UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
777 Sonoma Ave., Room 325
Santa Rosa, CA 95404-4731

September 18, 2007

In response refer to:
150304SWR01SR8648:SKL

Kimberly D. Bose
Federal Energy Regulatory Commission
Mail Code: DHAC, PJ-12.3
888 First Street, NE
Washington, D.C. 20426

Subject: National Marine Fisheries Service's Additional Comments on the Fisheries Study Plan for the Don Pedro Project (Project No. 2299-060)

Dear Secretary Bose:

The National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) provides these additional comments on the Tuolumne River Fisheries Study Plan submitted by the Modesto and Turlock Irrigation districts (collectively, "Districts") for the Don Pedro Project (Project No. 2299-060). On August 8, 2007, NMFS staff participated in the public meeting to discuss the Fisheries Study Plan for the Don Pedro Project (see Federal Energy Regulatory Commission (Commission) notice dated July 18, 2007). At that meeting, Commission staff solicited these additional comments. These comments are provided in accordance with provisions of the Federal Power Act (FPA) as amended (16 U.S.C. § 791 *et seq.*), the Fish and Wildlife Coordination Act (16 U.S.C. § 661 *et seq.*), and the Endangered Species Act (ESA) (16 U.S.C. § 1531 *et seq.*). These comments are in addition to comments that NMFS has previously filed on this plan and related analyses, including NMFS' comment letter, dated July 30, 2007, on Commission Staff's Preliminary Analysis of the Tuolumne River Fisheries Study Plan.

LISTED SPECIES UNDER THE ENDANGERED SPECIES ACT (ESA)

Since the Commission's issuance of the Project license in 1964, several fish species that occur in the project area have been federally listed as threatened under the ESA. The Central Valley spring-run Chinook salmon (*Oncorhynchus tshawytcha*) Evolutionarily Significant Unit (ESU) was listed as threatened under the ESA on September 16, 1999 (64 Federal Register [FR] 50394). The California Central Valley steelhead (*Oncorhynchus mykiss*) was listed as a threatened ESU under the ESA on March 19, 1998 (63 FR 13347), and reaffirmed as a

threatened Distinct Population Segment (DPS) on January 5, 2006 (71 FR 834). The Southern DPS of North American green sturgeon was listed as threatened under the ESA on April 7, 2006 (71 FR 17757). This constitutes new information that the Commission should consider in relation to actions under this license and, specifically, actions related to Articles 57 and 58 of this license.

FERC AUGUST 2007 WORKSHOP

The Commission provided a preliminary staff analysis by letter (see e-Library no. 20070619-0175, June 15, 2007) and during a public meeting held on August 8, 2007, at 650 Capitol Mall, Sacramento, California. The Commission staff's preliminary analysis suggests that additional studies are needed during the next four years to determine an effective instream flow schedule that would achieve the goal of recovering the naturally produced fall-run Chinook salmon population in the Tuolumne River.

The workshop provided perspective and insight into the progress of this project. In particular, the following information is noteworthy for the Commission:

- The Project has adverse impacts on important fisheries resources. The Tuolumne River salmon population has experienced appreciable decline since Project operations began (see below).

- The Tuolumne River hydrology is highly impaired by the Project (see below).

- Given the depleted status of the Chinook salmon population, no adequate measures have been implemented as protection from, mitigation for, or enhancement from (PME) adverse impacts on fisheries trust resources.

- Fisheries studies have been ongoing for 36 years and, despite this great amount of effort, the Licensees are unable to articulate what project factors are adversely affecting fish populations in the Tuolumne River downstream of project dams.

- The Licensees intend to continue the same kinds of studies despite their lack of success in providing information that would lead to good decisions on an appropriate flow release schedule to keep fish in good condition downstream of the project dams.

- Licensees are advocating studies that will better define smolt survival relationships by searching for a deflection point within smolt mortality and flow level where additional flow magnitude does not decrease mortality. The Licensees do not provide any support indicating that such a deflection point could be found, and NMFS has not found any literature or analysis that would support such a deflection point.

- Some agency-proposed fisheries studies that the Districts committed to perform have not been conducted. Turlock Irrigation District (TID) and Modesto Irrigation District (MID)

were supposed to complete a series of studies over the last 10 years that are described in the 1995 Settlement Agreement (signed in February 1996) for a total cost of $1,355,000. TID and MID reported progress in their Ten Year Summary Report to FERC (TID and MID 2005) as required under ordering paragraph (F) of the 1996 FERC Order. Under Riverwide Fishery and Habitat Studies - 4) Fry distribution and survival – the 1996 Agreement called for four years of multiple rotary screw trap (RST) investigations and mark and recapture studies. Districts implemented RST surveys from 1998 to 2002, but conducted the studies throughout the entire juvenile production and migratory periods only in 1998. No mark and recapture studies were conducted to determine fry survival. In addition, rotary screw traps were to be used to provide information on natural smolt outmigrants. Although the Districts collected the data, they did not produce an analysis of trends in smolt production.

- Commission staff also indicated that correlation analyses between salmon production and flow were inadequate to determine instream flow requirements. Instead, Commission staff indicated that studies were needed to determine the mechanisms by which flow affects salmon production to better focus the instream flow schedules, predator control, and restoration actions.

- Commission staff was interested in spring pulse flow data at 3,000 cubic feet per second (cfs) for a regression between spring pulse flows and numbers of returning adults to complete the analyses.

- River restoration projects, and some monitoring studies, have been characterized as dependent upon CalFed funding. These activities were not performed.

NMFS Analysis of Hydrology Regimes on the Tuolumne River as it Affects the Status of Anadromous Fishery Resources

Severe Hydrology Impairment

The hydrology of the Tuolumne watershed is highly impaired. Pre-Project average annual unimpaired watershed yield was 1,497,500 acre-feet (AF) and post-Project hydrograph (1971-1994) was only 318,971 AF, roughly a 78.9% impairment of the unimpaired flow (Bay Institute of San Francisco 1998). This is a large reduction in flow downstream of the project dams.

Fishery Status

The Anadromous Fish Restoration Program (AFRP) within the Central Valley Project Improvement Act (Public Law Number 102-575, Title XXXIV; 106 Stat. 4706 [1992]; (CVPIA)) is administered by the U.S. Fish and Wildlife Service (USFWS). The AFRP is tasked by the CVPIA to make "all reasonable efforts to at least double natural production of anadromous fish in California's Central Valley streams on a long-term, sustainable basis." The AFRP established

a baseline population for adult fall-run Chinook salmon (salmon) in the Tuolumne River based on the period of 1967 to 1991 upon which a doubling goal would be established and annually monitors progress towards this goal. This baseline was for CVPIA purposes and covered the period after the State Water Project (SWP) went on line and was prior to the onset of the CVPIA. The average annual adult production (total escapement plus instream harvest) baseline level of 18,946 was used to establish a doubling goal of 38,000 adults.

Fall-run Chinook salmon production in the Tuolumne River has appreciably diminished in recent years. The average annual salmon production level from 1992 though 2006, *i.e.*, post-baseline, is approximately 8,941 adult salmon or about 52 percent below the AFRP baseline production level (www.delta.dfg.ca.gov/afrp 2007). The 2006 Chinook production estimate was 625 (TID and MID 2007), or 93% below baseline populations. The most recent smolt data from RST surveys on the Tuolumne River shows an all time low smolt catch. At the downstream trap at Grayson, a total of 27 Chinook salmon smolts were collected, resulting in an estimate of 937 smolts leaving the river in spring 2007 (FISHBIO 2007). The previous lowest smolt estimate was 9,960 smolt in 1998. Therefore, *the present smolt estimate is about 10% of the previous all-time low.* The smolt production estimates at Grayson have been a good predictor of the number of adults that return to the river two years later. Extremely low escapement in fall 2009 is predicted. The failure to release the 12,000 acre-feet of water during this past spring likely contributed to the poor smolt production numbers. Given the steep trajectory of population decline, it would be prudent to institute adequate PME measures such as increased flow releases to avoid the potential extirpation of anadromous species downstream of the Project.

The Licensees have advanced the argument that adult salmon escapement reduction in the Tuolumne River is attributable to out-of-tributary limiting factors (*e.g.*, Delta exports and ocean harvest), as opposed to insufficient instream flow. The record shows that spring Delta exports between 1971 to 1991 (April - May) averaged 5,541 cfs, and the Central Valley Ocean Harvest Index (CVHI) averaged 0.66. In comparison, the 1992 to 2006 Delta exports averaged 3,252 cfs, and the CVHI averaged 0.53 (Mesick *et al.* 2007). The CVHI represents the percentage of fish harvested relative to the total Central Valley salmon escapement, and it does not include inland escapement. Since both Delta exports and the CVHI decreased at the same time as the Tuolumne River salmon escapement population declined, it appears that habitat quality constraints within the watershed are more directly responsible, rather than other exogenous factors.

The Licensees have also advanced the argument that adult density dependent mortality (*e.g.*, redd superimposition) is a primary cause of the overall salmon decline in the Tuolumne River. However, recent brood year recruitment analysis by the USFWS and the California Department of Fish and Game (CDFG) (Mesick *et al.* 2007) reveals that juvenile abundance is not controlled by adult stock abundance. Rather, juvenile abundance, necessary for adult production, is controlled by flow related habitat dependent mortality (*e.g.*, winter and spring flow habitats are controlling fry and smolt abundance).

There are no long term population estimates of other anadromous fish in the Tuolumne River. According to historical accounts (*e.g. circa* 1940), steelhead were historically present in the Tuolumne River (McEwan and Jackson 1996). NMFS assumes that population trends for fall-run Chinook salmon will be similar for other anadromous salmonids. All are coldwater species that require cold water and attraction flows to find their natal stream, gravels to spawn in, adequate flows in which to rear, and sufficient pulse flows in the spring to migrate to the ocean.

INSTREAM FLOW

The issue of instream flow and its influence upon in-tributary juvenile salmon production is of great importance. Both the Licensee's data and analysis (TID & MID 2007), and the state and federal fisheries agencies' data and analysis (Mesick *et al.* 2007), indicate that instream flow, specifically spring flow, has a strong influence upon juvenile salmon production in the Tuolumne River. To date, studies conducted in the Tuolumne River (and in other Central Valley rivers) indicate that as spring flow magnitude and duration increases, the following responses occur: 1) salmon smolt survival increases; 2) water temperature decreases; 3) predation of salmonids decreases; 4) entrainment of salmonids decreases; 5) disease prevalence in salmonids decreases; and 6) both juvenile and adult salmon abundance increases. In addition, emerging science indicates that winter flow magnitude and duration, in addition to spring flow magnitude and duration, is important in determining smolt abundance, which is the primary life history stage influencing adult salmon escapement (Mesick *et al.* 2007).

Article 57 of the FERC hydropower license provides instream flow criteria intended to sustain fisheries resources downstream of the Project. These flow criteria appear to be based on flow releases necessary to ensure some minimum level of survival of the fall-run Chinook species downstream. Article 57 does not address the flow requirements for ESA listed spring-run Chinook, steelhead, and green sturgeon. NMFS recommends that FERC reconsider the minimum instream flow schedule for this project, particularly the spring base and pulse flow components, in order to set more satisfactory flow releases that conserve all fish species of concern.

NMFS RECOMMENDATIONS FOR FISHERIES STUDIES

Article 58 of the Project license requires the Licensees to conduct fisheries studies. The current studies alone will not address the question of how flow is linked to fish production in the Tuolumne River; nor will they determine appropriate flows to prevent Project induced mortality factors downstream of the Project. This is because the licensees' studies are not 'cause and effect' in design.

The use of inferential correlation statistics to determine influence of independent variability upon dependent variables is a scientifically valid mechanism to determine the relationship between instream flow and fish population abundance downstream of the Project. Toward this end, correlation analyses from previous studies can assist in modifying the current Article 57 flow

schedule. In addition, new monitoring studies can be conducted to determine if modified pulse flows are accomplishing their intended juvenile and adult production levels.

Past and present studies have focused primarily on the issue of flow magnitude. However, information regarding flow *duration* and fish production has emerged as a result of fisheries studies conducted during unplanned, but managed, flood control releases. Results from these studies strongly suggest that flow *duration* is at least as important as flow *magnitude* in relation to fish production.

The Districts' draft fisheries study plan submitted in July 2007 cannot provide conclusive evidence needed to establish an effective instream flow schedule because it includes studies of only one potential flow mechanism- that predation by black bass (*Micropterus* sp.) in large mine pits is reduced by short pulses of turbid flow. The salient issue is not whether flow reduces predation. Rather, the primary issue of concern is - what specific duration of elevated flow is needed for adequate and sustainable salmon production in the Tuolumne River? Juvenile monitoring conducted both in the Tuolumne River, and in the San Joaquin River at Mossdale, shows that prolonged duration of spring pulse flow results in greater abundance of smolts. This is not surprising since the Licensees' own juvenile monitoring data (*i.e*, seining surveys) show that smolt size fish are still in the Tuolumne River when spring pulse flows are reduced to base flows during the dry water year types. In drier years, as Project flows are reduced in the spring, water temperatures elevate; and out-migration of juvenile salmon ceases even though juvenile salmonids still exist in the spawning reach of the lower Tuolumne River.

NMFS recommends an experimental flow schedule be implemented for six years from 2008 through 2013. Simultaneous studies should be conducted to test a range of potential cause-and-effect mechanisms by which flows may affect juvenile salmon survival. NMFS believes there is sufficient evidence that prolonged higher flows during the winter and spring result in higher rates of smolt outmigrant and adult production. It is common to have smolt sized juvenile salmon in the upper Tuolumne River in late May or early June when RST operations cease in drier, lower flow, years. The reason for stopping RST in late May/early June in low flow years has been due to a cessation of juvenile out-migration, coinciding with elevated water temperature and reduced flow velocities. Therefore, the primary issue requiring further study is to determine the schedule of pulse flow releases that best enhances salmon production.

Testing the following three hypotheses in a multi-year, spring pulse flow experiment would help to determine a more optimal regime for balancing instream requirements for anadromous fish with other beneficial uses of Tuolumne River water resources:

> H_1: The estimated number of smolt-sized outmigrants ($\geq$ 70 mm FL) that pass the Grayson River Ranch RST site is most strongly correlated with the mean flow from La Grange Dam between 1 April and 1 June (61 days), when smolts are outmigrating from the Tuolumne River.

H_2: The estimated number of smolt-sized outmigrants (≥ 70 mm FL) that pass the Grayson River Ranch RST site is most strongly correlated with the mean flow from La Grange Dam between 15 March and 1 June (77 days), when fry are rearing to a smolt-size in the Tuolumne River.

H_3: The estimated number of smolt-sized outmigrants (≥ 70 mm FL) that pass the Grayson River Ranch RST site is most strongly correlated with the mean flow from La Grange Dam between 1 March and 1 June (92 days), when fry are rearing to a smolt-size and smolts are outmigrating from the Tuolumne River.

To test these hypotheses, it will be necessary to obtain relatively accurate fry and smolt outmigrant estimates while implementing the following experimental flow schedule from 2008 through 2013. The six year schedule allows for three different flow periods and a replicate for each condition so that there is a measure of variability. The juvenile production estimates should be obtained by running the paired rotary screw traps at Waterford and Grayson from January 1 through the end of the outmigration period (typically mid-June) and by implementing protocols for trapping and efficiency testing that maximize the accuracy of the rotary screw trap estimates. Snorkeling surveys should be added to document location and abundance of juvenile salmonids in response to flow and water temperature. This information would allow flows to be managed on a real time basis in the Tuolumne River. The agencies provided evidence that fry and smolt survival is highly dependent on relatively high flows that increase food resources by inundating floodplain habitats (see Attachment 1 in e-Library no. 20070314-0089, March 7, 2007), and presumably by reducing rates of predation and disease. The average experimental flow should be at least 3,000 cfs to ensure that floodplains are inundated and to provide smolt production estimates at an untested flow range (*i.e.*, to determine if elevated flow and both elevated fish survival and fish production are most likely linear or non-linear). Flow releases during other periods of the year should not be reduced to provide these experimental flows.

Table 1. Summary of study elements in the proposed spring pulse flow experiment

Critical Life History Stage	Mean Flow Magnitude (cfs)	Flow Period	Acre-Feet	Number of Replicates
H_1 Smolts	3,000	April 15 to June 1	362889	2 Years
H_2 Fry	3,000	March 15 to June1	458073	2 Years
H_3 Fry and Smolts	3,000	March 1 to June 1	547308	2 Years

As part of the evaluation of the above hypotheses, the juvenile production estimates from 2008 through 2013 will be compared against the juvenile production estimates for the RST studies conducted from 1998 to 2006. To improve the high flow production estimates for 2005 and 2006, new trap efficiency studies should be conducted at a constant flow of 4,000 cfs at both the Waterford and Grayson trap sites by releasing 5 groups of 4,000 marked smolts at each site, over a 15-day period. NMFS will assume that if the traps are set at the same location as used in 2005 and 2006, the results will be applicable to the 2005 and 2006 estimates. The Licensees will have

to ensure an adequate supply of study fish is available for RST efficiency and river reach scale coded wire tag studies. To accomplish this, the Licensees will need to coordinate with the CDFG to construct temporary egg taking, and juvenile rearing facilities, in the Tuolumne River drainage this escapement year (*e.g.*, 2007). However, if study fish availability does materialize in this manner, it does not obviate the need for elevated pulse flows to reduce Project impacts on fish downstream, and studies should continue.

Cause-and-effect studies should be implemented simultaneously with the experimental flow releases. These studies should include: 1) acoustic tagging, 2) direct predator sampling, and 3) fish health studies. The objective of acoustic tagging studies is to help identify the locations where high rates of mortality occur in the river, and to determine the amount of mortality caused by predation. The Districts must release a sufficient number of tagged fish and deploy enough receivers to detect the precise location of mortality (*e.g.*, mine pits or other habitats) at different flows. Tagged fish should be released in mid-April and late-May so that survival can be estimated at different water temperatures, and to provide a comparison of base flows with pulse flows. The objective of the direct predator sampling is to determine relative predation rates on fry, parr, and smolts in different habitats and different potential fish predators: striped bass (*Merone saxitilis*), Sacramento pikeminnow (*Pychocheilus grandis*), and black bass (*Micropterus* sp.). The objective of the fish health studies is to identify the effects of high flows on the survival of fry and smolts relative to disease, contaminants, and food resources (lipid content in the muscle tissue). Fish health samples should be collected from fry, parr, and smolts under a range of flows and water temperatures.

Given the scarcity of the water resource to support multiple uses in this system, the studies outlined above are needed to optimize water allocations in a way that reduces Project impacts on fish downstream. Information on the relative importance of the different potential sources of disease/mortality will provide the justification for more strategic flow releases. For example, if early season flows substantially affect food resources and growth conditions for fry (high lipid content in the muscles), then greater consideration should be given to extended flows for fry survival between March and May. On the other hand, if flows more predominantly affect predation by black bass or disease infestation rates, then increased flows should focus more on smolt survival from April through June.

To provide information needed to set instream flow requirements for Central Valley steelhead, the Districts should make experimental flow releases that are sustained throughout the summer. Experimental summer flows should include: 150 cfs, 200 cfs, and 250 cfs. Existing summer flows typically range between 50 cfs and 120 cfs which provide marginal water temperatures and rearing habitat for rearing juvenile steelhead. These higher experimental flows would indicate whether higher summers flows improve these conditions and result in higher steelhead production. The Districts should monitor the abundance of adult and juvenile *O. mykiss* in the spring and summer to evaluate the effectiveness of these releases.

CONCLUSION

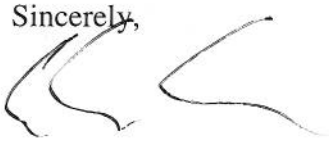
Substantial improvement in late winter/spring pulse flow is needed to provide adequate protection for the Tuolumne River salmon population. Conducting test flows at the 3,000 cfs level for the next six years accomplishes the following management objectives: a) increased smolt survival; b) greater in-tributary smolt production; c) fills in missing data points for smolt survival flow range studies; d) optimizes flood plain inundation; e) reduces low flow associated mortality caused by predation, elevated water temperature, disease prevalence, and entrainment potential; f) substantially improves the probability of elevated adult escapement going into project re-licensing; and g) reduces early winter flood releases that are a waste of water from a fish production perspective.

There are significant project impacts on fisheries resources downstream of the Project, as evidenced by the sharp decline in salmon abundance. Because the population abundance is 93% below AFRP baseline populations and the most recent smolt captures are only 10% of the previous all-time low, stronger PME measures should be instituted to ensure Chinook salmon, steelhead, and green sturgeon are not extirpated from the Tuolumne River.

License conditions originally set specific fish flow releases based primarily on keeping a fall-run Chinook salmon stock alive below the Project. Instream flow needs for steelhead, spring-run Chinook salmon, and green sturgeon are different than those for fall-run Chinook salmon due to differences in life history. Steelhead, spring-run Chinook, and green sturgeon have been federally listed as threatened under the ESA since the issuance of this license. This is new information and should be considered for all future actions taken under this license. In addition to measures for fall-run Chinook salmon, the Commission must ensure that the actions under its Project license do not adversely affect these other species, and the Licensees must avoid "taking" these species unless authorized under the ESA.

Thank you for considering these comments. Please contact Dr. Stacy Li (NMFS) at (707) 575-6090 with any questions regarding this matter. The National Marine Fisheries Service looks forward to working with Commission staff, the Districts, the U.S. Fish and Wildlife Service, the California Department of Fish and Game, and the Conservation Groups to develop a robust study plan to provide adequate data on which to base a long term minimum flow schedule (and other non-flow measures) adequate for protection, mitigation from adverse impacts, and enhancement of Tuolumne River fisheries.

Sincerely,



Steven A. Edmondson
Northern California Habitat Supervisor

cc: Robert Hoffman, NMFS, Long Beach
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CITATIONS

Bay Institute of San Francisco. 1998. From the Sierra to the Sea – the Ecological History of the San Francisco Bay – Delta Watershed. Novato, California.

FISHBIO. 2007. Juvenile Migration Monitoring, Tuolumne – Grayson (RM5), San Joaquin Basin Newsletter Number 10. www.sanjoaquinbasin.com/newsletter/10newsletter.htm.

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UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Modesto Irrigation District, Turlock Irrigation District, City and County of San Francisco **Application for Relicensing**	))))))	FERC Project No. 2299-060

Certificate of Service

I hereby certify that I have this day caused the foregoing document to be served upon each person designated on the official service list compiled by the Secretary in the proceeding.

Dated on this 18th day of September, 2007.

Stacy K. Li

Stacy Li
National Marine Fisheries Service

Service List for p-2299-000 TURLOCK & MODESTO

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