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Chad Dibble, Staff Environmental Scientist
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Re: Draft *Conservation Strategy for Restoration of the Sacramento-San Joaquin Delta Ecological Management Zone and the Sacramento and San Joaquin Valley Regions* Comments of the San Joaquin River Group Authority

Dear Mr. Dibble:

Please find attached comments on the draft *Conservation Strategy for Restoration of the Sacramento-San Joaquin Delta Ecological Management Zone and the Sacramento and San Joaquin Valley Regions*, submitted on behalf of the San Joaquin River Group Authority.

Very truly yours,
O'LAUGHLIN & PARIS

Kenneth Petruzzelli

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KP/tb
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Comments of the San Joaquin River Group Authority on the
Conservation Strategy for Restoration of the Sacramento-San Joaquin Delta Ecological Management Zone and the Sacramento and San Joaquin Valley Regions

1. Pages 50-53. Striped Bass not included among non-native invasive species.

The Draft ERP listed non-native Centrarchids as "NIS of highest management importance" (DFG 2011, p. 50), citing the negative effects of Centrarchids on native fish populations through predation and competition. However, several studies have documented that non-native, invasive striped bass prey upon juvenile salmon and other native species in the Sacramento-San Joaquin Delta (Stevens 1966, Thomas 1967, Pickard et al. 1982, Merz 1994, Gingras 1997, Nobriga and Feyrer 2007, Miranda et. al. 2010). Striped bass are also NIS with negative impacts, and should be included in the list of highest management concerns (NMFS 2010).

Although striped bass co-existed with salmon and steelhead in the Central Valley since their introduction in 1879, given the population crashes of salmon and steelhead that occurred as the region was developed and serious declines in salmon stocks that are already threatened or endangered, National Marine Fisheries Service ("NMFS") has recommended to the Fish and Game Commission that it is necessary to reexamine the ecosystem effects of maintaining a striped bass sport fishery. NMFS reviewed the available literature regarding striped bass predation on native fish, and concluded that striped bass predation on salmon and steelhead is an important stressor warranting action. Even DFG's striped bass experts have admitted that striped bass predation is one of the stressors contributing to the decline of winter and spring Chinook, with even a small predation rate sufficient to kill thousands of winter and spring Chinook. (Depo. of Marty Gingras, DFG Rule 30(b)(6) Designee, Coalition for a Sustainable Delta, et al. v. McCamman, et al., Eastern Dist. Cal. Case No: 1:08-CV-00397-OWW-GSA (2010); Depo. of Matthew Nobriga, CDFG Expert Witness, Coalition for a Sustainable Delta, et al. v. McCamman, et al., Eastern Dist. Cal. Case No: 1:08-CV-00397-OWW-GSA (2010).) Furthermore, NMFS has recommended amending the striped bass sport fishing regulations to eliminate bag, size, season, and other restrictions (DFG (No Date); NMFS 2010)

Contradictory objectives exist regarding non-native predatory fish species in the ERP. Goal 3, Objective 2 is to "Maintain, to the extent consistent with ERP goals, fisheries for Striped Bass, American shad, signal crayfish, grass shrimp, and non-native warm water game fishes."

(DFG 2011, p. 236). In this context, non-native predatory fishes such as striped bass and Centrarchids are considered harvested populations that should be enhanced. However, Goal 5 is to “reduce the negative ecological and economic impacts of established non-native species in the Bay-Delta estuary and its watershed.” (DFG 2011, p. 238) Given that the ERP clearly states that non-native invasive Centrarchids are of highest management importance due to their negative impacts on native species, the ERP should clarify that to maintain and enhance populations of NIS predatory fishes, such as striped bass and largemouth bass, is inconsistent with ERP goals and would obstruct restoration efforts.

2. Pages 53-54. Address substantial improvements in dissolved oxygen conditions in the Stockton Deep Water Ship Channel.

The Draft ERP states that, “Low DO continues to be a problem in the lower San Joaquin River at the Stockton Deep Water Ship Channel” (DWSC), however, dissolved oxygen in the DWSC is nowhere near the problem it once was. Since the State Water Resources Control Board (“SWRCB”) approved the TMDL, the City of Stockton added two nitrifying bio-towers and engineered wetlands to the Stockton Regional Wastewater Control Facility (“RWCF”) to reduce ammonia discharges to the San Joaquin River. (DWR 2010a, p. 1.) The California Department of Water Resources (“DWR”) constructed a demonstration aeration facility (“Aeration Facility”) at Rough and Ready Island to determine its effectiveness for improving DO conditions in the DWSC. (Id.) Finally, drainage reduction efforts upstream have significantly reduced oxygen demanding substances entering the DWSC. As a result, conditions have improved dramatically, with far fewer, less frequent, and less severe excursions. The major dissolved oxygen sags no longer occur. (DWR 2011; CVRWQCB 2011a.)

Despite the significant progress made, work remains. Stakeholders, among them the San Joaquin River Group Authority (“SJRGA”), are negotiating an agreement to fund and operate the Aeration Facility for the next five years. During that period, it is anticipated that oxygen demanding substances entering the DWSC from upstream will decline further. Hydrology will also change as a result of SWRCB amendments to the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (“Bay-Delta Plan”), a new Biological Opinion will be issued by NMFS for the Central Valley Project (“CVP”)/State Water Project (“SWP”) Operation Criteria and Plan (“OCAP”). During that time, additional information will be gathered. Funding has also become available for the upstream studies, sampling has begun, and a final report is expected in 2013.[1]

3. Pages 83, 119. To address non-native and invasive striped bass, adopt recommendations of NMFS to eliminate season, bag, and size limits for striped bass.

Consistent with its determination that striped bass predation on salmon and steelhead is an important stressor warranting action, NMFS recommended removing bag, season, and size limits for striped bass. (NMFS 2010.) The SJRGA concurs with these recommendations.

DFG's striped bass experts have further supported eliminating sport fishing restrictions on striped bass in order to reduce striped bass predation on winter and spring Chinook, thereby improving their survival, aiding in their recovery, and reducing their risk of extinction. (Depo. of Marty Gingras, DFG Rule 30(b)(6) Designee, Coalition for a Sustainable Delta, et al. v. McCamman, et al., Eastern Dist. Cal. Case No: 1:08-CV-00397-OWW-GSA (2010).)

4. Page 118. Doubling goal needs definition.

a. The "doubling goal" requires doubling "natural production."

Fish and Game Code section 6902(a) directed DFG to double the then-current (1988) natural production of salmon and steelhead trout. The Central Valley Project Improvement Act ("CVPIA") similarly directs the Secretary of the Interior to develop and implement a program to double the natural production of anadromous fish in Central Valley rivers and streams from the average levels attained from 1967-1991, on a sustainable, long-term basis. (P.L. 102-575, §3406(b)(1), October 30, 1992; 106 Stat. 4600.)

Before salmon can be recovered, it has to be determined what salmon (i.e., race, origin, etc.) are being recovered and to what state is it possible to recover them to. For instance, the doubling goals adopted by the CVPIA and the State of California do not define "natural production" and the goal of "doubling" has no biological basis in terms of what is possible to achieve or sustainable . According to the CVPIA's doubling goal, the Secretary of the Interior must:

> "Develop within three years of enactment, and implement a program which makes all reasonable efforts to ensure that by the year 2002, natural production of anadromous fish in the Central Valley rivers and streams will be sustainable, on a long-term basis, at levels not less than twice the average levels attained during the period of 1967-1991."

[1] Personal Communication Christine Joab, California Water Quality Control Board, Central Valley Region ("CVRWQCB"), June 14, 2011.

California’s similar doubling goal states:

> “It is the policy of the state to significantly increase the natural production of salmon and steelhead trout by the end of this century. The department shall develop a plan and a program that strives to double the current natural production of salmon and steelhead trout resources.”

(Cal. Fish and Game Code §6902(a).)

b. Source of the goal to double natural production

In 1983, the California Senate established the California Advisory Committee on Salmon and Steelhead Trout (Senate Joint Resolution 19 in 1983). In 1988, the Committee submitted its report to the Senate. The report, entitled “Restoring the Balance” (the “1988 Report”), found that **production** had declined precipitously throughout the State. (1988 Report, p.15) The 1988 Report then detailed the decline of the **total production**, stating that “King salmon now averages only one million annually.” (1988 Report, p.15) The 1988 Report therefore recommended to the Senate that “The legislature should declare its state policy to double the present levels of salmon and steelhead trout **production** by the year 2010, following the guidelines articulated in SB 2261.” Senator Keene had introduced SB 2261 (endorsed by the California Advisory Committee on Salmon and Steelhead Trout), which declared at Section 6902 that “It is the policy of the State to increase the **production** of salmon and steelhead trout by the end of this century to approximately double that of present levels.” As a result, “production” was not qualified as “natural production” in either the 1988 Report or in the initial legislation.

In a subsequent letter from Bill Yates of the Pacific Coast Federation of Fisherman’s Association (PCFFA”), dated June 14, 1988, the PCFFA suggested inserting the word “natural” in front of “production.” Senator Keene accepted Mr. Yates’ suggestion and inserted the word “natural” in front of the word “production” in the then-draft of SB 2261. PCFFA inserted the word “natural” in front of “production” in every section but the “definitions” section. California Fish and Game Code section 6911 therefore defines “production” as “the survival of fish to adulthood as measured by the abundance of the recreational and commercial catch together with the return of fish to the state's spawning streams,” without differentiating between hatchery and naturally-spawned fish. SB 2661, with the requirement for “natural production,” was eventually passed by the Assembly and Senate, and was signed by the Governor.

c. Estimating "natural production."

As a requirement of SB 2261, the DFG submitted its report, "*Central Valley Anadromous Sport Fish Annual Run-Size, Harvest and Population Estimates, 1967 through 1991*" (the "1994 Report"), to the Legislature in 1993.[2] (Fish & Game §6924.) The purpose of the report was to determine what natural production needed to be doubled by determining average baseline production from 1967-1991. The report, however, estimated salmon "population," not "production." (DFG 1994, pp. 26, 32.) According to the "Summary and Conclusions" section, SB 2661 requires restoration goals to be established for Central Valley anadromous **populations** not less than twice the average levels attained during the period of 1967-1991. (**emphasis added**.)" (DFG 1994, p. 26.)

"Population" is different than "production." Furthermore, the report did not distinguish between hatchery production and natural production, even though Fish and Game Code sections 6901(e) and (f) specifically recognized both the difference and the importance:

> "(e) Proper salmon and steelhead trout resource management requires maintaining adequate levels of natural, as compared to hatchery, spawning and rearing.
>
> "(f) Reliance upon hatchery production of salmon and steelhead trout in California is at or near the maximum percentage that it should occupy in the mix of natural and artificial hatchery production in the state. Hatchery production may be an appropriate means of protecting and increasing salmon and steelhead in specific situations; however, when both are feasible alternatives, preference shall be given to natural production."

However, DFG was unable to determine elements necessary to establish the doubling goal because it lacked some of the fisheries data for the 1967-1991 period. (DFG 1994, pp. 26, 32.) Fish and Game Code section 6911 defines "production" as the survival of fish to adulthood, as measured by the abundance of the recreational and commercial catch, together with the return of fish to the state's spawning streams. At the time, ocean harvest for the San Joaquin River harvest was not known. (DFG 1994, p. 32.) As a result, DFG lacked the information required to estimate "production" within the meaning of the Fish and Game Code. Even then, the population estimates did not distinguish between hatchery fish and natural fish. Distinguishing between hatchery fish and natural fish at the time was impossible, because hatchery fish were not marked. The only distinction between the two was the number of salmon harvested at the hatchery.

[2] A revised report was issued in 1994.

The other significant problem with the 1994 Report is that it uses carcass surveys[3] as the basis for estimating the number of fish. Escapement estimates were primarily made using methods that are not recommended for use due to bias and unreliability. (Parsons and Skalski 2010.) In addition, the 1994 Report does not set forth the data or methodology to arrive at the estimates, nor does the 1994 Report state the methodology was consistent from year-to-year, etc. There can be little reliability in carcass study estimates set forth in the 1994 Report.

As far as the SJRGA knows, the 1994 Report has not been amended and the numbers set forth in the 1994 Report are still the goals of SB 2661. Nonetheless, if the State is to achieve the goal of Fish and Game Code section 6902(a), it must set forth the correct goal and numbers for "natural production" of fall Chinook in the San Joaquin River Basin. Only then can DFG develop actions to implement the doubling goal.

5. Page 139. Dams and their associated reservoirs serve as migration barriers to adult salmon, preventing access to as much as 72 percent of the Central Valley's historical salmon and steelhead spawning and holding habitat.

The Draft ERP Conservation Plan does not distinguish between migratory barriers for the different Chinook salmon runs. (DFG 2011, p. 139.) This is an important distinction, because fall Chinook are the only remaining run in the San Joaquin River system. Fall Chinook historically spawned in the valley floor and lower foothill reaches below the 500 to 1,000 foot elevation, depending on location, and was limited in their upstream migration by their egg-laden and deteriorated physical condition. (Yoshiyama 1996, p. 74.) The spring Chinook, in contrast, ascended to higher-elevation reaches. Consequently, today's dams and reservoirs in the San Joaquin River system would not block upstream migration of fall Chinook and bypassing them should not be a goal in recovering fall Chinook.

6. Page 143. The Tuolumne River has historically produced the greatest amount of fall-run Chinook salmon and also has the widest fluctuation in adult population abundance over time.

According to the Draft ERP Conservation Plan:

> "For perspective, the Tuolumne River has historically produced the greatest amount of fall-run Chinook salmon (DFG 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

[3] This is uncertain, as the 1994 Report, at page 12, does not include this methodology. However, the Grand Tab uses this method, and the numbers reported in Appendix 3 are similar to the Grand Tab.

> association with adult abundance in the Tuolumne River (DFG 2010), and the Tuolumne has consistently been releasing the least amount of water proportionately across years, there is great potential restoration for fall-run Chinook in this tributary. This can be accomplished by allowing more water to consistently be released across years during key fall-run production time periods (e.g., spring)."

(DFG 2011, p. 143.)

First, there is no information presented in Yoshiyama et al (1996) to support the statement that "the Tuolumne River historically produced the greatest amount of FRCS." Specifically, Yoshiyama et al (1996) states:

> "The California Fish Commission (CFC 1886) noted that the Tuolumne River "at one time was one of the best salmon streams in the State", but that salmon had not ascended that stream "for some years". At the time of Clark's (1929) writing, salmon generally still were "scarce" in the Tuolumne River….In the past, fall-run sizes in the Tuolumne River during some years were larger than any other Central Valley streams except for the mainstem Sacramento River, reaching as high as 122,000 spawners in 1940 and 130,000 in 1944 (Fry 1961). Tuolumne River fish historically have comprised up to 12% of the total fall-run spawning escapement for the Central Valley (CDFG 1993)."

Secondly, the logic presented here implies that flow is the primary determinant of FRCS abundance in the Tuolumne River, and that salmon abundance would increase if more water was released. While it is not clear which document is being cited, DFG 2010a or DFG 2010b, all analyses of flow and adult abundance cited and presented by DFG have been based on linear regressions. The use of linear regressions to assess these effects is too simple an approach given the clear importance of other environmental factors, the tendency for other factors to be correlated with each other, and other violations of simple linear regression that have not been addressed (FISHBIO 2011 comments to the SWRCB). Thus, it is inappropriate to imply that releasing more water in the Tuolumne River will restore FRCS in this tributary.

7. Page 145. Potential floodplain habitat in the San Joaquin River Basin, upstream of Vernalis, is limited.

The Draft ERP Conservation Plan espouses the benefits of floodplain restoration in the San Joaquin River and its major tributaries (pages 144-146; pages 150-151). Action 1 under Natural Floodplains and Flood Processes is to "support SWRCB's efforts to establish flow requirements that provide sufficient flows to inundate floodplains during critical late winter and early spring periods." (DFG 2011, page 183) However, "sufficient flows to inundate floodplains" do not ensure that the inundated floodplains would be of sufficient quantity or quality to provide the desired benefits. Historically, most of the San Joaquin River Basin's floodplain existed in the upper basin upstream of the Merced River and relatively little floodplain habitat occurred in the Lower San Joaquin River until entering the Delta. (FISHBIO 2011, p. 23-24.) Inundated floodplains in the San Joaquin River are likely to be comprised of deep water, due to the natural confinement of the adjacent lowlands and to the frequent presence of oxbow features. (Id., p. 25.) Floodplains within the San Joaquin River are also likely to be swifter and may not provide as much food or cover when they are inundated, in comparison with floodways of the Sacramento River. Consequently, the amount of habitat suitable for juvenile Chinook, which strongly prefer shallow, slow-velocity habitat, may be limited to a relatively small portion of the inundation zones. The south Delta historically, consisted of large expanses of shallow, slow velocity water yielding increased productivity of fish food organisms and increased growth of juvenile Chinook. It was more similar to today's Yolo Bypass. However, extensive channel modification, primarily levees, changed the shallow tidal marsh environment in ways that cannot be re-established by flow management. Habitat restoration is needed to improve conditions before it can be determined whether managed flows would influence the functionality of restored habitats. In other words, restoring the south Delta to more historic conditions must come first. The Draft ERPP does acknowledge this challenge, stating that "Connecting floodplain inundation to flow values is a complicated task requiring intimate knowledge of each tributary river system. What has not been determined is whether flows generate inundated floodplain conditions." Thus, an important first step is to determine whether or not it is possible to provide flows to inundate existing or restored floodplains of sufficient quality and quantity to have the desired effect.

In recent Bay-Delta meetings, the SJRGA had one-dimensional unsteady hydraulic model runs performed for the San Joaquin River between the Merced River and the Mossdale Bridge to determine the relationship between floodplain inundation and flow. (CBEC Eco Engineering 2011.) An HEC-RAS ("RAS") model was developed for the 60 miles of the San Joaquin River using readily-available data. Model development was facilitated using HEC-GeoRA, a GIS interface for pre-processing model inputs (i.e., cross sections) and post-processing model outputs (i.e., inundation maps). Inundation mapping was performed by running a range of quasi steady-state flows through the unsteady RAS model in increments of 1,000 cfs from 1,000 cfs up to 25,000 cfs. (*see* Table 1.)

The model runs showed that in the San Joaquin River downstream of the Merced River, there was progressively less floodplain inundation in the downstream direction over a stream flow range of 1,000-25,000 cfs. (FISHBIO 2011, p. 25.) At a flow of 16,000 cfs, which represents approximate bank-full flow in the San Joaquin River downstream of the Stanislaus River and constitutes 2-3X bank-full flow in the main stem downstream of the Merced River, the estimated amount of inundated floodplain ranges from a maximum of 6,884 acres between the Tuolumne and Merced Rivers, to a low of 908 acres from the Stanislaus River downstream to Mossdale (CBEC Eco Engineering 2011.) In the Stanislaus to Mossdale reach (17 river miles), the extent of inundated floodplain only exceeds 2,000 acres at the maximum modeled flow of 25,000 cfs. (FISHBIO 2011, p. 25.) Almost no floodplain is inundated with flows less than 5,000 cfs and further gains in floodplain decline above 15,000 cfs. Much of the inundated floodplain habitat at intermediate flows are associated with oxbow features, many of which appear to retain water year-round and are known habitat for predatory fish.

The CBEC analysis did not extend into the Delta beyond Mossdale, but conventional wisdom is that the extensive levee systems in the Delta severely constrain all flows within narrow corridors (except for flooded islands) and, therefore, the potential functions associated with floodplain inundation are not applicable to the south and central Delta waters. Even then, the Delta contains heavily rip-rapped levees and no floodplain habitat capable of being inundated with higher flows.

Table 1. Available floodplain and flows required for inundation

Reach	Description	Length (miles)	Bankfull Flow (cfs)	% Available Floodplain			% Available Floodplain			Additional Available Floodplain	
				%	Acres	Flow (cfs)	%	Acres	Flow (cfs)	Acres	Flow (cfs)
1	Newman to E Las Palmas Ave	19	5,000-8,000	50	2,800	6,000-12,000	60	3,200	12,000	2,100	12,000-15,000
2	E Las Palmas Ave to Toulumne R.	14	5,000-8,000	50	2,800	6,000-12,000	60	3,200	12,000	2,100	12,000-15,000
3	Toulumne R. to Stanislaus R.	10	13,000	70	1,800	7,000-17,000	80	2,100	17,000	300	17,000-25,000
4	Stanislaus R. to Mossdale Bridge	17	16,000	56	1,600	10,000-25,000	74	2,100	25,000		

8. Page 147. EPA Region 10 temperature criteria should not apply in the San Joaquin River Basin.

To support its assertion that warmer water temperature limits life history diversity of populations because it abbreviates periods that support migration, spawning, and rearing, DFG relies on temperature thresholds for migratory salmonid species developed by the United States Environmental Protection Agency ("EPA"), Region 10. (DFG 2011, p. 147-148.) However, these temperature thresholds are not appropriate for direct application in the San Joaquin River Basin, because they were never intended for such use.[4]

EPA Region 10, which encompasses Oregon, Washington, Alaska, Idaho, and 267 Native American tribes, determined that there were a variety of chronic and sub-lethal effects likely to occur to Pacific Salmonids, that the guidance in *Quality Criteria for Water 1986* would not necessarily protect Pacific Northwest salmonids, and that guidance more specific to Pacific Northwest salmonids was necessary. (EPA 2003.) As a result, in EPA Region 10 issued additional guidance for designating uses, developing temperature water quality objectives, managing stream temperatures, issuing National Pollutant Discharge and Elimination System ("NPDES") permits for heat discharges, and identifying water quality limited segments under Clean Water Act Section 303(d) within its region. It did not adopt new water quality objectives or any new regulations, but simply additional guidance that agencies within EPA Region 10 could use in developing their own objectives. While the guidelines may offer states and regions outside the Pacific Northwest assistance in developing their own temperature objectives, the EPA Region 10 criteria were specific to Pacific Northwest salmonids, Pacific Northwest streams, and Pacific Northwest hydrology.

EPA Region 10 obtained preference and avoidance figures for various Pacific Northwest salmonids by conducting a literature review, but only one of the studies in the literature reviewed, a study of juvenile wild Steelhead, was conducted in California. (Sauter *et al.* 2001, p. 3-10.). The other studies used salmonids from British Columbia, Virginia, Oregon, Washington, and Ontario. The only California study was conducted in an unspecified stream in "northern California," not in the San Joaquin River Basin. Furthermore, only two of the studies observed fall-run Chinook salmon, but both studies were conducted in Washington, not the San Joaquin

[4] Directly applying EPA Region 10's temperature criteria in this manner is much like reading Cliffsnotes to understand literature.

River Basin. Even then, the Region 10 Temperature Criteria was just one part of EPA Region 10's guidance. The Regional 10 Temperature Criteria was not intended to operate alone and be applied directly, but as only one of multiple considerations, such as unusually warm seasonal conditions, natural background temperatures exceeding temperature criteria, and diurnal variations, in developing temperature objectives for the waters of the Pacific Northwest. (EPA 2003, pp. 20, 35.) While the methodology used to develop the EPA Region 10 criteria may provide useful guidance in developing temperature objectives in the San Joaquin River Basin, it was never intended to directly apply to rivers and streams in the San Joaquin River Basin, does not directly apply to rivers and streams in the San Joaquin River Basin, and should not be relied up to directly apply temperature thresholds in the San Joaquin River Basin to determine what temperature conditions are adequate for salmonids. Unlike the Pacific Northwest, the San Joaquin River Basin is at the southern-most range of fall fun Chinook.

9. Page 154. Temperature modeling shows that increased flows would not achieve DFG's recommended temperatures.

a. Relation of flow to water temperature unsupported by DFG Bay-Delta Phase I Exhibit 15.

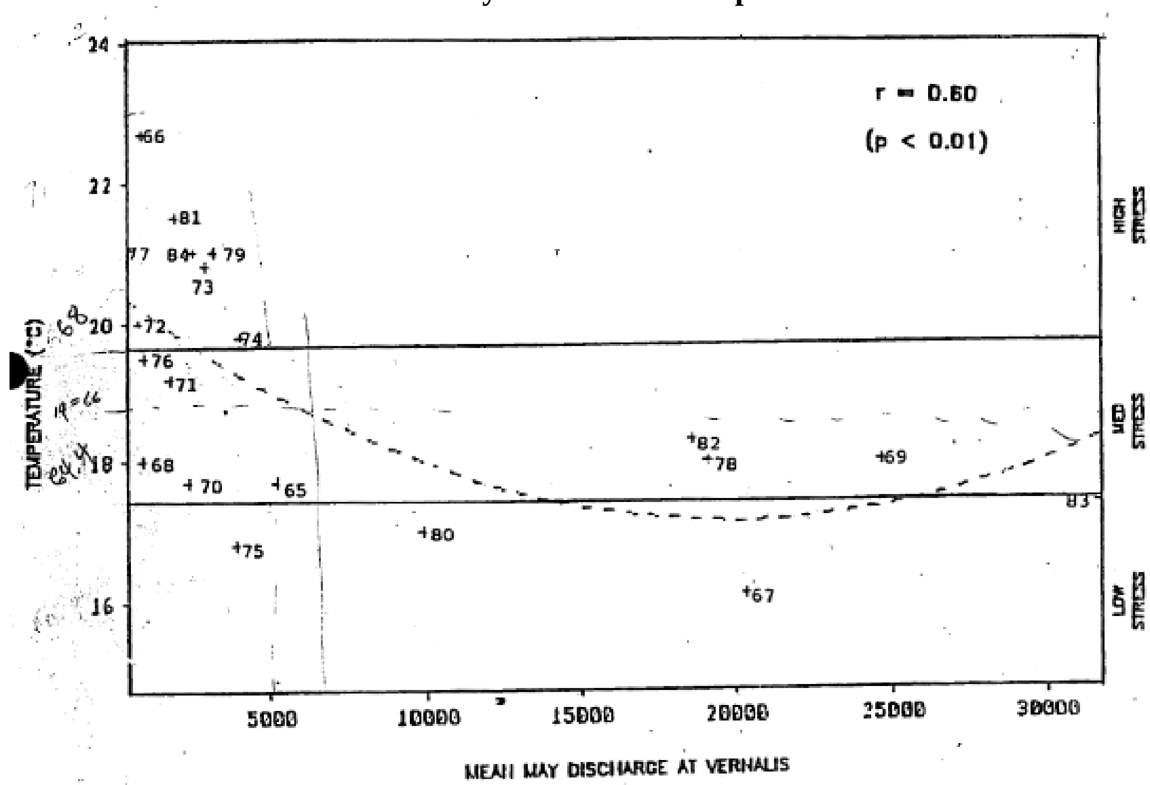
DFG quotes to the 1993 "Restoring Central Valley Streams: A Plan for Action. Department of Fish and Game," stating that "Exhibit 15 to the SWRCB for Phase I of the Bay-Delta hearings showed that, in years when the flow at Vernalis was 5,000 cfs or less in May, water temperatures were at levels of chronic stress for Chinook smolt." (DFG 2011, p. 154.) The cited reference, however, simply references Exhibit 15. It does not directly cite to or rely on Exhibit 15.

In Exhibit 15, DFG acknowledged that tributary stream flow would only be effective in improving the number of adult salmon if combined with measures which improve survival of juveniles in the south Delta. (DFG 1987.) Tributary stream flow alone will not improve survival and will accomplish nothing other than waste water. Absent a "total water management approach," which Exhibit 15 does not describe, "very large amounts of water would be necessary to recover San Joaquin Drainage Chinook salmon runs to historic levels." The Draft ERP Conservation Plan does not state how many acre-feet of water constitute "very large amounts of water." The Draft ERP Conservation Plan also fails to identify where the "very large amounts of water" would come from, or how reallocating "very large amounts of water" recover San

Joaquin Drainage Chinook salmon runs to historic levels would impact other existing water uses, or if reallocating "very large amounts of water" sufficient to recover San Joaquin Drainage Chinook salmon runs to historic levels would even be feasible.

Consistent with DFG's assessment, flow alone was not necessary to achieve non-High Stress temperatures half the time. DFG found no correlation between stream flow at Vernalis and water temperature in March and April from 1965-1984. (DFG 1987, p. 25.) It did not address whether there was a correlation in June. A correlation was only found in May. Although 8 of 13 years with a mean May discharge at Vernalis of less than 5,000 cfs were in the "High Stress" range and two additional years with a mean May discharge less than 5,000 cfs came very close to the High Stress range, of the 12 years when temperatures were not in the High Stress range only 6 had a mean May discharge greater than 5,000 cfs.[5] (*see* Figure 1.)

Figure 1. DFG Bay-Delta Phase I Exhibit 15, Figure 9, depicting the relationship of San Joaquin River stream flow and water temperatures at Vernalis in relation to chronic thermal stress for Chinook salmon fry and smolt development.



[5] From Figure 9, it is difficult to tell whether the mean monthly flow in May 1965 was more or less than 5,000 cfs.

Furthermore, in all years when flows at Vernalis were more than 5,000 cfs, they were 10,000 cfs or more. There were no years with flows between 5,000 and 10,000 cfs, and of the six years exceeding 10,000 cfs, only half (three years) resulted in Low Stress temperature conditions. Of the three years exceeding 10,000 cfs and only achieving Medium Stress temperatures, flows were nearly 20,000 cfs and in one year nearly 25,000 cfs. Clearly, even very high flows can be insufficient to result in optimal temperature conditions.

Of the 12 years with Medium and Low Stress temperatures, eight were Wet years and one was an Above Normal year. (*see* Table 2.) Clearly, in May, flow alone is insufficient to avoid High Stress temperature conditions and other conditions associated with Wet and Above Normal year types, such as more snow pack, lower air temperature, and air temperature increasing later in the year may be necessary to avoid High Stress temperature conditions.

Table 2. San Joaquin River water year types, temperature stress levels, and mean may flow from DFG Bay-Delta Phase I Exhibit 15, Figure 9

	San Joaquin	Temperature	Mean May Flow > cfs					
Year	**WY Type**	**Stress[6]**	**5000**	**10000**	**15000**	**20000**	**25000**	**30000**
1965	W	M						
1966	BN	H						
1967	W	L				Y		
1968	D	M						
1969	W	L					Y	
1970	AN	M						
1971	BN	M						
1972	D	H						
1973	AN	H						
1974	W	H						
1975	W	L						
1976	C	M						
1977	C	H						
1978	W	M			Y			
1979	AN	H						
1980	W	L		Y				
1981	D	H						
1982	W	M			Y			
1983	W	L						Y
1984	AN	H						
1977	C	H						
1978	W	M			Y			

[6] H = High, M = Medium, L = Low

b. Reservoir operations are not a viable method of lowering temperatures.

The Draft ERPP acknowledges that water temperatures are affected by multiple factors, including reservoir operations, water diversions and ambient air temperature, but places priority on the reservoir management (DFG 2011, p. 181). Contrary to the Draft DRP Conservation Plan recommendation, reservoir operations will not lower temperatures sufficiently to improve the survival of fall Chinook in the San Joaquin River Basin. Using the San Joaquin River Basin Temperature Model, the SJRGA has simulated temperature conditions that would occur if all of the water in the basin were used for fishery flows. (AD Consultants 2007, p. 5.) The simulation used the 1995 through 2005 hydrology, but maintained historical storage and eliminated diversions by rerouting them back to the reservoirs. (Id.) Even if New Melones, Don Pedro, McClure Reservoir, and Millerton Lake were full and emptied all of their storage immediately, the increased flows would still fail to achieve the temperature criteria DFG recommended for the 2008/2010 Clean Water Act section 303(d) List (59°F) with sufficient frequency to avoid water quality limited segment identification. (Id. at 21-22.) This is consistent with DFG's acknowledgement in Exhibit 15 that tributary stream flow would only be effective in improving the number of adult salmon if combined with measures improving survival of juveniles in the south Delta (DFG 1987).

In addition, the SWRCB considered the use of reservoir releases to control water temperatures in the Delta when it adopted the 1991 Water Quality Control Plan for Salinity for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary ("1991 Salinity Plan"). (SWRCB 1991.) The 1991 Salinity Plan required temperatures no greater than 68°F during the periods of April through June and September through November at Freeport on the Sacramento River, and Vernalis on the San Joaquin River. It further stated that temperatures should be achieved by controllable factors, such as waste discharge controls, increases in riparian canopy, and bypass of warming areas. (SWRCB 1991, p. 1-13, Table 1-1.) The SWRCB defined "controllable factors" as "those actions, conditions, or circumstances resulting from human activities that may influence the quality of the water of the State, that are subject to the authority of the [SWRCB], or the [CVRWQCB], and that may be reasonably controlled." The SWRCB therefore concluded, based on the record of proceedings, that controlling temperature in the Delta utilizing reservoir releases was not reasonable due to the long distance between the Delta and upstream reservoirs, and to uncontrollable factors such as ambient air temperature, water temperatures in the reservoir releases, etc. For these reasons, the SWRCB concluded that reservoir releases to control water temperatures in the Delta constituted a waste of water and, therefore, it would require a test of reasonableness before consideration of reservoir releases for such a purpose. Since, as DFG has acknowledged, flow alone will not improve the number of fall Chinook unless combined with other measures to improve survival of juveniles in the south Delta, any use of reservoir releases to control temperatures in the Delta would be a waste and unreasonable use of water in violation of Article X, section 2 of the State constitution and illegal. (DFG 1987.)

HEC-5Q temperature modeling also shows that that historic natural temperature was warmer than the Region 10 temperature criteria DFG has recommended. (AD Consultants 2007, pp. 6-7, 12; *see* Figure 2.) Even when simulated, “natural” historic maximum temperatures were cooler than actual historic maximum temperatures; they were still warmer than the Region 10 temperature criteria. If water temperatures were warmer under natural conditions, then San Joaquin River Basin fall Chinook thrived despite warm water temperatures, and factors other than water temperatures are responsible for their decline.

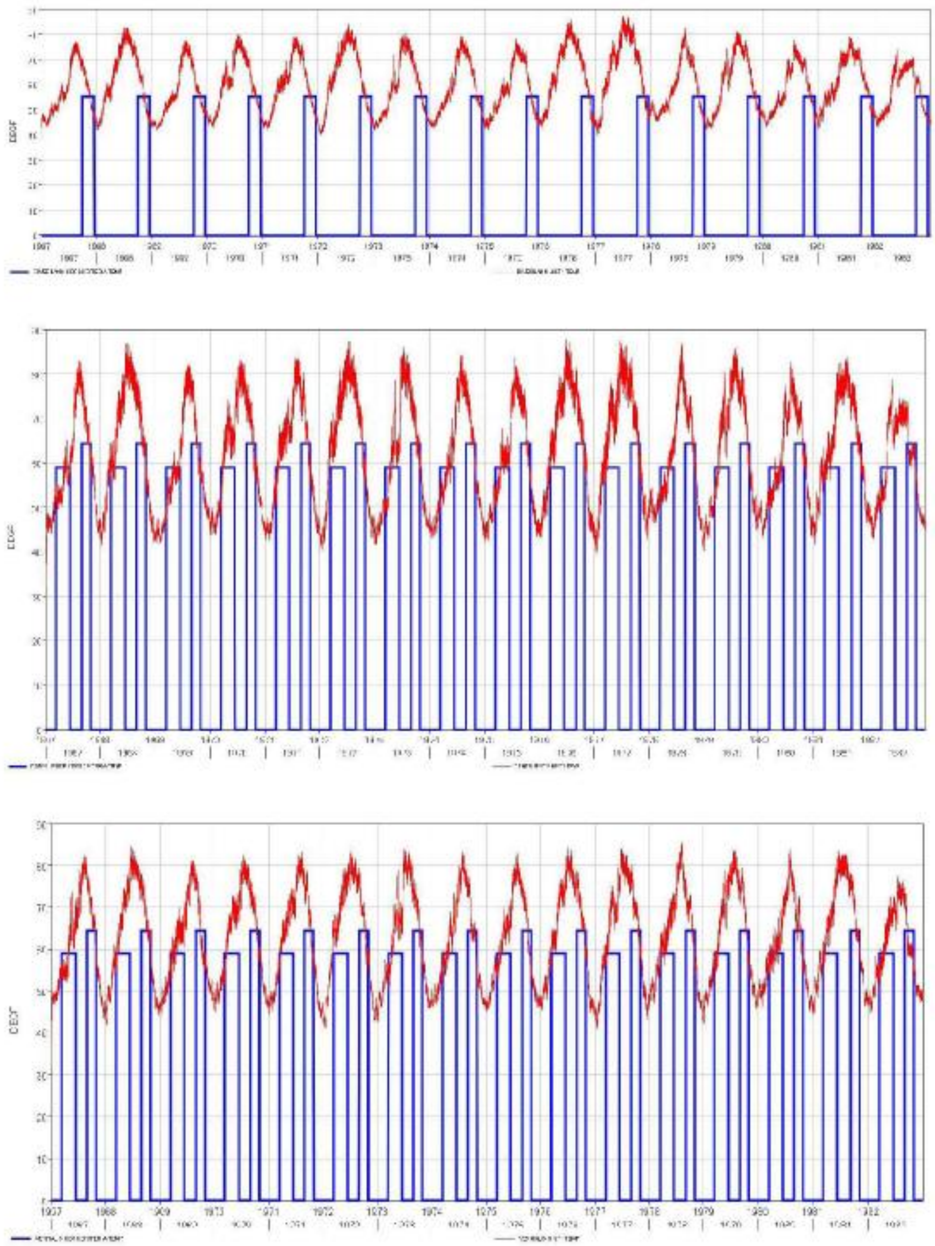


Figure 2. San Joaquin River Temperature Model Comparing DFG recommended temperature criteria (blue) to simulated natural temperatures (red).

c. Page 176. Clean Water Act section 303(d) temperature listing is not valid.

DFG's recommendations to indentify the San Joaquin, Stanislaus, Tuolumne, and Merced Rivers ("Lower Tributaries") for temperature impairment under section 303(d) of the Clean Water Act (33 U.S.C. §1313(d)(1)(A)) were not adopted by the SWRCB because DFG did not use an appropriate evaluation guideline.(SWRCB 2010.) As defined in the Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and

Estuaries of California, temperature impairment is based on whether detrimental changes from "natural receiving water temperature" have occurred. Nothing that DFG submitted addressed this issue." (SWRCB 2002; CVRWQCB 2011b, p. 23.)

DFG's 2012 section 303(d) List recommendations are essentially the same as those made for the 2008/2010 section 303(d) List. DFG again relies on the EPA Region 10 criteria, which is not applicable, and again fails to address whether detrimental changes from "natural receiving water temperature" have occurred. (DFG 2011, p. 156.) Whatever new recommendations the DFG has submitted in the Draft ERP Conservation Plan have not been addressed by the SWRCB, but DFG again takes the same approach that was previously rejected by the SWRCB.

The Draft ERPP claims that "the US EPA included [the lower San Joaquin River and its tributaries] on its list of impaired bodies for California and has reconsidered including the San Joaquin tributaries as impaired for temperature." (DFG 2011, page 156.) Although EPA issued its draft decision identifying water quality limited segments and associated pollutants in California, pursuant to section 303(d) of the Clean Water Act on November 12, 2010, and its draft decision which identified the San Joaquin, Stanislaus, Tuolumne, and Merced River for temperature impairment, it has not, in nearly nine months, issued a final decision. (75 Fed. Reg. 68784 (Nov. 9, 2010); 75 Fed.Reg. 71431 (Nov. 12, 2010); EPA 2010) Until EPA does, its decision is not final as to *any* water quality limited segments or pollutants, let alone the San Joaquin, Stanislaus, Tuolumne, and Merced Rivers for temperature impairment.

10. Page 155. Population response to improved temperatures uncertain.

The Draft ERP Conservation Plan lists a few detrimental effects of "elevated water temperature" on adult salmon escapement abundance. First, the Draft ERP Conservation Plan does not say what "elevated water temperature" is elevated from. If it is elevated from natural water temperatures, then other factors should be evaluated as limiting abundance of fall Chinook. It also admits that "Although steelhead and Chinook salmon in the San Joaquin, Stanislaus, Tuolumne, and Merced rivers could benefit from improved water temperature conditions, the population response is currently uncertain." (DFG 2011, p. 155.) In other words, despite the theoretical benefits of lower temperatures, it is unknown whether such efforts would actually contribute to increasing the abundance of fall Chinook and steelhead.

11. Page 156. San Joaquin River dissolved oxygen 6.0 mg/l September-November objective should be eliminated and the 5.0 mg/l objective applied year-round.

The San Joaquin River dissolved oxygen objective is 6.0 mg/l from September through November and 5.0 mg/l the rest of the year. (SWRCB 2006, p. 14.) According to the Draft ERP Conservation Plan, "the 6 mg/l objective was adopted to protect the upstream migration of fall-run Chinook salmon by the State Water Resources Control Board in 1991" (DFG 2011, p. 157). The source of the 6.0 mg/l dissolved oxygen objective appears to be a 1969 agreement between U.S. Fish and Wildlife Service, USBR, DWR, and DFG, wherein DWR would monitor dissolved oxygen levels in the San Joaquin River between Turner Cut and Stockton and, if dissolved oxygen levels dropped below 6.0 mg/l, DWR was required to install a temporary rock barrier across the head of Old River to increase San Joaquin River flows past Stockton, thereby improving dissolved oxygen levels. (SWRCB 1991, p. 5-23.) The dissolved oxygen discussion in the 1991 Salinity Plan references *Migrations of adult king salmon Oncorhynchus tshawytscha in the San Joaquin Delta*, a 1970 report by drafted by Richard Hallock for DFG, stated that "no salmon moved past Stockton until the dissolved oxygen had risen to about 4.5 ppm, and the run did not become steady until oxygen levels were above 5 ppm." The 6.0 mg/l was not a threshold requirement for anything related to the biological health or activities of salmon migrating into the San Joaquin River Basin between October and November, but instead was an operational trigger for DWR to begin installing the rock barrier at the head of Old River in time to prevent dissolved oxygen levels in the DWSC from falling below 5.0 mg/l.

In 2010, the DWR, in conjunction with the Aeration Facility project, issued a report on the impacts of dissolved oxygen on salmon migration through the DWSC. (DWR 2010b, p. 1.) Again, 6.0 mg/l does not appear to be an important biological threshold for salmon migrating into the San Joaquin River Basin between October and November. The SJRGA therefore recommends that the SWRCB eliminate the 6.0 mg/l September-October dissolved oxygen objective so the objective is 5.0 mg/l year-round.

12. Page 164. No differentiation between hatchery and natural Chinook salmon production.

The assessment of population trends over time does not differentiate between hatchery produced Chinook salmon and those produced naturally.

13. Page 195. The DFG San Joaquin River Salmon Model V.1.6 is improperly referenced and VAMP showed flow did not significantly improve survival absent a barrier at the Head of Old River.

Within the section on similar efforts by the Vernalis Adaptive Management Program ("VAMP"), the Draft ERP Conservation Plan states that "Increasing flows during the spring is indicated as the most effective solution towards doubling the fall-run response to alterations in San Joaquin River Chinook salmon population. (Figure 8)."The DFG San Joaquin River Salmon Model V.1.6 analyzes San Joaquin River flows at Vernalis to evaluate flow magnitude and duration scenarios to predict resulting smolt outmigrant populations." (DFG 2011, p. 174). This statement misrepresents the Doubling Goal, the Salmon Model and results of VAMP. First, the Doubling Goal is misinterpreted; the goal is to double natural production of fall-run Chinook from levels attained during the period of 1967-1991, and not to double the *response* to alterations in the Chinook population. Secondly, the Draft ERP Conservation Plan bases its conclusion that increasing flows will result in increased smolt survival on the findings of the DFG San Joaquin River Salmon Model V.1.6, but fails to acknowledge that this model has been generally viewed as inadequate and flawed.

In 2005, DFG submitted flow recommendations to the SWRCB based on version 1.0 of its Salmon Survival Model (DFG 2005). The DFG Model v1.0 used simple linear regression to determine relationships of interest. It was formally peer reviewed and, along with informal reviews, most reviewers indicated that there were substantial flaws in the methodology. DFG subsequently revised the model through two iterations and submitted the most recent Model v1.6 to the SWRCB in May 2009, with the acknowledgement that further refinements were to be made in version2.0.[7] This newer version (v1.6) only contains partial revisions and the updates to the model remain inadequate to address many of the original problems that were identified. The most recent version of the DFG model (DFG 2009) should not be cited by the Draft ERPP in this context for a number of reasons, including the incomplete revisions and the lack of a second peer-review. An assessment of the current DFG model, highlighting problems with the model's statistical validity, is summarized in recent comments to the SWRCB. (FISHBIO 2010.)

[7] Under Hydrodynamics Action 4 (page 183), the ERPP will "continue to support projects to develop ecological and hydrodynamic modeling tools and conceptual models that describe. . . outflow/fish population relationships". Presumably, this will include a complete reassessment of their highly criticized Salmon Model.

Furthermore, the VAMP review panel found "no statistically significant relation between estimated CWT survival rates and Vernalis flow for Mossdale/Durham Ferry releases made when the HORB has not been in place." (Dauble 2010, p. 5.) Moreover, downstream migration survival was very poor in 2005 and 2006, despite flows in excess of 10,000 and even 20,000 cfs, indicating that high flow alone does not guarantee migrant survival. (Id.) Finally, the review panel found that survival rates in the last 10 years had declined at all flows. (Id.) As a result, if the regression equations used by DFG's San Joaquin River Salmon Model v1.6 relied on data from before 2000, it appears to over-predict survival at a given flow.

14. Harvest impacts must be addressed.

The Draft ERP Conservation Strategy does not address the impacts of commercial harvest, although a stated goal of the ERP is to "maintain and/or enhance populations of selected species for sustainable commercial and recreational harvest." (Goal 3; page 236). From 2007 through 2009, fall Chinook escapement crashed with the lowest number of spawners ever. Commercial harvest was prohibited in 2008 and 2009, and severely limited in 2010. In assessing the causes of the crash, the PFMC recognized that factors in the Delta and tributaries are now largely irrelevant, because the vast majority of fall Chinook now come from hatcheries and are trucked past the Delta. The PFMC found that the proximate cause of the crash was ocean conditions. (PFMC 2011a, p. 8.)

Fishery management was partly responsible for the crash in 2007, when the PFMC forecasted an escapement of 265,000 Sacramento River fall-run Chinook ("SRFC") in 2007, but the actual escapement of SRFC adults was 87,900.[8] (Lindley et al. 2009, p. 5.) Had the pre-season ocean abundance forecast been more accurate and fishing further constrained by management regulation, the SRFC escapement goal could have been met in 2007. Thus, fishery management, while not the cause of the 2004 brood weak year-class strength, contributed to the failure to achieve the Sacramento River fall Chinook escapement goal in 2007, to the closures in 2008 and 2009, and to the severe restrictions in 2010.

For many years, Central Valley Chinook stocks have been exploited at rates averaging more than 60 percent. (Lindley et al. 2009, pp. 41.) Such levels may not be sustainable for natural stocks. Although the exploitation rate has fallen since 1990, when it was 87 percent, the

[8] Sacramento River Fall Chinook are used as the "indicator species" by PFMC for managing the Pacific salmon fishery south of Cape Falcon, Oregon, and off the coast of California.

exploitation rate since then has nonetheless averaged 65 percent and in some years has been as high as 80 percent.[9] (PFMC 2011b, p. 22.) Harvest drives rapid changes in the life history and morphological phenotypes of many organisms, with Pacific salmon showing some of the largest changes. (Lindley et al. 2009, p. 41.) An evolutionary response to the directional selection of high ocean harvest is expected, including reproduction at an earlier age, smaller fish size, and spawning earlier in the season.

Despite the lack of commercial harvest in 2008 and 2009, and the increase in escapement in 2010 (due to more favorable ocean conditions), chronic issues remain that may only worsen with a return to the "status quo" management and hatchery strategies. (Lindley et al. 2009.) Future management of the Central Valley Chinook stocks should be ecosystem-based with an ecological risk assessment framework. Furthermore, since fishing pressures may have affected the age and size of the fished species, "it can be premature therefore to resume fishing activities solely on the basis of recovery of biomass but before restoration of historical age distributions, even though short-term industry pressures may make this difficult to realize" (Anderson et al. 2008), and this may apply as well to the restoration of life history diversity in the Central Valley. Currently, while fishery management planning considers the impacts of restoration efforts on harvest, it does not appear to consider the impacts of harvest on restoration efforts. If California is to double natural populations of Chinook salmon in the San Joaquin River Basin, fishery management planning must consider its impacts on natural fall Chinook. Given that an objective of the ERP is to "enhance fisheries for salmonids" (page 236), ERP should develop a collaborative relationship with the PFMC and its annual ocean salmon fishery management process. This should be listed under the "Relationships of the Conservation Strategy to Other Planning Efforts" for each Ecological Management Zones (DFG 2011, pp. 68, 117 and 173).

15. Hatchery impacts must be addressed

Chinook salmon Action 3 is "to the extent possible, limit interaction between wild and hatchery-reared fish". (DFG 2011, p. 186.) However, this Action inadequately addresses the impacts of hatchery production on Chinook salmon populations. Hatchery operations are contributing to the boom-bust cycle and, potentially, a downward spiraling abundance. Central Valley fall Chinook are dominated by hatchery production, and Central Valley hatcheries release

[9] This excludes years 2008-2010, in which commercial harvest was either prohibited or severely limited as a result of a devastating fall Chinook population crash.

most of their production at similar times. (Lindley et al. 2009, p. 43.) Very high variation in ocean abundance and escapement should be expected from the system as currently operated. The management strategy of fishing the aggregate stocks (natural and hatchery) has not only masked the decline of wild fall-run Chinooks, but has also led to exploiting wild stocks at unsustainably high rates with probable negative consequences for their life history (Moyle et al. 2008, Lindley et al. 2009). One possible solution would be to adipose fin clip all hatchery salmon; constant fractional coded wire tagging of 25 percent of hatchery salmon would continue. Commercial and recreational harvesting of salmon could then be limited to only fish with its adipose fin clipped.

Historically, few hatchery fish were marked, thus it was difficult to assess the effects of hatchery fish on the wild Central Valley Chinook populations. In the Central Valley, the term ”wild” or ”naturally produced” is generally used to describe fish that are born and spend their entire life cycle in nature regardless of whether their parents were hatchery strays. According to the Joint Committee Final Report (California Department of Fish and Game and National Marine Fisheries Service 2001; page 12-13), “the genetic hazards posed by large numbers of straying hatchery fish in natural spawning areas . . . are extremely serious, since they include extirpation of natural stocks and loss of significant genetic diversity, consequences that are not easily reversible.” There are several Central Valley hatcheries that release anadromous fish off site (rivers downstream from the hatchery, in the Sacramento-San Joaquin Delta and in the San Pablo or San Francisco Bays) in order to improve the survival and reduce potential for competitive interactions with wild fish in the rivers (DFG and NMFS 2001). Although studies have established benefits to these off-site releases (i.e. higher survival), there are many drawbacks. At the hatcheries, fish are raised in waters from their natal stream; however, when the fish are trucked to a release site downstream, they are not exposed to the water conditions along the way, increasing the likelihood that these fish will stray when they return from the ocean to spawn. When salmonids stray to non-natal streams and spawn with local salmon, they threaten the genetic integrity of the locally-adapted populations in two ways: (1) reducing overall genetic variability among populations; and (2) introducing genetic changes that occurred in hatchery populations that may reduce fitness or productivity (DFG and NMFS 2001).

The observed numbers of adipose fin clipped fish in Central Valley tributaries suggest substantial straying. High rates of ad-clipped fish (likely hatchery origin) were observed in 2010 at the Stanislaus River weir (25.0% of adult in-river returns as of 2/7/11) and the Tuolumne

River weir (32.7% of adult in-river as of 11/30/10) (FISHBIO unpublished). Given that roughly 75 percent of hatchery fish were not clipped in 2007, it is likely that quite a few un-clipped hatchery fish also entered these two rivers in 2010. Since neither the Stanislaus nor the Tuolumne Rivers have hatcheries, and no hatchery releases have been conducted into these tributaries since 2006, these data demonstrate that a considerable portion of the in-river spawning in the San Joaquin Basin is by hatchery-origin salmon.

ICF Jones & Stokes conducted independent assessments of stray indices, which they calculated based on the number of tagged adults recovered not at the hatchery and divided by the total number of tagged adults recovered (strays plus fish recovered at the hatchery)[10], using coded-wire tag data (CWT) from the Regional Mark Information System. Their independent assessment of fall-run Chinook indicated that off-site releases have considerably higher rates of straying and that the rates vary by hatchery. Mokelumne River hatchery fish showed a high propensity for straying; "Only 6.5% of the tags from San Francisco Bay releases were recovered in the Mokelumne River, and only half of these fish were recovered at the hatchery. Other watersheds receiving strays from offsite releases of Mokelumne River Hatchery fall-run Chinook included the American River (31%), the Merced River (20%), the Stanislaus River (15%), the Tuolumne River (11%), the Feather River (10%), Clear Creek (4%), Battle Creek (2%), and Butte Creek (1%)" (ICF Jones & Stokes 2010; p. 4-186). Similarly, "Less than half (48%) of the tagged Merced River Fish Facility fall-run Chinook released into the San Joaquin River were recovered in the Merced River, with sizeable recoveries occurring in the Tuolumne River (22%), the Stanislaus River (10%), the American River (8%), the Feather River (8%), the Sacramento River (2%), the Mokelumne River (2%), and Butte Creek (1%)" (ICF Jones & Stokes 2010; p. 4-187). In order to provide a consistent record of the proportion of hatchery fish in the harvest and escapement, the Constant Fractional Marking Program began in 2007, with the goal of marking approximately 25 percent of the fall Chinook released in the Central Valley each year. Thus, in the near future, there will be a much more complete estimate of the percent of hatchery fish in the ocean harvest, the recreational harvest and the escapement.

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[10] Strays/(Strays + Hatchery Recoveries)

16. Sources of additional flow, the impacts of reallocating flow, and the feasibility of reallocating flow are not discussed.

Throughout the Draft ERP Conservation Plan, DFG recommends additional flows for transport flow, over-summer flow, temperature control, and other purposes, but it does not address the water costs or the costs of reallocating water supply to such purposes. Allocating additional supply for DFG purposes will necessarily require reallocating supply from other existing uses. The Draft ERP Conservation Plan does not look at how much water would be required, where the water would come from, and what the impacts of reallocating existing water supplies would be. Two of the most critical impacts would be to carryover storage and the ability to retain a cold water pool. Lower carryover storage normally leads to higher reservoir release temperatures. It is inadequate to simply evaluate necessary flow in one year because water is required every year. Over-committing available water supply in one year can have severe detrimental impacts on the ability to supply water for beneficial uses, including for fish and wildlife, for years to come.

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