UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
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1/6-7/11 Bd. Wrkshop
SJR Technical Report
Deadline: 12/6/10 by 12 noon

Jeanine Townsend, Clerk to the Board
State Water Resources Control Board
Cal-EPA Headquarters
1001 I Street, 1st Floor
Sacramento, California 95814

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

Dear Ms. Townsend:

The National Marine Fisheries Service (NMFS) appreciates this opportunity to comment on the State Water Resource Control Board's (SWRCB) Draft Technical Report on the Scientific Basis for Alternative San Joaquin River Flow and Southern Delta Salinity Objectives (Report). NMFS, along with the U.S. Fish and Wildlife Service, share responsibility for implementing the Federal Endangered Species Act. Within the San Joaquin River watershed, NMFS has management authority over the Central Valley (CV) steelhead (*Oncorhynchus. mykiss*) distinct population segment (DPS). Additionally, NMFS has responsibilities under the Magnuson-Stevens Fishery Conservation and Management Act to protect and conserve essential fish habitat for fall-run Chinook salmon, which are managed under a Federal Fisheries Management Plan. This letter summarizes our general technical review and includes a table of specific comments.

The SWRCB is in the process of reviewing the objectives contained in the 2006 Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary. SWRCB staff drafted the Report to provide the SWRCB with the scientific information and tools necessary to establish San Joaquin River flow and southern Delta salinity objectives for the reasonable protection of fish and wildlife, agriculture, and municipal and industrial beneficial uses. Specifically, the Report focuses on the flow needs of salmonids in the San Joaquin River basin to the Bay-Delta at Vernalis. The Report summarizes a vast list of scientific literature regarding the hydrology of the San Joaquin River, the life history needs of salmonid species emanating from the San Joaquin River tributaries, and various relationships regarding the effects of in-Delta and San Joaquin River disturbances on salmonid abundance. After summarizing the data the Report concludes that providing a greater percentage of unimpaired spring flow (February through June) at Vernalis would be more protective of the fish and wildlife beneficial uses in the San Joaquin River basin.

NMFS supports the logic and rationale of the Report including the importance of an unimpaired natural hydrograph for providing habitat for salmonids. In an alluvial system, river flows work with local geology and topography to create physical attributes such as the shape of the river, water temperature, gravel beds, and floodplain terraces. These attributes have served as evolutionary drivers for salmonid life history strategies, and development of behaviors that are adapted to those habitat conditions. NMFS considers these drivers of life history requirements and behaviors when analyzing how a proposed action may or may not affect salmonids in the San Joaquin River basin.

Unimpaired flow is a useful starting point for understanding basic flow and habitat patterns. The Report highlights how consistent percentage reductions may affect instream flow and habitat conditions for salmonids, but only from February through June. There are shortcomings to this approach. It assumes that the effect of the reduction is the same at any point with the salmonid life cycle. The focus of the Report is during the spring period (February through June), primarily addresses juvenile rearing and outmigration stages of salmonids. Nonetheless, given that flows of these rivers are managed for a variety of purposes, it is important to understand how a change in flow in one period of the year may affect instream flows at another time of year. A simple focus on spring flows could result in a redistribution of reservoir releases that create more suitable spring time conditions, to the detriment of instream conditions at another fish life history stage. NMFS agrees that smolt survival in the San Joaquin River basin does correlate with adult escapement, but analysis of the recent collapse of the fall-run Chinook salmon fishery underscores the need to manage for the complete lifecycle of the species (Lindley, et al. 2009)

An alternative approach would be for the SWRCB to develop year-round flow regimes for these rivers. NMFS has recently applied this approach in our recommendations for FERC proceedings on the Tuolumne River (FERC 2009). For the Stanislaus River, the NMFS 2009 Biological Opinion on the Long-tern Operations of the Central Valley Project and State Water Project (Opinion) identifies a minimum flow schedule to prevent jeopardy to CV steelhead, in conjunction with temperature criteria, habitat, and geomorphic flow objectives (NMFS 2009a, pp 619-627, Appendix 2e). The Opinion also cites the importance to CV steelhead of flow contributions from the Merced and Tuolumne Rivers. The Opinion did not address specific flow requirements on those rivers as they were not a component of the Federal action under consultation.

One key reason why a year-round flow regime may be preferred is the differences in CV steelhead and fall-run Chinook salmon life histories. CV steelhead have longer adult migration period (winter), later spawning period (winter) and year-round juvenile rearing (summer). Figure 1 describes their life history differences and similarities. One similarity is the timing of juvenile outmigration (February through June). In certain cases, NMFS has used fall-run Chinook salmon as a surrogate for CV steelhead because of the lack of steelhead data in the San Joaquin River Basin. This may be most applicable in the spring because both species are migrating as juveniles at this time, but it is important to include consideration of the larger size and swimming ability of juvenile steelhead in the analysis.

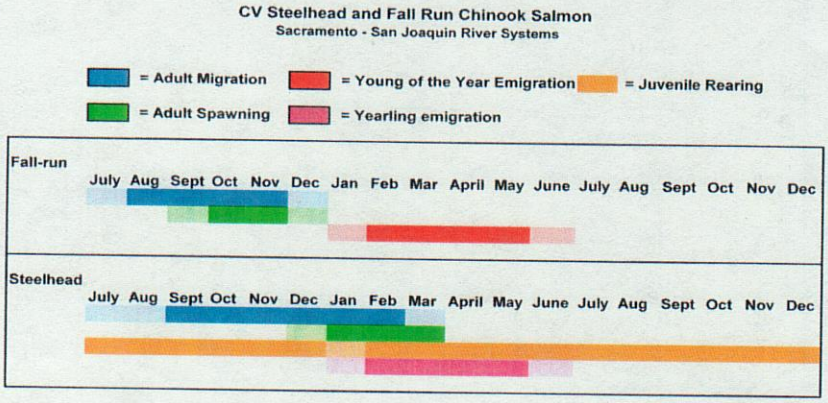

Figure 1. Central Valley steelhead and Fall-run Chinook salmon life history (source: NMFS 2008)

The San Joaquin River watershed of today is dramatically different than the ecosystem where salmonids once co-evolved. Historically, CV steelhead and spring-run Chinook salmon adults would migrate to higher elevations of the southern Sierra Nevada Mountains, and over-summer in those cooler waters. Access to those habitats is now blocked by dams, and other extensive human development, such as flow diversion, decreased floodplain habitat, and increased pollution due to agricultural, industrial and municipal waste, has severely reduced habitat essential to salmonid survival and abundance. These past actions have led to the present day conditions where spring-run Chinook salmon have become extirpated in the SJR, where CV steelhead have been listed as threatened, and where fall-run Chinook salmon have been considered as candidates for listing in the major tributaries.

The Report does note the severely depleted state of salmonid populations presently in the San Joaquin River system. This status is of particular concern for NMFS in light of the Viable Salmonid Population (VSP) framework (McElhany *et al.* 2000) that we employ to evaluate and manage anadromous salmonids in the Central Valley. In particular, VSP criteria for genetic and spatial diversity are of particular interest in the San Joaquin River Basin, as this area supports the Southern Sierra Nevada Diversity Group. These rivers are on the southern extent of these species' distributions, providing distinct evolutionary conditions. Applying the natural patterns of the unimpaired hydrographs to these streams may preserve unique patterns and attributes that are important to this diversity group.

NMFS supports the approach of using a natural unimpaired hydrograph for analyzing changes in the San Joaquin River flow standard. However, we note that the system is operated in a different manner. The Report would be significantly strengthened if included modeling of the effect of new flows on operational factors like reservoir storage, cold water pool, and general temperature effects, which are also critical for salmonids. These conditions are of particular importance because both Chinook salmon and CV steelhead are precluded from much of their natural range by impassable barriers. Therefore it is important to optimize flow from reservoir releases to provide suitable conditions downstream of these barriers.

The Report describes the current status of altered flows in the San Joaquin River Basin and how those altered flows have contributed to the decline of fish populations. However, this analysis does not fully take into account the magnitude, duration, frequency, and timing of flows in a

river system and the importance of its variability. Altered flows have created a homogenous fluvial environment to the detriment of the species. In addition, the report lacks a thorough explanation about how unimpaired flows contribute to a healthy ecosystem (*e.g.*, riverbed mobilization, floodplain inundation, annual hydrograph components, and nutrient cycling (Trush *et al.* 2000)).

It is not clear that the Report addresses added flows required under the San Joaquin River Restoration Program (SJRRP). The Board should consider altering the flow standard to incorporate settlement flows, including recapture considerations in such a way that it will not detract from instream flow needs on the Merced, Tuolumne, and Stanislaus Rivers. For example, new base flows could reduce the need for tributary flows to meet currend Vernalis flow standards. It is also important to note that the effect of SJRRP restoration flows on temperature and other factors is still very uncertain.

Thank you for this opportunity to provide technical comments. NMFS will participate in the workshop process and provide more recommendations at that time. Please contact me at (916) 930-3600, or have your staff contact Rhonda Reed at (916) 930-3609 or via email at rhonda.reed@noaa.gov, if you require any additional information.

Sincerely,

Maria Rea

Maria Rea
Central Valley Area Office Supervisor

References:

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Enclosure:1

Enclosure 1

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

Page Number	Comments
1	The term "flow needs" in the last paragraph, starting with the sentence, "This section includes the life history…" is confusing. Does this term refer to flow needs within the SJR tributaries, Delta flow needs, or an outflow component of the SJR at Vernalis for salmonids?
19	Is it addressed on a spatial and temporal scale? Temporal, exceedance curves – wettest month – April, June, March
22	Figure 2-8 Average observed and unimpaired flow contributed by four major tributaries to the SJR combined (1984 to 2009): The unimpaired line suggests that the 4 tributaries to the SJR are able to contribute 105% of the flow to Vernalis. Is the extra 5% of unimpaired flow at Vernalis an artifact of the modeling? Is this error within the hydrologic model? Is there any discussion of error or assumptions regarding the hydrologic modeling?
23	Table 2-9 Average % contribution of unimpaired flow: In the observed flow calculation, 22% of the flow at Vernalis is provided by sources other than the major tributaries. However, the report does not specify where this water comes from. NMFS believes that this flow may come from winter storms and the minor tributaries, Sacramento-basin transfers, or groundwater. The report should further explain where this water comes from.
34	The second sentence of the first paragraph starting with "Specifically this section focuses on…inflows from the SJR to the Bay Delta." Is confusing when read with the preceding sentence that says the planning effort is on the Bay-Delta itself. The first sentence under the 3.1.1 Problem Statement states, "Scientific information indicates a reduction in flows and changes in the natural flow regime of the SJR basin resulting from water development over the past several decades are impairing fish and wildlife beneficial uses." This sentence is confusing when read within the context of the introduction that states the focus is on the Bay-Delta. To improve the clarity of the sentence, it is suggested that the words "to the Bay-Delta" be inserted after the word flow.

34-35	Typo in abundance/escapement: At the bottom page 34 and continuing on page 35, the report states, "The population of fall-run Chinook salmon in the Central Valley historically approached 300,000 adults (BDCP 2009), but has since exhibited significant reductions in peak abundance (DFG 2010c; 3552 adults in 2009) over time suggesting the overall population resiliency is decreasing. NMFS believes this sentence was meant to reflect the abundance of fall-run within the SJR basin, and not the Central Valley as a whole.
35	Requires a more natural flow regime w/ increase in flood, river flow, cool water, migratory corridor alternatives. Yes – but is this reflected in the model?
39	In third paragraph starting with the sentence, "In the SJR and on the major SJR tributaries…" discusses the importance of floodplains to juvenile rearing. The first sentence suggests that Chinook Salmon within the SJR prefer to rear in rivers, and when available connected floodplains. While floodplains are important rearing areas, NMFS would like to point out that Miller et al. (2010) found that fall run Chinook exhibit a diversity of migratory behaviors that all contribute to adult production.
40	3.2.5 Population Trends: See comment regarding abundance confusion on page 34-35. The first paragraph of this section reiterates the same information.
43	In reference to the first paragraph, NMFS would posit that SJR basin fall-run Chinook have experienced a marked decline from their past abundance, and that the most recent declining trends are alarming, however the term "population bottleneck" suggests that population no longer has the ability to recover. In addition, escapement data for the SJR suggests that hatchery contributions are relatively low. NMFS believes that recent trends suggesting greater contributions due to hatcheries are a result SJR survival experiments such as the VAMP, and other scientific studies, which utilized out of basin fish. Any fish surviving from these experiments may have imprinted on the river where they were planted and may not be the result of straying or direct replacement. Anadromous fish (steelhead/Chinook) are semelparous/ iteroparous and 2) Moyle et al 2010, there is no reproductive barrier between anadromous and non-anadr0mous form, therefore residence time may be significant for the fish, is this addressed in the flows – the multi-year spawning schedule and the inter-spawning with resident form. (In other words, resident form needs water all year long and is not ocean-going so minimum flow and quality needed to be maintained.)
48	3.5 Functions Supported by Spring Flows – should discuss the importance of floodplain inundation and key benefits for juvenile fish.

49	Analysis of flow effects on fish survival 1) escapement 2)survival – What about – flow as it relates to spawning a) is there gravel that can be mobilized in the redds, b) is there sufficient O2 in the redds – has flow been sufficient to provide dynamic porosity and permeability. Geomorphology – what are the infiltration seepage losses through the stream bed as it relates to an unconsolidated aquifer?
57	Report cites the IRP as noting that juvenile survival is affected by delta factors beyond Vernalis flow. NMFS agrees that survival is affected by a range of factors, but also notes strong correlation between instream flows in the tributaries and subsequent escapement success. This argues for analysis of a flow standard that addresses both Delta and tributary flow conditions for fish. In keeping with the concept of unimpaired flow allocation, the Bay-Delta should look to proportionate allocation from tributaries as percent of tributary watershed.
59	R2 values range 0.53 – 0.65 ,get them out quickly ; Question the duration of time in the outmigration needs to be sufficient enough to have a robust individual that can survive in the ocean, not just the fastest exit. 2) Moyle et al 2010, there is no reproductive barrier, therefore residence time may be an important issue. Is this covered?
61	Poff et al describes the natural flow regime as the "master variable" need to add the linkage here from Brett (1977) that temperature is the master variable in fishes.
62	NMFS would like to point out that the Lindley et al. 2009 report indicates that the most recent downward trends in fall-run abundance are likely caused by poor ocean conditions overlaid on top of a degraded freshwater ecosystem in addition to the negative consequences of low genetic variability.
64	3.8.4 concern Veg encroachment, this is a symptom of a greater issue. We might need to be concerned with scour bed mobilization. Based on flow have the hydro geomorphological processes been looked into. (Is there O2, what is the porosity, how are the riffles and pools moving, are the riffle and pools moving?