

FEDERAL ENERGY REGULATORY COMMISSION  
Washington, D. C. 20426

OFFICE OF ENERGY PROJECTS

Project No. 2299-060—California  
Don Pedro Hydroelectric Project  
Modesto Irrigation District  
Turlock Irrigation District

To the Parties Addressed:

**JUN 15 2007**

Enclosed is the Commission staff's preliminary analysis of the Tuolumne River Fisheries Study Plan submitted by the Modesto and Turlock Irrigation Districts in response to a letter of December 20, 2006, from the Commission. This analysis outlines staff's preliminary determination regarding the licensee's plan, filed with the Commission on March 20, 2007, based on our review of the plan and comments received.

Please review the attached preliminary analysis and provide the Commission with your comments and recommendations within 30 days from the date of this letter. Your filing should reference P-2299-060. Please file an original and seven copies of your comments with:

The Secretary  
Federal Energy Regulatory Commission  
Mail Code: DHAC, PJ-12.3  
888 First Street, NE  
Washington, DC 20426

Thank you for your cooperation in this matter. If you have any questions or concerns, please contact Mr. Philip Scordelis at (415) 369-3335 or by email at [philip.scordelis@ferc.gov](mailto:philip.scordelis@ferc.gov).

Sincerely,



George H. Taylor  
Chief, Biological Resources Branch  
Division of Hydropower Administration  
and Compliance

Enclosure: As stated

**PRELIMINARY STAFF ANALYSIS  
OF THE  
TUOLUMNE RIVER FISHERIES STUDY PLAN**

**Don Pedro Hydroelectric Project**

**Project No. 2299-060**

**California**

**Federal Energy Regulatory Commission  
Office of Energy Projects  
Division of Hydropower Administration and Compliance  
888 First Street, NE  
Washington, DC 20426**

**June 2007**

**PRELIMINARY STAFF ANALYSIS**  
**Don Pedro Hydroelectric Project**  
**Tuolumne River Fisheries Study Plan**  
**FERC Project No. 2299-060 – California**

The Turlock and Modesto Irrigation Districts (Districts) submitted their Tuolumne River Fisheries Study Plan on March 20, 2007<sup>1</sup> in response to Commission staff's request of December 20, 2006<sup>2</sup>. The Districts had previously submitted a draft plan for comment on February 2, 2007. The U.S. Fish and Wildlife Service, the California Department of Fish and Game, and the National Marine Fisheries Service (collectively referred to as the Agencies) jointly filed comments on the draft plan on March 5, 2007<sup>3</sup>. Additional comments were submitted by the City and County of San Francisco<sup>4</sup>. The Districts included a response to the Agencies' specific comments as part of the final plan submitted on March 20, 2007.

The Commission staff's analysis presented here provides an evaluation of the Districts' plan including a review of pertinent comments of the Agencies on the draft plan. Staff's primary objective in assessing the plan was to compare it to the list of deficiencies we had previously identified in the summary of the past 10 years of mitigation and study on the Tuolumne River<sup>5</sup>. The following evaluation presents staff's original analysis first, followed by a summary of the Districts' study plan in response to the original assessment, then a brief summary of concerns expressed by the Agencies about the proposed study plan, and lastly staff's conclusions as to whether the proposed plan would address the identified information needs. This analysis discusses each of the six areas of information needs identified in staff's letter of 20 December 2006 followed by an overall summary of our evaluation of the plan.

## **INSTREAM FLOW SCHEDULE**

**Staff's Initial Assessment of 10-year Summary Report** – Staff's review of the 10-year Summary Report determined that the data were insufficient to conclude that implementation of the 1995 settlement agreement flow schedule had produced the intended benefits in salmon production. There is little conclusive evidence that either smolt survival or spawner escapement has increased in response to the increased flow requirements. Alternative analyses presented by others were also insufficient to

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<sup>1</sup> File date April 2, 2007.

<sup>2</sup> File date December 20, 2006.

<sup>3</sup> File date March 14, 2007.

<sup>4</sup> File date April 4, 2007. Comments on the plan from the City and County of San Francisco consisted of a lengthy statement by fisheries biologists R. M. Yoshiama and P. B. Moyle. Because these comments did not directly address the information gap issues raised by staff or the Districts' response to our request for additional information, we do not make further mention of them in the following assessment. However, the Yoshiama and Moyle statement does present areas for additional or future studies. The questions they pose and the approach they present for identifying the relative benefits of different studies should be considered when evaluating new results and designing future studies.

<sup>5</sup> File date March 24, 2005.

convincingly detect significant change in production or recruitment with the new flows. That no differences are detectable is partly due to the amount of natural variability in the system and the relatively short time that has passed since flows were increased. Population-level responses like those being evaluated often take many years to manifest. Therefore, we advised that a new study plan should include continued data collection to provide more information on the relationship between flow and fry and smolt production and survival.

**Districts' Plan** – The Districts propose four studies to address issues related to instream flow:

- 1) an expanded analysis of existing coded-wire tag (CWT) data with emphasis on an analysis of fish recovered outside of the Tuolumne River. The Districts are opposed to additional CWT studies, and they provide several reasons for their reluctance to conduct more CWT studies;
- 2) releases of experimental winter pulse flows of 500-1,500 cfs as long as the current flow schedule volumes are not exceeded;
- 3) paired rotary screw trap (RST) monitoring at two locations (RM 29 and RM 5); and
- 4) acoustic tracking of passage and habitat use by smolt at three test flows from 1,000 to > 4,000 cfs. (Note: this task was added in response to the Agencies' comments on the first draft of the Districts' plan).

**Agencies' Comments** – The Agencies agree with staff's assessment that additional smolt survival studies are needed and recommend that 1) a CWT study be carried out at >4,000 cfs if hatchery fish are available and 2) telemetry be used to monitor smolt survival under various flows. They agree that RST studies should be done, but that calibration and protocol need to be revised from what the Districts have done in the past and that RST studies should be conducted beyond 2011. The Agencies' comment that the flows proposed for study by the Districts are not responsive to the Commission's request to evaluate the flow: survival relationship at flows in excess of 4,000 cfs. Instead, they recommend that the Districts adopt the Agencies' proposed experimental flow schedule which would provide high flows for analysis of the flow: survival relationship. The Agencies suggest that a micro-chemical analysis of otoliths could help answer the Districts' hypothesis that fish that get transported out of the river faster (such as by pulsed flows) have higher survival than those with extended river residency. They also recommend that the Districts test the Agencies' conceptual model that is based on the hypothesis that extended flood flows ameliorate a combination of stressors that limit fry and smolt survival.

**Staff's Conclusion** – We conclude that the Districts continue monitoring smolt production and adult escapement to further develop the relationship between production and flow. In particular, more smolt production data are needed for high flow years, which would likely necessitate the Districts releasing more water than required during the period of study (roughly April to May). The Districts do not believe these studies are necessary and instead propose experimental pulse flows that are short in both magnitude and duration and are within the current flow schedule requirements. Staff believes the

Districts should develop a study that tests moderately high flow conditions (>4,000 cfs average Modesto flow during April-May) at least once during the next four years to produce smolt production data for high flow conditions. The Districts need to include in their pulse flow tests, an analysis of more effective timing of spring pulse flows, such as the possibility of making the timing of pulse flows dependent on water year type instead of releasing them at the same time every year regardless of river conditions.

The Districts provide several reasons for not pursuing additional CWT studies, but the option to do more CWT studies should remain on the table and discussed further at future Tuolumne River Technical Advisory Committee (TRTAC) meetings.

Staff concludes that the RST procedures must be modified if meaningful results are to be obtained. The Districts indicate that the procedures they use have been successful elsewhere. If so, then the Districts need to determine why those methods did not work successfully in recent Tuolumne River studies and then work with the TRTAC to revise RST deployment and calibration to ensure that useful data are collected.

The proposed acoustic tracking study to assess response to flow is part of the same tracking study being used to assess predation on smolts (see below) and will provide useful information to flow-related studies as well as the predation study. Staff's concern with the telemetry study is whether researchers will be able to tell the difference between a smolt with an implanted transmitter and a predator with a transmittered smolt in its stomach.

As part of the fry survival study, the Districts propose a micro-chemical analysis of otoliths to evaluate freshwater residency duration. The results from this study would also serve to evaluate the effects of flow on freshwater residency as suggested by the Agencies. Staff supports these studies and believes they should provide useful information.

## **HABITAT RESTORATION**

**Staff's Initial Assessment of 10-year Summary Report** – Because the habitat restoration projects have only recently been completed (or are yet to be completed), it is too early to tell if the restoration projects have been successful. Because these projects appear to have a high potential for success, those that are not yet completed should be completed or be replaced with more promising restoration projects. Deficiencies identified in review of the summary report included lack of definitive information on improvements in spawning habitat as indicated by both physical (i.e., gravel size and type, sedimentation, and flow penetration of spawning beds) and biological (i.e., utilization by adults and survival of eggs and fry) characteristics. Additional efforts to increase spawning habitat utilization and reduce redd superimposition by flow management, gravel restoration, and gravel addition in upstream areas is also needed.

**Districts' Plan** – The Districts' plan includes studies that address those data gaps

identified by staff including studies on egg survival, fry production, gravel quality, inter-gravel water-quality, redd superimposition, and habitat mapping. In the plan, the Districts did not address whether they intend to fund the two remaining projects or complete those in progress, but they do plan an assessment with TRTAC of all habitat restoration projects. In their response to the Agencies' comments on the plan, the Districts indicate that state and/or federal funding will be necessary to fully complete the planned habitat restoration.

**Agencies' Comments** – The Districts' plan does not indicate a commitment to complete remaining projects. Egg survival and spawner use studies are dependent on available funding. More restoration of floodplain habitat is needed. The Districts should incorporate juvenile and smolt production as determined by RST captures in their assessment of habitat restoration.

**Staff's Conclusion** – The Districts' plan includes the studies that staff considered necessary to address questions regarding the success of the habitat restoration. The details of individual studies are not provided, but we would expect these to be worked out with the TRTAC. Staff's biggest concern is whether some of these studies are of sufficient duration to provide adequate data. The Districts need to clarify their intentions with regard to completing the remaining restoration projects. With respect to additional studies that the Agencies suggest need to be undertaken by the Districts, there should be a limit particularly with regard to correcting problems created by past mining practices that are not directly the result of project operations.

## **FRY SURVIVAL**

**Staff's Initial Assessment of 10-year Summary Report** – The FERC Settlement Agreement required assessments of Relative Fry Density/Female Spawners and of fry distribution and survival were inconclusive. The data collection methods did not allow a statistically valid estimate of fry production per female spawner or of fry distribution. The new study plan should include more focused monitoring of site-specific fry emergence, temporal distribution, and transport.

**Districts' Plan** – The Districts propose to continue monitoring fry density and movement using the paired RST and river-wide seining surveys as they have in the past from January to May/June. Data on fry production obtained from these methods will be used in analyses with data from other studies (i.e., redd monitoring, fry emergence, and superimposition). In response to a comment from the Agencies, the Districts added a new study of micro-chemical analysis of otoliths collected from spawner carcasses to determine the duration of juvenile residency in fresh water.

**Agencies' Comments** – The Agencies restate their previously voiced concern that seining studies as implemented in the past do not provide useful information regarding fish distribution or abundance relative to flow management or habitat restoration. The Agencies instead favor the use of rotary screw traps. The Agencies commented that more

information is needed on fry movement, survival, and health, and they propose four studies to: 1) monitor the temporal and spatial aspects of fry movement; 2) calculate fry survival from upper to lower screw trap locations; 3) perform bioassays of fry health; and 4) evaluate freshwater residency duration and the relative contribution of different rearing locations (Tuolumne River vs. the Delta) to adult recruitment.

**Staff's Conclusion** – The Districts have made some changes in their RST study from previous years but likely need to modify their RST study further to achieve desired results. Relying on previous methods that failed to produce useful results in the past with regard to fry movement and abundance, is likely to result in equally poor data in the future. Continuing shoreline seining has some merit because it will continue to provide data to a long term data set, but quantitatively it offers little with regard to abundance estimates and only limited information on movement patterns. The RST studies hold more promise than seining, but, as noted above, calibration and deployment may need to be improved. The Districts need to modify their study plan and techniques to ensure that they produce useful and defensible data from the RST study. The otolith analysis should provide valuable data on freshwater residency. With regard to the Agencies' four proposed studies, numbers 1, 2, and 4 are being addressed in the Districts' current plan. As for item 3, staff believes that bioassay studies are not justified at this time until there is evidence that compromised health contributes to reduced survival. The Districts and Agencies disagree on whether high winter flow results in movement of fry that is beneficial to their survival and ultimately adult production. They should agree prior to the completion of these studies how the study results will be analyzed to address this question to minimize future disagreements in the interpretation of results.

## **STEELHEAD PRESENCE/PROTECTION**

**Staff's Initial Assessment of 10-year Summary Report** – Opinions differ as to whether *Oncorhynchus mykiss* in the Tuolumne River represent a viable steelhead trout population. After reviewing the 10-year Summary Study, staff determined that additional information should be collected to further clarify the status of *O. mykiss*.

**Districts' Plan** – The Districts' plan outlines a 5-yr summer snorkeling/electrofishing survey to assess the number of *O. mykiss* (resident rainbow and migratory steelhead trout) at several locations in the river. If permitted, otoliths from both juveniles and adults will be used to assess proportion of anadromy represented. Also, if permitted, adult *O. mykiss* will be tagged with acoustic tags for a 2-yr tracking study to evaluate habitat use and movement. The Districts' plan includes most of the items which staff identified as necessary except for including in their analysis the results of studies in nearby basins to assist in determining the status of *O. mykiss* in the Tuolumne River.

**Agencies' Comments** – The Agencies are concerned that the survey work only takes place in the summer and not in the winter and spring when more *O. mykiss* are likely to be present. A concern that the Districts' plan did not include an analysis of habitat use was addressed in the revised plan with the telemetry study. The Agencies also noted that

the Districts' plan lacks any intention to use data from nearby rivers in the analysis. The Agencies suggest that a limiting factor analysis should be used to evaluate the relative impact of the factors that affect the *O. mykiss* populations.

**Staff's Conclusion** – Except for not including in their analysis a consideration of data from nearby rivers, the Districts' plan addresses most of the items we identified to begin a meaningful analysis of the status of *O. mykiss* in the system. If these studies document the presence of a steelhead trout population in the Tuolumne River, further analysis should be defined to determine what protective measures (e.g., flows, temperature, habitat, passage, etc.) are needed. The results of these studies will likely introduce more questions that require further analysis, but we believe the Districts' plan is a good start. The plan should be revised to include a comparison with results (e.g., return rates and population status) from nearby rivers. With regard to the limiting factor analysis, it is suggested that it might be better for the TRTAC or one of its members (e.g., California Department of Fish and Game or National Marine Fisheries Service) to take the lead on the limiting factor analysis using data generated by the Districts and others. However, because there are no standard methods for a limiting factor analysis, the methods for this analysis would need to be agreed to by all parties and perhaps be subjected to outside peer-review.

## **PREDATOR CONTROL**

**Staff's Initial Assessment of 10-year Summary Report** – The reduction of predation on salmon by exotic predator species is crucial to successful salmon smolt survival. Based on the results of studies to date, staff suggested that new methods to reduce predation should be tested and monitored for effectiveness.

**Districts' Plan** – The Districts propose several studies to assess the impacts of predation on salmonid production and the effect of various management alternatives on the rate of predation. These activities include: predator sampling and documentation of their density, habitat preference, and diet; a telemetry study to track predator movement and habitat choice; predator removal from a select reach of the river; and an assessment of the potential protection from predation afforded by high flow and turbidity. In response to Agency comments, the Districts noted that they will sample a variety of predators (not just largemouth bass), include sampling in winter, and track predators and smolts at flows in excess of 2,500 cfs.

**Agencies' Comments** – The Agencies suggest that studies should be carried out over a wider range of flows than proposed, that other predator species (Sacramento pikeminnow and striped bass) not be excluded from the analysis, and that sampling be extended beyond the summer when largemouth bass are active.

**Staff's Conclusion** – The Districts' plan provides a variety of studies that adequately address the needs identified by staff. The Districts' response to Agency comments also addresses most of their concerns. See concerns about telemetry study above in discussion

on Instream Flow study plan.

## **RIVER TEMPERATURE**

**Staff's Initial Assessment of 10-year Summary Report** – The degree to which project operations affect river temperatures and the resulting effect on the fisheries resources is not fully understood even though a great deal of effort has been expended on this issue. Additional studies are needed to assess thermal dynamics in the river and the relationship between the river and the Delta thermal conditions.

**Districts' Plan** – The Districts intend to continue the temperature monitoring system that they have maintained for several years (nine locations in the Tuolumne River and two in the San Joaquin River). They will continue to test and use the existing Tuolumne River temperature model and use it to analyze thermal effects on fish distribution. They also intend to continue to collaborate with current modeling efforts for the larger San Joaquin basin and use that model to better understand the relationship between project operations and temperatures in the San Joaquin River and the south Delta.

**Agencies' Comments** – The Agencies are concerned that the Districts' fish distribution data are insufficient to evaluate thermal effects on fish distribution. They recommend five additional studies: 1) screw trap studies to see how flow and temperature affect smolt survival and production; 2) escapement and age analysis to see how flow and temperature affects adult recruitment; 3) smolt telemetry studies; 4) bioassay studies to relate fish condition to flow and temperature; and 5) inclusion of flow and temperature in predation studies (California Department of Fish and Game filing of March 5, 2007).

**Staff's Conclusion** – The Districts' plan includes the elements that we determined were most necessary; i.e., continued development of a thermal model for the Tuolumne River so that the flow-temperature relationship can be better understood, and an analysis of how conditions in the Delta might affect the success of any measures taken to improve thermal conditions in the Tuolumne. Of the additional studies recommended by the Agencies, numbers 1, 3, and 5 are mostly just additional analyses on existing tasks to include consideration of flow and temperature effects; these should be included and the Districts' concur in their response to the Agencies' comments. With regard to item 2, staff is not convinced that the proposed analysis would be very productive. As stated above, bioassay studies are not justified until there is some evidence that poor health in the river is a real factor in juvenile survival.

## **SUMMARY**

It was clear in the results presented in the 10-year Summary that additional annual studies of population-level data are necessary before the effects of increased flow and habitat restoration on the fall-run Chinook salmon population will be detectable. Therefore, the point of completing many of the short-term studies is to better understand

the underlying mechanisms that affect population-level success of the fisheries resources, with the belief that improvements at particular life stages (e.g., increased hatching success, reduced predation on fry, etc.) will translate to positive population-level effects. The intent of Staff's request for additional studies was to encourage 1) the continued collection of long-term data that can be used to assess population-level responses and 2) short-term studies that would evaluate the success of mitigation on specific life-stage processes.

For the most part, the plan submitted by the Districts addresses the issues we presented. With the exception of the instream flow issue, the Districts' plan with some fine tuning should address most of Staff concerns with the results presented in the 10-year *summary report*. In some cases the plan does not include details of individual studies that are crucial to evaluating their likely success. Details such as study duration, number of samples, sample locations, reference data, etc., can have a big impact on both study costs and the value of the results. These details should be worked out through the TRTAC. In cases where the Districts put a limit on the number of years that a study will be performed (e.g., many of the habitat restoration studies), the proposed study duration is only acceptable if useful results are obtained in that time or if it becomes apparent that further study will be fruitless. Otherwise, the studies should continue.

As a result of staff's analysis, the following issues still need to be resolved in the Districts' plan:

- 1) provide flows higher than required by the settlement agreement at least once during next four years to produce smolt production data for high flow conditions (>4,000 cfs);
- 2) continue discussions with TRTAC regarding cost and benefits of future coded-wire tag studies;
- 3) provide better justification for the short duration (1 to 2 years) of some habitat restoration studies or provide decision points that would be used to determine whether to terminate or continue a study;
- 4) provide assurance that proposed RST studies will address deficiencies in past studies;
- 5) come to agreement with the Agencies as to how to assess the relationship between smolt movement and winter flow to minimize disagreement as to data interpretation after the data are collected; and
- 6) include in the steelhead status studies a comparison of results (e.g., return rates and population status) from nearby rivers.

Most of the Agencies' suggestions are contained in their recently released (February 27, 2007) report outlining their limiting factor analysis and recommended studies for the Tuolumne River. The Agencies' plan considers many more issues than those identified by Commission staff to be addressed by the Districts. The Agencies' report represents a thorough analysis of the challenge of conserving and restoring the Chinook salmon runs. However, many of the issues are unrelated (or only partially related) to Don Pedro operations, and the Districts should not be solely responsible for determining what is limiting salmon production in the Tuolumne River. For example,

past mining activities in the river left behind significant habitat modification. The Districts and the TRTAC recognize that restoring some of this habitat may offset the impact of modified flows due to project operations; however, the Districts should not be expected on their own to remediate all problems associated with past mining activities. The fisheries restoration challenges in the Tuolumne River beg for a comprehensive watershed-wide approach, as with many other rivers in California and elsewhere. This FERC proceeding is only one part of that comprehensive solution.

The Districts' Tuolumne River Fisheries Study Plan, with the modifications outlined here, should assist in determining if the current instream flow requirements and other mitigation undertaken by the Districts has provided the intended benefit of providing better conditions for Chinook salmon production. Additionally, the TRTAC collaboration, review and approval process should provide the guidance and framework necessary for the successful implementation of the Districts' plan.