpaired and observed flow data for the Stanislaus River from Table 2-10 of the report indicates volumes of 224,000 and 63,000 acre-feet, respectively. These volumes equate to unimpaired and observed daily flows of 3,640 and 1,020 cfs, respectively. At 3,640 cfs, the Stanislaus River covers an area of roughly 1,480 acres. The observed 1,020 cfs flow provides about 930 acres. It is difficult to determine when floodplain inundation will likely occur on the Stanislaus River from the the ACOEs' data. The gradual sloping curve in the graph lacks a steeper jump as shown in the other two rivers and may be indicative of a more incised river channel devoid of accessible floodplains. Managed flows without the frequent storm or snowmelt runoff peaks allow vegetation to encroach and armor the river's banks.

In supporting the SWRCB's efforts to establish flow requirements as a percent of unimpaired flow, the Department stresses the need for any flow percentages chosen to generate flows during the critical late winter and early spring periods sufficient to inundate each tributary's floodplains.

Mitigation for Water Development

For more than 100 years substantial water development has occurred on the Delta and the San Joaquin watershed. This has resulted in the following consequences:

i) anadromous fish habitat has been reduced by over 50% in each SJR tributary;
ii) spring-run Chinook salmon have become extinct;

iii) steelhead populations have been reduced to levels that are in danger of extinction warranting protection under the Federal Endangered Species Act,
iv) fall-run Chinook salmon are at high risk of extinction in at least one SJR tributary (Tuolumne);
v) remaining anadromous fish populations have been forced to coexist in lower elevation lower quality habitat areas when historically they were spatially segregated and had access to higher quality habitat areas;
vi) instream flow patterns are highly altered and do not resemble historical "fish friendly" natural hydrographs that produced substantially greater numbers of anadromous fish than occurs today;
vii) anadromous fish habitat and populations have essentially been extirpated in the mainstem SJR.

This water development induced significant reductions of anadromous fish populations and their habitats has largely been unmitigated except for small scale habitat restoration efforts and minor hatchery production that falls grossly short of replacing lost fishery habitat and fishery beneficial uses.

Window of Protection

The Department has submitted substantive information to the Board demonstrating that the 31-day pulse flow window of protection afforded to out-migrating juvenile salmon smolts from the SJR is too narrow (CDFG 2005). When the 1995 WQCP was promulgated it was anticipated that 75% of smolts would be protected. However in practice, the 31-day pulse flow has provided less than 60% on average across water year types. This lack of sufficient window of duration protection is linked with, and corresponds to, a lack of tributary flow. When tributary flows are reduced after the 31-day pulse flow period, smolt movement ceases even though substantial smolt-size fish remain in the upper portions of the tributary where cold water exists. This cessation in smolt movement occurs simultaneously with elevated water temperatures that occur due to diminished reservoir releases that are unable to sustain cool water throughout the majority of the lower river channel (CDFG 2007). CDFG Model V.1.6. (CDFG 2009a) indicates that to double juvenile production, the spring pulse flow window of protection needs to expand with increase in water year type, ranging from 31 days in Critical Dry Years to 70 days in Wet Years.

Flow Alternatives to Evaluate

The Department recommends that today's observed flows represent the baseline condition and that the maximum range evaluated be 70% consistent with the SWRCB's Delta flow Recommendations for the Sacramento and Delta outflow criteria. Gradations between these two flow extremes could be evaluated as mid-range alternatives.

Although the report indicates "No attempt was made to calculate the short term peak flows and flood frequencies of unimpaired flow in this report because daily unimpaired flow data is not readily available at Vernalis," the Department does believe these calculations would be helpful to better understand the natural flow regime.

Escapement Trend Analysis

The Board's report references spring flow vs. annual escapement trends (Section 3.6 page 49). Use of escapement estimates when comparing spring flow 2.5 years prior to escapement year assumes that each year's escapement is dominated by three year old salmon. This assumption does not hold true in many instances. In some years, other aged fish dominate annual escapements while in some years, non-age-three fish approximate age three fish, confounding the results. The use of brood year production cohorts that aggregate fish from all age groups based upon their birth year is statistically and biologically more accurate. This method also enables correlation analysis with environmental conditions such as spring flow and juvenile fish experience during their natal year to be assessed. The Department, in consultation with Dr. Carl Mesick, has prepared brood year cohort data for the Merced, Tuolumne, and Stanislaus Rivers. These data were compared with SJR (Vernalis) spring flows and Delta exports with results presented to the CalFed Environmental Water Account Peer Review Panel in 2006 (Marston and Mesick 2006). The results of this analysis indicates that a strong relationship exists between spring flow magnitude and total number of fish produced (both ocean harvest and inland escapement). To the contrary, spring South Delta combined exports showed little correlation with brood year production cohort population abundance.

Production Goals

The Department recommends that the SWRCB recognize and accept the biological and management goals identified in its Delta Flow Criteria Report (SWRCB 2010) as a basis for establishing flow criteria for the SJR. Additionally, immediate and short term objectives to increase populations to sustained levels that result in population resiliency (viability) enabling the populations to withstand both predictable (e.g. lowered flow) and unpredictable (e.g. ocean condition down turn) mortality pressures are needed.

Restoration Actions

The Department submitted comments to the Board (CDFG 2010) regarding restoration actions taken to date to reverse the declining SJR salmon trend. Increasing instream flows in the SJR tributaries during key production periods has not occurred though major non-flow restoration actions have. The result of this management strategy has not stopped the decline of SJR salmon populations, where today at least one stock (Tuolumne) has declined to the point of being at high risk of extinction. Though millions have been spent on non-flow habitat restoration (Department of Finance, 2005), ocean fisheries have been shut down, and exports substantially curtailed, substantive increases in instream flow in the SJR tributaries have not occurred. The reason that non-flow restoration actions have not resulted in reversing the SJR salmon decline is that these actions have a secondary population influence, while spring instream flow has a first order production influence (CDFG 2008). What this means, is that collectively we have been focusing on the wrong issues to bring about SJR salmon restoration. The Department recommends that the SWRCB substantially improve flows of the SJR.

San Joaquin River Restoration Settlement

The Department is cautiously optimistic regarding the mainstem SJR Restoration Program (SJRRP) now being implemented. The Department is committed to implementing the terms of the Settlement Agreement. However, the SJRRP has many hurdles to overcome and is proceeding with a high level of uncertainty. Some of these hurdles include but are not limited to increasing channel flow capacity in 153-miles of highly altered river course, overcoming significant fish migration barriers, and improving habitat quantity/quality (San Joaquin River Restoration Program 2009). Though the reach between Friant Dam and the confluence with the Merced River has experienced the greatest reduction in flow and channel continuity across years in the SJR system, releasing large amounts of water from Millerton Reservoir before substantial habitat restoration has occurred could have significant impacts including the potential release of excessively warm water into the mainstem SJR downstream of the Merced River confluence. Presence of excessively warm water could retard restoration efforts in the SJR tributaries and diminish cold water benefits accruing in the SJR tributaries if substantial increases in flows in the tributaries were to occur.

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