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April 13, 2011

Via US Mail and Email to commentletters@waterboards.ca.gov

Jeanine Townsend, Clerk to the Board
State Water Resources Control Board
1001 I Street, 24th Floor
Sacramento, CA 95814

RE: Comment Letter—MID Draft Order
4/19/2011 BOARD MEETING—Consideration of a proposed draft Order regarding Merced Irrigation District's request to stay Investigation Order WR 2011-0003-EXEC

Dear Ms. Townsend:

The following comments are provided on behalf of the Merced Irrigation District ("Merced") in response to the State Water Resources Control Board's ("SWRCB" or "Board") Draft Order Regarding Merced's Petition for Reconsideration and Request for Stay ("Draft Order") dated April 6, 2011. Merced hereby incorporates the points and authorities submitted to support its Petition for Reconsideration and Request for Stay and the comments submitted by Merced, the Modesto Irrigation District and PacifiCorp in support of Merced.

As a matter of clarification, the Petition for Reconsideration was filed pursuant to Water Code § 13321 and 23 CCR § 2053 because those seemed to be the most appropriate sections given that they address petitions for reconsideration of water quality orders pursuant to the Porter-Cologne Water Quality Act. The cover letter to the Investigation Order cites to Water Code §§ 13383 and 13385 of the Porter-Cologne Water Quality Act, and the authority for the Investigative Order to require the water quality studies ostensibly needed by the Board to issue a water quality certification is given as Water Code § 13267. On the other hand, 23 CCR § 3869, the authority cited by the Board in the Draft Order, is focused on reviews of water quality certifications. Since no water quality application has been filed and there has been no water quality certification issued, the authority cited by the Board hardly seems appropriate.

Despite the tone of Investigative Order WR 2011-0003 EXEC and the Draft Order, Merced is not the bad guy in this proceeding. Merced has offered to work with staff on numerous occasions. For example, Merced agreed to collect fish from within the project reservoirs and have the tissue analyzed for total mercury, copper, selenium and silver. The results of the study were provided to the SWRCB (see attached HDR/DTA Memorandum from Carin Loy to Jim Lynch, December 22, 2009). Mr. Bryan Kelly, Director of Regulatory Compliance and Government Affairs, Water for Merced, personally spoke with Ms. Watts following his appointment and assured her that when it came time to perform the CEQA analysis and apply for the 401 certification, he would ensure that these activities were planned and performed in a collaborative fashion with the SWRCB. In addition, a revised water quality study, *which was approved by Board staff*, was submitted to FERC. The submittal stated that if DO problems occurred, Merced and the SWRCB would discuss the need to install continuous DO monitors in 2011 (see attached letter from Geoffrey Rabone, Merced, to Honorable Kimberly D. Rose, FERC, April 6, 2010). Regrettably, the SWRCB never contacted Merced to discuss either issue prior to issuing the Investigative Order.

This entire proceeding is unnecessary as there is no 401 water quality certification application pending. Despite the feeble attempts by staff to claim that the 401 proceeding started the moment a Notice of Intent was filed, that is just not the case. In fact, there is not even a "proceeding" before FERC until the license application is filed in February 2012. Sections 5.5(c) and 5.8(d)(4) of the ILP regulations are not applicable. Section 5.5(c) addresses the filing of the Notice of Intent and requires that potential applicants distribute the notice to appropriate federal and state agencies, among others. Section 5.8(d)(4) describes the scoping meeting and site visit and requires that the pre-application schedule maximize coordination between federal, state, and tribal permitting and certification processes. The California Code of Regulations do not specify when the 401 certification process begins, but only specify when a potential 401 applicant has to begin paying a fee to the water right program and pay for staff to become engaged in the process. According to the regulations, the fee is for "review in anticipation of consideration of certification." (23 CCR § 3833.) Water Code § 13160.1 clearly states that the fee is "to cover the costs incurred by the state and regional boards in connection with any certificate that is required or authorized by any federal law." There is no guarantee that Merced will file an application with FERC or file an application for water quality certification.

The Draft Order ignores FERC regulations which clearly provide for the timing of the filing of the 401 application (see attached ILP Final Rule Flowchart). Section 5.23(b) provides that the applicant must provide a copy of the application or a copy of the water certification no later than 60 days following the date of issuance of the notice of acceptance

and ready for environmental analysis by FERC. See also WR 2010-0004-EXEC "YCWA is not required to file a water quality certification until 60 days after FERC accepts an application for relicensing.... (18 CFR §§ 5.17(a), 5.23.)"

Merced realizes that FERC's requirements for its relicensing process are different than the Board's requirements for a water quality certification. The FERC ILP regulations encourage early consultation with the states on water quality issues and data needs (18 CFR § 5.18(b)(3)(i)). Despite numerous attempts on the part of Merced to discuss these issues with staff, such early consultations did not take place. Unfortunately, the Board offered very limited input in the ILP scoping and study formulation processes on proposed studies from the unique perspective of its status as the agency responsible for issuing a 401 water quality certification. In its March 2, 2009, comments on the Pre-Application Document and Scoping Document 1, the Board made a single study request: "an examination of whether and to what extent bioaccumulation of mercury may be occurring in fish that reside in the Project impoundments." In subsequent filings, while reiterating its purported need for bioaccumulation study data, the Board otherwise merely hopped on board with other state and federal resource agencies and non-governmental conservation groups in endorsing the "anadromous salmonid study plan package" suite of 16 studies. The Board made no unique requests for studies or study modifications apart from the omnibus, group-endorsed suite of studies, many of which have no obvious pertinence to the State Water Board's section 401 jurisdiction. Unable to convince FERC to order Merced to perform the studies, the SWRCB has now taken it upon itself to circumvent the FERC ILP and order these studies without the courtesy of even a phone call.

The Board's cost analysis is incorrect. As presented by Merced in its response to comments on the Initial Study Report, the estimate of costs requested by all the interested parties ranged from $5,695,000 and $8,845,000 (see attached Table 1). In making this estimate, Merced attempted to estimate level of effort and costs to perform each of requested studies, but since some studies had very vague scopes, Merced could only do a best guess estimate at a range of costs. Based on Merced's estimates, the actual cost could be as high as $4.6 to $20.2 million dollars, depending on the final scope of the studies. Merced's estimate of all study costs ordered by the SWRCB's Investigative Order is between $3,350,000 and $5,425,000 (Table 1). The actual costs could be higher depending on the number of transects used for the IFIM study. Subtracting out the cost of the MOU studies ($1,560,000 to $2,750,000) (Table 2) and the April 1, 2011, additional FERC-ordered studies ($1,065,000 to $1,115,000) (Table 3), the remaining costs are estimated to cost between $725,000 and $1,560,000. The SWRCB staff may consider these reasonable costs

and not an undue burden, but Merced has already spent $2,300,000 on technical studies during the FERC process to provide information to support its application, CEQA and NEPA analysis, and 401 application and will be spending more than $1 million on additional studies based on FERC's revisions to the study plan. The rate payers of Merced would not consider these extra costs inconsequential. Merced is disappointed by the implication in the order that Merced, a local public agency, is somehow awash in money and can easily absorb these costs. For the record, the incorporated cities and unincorporated communities within Merced's boundaries are "Disadvantaged Communities" with "an annual median household income that is less than 80 percent of the statewide annual median household income." (Water Code § 79505.5(a).)

Even though some studies are not required to start until 2012, the following studies are required to start in 2011. Contrary to assertions in the Draft Order, the costs for these studies are not insignificant and are estimated to be between $670,000 and $1,215,000. There are also several studies listed with no start dates specified.

- Monitoring Temperatures During Salmon Egg Incubation
- Determine the Distribution and Abundance of Steelhead in the Merced River
- Health Assessment of Juvenile Salmon during Spring Outmigration in the Merced River
- Water Quality Monitoring
- Toxicity Bioassays
- Temperature Monitoring
- Dissolved Oxygen Monitoring
- Fish Tissue Mercury Study

As pointed out in Merced's Petition for Reconsideration, Water Code § 13267 requires that the burden of furnishing technical or monitoring reports, including costs, shall bear a reasonable relationship to the need for reports and the benefits to be obtained. (Cal. Water Code § 13267(b)(1).) The board has yet to demonstrate any nexus between the studies requested and the relicensing of the Merced hydroelectric project. The project releases cold, clean water from the lower depths of Lake McClure—nothing is added to the water. The water continues downstream or is diverted and used by others, some of which returns to the system. Sampling for Group A pesticides, boron, pyrethroids, *E. coli*, DDT and DDE in the Merced and San Joaquin rivers is an example of the lack of any nexus to project operations. Water quality sampling of irrigation district return flows and toxicity testing of Merced River water also demonstrate a lack of any connection between the order and project operations.

The board's insistence that there is harm to the public if the stay is granted is unsubstantiated. The so-called harm to the public because beneficial uses are allegedly not being met exists whether the studies are conducted or not. The staff's fear that the license will be delayed does not translate to harm to the public. There are no immediate or acute threats to the public. The project is on schedule with a license application scheduled to be filed with FERC on or about February 28, 2012. The application for the 401 water quality certification could be filed as late as October 2014 due to the time involved in completing all the studies, including those recently ordered by FERC. Conducting the studies will not provide any greater or lesser level of protection to beneficial uses or change the status quo.

Furthermore, the Draft Order is inconsistent with the Investigative Order. On the one hand, the Draft Order alleges that there will be harm to the public if the Board does not receive the requested information in a timely fashion. On the other hand, Order WR 2011-0003 specifically allows Merced to request the Deputy Director to amend the requirements of the Order due to unforeseen delays, such as securing the necessary federal and state study permits.

Regarding the delay in hearing the petition for reconsideration, the board's reliance on WQ 2009-0007 and WR 2009-0039 is misplaced. WQ 2009-0007 involves a petition for reconsideration filed by PG&E in regards to a water quality certification for its Spring Gap-Stanislaus Project (FERC Project 2130). The board granted PG&E's request to hold the petition in abeyance while PG&E and board staff met to review the certification and propose alternative language. WR 2009-0039 involved a petition for reconsideration filed by interested parties opposed to the water quality certification issued to DWR for an amendment to its Pyramid Lake Project (FERC Project 2426). DWR was in fact satisfied with the certification and requested that the board deny the petition for reconsideration (see attached Memorandum from Erick Soderlund, DWR, to Camilla Williams, SWRCB, February 19, 2009). DWR operated the project according to the water quality certification while the petition was pending. In both cases, neither applicant suffered any harm while the petition was pending. In Merced's case, the board would have the district spend millions of dollars on studies, some of questionable merit, while the petition is pending. If the petition is later granted, then the district's funds will have been wasted.

Merced supports the idea of a technical workshop, however, it makes no sense to deny the stay, require Merced to comply with the order and begin the studies, and then conduct a workshop which could alter or amend the order. In addition, the recent decision

by FERC to revise the study plan requires consultation with Board staff to eliminate redundant or inconsistent studies (see attached FERC Revisions to study plan, April 1, 2011). Merced suggests an alternate approach to the resolution of this matter as follows:

a. Continue the item on the calendar for 90 days including the issuance of a stay of all deliverables during the 90 day period. There is no harm to any party in this short stay in that few if any of the studies can be conducted in that time frame, and, in any case, the time for filing the 401 application is not until mid-2012 at the earliest, while the harm to Merced is significant in terms of expenditures on studies that may not be needed under the order or which may change after consultation with staff.

b. Conduct the workshop referenced in the order and authorize communication between Board staff and Merced personnel to discuss potential changes to the ordered studies in light of recent FERC study orders and informal discussions with the Department of Fish and Game.

c. At the Board meeting in July consider a potential agreed study plan or conduct the hearing as noticed.

Very truly yours,

MASON, ROBBINS, BROWNING & GODWIN

ARTHUR F. GODWIN

AFG/db

cc: Bryan Kelly (w/encl.)

Table 1

Merced ID Study Cost Estimates

Table 3.0-4 Response to Comments on ISR (Feb. 2011)

Study Number	low estimate	high estimate
1. Salmonid Floodplain Rearing	$ 400,000	$ 700,000
2. Chinook Salmon Egg Viability	$ 125,000	$ 300,000
3. Instream Flow (PHABSIM) Downstream of Crocker-Huffman	$ 900,000	$ 1,000,000
4. Reservoir Water Temperature Management	$ 100,000	$ 150,000
5. Sediment/Gravel Supply and Transport	$ 300,000	$ 500,000
6. Upper River Fish Populations and Habitat	$ 200,000	$ 500,000
7. Determination of Anadromy in Merced River *O. mykiss*	$ 420,000	$ 420,000
8. Migration Timing of Adult Chinook Salmon (MOU1)	$ 300,000	$ 500,000
9. Evaluation of Anadromous Salmonid Salmon Spawning Habitats (MOU2)	$ 100,000	$ 300,000
10. Evaluation of Anadromoous Salmonid Rearing Habitat (MOU3)	$ 150,000	$ 300,000
11. Evaluation of Anadromous Salmonid Outmigration and Survival (MOU4)	$ 1,000,000	$ 1,500,000
12. Water Temperature Monitoring in the Lower Merced River (MOU5)	$ 10,000	$ 150,000
13. Monitoring Temperatures During Salmon Egg Incubation	$ 30,000	$ 100,000
14. Determine the Distribution and Abundance of Steelhead	$ 125,000	$ 225,000
15. Examine Environmental and Physiological Factors Associated with Juvenile Salmon Survival and Fitness	$ 100,000	$ 300,000
16. Develop Map of Potential Juvenile Salmon Predator Habitat	$ 60,000	$ 80,000
17. Evaluate Relationship Between Flow and Connectivity with Juvenile Salmon Predator Habitat	$ 60,000	$ 80,000
18. Instream Flow	$ 900,000	$ 1,000,000
19. Health Assessment of Juvenile Salmon during Spring Outmigration	$ 100,000	$ 350,000
20. Water Quality Monitoring	$ 135,000	$ 150,000
21. Toxicity Bioassays	$ 40,000	$ 50,000
22. Temperature Monitoring	$ 20,000	$ 30,000
23. Dissolved Oxygen Monitoring	$ 60,000	$ 80,000
24. Fish Tissue Mercury Study	$ 60,000	$ 80,000
Total	$ 5,695,000	$ 8,845,000
Investigative Order Studies	$ 3,350,000	$ 5,425,000

Table 2

Merced ID Study Cost Estimates

Table 3.0-4 Response to Comments on ISR (Feb. 2011)

Study Number	low estimate	high estimate
1. Salmonid Floodplain Rearing	$ 400,000	$ 700,000
2. Chinook Salmon Egg Viability	$ 125,000	$ 300,000
3. Instream Flow (PHABSIM) Downstream of Crocker-Huffman	$ 900,000	$ 1,000,000
4. Reservoir Water Temperature Management	$ 100,000	$ 150,000
5. Sediment/Gravel Supply and Transport	$ 300,000	$ 500,000
6. Upper River Fish Populations and Habitat	$ 200,000	$ 500,000
7. Determination of Anadromy in Merced River *O. mykiss*	$ 420,000	$ 420,000
8. Migration Timing of Adult Chinook Salmon (MOU1)	$ 300,000	$ 500,000
9. Evaluation of Anadromous Salmonid Salmon Spawning Habitats (MOU2)	$ 100,000	$ 300,000
10. Evaluation of Anadromoous Salmonid Rearing Habitat (MOU3)	$ 150,000	$ 300,000
11. Evaluation of Anadromous Salmonid Outmigration and Survival (MOU4)	$ 1,000,000	$ 1,500,000
12. Water Temperature Monitoring in the Lower Merced River (MOU5)	$ 10,000	$ 150,000
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19. Health Assessment of Juvenile Salmon during Spring Outmigration	$ 100,000	$ 350,000
20. Water Quality Monitoring	$ 135,000	$ 150,000
21. Toxicity Bioassays	$ 40,000	$ 50,000
22. Temperature Monitoring	$ 20,000	$ 30,000
23. Dissolved Oxygen Monitoring	$ 60,000	$ 80,000
24. Fish Tissue Mercury Study	$ 60,000	$ 80,000
Total	$ 5,695,000	$ 8,845,000
Total MOU Studies	$ 1,560,000	$ 2,750,000

Table 3

FERC Revisions to Study Plan (Apr. 2011)

Study	Low Estimate	High Estimate
Reservoir Water Temperature Management Feasibility Study	$ 100,000	$ 150,000
Salmonid Rearing Habitat	$ 225,000	$ 225,000
Instream Flow (PHABSIM) Downstream of Crocker-Huffman	$ 600,000	$ 600,000
Chinook Salmon Egg Viability	$ 125,000	$ 125,000
Dissolved Oxygen Study	$ 15,000	$ 15,000
Total	$ 1,065,000	$ 1,115,000

HDR | DTA

MEMORANDUM

DATE: December 22, 2009

TO: Jim Lynch

FROM: Carin Loy

SUBJECT: Merced Irrigation District: Fish Tissue Sample Results

Below, please find the results of fish tissue analyses performed for the Merced Irrigation District in 2009.

Lake McClure and McSwain Reservoir fish sampling occurred in September and October 2009, a non-spawning period when the target species were expected to be available. Larger fish and game species with greater potential for bioaccumulation were targeted. At the direction of the California State Water Resources Control Board (SWRCB), who had consulted the Office of Environmental Health Hazard Assessment (OEHHA), the goal was to collect 37 fish: 27 from Lake McClure (nine rainbow trout, nine kokanee, and nine Chinook salmon) and 10 from McSwain Reservoir (five rainbow trout and five spotted bass).

The Marine Pollution Studies Laboratory of the Department of Fish and Game (MPSL-DFG) at Moss Landing collected fish and performed the laboratory analyses for this study. Field sampling and laboratory procedures were consistent with the SWRCB's Surface Water Ambient Monitoring Program (SWAMP) Bioaccumulation Oversight Group (BOG) Quality Assurance Project Plan (QAPP) (Bonnema 2007)[1].

MPSL-DFG hired a local commercial fisherman to help locate reservoir fish. Fish were collected by both electroshocking and gill nets over two visits. Twenty-four (24) fish were collected: 17 individuals from target species (rainbow trout, kokanee, Chinook salmon) and seven individuals from non-target species (brown trout, Sacramento sucker). For each fish collected the following attributes were recorded: fish species; fork length (mm); total length (mm); and weight (grams). Fish were in good condition and MPSL-DFG did not note anything out of the ordinary.

Following consultation with the SWRCB, it was decided that all 24 fish collected, both target and non-target species, would be submitted to the laboratory for chemical analyses (Watts, pers.

[1] The SWAMP BOG QAPP incorporates the collection methods outlined by the California Environmental Protection Agency (2005) in their *General Protocol for Sport Fish Sampling and Analysis* and CDFG Method # MPSL-102a. Being consistent with the SWAMP BOG QAPP ensured that tissue results would be consistent with SWAMP's ongoing statewide fish tissue sampling campaign (Davis 2007; Davis 2009).

comm.). Hence, fillets from all 24 fish were analyzed for total mercury[2], copper, selenium and silver. Methods and reporting limits are provided in Table 1.

Table 1. Analytical Methods and Reporting Limits

Metal	Analytical Method	Reporting Limit (mg/kg wet-weight)
Copper	EPA 3052/EPA 200.8[a]	0.06
Mercury	EPA 7374	0.01
Selenium	EPA 3052/EPA 200.8	0.15
Silver	EPA 3052/EPA 200.8	0.01

[a] EPA 3052 is microwave digestion of tissue method. EPA 200.8 is ICPMS analysis of metals method.

Results of the fish tissue analyses are provided in Table 2. MPSL-DFG is a California Certified Laboratory. Analytical methods were consistent with the SWRCB SWAMP BOG QAPP (Bonnema 2007), which includes the criteria for data quality acceptability, testing (including deviations) and calibration, as well as preventative and corrective measures. Laboratory quality assurance documentation is provided as Attachment A.

[2] Of the total amount of mercury found in fish muscle tissue, methyl mercury comprises more than 95 percent (ATSDR 1999; Bloom 1992).

Table 2. Merced Irrigation District Fish Tissue Results

Species	Date Collected	Total Length (mm)	Fork Length (mm)	Weight (grams)	Tag #	Percent Moisture	Mercury (µg/g wet-weight)	Silver (µg/g wet-weight)	Copper (µg/g wet-weight)	Selenium (µg/g wet-weight)
LAKE MCCLURE										
Rainbow Trout	9/1/2009	410	390	555	A2682	78.9	0.021	<.003	0.32916	0.31
	9/1/2009	366	348	430	A2683	79.7	0.021	<.003	0.23954	<.15
	9/1/2009	390	371	460	A2684	78.5	0.018	<.003	0.2451	0.36
	9/1/2009	365	352	365	A2685	78.5	0.029	<.003	0.25585	0.73
	9/1/2009	346	327	325	A2686	76.3	0.044	<.003	0.30336	0.24
	9/1/2009	390	371	410	A2687	81.8	0.051	<.003	0.14378	0.19
	9/1/2009	410	387	480	A2688	79.6	0.202	<.003	0.14688	0.37
	10/15/2009	433	411	500	13492	80.8	0.151	<.003	0.20736	0.27
Kokanee Salmon	10/15/2009	374	362	400	13493	80.6	0.167	<.003	0.35502	0.37
Chinook Salmon	10/15/2009	380	349	540	13491	80.9	0.134	<.003	0.41065	0.21
	10/15/2009	389	342	440	13490	77.0	0.577	<.003	0.2622	0.53
	10/15/2009	347	309	345	13489	76.5	0.383	<.003	0.26085	0.56
MCSWAIN RESERVOIR										
Rainbow Trout	8/31/2009	365	347	430	A2676	78.7	0.022	<.003	0.21513	0.37
	8/31/2009	407	390	545	A2677	78.3	0.069	<.003	0.2387	0.34
	8/31/2009	375	358	470	A2678	77.7	0.019	<.003	0.30551	0.27
	8/31/2009	400	388	610	A2679	77.3	0.326	<.003	0.2724	0.61
	8/31/2009	361	342	390	A2680	78.3	0.270	<.003	0.23002	<.15
Brown Trout	8/31/2009	365	354	490	A2681	77.1	0.061	<.003	0.3206	0.40
Sacramento Sucker	9/2/2009	390	370	540	A2689	80.5	0.222	<.003	0.1794	0.44
	9/2/2009	435	416	920	A2690	80.4	0.298	<.003	0.26264	0.52
	9/2/2009	485	460	1270	A2691	73.1	0.388	<.003	0.26631	0.26
	9/2/2009	462	438	980	A2692	79.1	0.224	<.003	0.33649	0.44
	9/2/2009	462	437	1020	A2693	77.8	0.229	<.003	0.23976	1.33
	9/2/2009	354	337	425	A2694	76.8	0.139	<.003	0.16936	0.33

mm millimeters
ug/g micrograms per gram (parts-per-million)

References Cited:

ATSDR. 1999. Agency for Toxic Substances and Disease Registry. Toxicological profile for mercury (update). Prepared by Research Triangle Institute under contract no. 205-93-0606. Public Health Service, U.S. Department of Health and Human Services.

Bonnema, A. 2007. Quality Assurance Project Plan Screening Study of Bioaccumulation in California Lakes and Reservoirs. Moss Landing Marine Labs. Prepared for SWAMP BOG, 49 pages plus appendices and attachments.

Bloom, N.S. 1992. On the chemical form of mercury in edible fish and marine invertebrate tissue. Can. J. Fish. Aquat. Sci. 49(5):1010-1017.

California Environmental Protection Agency (Cal EPA). 2005. General Protocol for Sport Fish Sampling and Analysis. Pesticide and Environmental Toxicology Branch, Office of Environmental Health Hazard Assessment, California Environmental Protection Agency. December 2005.

Davis, J.A., A.R. Melwani, S.N. Bezalel, J.A. Hunt, G. Ichikawa, A. Bonnema, W.A. Heim, D. Crane, S. Swenson, C. Lamerdin, and M. Stephenson. 2009. Contaminants in Fish from California Lakes and Reservoirs: Technical Report on Year One of a Two-Year Screening Survey. A Report of the Surface Water Ambient Monitoring Program (SWAMP). California State Water Resources Control Board, Sacramento, CA. http://www.swrcb.ca.gov/water_issues/programs/swamp/lakes_study.shtml

Davis, J.A., J. L. Grenier, A.R. Melwani, S. Bezalel, E. Letteney, and E. Zhang. 2007. Bioaccumulation of pollutants in California waters: a review of historic data and assessment of impacts on fishing and aquatic life. Prepared for the Surface Water Ambient Monitoring Program, California Water Resources Control Board, Sacramento, CA.

US Environmental Protection Agency. 1994. Method 200.8. Determination of Trace Elements in Waters and Wastes by Inductively Coupled Plasma – Mass Spectrometry. Revision 5.4. US Environmental Protection Agency, Washington, DC.

US Environmental Protection Agency. 1996. Method 3052. Microwave Assisted Acid Digestion of Siliceous and Organically Based Matrices. Revision 0. US Environmental Protection Agency, Washington, DC.

US Environmental Protection Agency. 1998. Method 7473. Mercury in Solids and Solutions by Thermal Decomposition, Amalgamation, and Atomic Absorption Spectrophotometry. Revision 0. US Environmental Protection Agency, Washington, DC.

Watts, J., State Water Resources Control Board. Personal communication with C. Loy, HDR|DTA, October 1, 2009.

MERCED IRRIGATION DISTRICT

April 6, 2010

Electronically Filed (E-File)

Honorable Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

Subject: **Merced River Hydroelectric Project**
FERC Project No. 2179 - California
Water Quality Study

Dear Secretary Bose:

On September 14, 2009, the Federal Energy Regulatory Commission (FERC) issued a Study Plan Determination (FERC's Determination) for Merced Irrigation District's (Merced ID) Merced River Hydroelectric Project (FERC Number 2179). FERC amended its Determination on September 14 and 17, 2009, and on December 22, 2009.

FERC's Determination, as amended, included a Water Quality Study (Study). Step 3 in the Study pertains to continuous dissolved oxygen (DO) monitoring and states:

> ***Timing of Sampling Events.*** *Continuous DO monitors will be deployed for a minimum of 14 days in the late summer low flow season (late August/early September). If collaboratively agreed to by Merced ID and the SWRCB, Merced ID will install and maintain continuous dissolved oxygen recorders for 14 days during spring and/or fall low flow periods upstream and downstream of Project reservoirs, below PG&E's Merced Falls Dam, in the Merced River immediately upstream of the Crocker-Huffman Diversion Dam impoundment, and in the Merced River immediately downstream of Crocker-Huffman Diversion Dam. Additional DO data collection will also be undertaken during the spring and fall when flow releases from the Project reservoirs are not being made to provide for irrigation water demand. The exact timing of sampling events will be decided in consultation with the SWRCB. Within 30 days after consultations, Merced ID will file a study schedule with FERC for approval.*

With regards to the spring continuous DO monitoring, Merced ID consulted with the State Water Resources Control Board (SWRCB) on March 2, 2010, and Merced ID and the SWRCB agreed since the water temperatures in the Merced River in spring are cold, low DO concentrations were unlikely to be an issue. Therefore, it was agreed that in lieu of continuous DO monitoring, Merced ID would collect a spot DO reading twice in one day (around noon and midnight) during the week of March 8, 2010. Samples would be taken in the Merced River upstream of Lake McClure, in McSwain Reservoir downstream of New Exchequer Powerhouse, in Pacific Gas and Electric Company's (PG&E) Merced Falls Reservoir downstream of McSwain Powerhouse, and in the Merced River downstream of PG&E's Merced Falls Powerhouse. If it was found that any

Merced Irrigation District
744 West 20th Street
Merced, CA 95340

DO problems occurred, Licensee and the SWRCB would discuss the need to install continuous DO recorders in spring 2011, or another approach that is more focused. Merced ID advised FERC's Relicensing Manager of this agreement via e-mail on March 2, 2010, and conducted the sampling.

With regards to the timing of the late summer and fall continuous DO monitoring, Merced ID consulted with Relicensing Participants, including the SWRCB, during a scheduled March 25, 2010, conference call. It was agreed that Merced ID would perform:

- Summertime continuous DO monitoring for 14 days including the last week in August and the first week in September 2010
- Fall continuous DO monitoring for 14 days in late October or in the first two weeks in November 2010. The fall DO monitoring period would coincide with the earliest time period during which irrigation deliveries and fall salmon migration flow releases are not occurring.

Merced ID and the SWRCB also agreed that Merced ID would perform the summer and fall 2010 continuous DO monitoring at five locations: 1) in the Merced River immediately upstream of Lake McClure; 2) in McSwain Reservoir immediately downstream of New Exchequer Powerhouse; 3) in PG&E's Merced Falls Reservoir immediately downstream of McSwain Powerhouse; 4) in the Merced River immediately downstream of PG&E's Merced Falls Dam; and 5) in the Merced River immediately downstream of Crocker-Huffman Diversion Dam.

In accordance with the FERC-approved Study, the above DO monitoring scheduling information is hereby provided to FERC for approval.

In addition, Merced ID notes that the FERC-approved Study requires Merced ID to conduct water chemistry sampling "*during the late summer low flow season (late August/early September). The low flow sampling in the vicinity of the Project should be conducted when irrigation deliveries are not occurring.*" Irrigation deliveries occur continuously from March through October of each year, so irrigation deliveries occur for the entire summer (i.e., there is no summer low flow season when irrigation deliveries are not occurring). During the March 25, 2010, conference call, Merced ID and the SWRCB agreed the summer low flow season water chemistry sampling would occur in the late August/early September 2010 period, as stated in the study plan and which overlaps with the summer continuous DO monitoring period. The SWRCB understood that irrigation deliveries would occur during the sampling period.

If you have any questions regarding this matter, please contact me at (209) 722-5761.

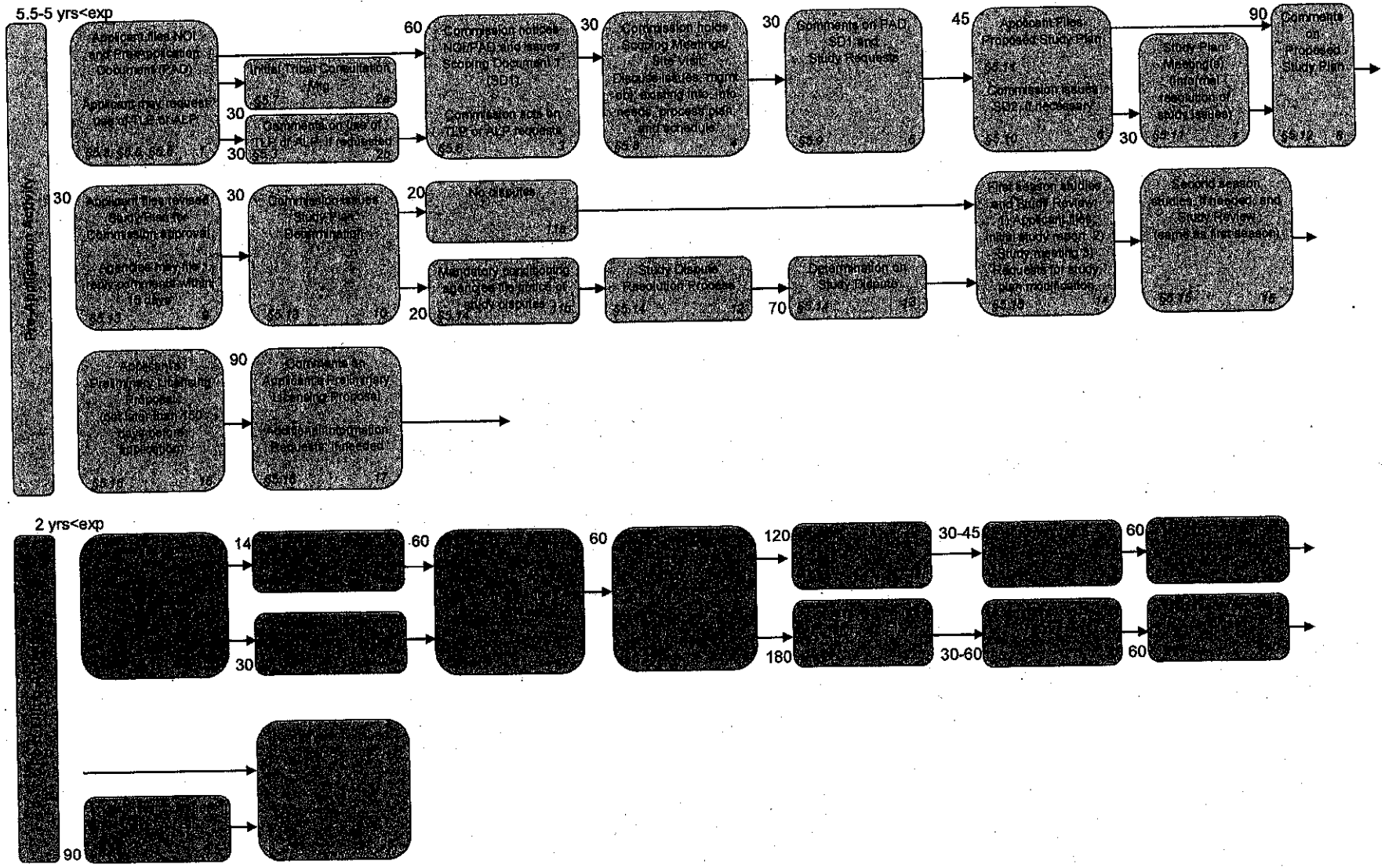
Sincerely,

Geoffrey Rabone

Geoffrey Rabone
Director of Regulatory Compliance and Government Affairs (Water)
MERCED IRRIGATION DISTRICT

cc: Matt Buhyoff, FERC DC
Jennifer Watts, SWRCB
Relicensing Participants (via e-mail)

Integrated Licensing Process
Final Rule



State of California

The Resources Agency

Memorandum

Date: February 19, 2009

To: Camilla Williams
State Water Resources Control Board
1001 I Street
P.O. Box 2000
Sacramento, CA 95812-2000

2009 MAR -9 P 2:32

From: Department of Water Resources

Subject: Comments on the Petition for Reconsideration on 401 Water Quality Certification for the California Aqueduct Hydroelectric Project, Federal Energy Regulatory Commission, Project No. 2426

The Department of Water Resources (DWR) offers the following comments on the California Trout, Inc. (CalTrout) and Friends of the River (FOR) (collectively, Petitioners) Petition for Reconsideration and Request for Stay (Petition) regarding the Water Quality Certification (WQC) for the Re-Operation of Pyramid Dam for the California Aqueduct Hydroelectric Project, Federal Energy Regulatory Commission (FERC) Project No. 2426. For the reasons set forth below, DWR respectfully requests the State Water Resources Control Board (SWRCB) deny the petition for reconsideration and request for a stay.

As noted in the WQC, the flow regime proposed by DWR in its license amendment application to FERC was considered and developed to prevent the incidental take of the federally endangered arroyo toad. DWR worked closely with the U.S. Fish & Wildlife Service (FWS) and the California Department of Fish and Game, among others, to develop a flow regime in Piru Creek that would adequately protect arroyo toad and help with the species' survival and recovery. As such, DWR believes that any modification to the proposed flow regime could harm the arroyo toad and put DWR at risk to unlawfully take the arroyo toad. Thus, DWR believes the Petitioner's request to modify the proposed flow regime in Piru Creek should be denied.

In addition, the Petitioner's request to modify the proposed flow regime could deplete storage in Pyramid Lake and decrease DWR's ability to provide adequate and reliable water supply to its contractors downstream of Pyramid Lake. A combination of winter flows mimicking natural inflows to Pyramid Lake and elevated summer releases from Pyramid Lake, as suggested by the Petitioners, could cause a water shortage at Pyramid Lake. Prior to 2005, the water released in the summer was balanced by withholding in Pyramid Lake water from winter storm events. However, under the Petitioner's proposed flow regime, DWR would be required to both release water in the summer and allow water from winter storm events to pass through to the Piru Creek. DWR probably would not be able to "make up" the water it would be required to release under this proposed regime, especially during dry conditions.

In sum, the Petition asks for modifications to the WQC that have the potential to cause harm to the federally endangered arroyo toad and decrease DWR's ability to maintain

storage in Pyramid Lake and, subsequently, provide an adequate and reliable water supply.

Please feel free to contact me if you or your staff have questions on these comments or would like additional information please contact me at (916) 653-8826 or esoderlu@water.ca.gov.

Erick Soderlund
Staff Counsel

Attachment – Piru Petition Mailing List

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D.C. 20426
April 1, 2011

OFFICE OF ENERGY PROJECTS

Project No. 2179-042--California
Merced River Hydroelectric Project
Merced Irrigation District

John Sweigard
General Manager
Merced Irrigation District
P.O. Box 2288
Merced, CA 95344

RE: Revisions to study plan

Dear Mr. Sweigard:

On December 22, 2009, I issued a Study Dispute Resolution Determination (Determination) on sixteen studies for the Merced Irrigation District's (MID) Merced River Hydroelectric Project relicensing (Project No. 2179). Of those, I determined that four studies: (1) *Salmonid Floodplain Rearing Study*; (2) *Chinook Salmon Egg Viability Study*; (3) *Instream Flow (PHABSIM) Study Downstream of Crocker-Huffman;* and (4) *Reservoir Water Temperature Management Feasibility Study*) be considered during the second study season. I determined that an evaluation of the need for these studies should be based upon results from two approved first-season studies (*Water Balance/Operations Model Study* and *Water Temperature Model Study*) to identify and isolate direct project effects on water quality and quantity variables.

On November 30, 2011, you conducted a meeting to report the results of your studies. You filed a summary of the meeting on December 15, 2011. In response to the meeting summary, we received nine letters expressing disagreement with your plan for second-season studies from the following: the U.S. Department of the Interior, Fish and Wildlife Service (FWS); the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS); the California State Water Resources Control Board (Water Board); the U.S. Department of the Interior, Bureau of Land Management (BLM); the California Department of Fish and Game (CDFG);

the Merced River Conservation Committee (MRCC); the Conservation Groups; [1] San Joaquin et. al.; and Mr. Jeff Gabe.

My determination on the disagreements is based on the study criteria set forth in Section 5.9(b), Section 5.15(d) and Section 5.15(e) of the Commission's regulations, applicable law, Commission policy and practices, information in the record, and your February 28, 2011, response to comments. I summarize my findings below and include a table of the findings in Appendix A and the basis for the findings in Appendix B.

Staff performed a preliminary analysis of MID's *Water Balance/Operations Model Study* and the *Water Temperature Model Study* and reviewed existing information. Regarding potential project effects in the lower Merced River, downstream of MID's Crocker-Huffman diversion dam, staff found that early season project releases from the project's New Exchequer dam have a direct impact on water temperatures, and that, while the geographic extent of direct project effects is highly dependent upon operational scenarios, it generally decreases with increasing distance downstream. This suggests that studies performed within the 23-mile reach downstream of Crocker-Huffman, should provide an adequate geographic scope to capture direct project effects, while also encompassing the known primary spawning areas for anadromous Chinook salmon. Regarding downstream flows, review of existing information and preliminary staff analysis suggests that, during the non-irrigation season, the magnitude and duration of releases from New Exchequer dam have a direct effect upon flows in the 23-mile downstream reach, however, during the irrigation season, non-jurisdictional water withdrawals limit the available water supply for instream flow needs, and thus during this time, flows are not directly affected by the project.

New Studies

Based upon the results of MID's *Water Balance/Operations Model Study* and the *Water Temperature Model Study*, and as explained in Appendix B, I am requiring four new studies to be included in the approved study plan. Three of these new studies are among the four that I considered in my December 2009 Determination for the second study season as noted above. In that Study Determination, I concluded that those studies did not adequately explain any nexus between project operations and effects (Study Criterion 5). However, based upon Staff's preliminary analysis of MID's *Water Balance/Operations Model Study* and the *Water Temperature Model Study*, as well as further review of existing information, I now conclude that these studies, as modified by Staff where appropriate, demonstrate a sufficient nexus between project operations and effects.

[1] The Conservation Groups are a consortium consisting of the Merced River Conservation Committee, Trout Unlimited, the California Sportfishing Protection Alliance, Friends of the River, and American Rivers.

The first new study, *Chinook Salmon Egg Viability Study*, will evaluate potential project effects upon the viability of Chinook salmon eggs in the upstream reaches of the lower Merced River below Crocker-Huffman. The second new study, *Instream Flow (PHABSIM) Downstream of Crocker-Huffman*, will evaluate the potential direct project effects upon salmonid habitat in lower Merced River below Crocker-Huffman dam. Additionally, I am modifying the methodology of the new instream flow study to require that MID also evaluate the relationship of flow to the connectivity of side-channel and main-channel habitat for two salmonid predator species. The third new study, *Reservoir Water Temperature Management and Feasibility* will evaluate engineering alternatives for the purpose of managing water temperature in project reservoirs and in the lower Merced River.

The fourth is a study put forth by NMFS and the Water Board. In the December 2009 Study Determination, I concluded that this study did not adequately explain any nexus between project operations and effects (Study Criterion 5). However, based upon Staff's preliminary analysis of MID's *Water Balance/Operations Model Study* and the *Water Temperature Model Study*, as well as further review of existing information, I now conclude that this study demonstrates a sufficient nexus between project operations and effects. This study, *Evaluation of Anadromous Salmonid Spawning Habitats in the Lower Merced River*, will examine project effects on anadromous salmonid rearing utilization in the upstream reaches of the lower Merced River below Crocker-Huffman.

I am requiring that MID file study plans for Commission approval for the *Chinook Salmon Egg Viability* and *Instream Flow (PHABSIM) Downstream of Crocker-Huffman* within 75 days of the date of this Determination and after consultation with the agencies as explained in Appendix B. MID shall include with the plan, specific methodology, a schedule, documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. MID shall allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the plan with the Commission. If MID does not adopt a recommendation, the filing shall include the MID's reasons, based on project-specific information.

Study Plan Modifications

Based upon results of MID's *Water Quality Study*, *Water Temperature Model Study,* and objectives of the proposed *Dissolved Oxygen Study*, and because the approved study was not conducted as provided for in the study plan, pursuant to Section 5.15(d)(1), as explained in Appendix B, I am modifying the approved *Water Quality Study* to require an additional season of sampling for dissolved oxygen at one existing site and two additional sites in the lower Merced River downstream of Crocker-Huffman dam. This study modification will allow for an evaluation of potential project effects upon the

concentrations of dissolved oxygen downstream of Crocker-Huffman dam.

I am not adopting requested modifications to approved studies *Water Quality Monitoring Study*; *Riparian Habitat and Wetlands Study*; *Recreation Use and Visitor Surveys*; and *Visual Quality*. As explained in Appendix B, these study modifications did not conform to the criteria for modification of approved study, listed in Section 5.15(d).

Studies Not Adopted

Finally, I am not adopting: *Salmonid Floodplain Rearing*; *Sediment/Gravel Supply and Transport*; *Upper River Fish Populations and Habitat*; *Determination of Anadromy in Merced River O. mykiss*; *Migration Timing of Adult Chinook Salmon into the Merced River*; *Evaluation of Anadromous Salmonid Spawning Habitats in the Lower Merced River*; *Evaluation of Anadromous Salmonid Outmigration and Survival in the Lower Merced River*; *Water Temperature Monitoring in the Lower Merced River*; *Water Temperature Monitoring During Salmon Egg Incubation*; *Determine the Distribution and Abundance of Steelhead in the Merced River Study*; *Examine Environmental and Physiological Factors Associated with Juvenile Salmon Survival and Fitness as Related to Spring Pulse Flows for Outmigration*; *Health Assessment of Juvenile Salmon during Spring Outmigration in the Merced River*; *Fish Tissue Mercury Study*; and *Toxicity Bioassays Study*. These studies did not conform to one or more of the study criteria, listed in Section 5.9(b)(1-7), or the *Criteria for new study*, listed in Section 5.15(e), and for the reasons discussed in Appendix B.

Although the studies not adopted in the approved study plan are not needed for the Commission's environmental analysis, I wish to clarify that MID is not precluded from conducting studies to satisfy regulatory requirements of other agencies.

If you have any questions, please contact Matt Buhyoff at (202) 502-6824.

Sincerely,

Jeff Wright
Director
Office of Energy Projects

cc: Service List
Public Files

APPENDIX A – STUDY REQUESTS ADOPTED, MODIFIED, MODIFICATION NOT ADOPTED, AND NOT ADOPTED

Study Request	Adopted*	Modified	Requested Modification not Adopted	Not Adopted
(1) *Salmonid Floodplain Rearing Study*				X
(2) *Chinook Salmon Egg Viability*	X*			
(3) *Instream Flow (PHABSIM) Downstream of Crocker-Huffman*	X*			
(4) *Reservoir Water Temperature Management and Feasibility*	X			
(5) *Sediment/Gravel Supply and Transport*				X
(6) *Upper River Fish Populations and Habitat*				X
(7) *Determination of Anadromy in Merced River O. mykiss*				X
(8) *Migration Timing of Adult Chinook Salmon into the Merced River*				X
(9) *Evaluation of Anadromous Salmonid Spawning Habitats in the Lower Merced River*				X
(10)*Evaluation of Anadromous Salmonid Rearing Habitats in the Lower Merced River*	X			
(11) *Evaluation of Anadromous Salmonid Outmigration and Survival in the Lower Merced River*				X
(12) *Water Temperature Monitoring in the Lower Merced River*				X
(13) *Water Temperature Monitoring During Salmon Egg Incubation*				X
(14) *Determine the Distribution and Abundance of Steelhead in the Merced River Study*				X
(15) *Examine Environmental and Physiological Factors Associated with Juvenile Salmon Survival and Fitness as Related to Spring Pulse Flows for Outmigration*				X
(16) *Evaluate Relationship between Flow and Connectivity with Salmon Predator Habitat Outside Main Channel; Develop Map of Potential Juvenile Salmon Predator Habitat and Sampling Locations Juvenile Salmon Predator Habitat Mapping Study*	X*			
(17) *Health Assessment of Juvenile Salmon during Spring Outmigration in the Merced River.*				X
(18) *Fish Tissue Mercury Study*				X
(19) *Toxicity Bioassays Study*				X
(20) *Water Quality Monitoring Study*			X	
(21) *Dissolved Oxygen Study*		X		
(22) *Riparian Habitat and Wetlands Study*			X	
(23) *Recreation Use and Visitor Surveys*			X	
(24) *Visual Quality*			X	

* As modified by Staff

APPENDIX B – STAFF ANALYSIS OF STUDY REQUESTS

Phased Studies

On December 22, 2009, the Director of the Office of Energy Projects issued a Study Dispute Resolution Determination (Determination) on sixteen studies. Of those, the Director determined that four studies: (1) *Salmonid Floodplain Rearing Study*; (2) *Chinook Salmon Egg Viability Study*; (3) *Instream Flow (PHABSIM) Study downstream of Crocker-Huffman;* and (4) *Reservoir Water Temperature Management Feasibility Study*) be considered during the second study season. The Director stated that due to the confounding effects of the downstream Crocker-Huffman diversion dam (Crocker-Huffman), an evaluation of the need for these studies should be based upon results from two approved first-season studies (*Water Balance/Operations Model Study* and the *Water Temperature Model Study*) to identify and isolate direct project effects on water quality and quantity variables.

In 2010, the Merced Irrigation District (MID) conducted a *Water Temperature Model Study* that included the development of a water temperature model. The study area included Lake McClure, McSwain Reservoir, and the project powerhouses and encompassed the Merced River from and including Lake McClure to Shaffer Bridge, approximately 23 miles downstream of McSwain dam. In the same year, MID also conducted a study that included development of a water balance/operations model. The goal of the study was to develop a model to simulate project reservoir levels, reservoir releases, and hydropower generation over a range of hydrologic conditions. The model study area was similar to that developed for the water temperature model. MID provided executable versions of both models to interested relicensing participants, and held a workshop to collaboratively review the model.

In our evaluation of the Water Balance/Operations Model, we found that the assumptions and logic used in the model are reasonable, components that influence the flow distribution are complete, model limitations are fully discussed, and the validation is adequate and credible.

In our evaluation of the Water Temperature Model, we found that the model documentation is well organized and clearly written. We evaluated and confirmed that the model was performing as described. The model is well constructed, with an adequate set of input data and credible calibration. We found that there is a seasonal component to the prediction errors, in that the model tends to under-predict water temperatures in the summer and over-predict water temperatures in the winter. Nevertheless, the model provides reasonable results for the purpose of analyzing various flow scenarios.

Regarding potential project effects upon downstream water temperature, we suggest that early season project releases from New Exchequer dam have a direct impact on water temperatures in lower Merced River. The model shows that the downstream of the extent of the project impacts upon water temperatures are highly dependent upon operational scenarios, but typically extend several miles downstream of Crocker-Huffman from late spring through early fall, beyond which the influence of ambient meteorology would require large volumes of release water as a means to control water temperatures. Figure 1 illustrates the increasing effect of ambient meteorology, and decreasing correlation of project effects with increasing distance downstream of Crocker-Huffman. We note the increasing spread of, and dissimilarities of shape, of the temperature exceedance lines between March and October, where each line represents percent temperature exceedance at a different point downstream of Crocker-Huffman, indicates this decreasing correlation with project effects with increasing distance downstream. Furthermore, our evaluation of the Water Temperature model indicates that the relative magnitude of inflows and outflows can greatly influence water temperatures within Lake McClure and McSwain reservoir, thereby affecting water temperatures downstream of Crocker- Huffman. Larger early-season release of water reduces the available cold water pool within Lake McClure, which directly impacts the availability of cold water later in the season. This point is illustrated by figure 2, which represents percent exceedance by month for modeled water temperatures downstream of Crocker-Huffman under a hypothetical operating scenario which provides for a high magnitude pulse flow during late spring months (where flow at Shaffer Bridge is proportional to 60% of inflow to Lake McClure during the months of February and June). Under this scenario, downstream water temperatures demonstrate a better correlation to the release from Lake McClure from March through June (lines demonstrate less spread). However, from July through October, downstream water temperatures are more likely to exceed temperatures which are suitable for cold-water species, suggesting that an early-season pulse flow effectively exhausts the cold water supply from Lake McClure.

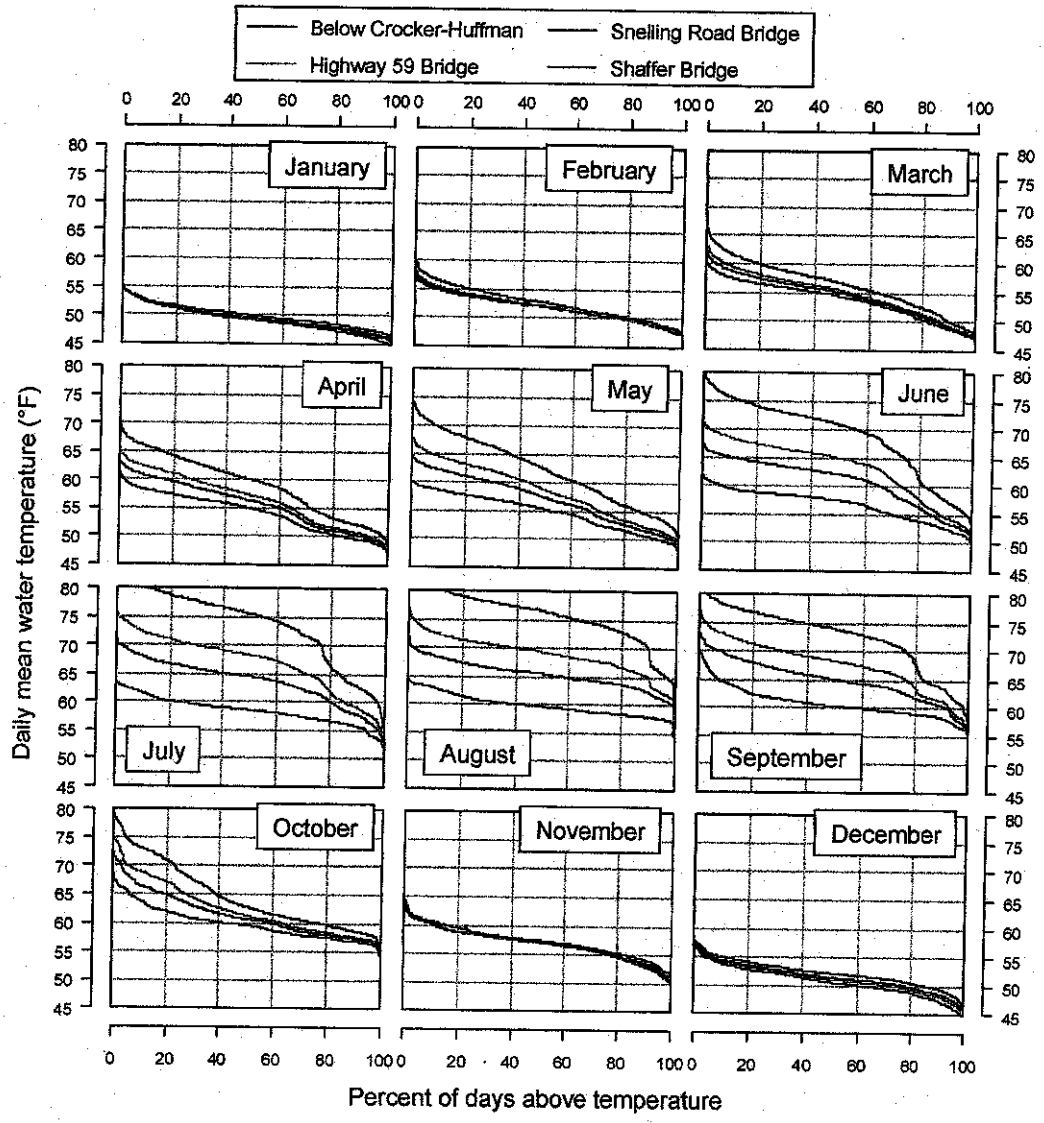


Figure 1. Modeled water temperatures under the current operation scenario. Percent exceedance by month (January 1, 1980 -- September 30, 2006).

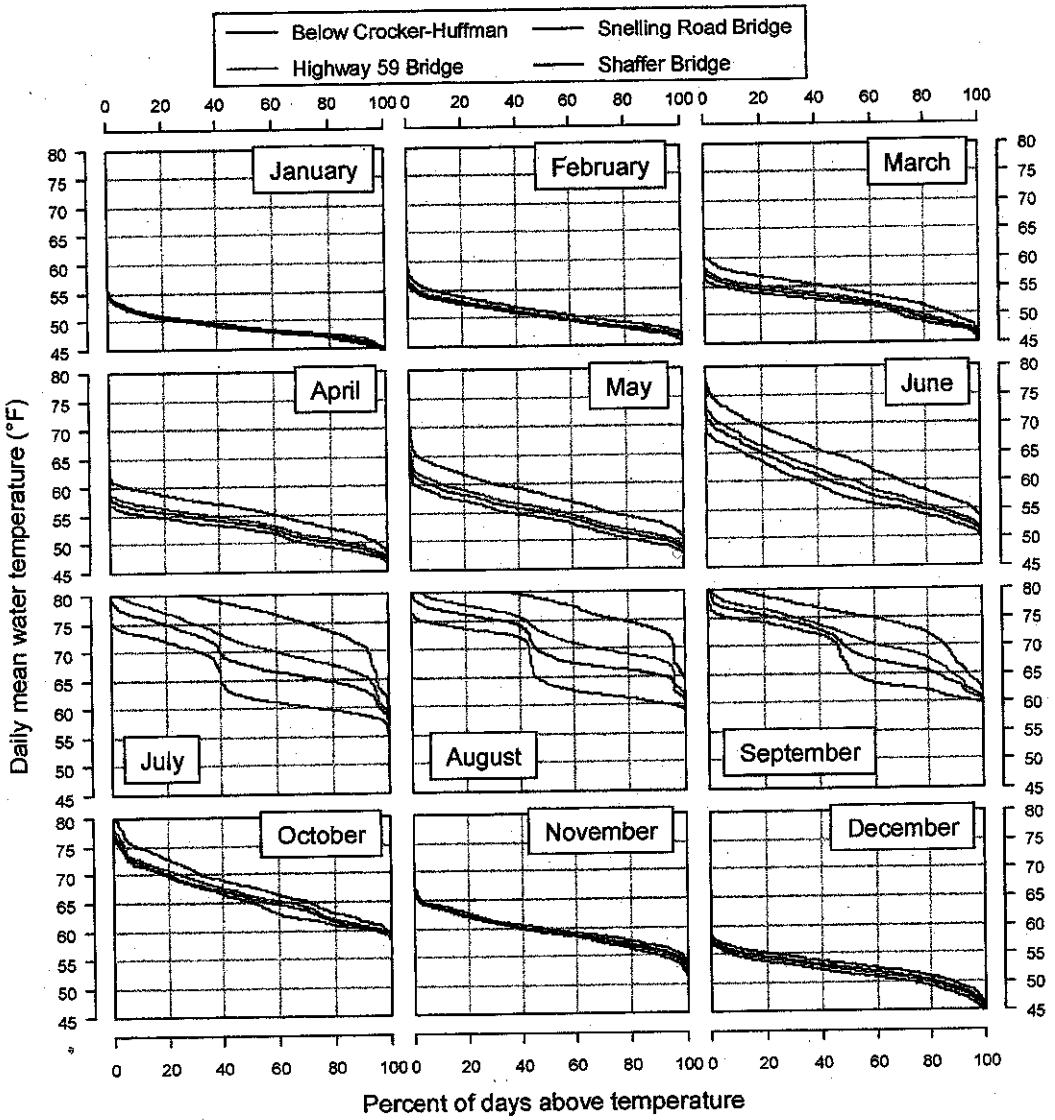


Figure 2. Modeled water temperatures under a hypothetical high late-spring pulse flow operation scenario. Percent exceedance by month (January 1, 1980 -- September 30, 2006).

Regarding downstream water quantity, existing hydrology data, and information in the Pre-Application Document (PAD) suggests that during the non-irrigation season (approximately November – February) when little or no diversions from Crocker-Huffman are occurring, the magnitude and duration of releases from New Exchequer dam have a direct effect upon flow-related habitat conditions in the lower Merced River, and also have an influence upon water storage availability during the remainder of each water year. Existing information indicates that during the irrigation season, non-jurisdictional withdrawals account for up to 52% of the average annual unimpaired discharge from the watershed, limiting the available water supply for instream flow needs.[2] Therefore, direct hydropower effects are seasonally dependent.

Our recommendations regarding the four phased studies below are based on these preliminary conclusions.

Salmonid Floodplain Rearing Study

As proposed, the *Salmonid Floodplain Rearing Study* would:

- determine whether flows that inundate floodplains, thereby affecting fry rearing during February and/or March, are critical to the production of smolt-sized outmigrants from the Merced River.

- identify differences in health, feeding and growth of juvenile salmonids that use the floodplain habitats versus those using main channel of the rivers.

- determine whether a combination of stressors affects the survival of fry to a smolt size or if survival is primarily improved by managing instream flow.

In the December 22, 2009, Director's Study Dispute Determination, the Study Dispute Resolution Panel[3] (Panel) concluded that the requested *Salmonid Floodplain*

[2] Stillwater Sciences (2002). Merced River Corridor Restoration Plan. Stillwater Sciences, Berkeley, California. 245 pages.

[3] In response to study disputes, Commission staff convened a three-person Dispute Resolution Panel on October 16, 2009. Panel members included: Commission staff (Panel Chair), an independent third-party panelist, and panelist chosen by the Resource Agencies (Resource Agency Panelist). On December 2, 2009, all panel members filed their findings regarding the disputed studies. The Panel Chair and the independent third-party panelist filed joint findings; the Resource Agency Panelist filed his findings separately. Here, the term Panel reflects the findings of the Panel Chair and the independent third-party panelist.

Rearing Study was unlikely to establish defensible relationships between only three target flow releases and the growth, survival, and health of juvenile salmonids within the study timeframe. The Panel also concluded that proposed study methodology presented the potential for excessive juvenile salmon mortality in a system with very low numbers of returning adults (Study Criterion 6). For these reasons, the panel suggested instead integrating the objectives of the requested study in to an Instream Flow (PHABSIM) study.

In the Dispute Determination, we concurred with the Panel's conclusions and found that the results from approved and existing studies could provide information regarding the hydropower project's cumulative effect on water quality, temperature, and dissolved oxygen as they relate to the life history requirements of anadromous fish downstream of Crocker-Huffman (Study Criterion 4). However, we also found that these studies may not provide information on the hydropower project's capability to influence those variables (Study Criterion 5). The Director, therefore, determined that the need for a study to assess the quality of corridor habitat and/or existing spawning and rearing habitat in the lower Merced River should be established by results of the approved *Water Balance/Operations Model* and *Water Temperature Model* studies.

As noted above, we acknowledge that the results of the *Water Balance/Operations Model* and *Water Temperature Model* studies indicate that operation of the hydropower project directly affects flows and temperatures in the lower Merced River downstream of Crocker-Huffman and that information regarding effects of the project on salmonid rearing and habitat would be useful. However, we agree with the Panel that the requested *Salmonid Floodplain Rearing Study* does not address problematic issues related to the proposed study design and methodology (Study Criterion 6). For example, given the requested methodology, we continue to question whether the requested study would produce results adequate to provide reliable statistical inferences in the relationship between target flow releases and the growth, survival, and health of juvenile salmonids. Additionally, the requested study methodology is vague and therefore does not adequately address the Panel's and the Director's concern regarding the excessive harvest of juvenile salmon for study purposes in a system with low numbers of returning adults. Furthermore, existing information indicates that, as a result of non-project related dredger and aggregate mining, the floodplain downstream of Crocker-Huffman has been elevated from its original position, indicating that non-project variables affect the establishment of over-floodplain flows. Finally, analysis of the existing water temperature model show that the high volume pulse flow releases necessary to simply conduct the study would very likely deplete the coldwater supply during the summer and fall, potentially endangering coldwater aquatic species in the lower Merced. Because high study flows would result in unsuitable temperature conditions in the lower Merced River, they could not inform potential flow prescriptions of a similar magnitude, calling into question the study's ability to inform the development of license requirements (Study Criterion 5).

For these reasons we conclude that the *Salmonid Floodplain Rearing Study*, as requested, is not warranted. However, as recommended by the Panel in its December 2, 2009 filing, we note that study objectives regarding the suitability of juvenile salmonid habitat in the reach of the lower Merced River downstream of Crocker-Huffman to Shaffer Bridge can be evaluated with study using the existing water balance/operations and water temperature models and may also be evaluated in the Instream *Flow Study* (*PHABSIM*) *Study*, as discussed below.

Chinook Salmon Egg Viability

As proposed the *Chinook Salmon Egg Viability Study* would:

- evaluate straying rates of Coded Wire Tag (CWT) smolts that were released in the Merced River and recovered in Central Valley adult escapement surveys relative to pulse flow releases, Delta water quality, and fall export rates.

- evaluate egg viability at the Merced River Hatchery relative to tributary and Delta water temperatures. The migration history of individual females will need to be evaluated to determine the temperature exposure.

- evaluate pre-spawn mortality surveys in the Merced River relative to pulse flow releases. This would require the California Department of Fish and Game (CDFG) carcass survey crews to collect the eggs from a number of adult female carcasses and then count the eggs following the surveys. Relationships would be evaluated between the timing and occurrence of fall pulse flows and the number of eggs retained per female.

As noted above, results of the Water Temperature and Water Balance/Operations models suggest that early season project releases from New Exchequer dam have a direct impact on water temperatures in lower Merced River. Therefore, the premise that hydropower project operations may affect salmonid egg viability within the reach of the Lower Merced River between Crocker-Huffman and Shaffer Bridge, located may be valid (Study Criterion 5). For this reason, we now recommend that a study of Chinook salmon egg viability should be conducted using the existing Merced-5Q model which, in conjunction with the Water Balance/Operations Model, which would provide estimates of temperature conditions in the spawning reach under given operational scenarios. If the study reach, or a portion of the reach, shows predicted water temperatures to be too high for egg incubation, MID should conduct direct surveys of egg mortality in combination with observed temperatures to verify modeled results. We further recommend limiting the downstream extent of any such study to Shaffer Bridge, located approximately 19 miles downstream of Crocker-Huffman. Our recommended study scope will include the dredger tailings reach of the lower Merced, which extends from Crocker-Huffman (river mile [RM] 52) to approximately 1.2 miles downstream of the Snelling Road Bridge (RM

45.2). Existing information notes that this reach is the primary spawning area for Chinook salmon.

In its February 28, 2011 response to the new study request, MID states that it views this request as a "research" project. MID states that the requested study seeks to collect data from research throughout the Bay-Delta and tributaries, and draw conclusions regarding the Merced River. MID states that attributing the movement to factors in one tributary alone is unrealistic. It concludes: "The narrow focus regarding straying would provide little information on which to assess Project cumulative effects and base license requirements." Regarding the proposed methodology, MID states that it believes that a pre-spawn mortality survey is "...unconventional and lacks any level of scientific support or reference to past methodologies. Finally, MID notes that assessing female Chinook salmon exposure to water temperatures in the Bay-Delta offers no project nexus.

While we recommend a Chinook salmon egg viability study, we do not agree that it should be conducted using the methodology originally proposed by the agencies. We agree with MID's comment above and note that the initial methodology proposed by the agencies regarding the evaluation of the straying rates of smolts is extremely vague. Causes of anadromous salmonid straying are not well known, but are probably the result of a combination of a multitude of variables, including both behavioral and environmental cues. Therefore, the results of any such study would be unlikely to establish a defensible causational link between project-related variables and straying of juvenile fish, thereby limiting the study's capacity to inform license requirements (Study Criterion 5).

In addition, the agencies' proposed methodology for a study of salmonid egg viability at the Merced River Hatchery relative to tributary and Bay-Delta water temperatures is equally vague. We note that because the project has very minimal or no influence over Bay-Delta and tributary water temperatures, a study which relies on those variables to produce inferences lacks any nexus to project-related effects (Study Criterion 5).

The agencies also suggested evaluating the egg retention of pre-spawn females to evaluate the relationship between the timing and occurrence of fall pulse flows. MID believes that the requested study is seeking to simplify a research question that can be influenced by a multitude of factors that would preclude any project-related conclusions from gathered data. We agree with MID that fecundity is influenced by a multitude of factors, and therefore the results of any such study would be unlikely to produce defensible correlations between project-related variables and egg retention, thereby limiting the usefulness of study results to inform license requirements (Study Criterion 5). Furthermore, we are unaware of any generally accepted study methodologies which have correlated egg counts from pre-spawn mortality surveys with flow variables (Study Criterion 6). For these reasons we maintain that the agencies proposed methodologies

regarding straying of smolts, egg viability relative to tributary and Bay-Delta water temperatures, and use of pre-spawn mortality surveys of egg retention as it relates to flow are not warranted.

In conclusion, we now recommend that MID, after consultation with National Marine Fisheries Service (NMFS), the Fish and Wildlife Service (FWS), the California State Water Resources Control Board (Water Board), and CDFG, file a new study plan for Chinook salmon egg viability, for Commission approval, that includes a specific methodology and scope, as explained above, within 75 days of the date of this Determination.

Instream Flow (PHABSIM) Downstream of Crocker-Huffman

This study would evaluate the relationship between flow and fish habitat in the lower Merced River between Crocker-Huffman and the confluence with the San Joaquin River using PHABSIM modeling. Species and life-stages of interest include adult, juvenile, fry and spawning steelhead (*O. mykiss*) and fall-run Chinook salmon (*O. tshawytscha*) and adult and juvenile hardhead and Sacramento splittail.

In its February 28, 2011 filing, MID suggests that the *Instream Flow (PHABSIM) Study Downstream of Crocker-Huffman* would not provide useful information as existing information indicates that factors such as water temperature, poor stream bed conditions due to dredging and mining, the abundance of non-project water withdrawals, and predation by bass are more likely limit steelhead and anadromous fish than flow. MID also contends that the methodology requested by the agencies is problematic. Specifically, MID indicates that low numbers of Sacramento splittail, steelhead and Chinook salmon would render the development of site-specific Habitat Suitability Criteria (HSC) impractical. Finally, MID indicates that the proposed methodology "...goes into detail regarding development of the PHABSIM flow model, but provides little detail regarding how the PHABSIM model would be used to develop weighted usable areas, and does not mention time series analysis, which is the ultimate product of an instream flow study."

While we acknowledge that existing information suggests that temperature, non-project related habitat impacts, and other factors likely limit anadromous salmonids in the lower Merced, we note that existing information cannot rule out flow as a limiting factor. As noted above, results of the Water Balance/Operations model suggest that during the non-irrigation season (approximately November – February) when little or no diversions from Crocker-Huffman are occurring, the magnitude and duration of releases from New Exchequer dam have a direct effect upon flow-related habitat conditions in the lower Merced River, downstream of Crocker-Huffman, and also have an influence upon water storage availability during the remainder of each water year. Because study results indicate the potential for a project effect on flow habitat for aquatic resources (Study

Criterion 5), we now recommend an instream flow study to determine project effects on flow-habitat downstream of Crocker-Huffman.

While we recommend such a study, we do not necessarily agree with the scope of the instream flow study as originally proposed by the agencies. The agencies request a PHABSIM modeling study of approximately 52 miles of the lower Merced River between Crocker-Huffman and its confluence with the San Joaquin River. Based on the modeling results, we recommend limiting the geographic scope of the requested PHABSIM study to Shaffer Bridge, located approximately 19 miles downstream of Crocker-Huffman. As previously indicated in the Study Dispute Determination, existing information documents the increase of non-project flow-related variables increases with increasing river distance from the project, such as numerous (estimates include between 170-240) non-project water withdrawals in the lower Merced River; extensive aggregate mining both in the floodplain and the channel, which have created in-channel or captured mining pits; flow accretion and sedimentation from Dry Creek, a tributary to the Merced; extensive development of non-project levees; and backwater effects of the San Joaquin River. By limiting the geographic scope of the instream flow study, results would more precisely indicate whether project-related flow-habitat is a limiting factor and not a result of other non-project factors. Furthermore, we note that the limited scope would encompass PHABSIM modeling in the dredger tailings reach of the lower Merced, a reach that has been the subject of several previous studies, and which extends from Crocker-Huffman (RM 52) to approximately 1.2 miles downstream of the Snelling Road Bridge (RM 45.2). Existing information notes that this reach is the primary spawning area for Chinook salmon.

Due to the seasonality and operational constraints regarding project flows, we concur with the agencies that target calibration flows must be within the range of project flow control. We also concur with MID, that due to potentially low numbers of observable individuals, the establishment of site-specific HSC for certain species may be impractical. Therefore, we recommend that MID consult with NMFS, CDFG, and FWS to determine suitable representative HSC curves. Finally, we note that results of the Merced-5Q model are well suited for the development of "effective weighted usable area" estimates in combination with physical habitat modeling of various discharge alternatives using the PHABSIM model. We recommend that MID, after consultation with the agencies, file a plan for Commission approval for the study of flow-habitat (1-D PHABSIM model) from Crocker-Huffman to Shaffer Bridge within 75 days upon the date of this Determination.

Reservoir Water Temperature Management Feasibility

The *Reservoir Water Temperature Management Feasibility Study would*:

- identify engineering alternatives for water temperature management and the selective withdrawal of cold water from project reservoirs;

- develop conceptual engineering plans for selective withdrawal facilities;

- evaluate the potential effectiveness and engineering and biological feasibility of the various temperature control alternatives, and rank their relative effectiveness for accessing the respective cold water pools and delivering cold water to the lower Merced River;

In its February 28, 2011 filing, MID suggests that the existing water temperature model, in combination with the existing Water Balance/Operations model is fully capable of simulating not only differing operational scenarios, but is also capable of simulating withdrawal of water from various elevations in Lake McClure and the resulting downstream water temperature effects. MID also states that the existing intake in Lake McClure is already located near the bottom of the reservoir, therefore any studies of selective withdrawal structures for the purpose of withdrawing colder water from Lake McClure would be superfluous, as water is currently withdrawn from the coldest region of the water column.

Results of the *Water Temperature Model Study* suggest that changes in the reservoir storage elevation and resulting thermal structure of Lake McClure may affect water temperatures downstream of Crocker-Huffman (Study Criterion 5). Evaluation of the temperature model suggests that under certain scenarios, the existing Lake McClure cold water pool may become depleted resulting in elevated downstream water temperatures, which at times would be unsuitable for cold-water aquatic species. While we acknowledge that the existing water temperature model and Water/Balance/Operations model is capable of simulating withdrawal of water from different (but fixed) elevations in Lake McClure, we note that the model, as presently constructed, cannot simulate downstream temperature effects of a control structure such as a selective withdrawal tower to release water from different elevations at different times within the water column, as a means to conserve the existing cold water pool. Evaluation of such engineering alternatives could provide information useful in the development of operation scenarios and potential for engineered structures to optimize the cold water pool. For these reasons we find that the MID should perform the *Reservoir Water Temperature Management Feasibility Study* as proposed by the agencies and as described by CDFG in their January 31, 2011 filing.

Requests for New Studies

Sediment/Gravel Supply and Transport

NMFS and the Conservation Groups requested a new study to investigate the balance between sediment supply and transport with respect to spawning and rearing habitat, necessary for the maintenance and enhancement of anadromous salmonids. These entities asked for a similar study in their 2009 study requests. The entities state that new information from the results of the *Channel Armoring Study* now indicates the need for a new study. Specifically, the entities indicate that the study demonstrates that the reach of the lower Merced River, downstream of Crocker-Huffman lacks coarse sediment as a result of project operations. The entities state that information is still needed to allow for an assessment of when and how often sediment transport occurs, the current balance between sediment supply and transport, how the balance has shifted relative to unimpaired conditions, and what kind of sediment additions (both grain size and volume) and instream flow conditions are necessary to maintain a properly functioning channel morphology that includes spawning gravels for anadromous fish and resident salmonids.

In the December 2009, Study Dispute Determination, we noted that based upon information in the record, as well as the analysis of the Panel, sediment supply and mobility in the Merced River downstream of Crocker-Huffman is a function of not only project-related factors, but also the presence of non-project facilities such as PG&E's Merced Falls dam (FERC No. 2467), Crocker-Huffman, and non-Project irrigation delivery operations. The Study Dispute Determination recognized the project's potential to contribute to cumulative impacts downstream of Crocker-Huffman, and also recognized existing information that documents channel armoring resulting from cumulative impacts. Both we and Panel noted that existing information already provided a basis for potential mitigative measures. We further noted that approved studies, such as the *Water Balance/Operations Model* would provide additional information regarding the magnitude of the project's influence downstream of McSwain dam and scope of viable operation scenarios. Therefore, the Director concluded that the agencies had not adequately described the need for additional information (Study Criterion 4).

In its February 28, 2011 response to the new request for a *Sediment/Gravel Supply and Transport Study*, MID indicates that much of the information sought by the requested study has been addressed by existing studies of the lower Merced River, particularly in the dredger tailing reach, which extends downstream 6.8 miles from the Crocker-Huffman to 1.2 miles below the Snelling Road Bridge. Existing studies include; information on channel morphology and the riparian corridor[4], a study of the addition of

[4] Stillwater Sciences. 2004a. *Channel and floodplain surveys of the Merced River Dredger Tailings Reach.* Stillwater Sciences, Berkeley, California.

gravel wing dams (MID and NRS 2003)[5], a sediment transport study using tracer gravels (Stillwater 2001)[6], and a sediment transport model (Stillwater 2004b)[7]. MID states that in addition to the existing information, between 1991 and 2003, over 7,920 metric tons of gravel was introduced to sites in the lower Merced River as part of gravel augmentation projects.

As stated in the Study Dispute Determination, we continue to recognize that existing information indicates that sediment and gravel supply in the lower Merced is a function of not only project-related factors, but also the presence of non-project facilities such as PG&E's Merced Falls dam (FERC No. 2467), Crocker-Huffman, non-Project irrigation delivery operations, and other non-project factors, especially the impacts of historic dredger mining and ongoing gravel mining. Results from existing studies should provide not only baseline data, but also tools for the prediction of sediment transport rates, sediment routing, deposition patterns, bed surface and bedload grain size, and estimations of the volume and texture of sediment needed for augmentation. We note that the requesting entities do not specifically address why the existing information from the other studies, augmentation programs, and restoration programs in the lower Merced River, as noted above, do not provide information suitable for the development of inferences regarding the size, suitability, and mobilization of bed materials (Study Criterion 4). For this reason we again find that a new study of *Sediment/Gravel Supply and Transport* is not warranted.

Upper River Fish Populations and Habitat

NMFS and the Conservation Groups requested a new study to characterize and quantify fish habitat in the upper Merced River, including the South Fork, Merced River, and tributaries that are likely to provide spawning and/or juvenile rearing habitat for re-introduced anadromous salmonids. This study was previously requested in 2009.

In the Study Dispute Determination, we noted that anadromous fish do not pass upstream of the Merced Falls dam, which is downstream of the first project dam at McSwain Reservoir, and therefore are not present in Lake McClure or the upper Merced River. Because project operations or structures do not affect areas upstream of the

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[5] Merced Irrigation District (MID) and Natural Resources Scientists, Inc. (NRS). 2003. *Merced River Wing Dam Gravel Monitoring 2000-2002 Final Report*. Funded by U.S. Fish and Wildlife Service Anadromous Fish Restoration Program. Prepared by NID Merced, California and NRS Red Bluff, California.

[6] Stillwater Sciences. 2001. *Merced River Corridor Restoration Plan Baseline Studies Volume II: Geomorphic and riparian vegetation investigations*. Prepared by Stillwater Sciences, Berkeley, California for CALFED, Sacramento, California.

[7] Stillwater Sciences. 2004b. *Sediment transport model of the Merced River Dredger Tailings Reach*. Stillwater Sciences, Berkeley, California.

uppermost project reservoir, the Director failed to see how results of the study would allow for the evaluation of project-affected streams (Study Criterion 5), and therefore inform the development of license requirements (Study Criterion 5).

In their new study request, NMFS and the Conservation Groups state that they have again requested a study of upper river fish populations and habitat because; (1) critical and pertinent policy information was not available until recently, including a Draft Recovery Plan and proposals for re-introduction of anadromous fish species in waters upstream of Lake McClure; (2) five new studies[8] that "...collectively conclude that populations of anadromous fishes in the lower Merced River are severely imperiled and have a high risk of extinction, based upon NMFS criteria for risk."; (3) results of the approved *Reservoir Fish Populations* study indicate the presence of "... possibly "trapped" anadromous species populations (non-migratory anadromous species, including rainbow trout, kokanee, and Chinook salmon) in Project reservoirs; (4) results of the *Water Balance/Operations Model* and *Water Temperature Model* studies indicate that the project has "...direct and cumulative affects [*sic*] on downstream water quantity and quality."

Neither existing information, nor the new information provided by NMFS indicate that anadromous fish pass upstream of Merced Falls dam. While individuals of existing non-migratory anadromous species populations in project reservoirs may resume migratory anadromous behavior, we note that this assertion is not without a degree of uncertainty. Quinn and Myers (2005)[9] argue that "...anadromy is not a single trait with

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[8] NMFS references:

(1) Draft Technical Report on the Scientific Basis for Alternative San Joaquin River Flow *and Delta Salinity Objectives* (Draft Delta Flow Objectives) (SWRCB 2010b)

(2) *Quantifiable Biological Objectives and Flow Criteria for Aquatic and Terrestrial* Species of Concern Dependent on the Delta: Final Report (Final CDFG Delta Criteria) (CDFG 2010)

(3) Status Report on Salmon, Steelhead and Trout (Moyle et al. 2008)

(4) *Statement of Key Issues on the Volume, Quality, and Timing of Delta Outflows Necessary for the Delta Ecosystem to Protect Public Trust Resources with* Particular *Reference to Fall-Run Chinook Salmon in the San Joaquin River Basin.* Mesick, C. Testimony in SWRCB Delta Flow Criteria Hearings. (Mesick 2010a)

(5) *The High Risk of Extinction for the Natural Fall-Run Chinook Salmon Population in* the Lower Merced River due to Insufficient Instream Flow Releases (Mesick 2010b)

[9] Quinn, Thomas P. and Katherine W. Myers. 2005. *Anadromy and the marine migrations of Pacific salmon and trout: Rounsefell revisited.* Reviews in Fish

two conditions (anadromous or non-anadromous). Rather, it reflects a suite of life history traits that are expressed as points along continua for each species and population." Regardless of the status of anadromy in existing non-migratory reservoir populations, we continue to note that there are no project structures or operations in areas upstream of the uppermost project reservoir. Therefore, we continue to find that the parties have failed to explain any nexus between project operations and effects and the resource to be studied (Study Criterion 5). Finally, we note that the suitability of upstream habitat for anadromous salmonids, as it relates to recovery planning under NMFS guidelines, pertains to management decisions and actions which most appropriately fall under NMFS jurisdiction. For these reasons, we again find that a study of upper river populations and habitat is not warranted.

Determination of Anadromy in Merced River O. mykiss

CDFG, NMFS, and the Conservation Groups request a new study to determine the extent to which anadromous steelhead occur in the Merced River and to determine the extent of potential impact on the Southern Sierra Nevada Diversity Unit of the ESU from project operations. A similar study, *Anadromy Salmonid Habitat*, was previously requested in 2009.

In the Study Dispute Determination, we concluded that the requesting entities had not adequately described the need for additional information (Study Criterion 4), as existing information, which includes a coarse-scale habitat assessment of the mainstem Merced River, in concert with currently approved studies are sufficient to inform relicensing participants on the potential project-related cumulative effects on anadromous salmonid habitats.

In their new study request, CDFG, NMFS, and the Conservation Groups state that they have resubmitted a revised request for a study of the determination of anadromy in Merced River *O. mykiss* because: (1) results of the *Water Balance/Operations Model* and *Water Temperature Model* studies indicate that the project has direct and indirect water temperature and flow effects downstream of Crocker-Huffman; (2) the existing habitat assessment conducted by Stillwater Sciences in 2008 "... provides little more than a presence/absence analysis of *O. mykiss* populations downstream of Crocker-Huffman," and does not address anadromous vs. resident life history of *O. mykiss*; (3) the re-written study seeks to address "...controversy surrounding the only identified aquatic species in the Merced River that is listed under the Endangered Species Act."

In its February 28, 2011 response to the new study request , MID indicates the request: (1) would not provide definitive evidence to document that naturally spawned

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steelhead populations occur in the Merced River, and therefore the information developed by the study would not inform license requirements; and 2) the request does not describe why existing information and the information that is being gathered under other proceedings is not adequate to address project cumulative effects on steelhead. Regarding the presence of anadromous *O. mykiss* (steelhead) in the Merced River, MID states: "...Merced ID and CDFG have not found a single steelhead in the river in 10 years of studies."

As noted in the Study Dispute Determination, existing information and approved studies, either currently or are designed to, provide information on project-related effects and cumulative effects on aquatic habitat, geomorphic conditions, water quantity, water temperature, and other metrics which support all forms of aquatic life in the lower Merced River. Therefore, existing information and approved studies should provide information suitable to establish any potential project effects on the species, regardless of its presence or absence, thereby informing the development of license requirements. For this reason we find that the parties have not adequately described how a determination of the extent of anadromy in *O. mykiss* will necessarily inform the development of license measures (Study Criterion 5). Therefore, we find that a new study of the *Determination of Anadromy in Merced River O. mykiss* is not warranted.

MOU studies for Commission approval

The Water Board and NMFS have requested that the Commission include five studies in the approved Study Plan where MID has already agreed to perform these studies as part of an MOU with CDFG.

In 2002, MID and CDFG entered into an MOU to perform five studies related to the life-history and habitat requirements of Chinook salmon in the lower Merced River. A primary objective of the MOU studies was to investigate the effects related to the release of an additional 12,500 acre-feet (ac-ft) pulse of water above existing instream flow requirements during October. This fall pulse release was also a result of the MOU and mandated by the Water Board as an addition to MID's water rights. In 2009, several relicensing participants requested Commission approval of the MOU studies. The Director did not approve the requested MOU studies, and in the Director's September 14, 2009 Study Plan Determination; we noted that independent operation of Crocker-Huffman inherently confounds direct project effects, and therefore, any studies that attempt to correlate project effects to downstream effects below Crocker-Huffman are prone to substantial error.

We now reevaluate the request to approve the existing MOU studies, given the results of the *Water Temperature and Water Balance/Operations Models* and with regard to section 5.15(e) – *Criteria for new study* and section 5.9(b) – *Content of study request* of the Commissions regulations.

Migration Timing of Adult Chinook Salmon into the Merced River

This study would evaluate potential benefits of attraction of adult Chinook salmon into the Merced River by flow augmentation and acquire data on daily adult salmon migration into the Merced River.

In its February 28, 2011 response to the new request for a study of *Migration Timing of Adult Chinook Salmon into the Merced River*, MID states as part of the 2002 MOU, it had agreed to release an additional 12,500 acre-feet (ac-ft) of water above existing instream flow requirements during October with the intent of attracting adult salmon into the river. Based on the Water Board's decision involving an unrelated, non-FERC matter before the Water Board, a requirement for said fall release was added to MID's water rights license 11395. MID further indicates that this requested study is intended, in part, to evaluate the effectiveness of that measure.

Results of the Water Temperature and Water Balance/Operations models suggest that during the non-irrigation season (approximately November – February) the magnitude and duration of releases from New Exchequer dam may have a direct effect upon flow magnitude and duration downstream of Crocker-Huffman. During the irrigation season, non-jurisdictional withdrawals account for up to 52% of the average annual unimpaired discharge from the watershed. Therefore, we consider direct hydropower effects to be seasonally dependent. We note that this study would seek to establish project effects during the irrigation season, when downstream flows are highly dependent upon irrigation diversions. Therefore, the study as requested does not sufficiently explain the nexus between project operations and effects and the resource to be studied (Study Criterion 5). Furthermore, we note that results and/or reanalysis of the existing Water Balance/Operations model will be sufficient provide information regarding the contribution of project cumulative effects during irrigation season flows (Study Criterion 4). For these reasons, we find that a new study of *Migration Timing of Adult Chinook Salmon into the Merced River* is not warranted.

Evaluation of Anadromous Salmonid Spawning Habitats in the Lower Merced River

This study would quantify the characteristics of spawning substrate conditions in the Merced River downstream of Crocker-Huffman to Shaffer Bridge as related to potential effects on salmonid egg and embryo survival; evaluate salmon spawning utilization in the reach as related to localized habitat conditions; and identify potential remedial actions, if necessary, that could be implemented to improve salmonid spawning habitats.

In its February 28, 2011 response to the new, MID again indicates that this requested study is intended, in part, to evaluate the effectiveness of its agreed to 12,500 ac ft salmonid attraction flow.

We note that some of the goals and objectives of this study are to evaluate irrigation season pulse releases mandated by the Water Board. As described above, we maintain that study with the objective of evaluating an irrigation season release does not sufficiently explain the nexus between project operations and effects and the resource to be studied (Study Criterion 5). We also note that results of our recommended *Salmonid Egg Viability Study*, and the *Instream Flow (PHABSIM) Study*, as modified by staff will provide information regarding project effects upon salmonid egg survival, and suitability of flow-habitat for all life stages of steelhead and Chinook salmon. Furthermore, extensive existing information regarding substrate composition and geomorphic characteristics of the reach can provide information regarding project effects on anadromous salmonid spawning habitat (Study Criterion 4). For these reasons, we are not recommending the *Evaluation of Anadromous Salmonid Spawning Habitats in the Lower Merced River*.

Evaluation of Anadromous Salmonid Rearing Habitats in the Lower Merced River

This study would evaluate fry and juvenile salmon rearing utilization in the lower Merced River downstream of Crocker-Huffman to Shaffer Bridge as related to localized habitat conditions.

In its February 28, 2011 response to the new study request, MID states that it approaches ecosystem restoration in a broader forum that is not jurisdictional to FERC, actively participating in multiple processes under way in California but feels relicensing should not set borders for the other proceedings. MID also points to the Commission's Scoping Document 2, which indicated that direct effects of project are nullified by the presence of Crocker-Huffman. MID also notes that objectives of this study directly overlap with objectives of the proposed *Chinook Salmon Egg Viability*, discussed above.

Despite our statements in Scoping Document 2, results of the Water Balance/Operations model, as noted above, now suggest that during the non-irrigation season (approximately November – February) the magnitude and duration of releases from New Exchequer dam may have a direct effect upon flow magnitude and duration downstream of Crocker-Huffman. Typically, fall-run Chinook enter the river during mid- to late- October with peak spawning activity observed in November and peak emergence of fry during mid-February. Existing information notes that the proposed study reach is the primary spawning area for Chinook salmon in the lower Merced River. Therefore, rearing Chinook salmon may be present during a period and geographic extent where the project appears to exert direct effects. For these reasons we find that a study of Salmonid rearing utilization, with the methods described above would provide important information on project effects to fry and juvenile anadromous salmonids and would inform license conditions (Study Criterion 5). Furthermore, results of this study could be used to supplement results of the *Chinook Salmon Egg Viability* study, and validate

results from the *Instream Flow (PHABSIM) Downstream of Crocker-Huffman.* We note that MID has agreed to conduct this study. Therefore, we recommend the study be a part of MID's Commission-approved study plan and recommend that MID file the results of the study with its preliminary licensing proposal pursuant to section 5.16(3) of the Commission's regulations.

Evaluation of Anadromous Salmonid Outmigration and Survival in the Lower Merced River

The objectives of this study are to characterize the relative magnitude and timing of fry and juvenile salmon outmigration in the Merced River and potential factors influencing outmigration; to evaluate potential changes in outmigration timing of young salmon during pulse flow events; to estimate juvenile salmon survival within the Merced River; and to evaluate predatory fish characteristics and habitats in the Merced River as related to potential effects on juvenile salmon survival.

In its February 28, 2011 response to the new request, MID states again that it approaches ecosystem restoration in a broader forum that is not jurisdictional to FERC, actively participating in multiple processes under way in California but feels relicensing should not set borders for the other proceedings. MID again points to the Commission's Scoping Document 2, which indicated that direct effects of project are nullified by the presence of Crocker-Huffman dam.

Out-migration of juvenile anadromous salmon may be a result of many factors including, but not limited to, flow, water temperature, hormonal triggers, the lunar cycle, and density-dependent effects, such as schooling. Success of outmigration is again related to a multitude of factors including, but not limited to fitness, predation, flow, water temperature, and suitability and availability of habitat. We note that the approved *Evaluation of Anadromous Salmonid Rearing Habitats in the Lower Merced River Study, Chinook Salmon Egg Viability Study, Instream Flow (PHABSIM) Downstream of Crocker-Huffman,* and the *Water Temperature and Water Balance/Operations Models* can provide information related to the timing of juvenile outmigration as well as suitable water temperature and habitat as they relate to project effects in the lower Merced River from Crocker-Huffman to Shaffer Bridge. Furthermore, we note that existing studies of anadromous salmonids in the lower Merced River provide adequate documentation for the establishment of project-related cumulative effects as they relate to the success of juvenile outmigration (Study Criterion 4). Because the results of approved studies and existing information should be suitable to document the direct and cumulative effects of anadromous salmonid, we are not recommending the *Evaluation of Anadromous Salmonid Outmigration and Survival in the Lower Merced River.*

Studies Requested by the Water Board

In its January 28, 2011 filing to the Commission, the Water Board attached an "Investigation Order" which ordered MID perform the studies outlined below. In its filing, the Water Board requested that the Commission also require the same set of studies as part of the approved study plan. We note that, for the proposed studies, the Water Board did not provide any details regarding any nexus between project operations and effects and the resource to be studied (Study Criterion 5) or considerations of level of effort and cost (Study Criterion 7) and in some cases failed to provide detailed study methodology (Study Criterion 6). In addition, the Water Board did not describe why the study request was not made earlier, pursuant to section 5.15(e)(3) of the Commission's regulations.

Water Temperature Monitoring in the Lower Merced River

This study would provide detailed empirical data on water temperatures in the Merced River relevant to anadromous salmonids by collecting hourly water temperature data year-round in the Merced River at various locations from upstream of Lake McClure to downstream to the San Joaquin River confluence. The Water Board requests the addition of two new sites to the locations to be monitored. The Water Board also states that this study should be required only if CDFG is not able to continue its ongoing temperature monitoring program in the lower Merced River. Details regarding study methods were not provided (Study Criterion 6).

In its February 28, 2011 response to the new study request, MID notes that CDFG actively monitors water temperature within the lower Merced River.

Results of the *Water Temperature Model Study and Water Balance/Operations Model Study* will provide information regarding potential project effects upon water temperature downstream of Crocker-Huffman. Additionally, existing information from an ongoing water temperature monitoring program conducted by CDFG provides data that can be used to further validate the existing temperature model. Because existing information is capable of establishing and predicting project effects upon downstream water temperature, we do not agree that an additional study of *Water Temperature Monitoring in the lower Merced River* would provide information useful for the development of license requirements (Study Criterion 5). For these reasons we are not recommending *Water Temperature Monitoring in the lower Merced River.*

Water Temperature Monitoring During Salmon Egg Incubation

This study would compare water temperature data with information supplied by CDFG from spawning surveys and fish hatchery records to evaluate the relationship

between temperature and egg development and mortality of salmon. Specifically, the Water Board requested MID collect two consecutive years of temperature data near Chinook salmon spawning areas between late September and early March.

In its February 28, 2011 response to the new study request, MID states that CDFG is currently collecting water temperature data at six locations between Crocker-Huffman Diversion dam and the confluence with the San Joaquin River.

As noted above, results of the *Water Temperature Model Study and Water Balance/Operations Model Study* provide information regarding potential project effects upon water temperature downstream of Crocker-Huffman. Additionally, existing information from an ongoing water temperature monitoring program conducted by CDFG provides data that can be used to further validate the existing temperature model. We note that results from the approved *Chinook Salmon Egg Viability Study*, the approved *Evaluation of Anadromous Salmonid Rearing Habitats in the Lower Merced River Study* and the approved *Instream Flow (PHABSIM) Downstream of Crocker-Huffman Study* will serve to establish project effects upon eggs and early life stages of Chinook salmon within the reach of the lower Merced River between Crocker-Huffman and Shaffer Bridge (Study Criterion 4). For these reasons, we are not recommending a study of *Water Temperature Monitoring During Salmon Egg Incubation.*

Determine the Distribution and Abundance of Steelhead in the Merced River

This study would seek to identify and count steelhead in the Merced River utilizing a combination of weirs, fyke nets, electrofishing, and visual observation surveys. Details regarding study methods were not provided (Study Criterion 6).

In its February 28, 2011 response to the new study request, MID states that there is no strong physical evidence of steelhead within the river, as no steelhead have been identified in 10 years of studies on the lower Merced. Further, MID states that the presence of resident trout in the lower Merced River appears confounding and the study methodology does not suggest as to how resident freshwater rainbow trout and steelhead would be distinguished.

As noted previously noted, existing information and approved studies, either currently or are designed to, provide information on project-related effects and cumulative effects on aquatic habitat, geomorphic conditions, water quantity, water temperature, and other metrics which support all forms of aquatic life in the lower Merced River. Therefore, existing information and approved studies should provide information suitable to establish any potential project effects on the species, regardless of its presence or absence, thereby informing the development of license requirements (Study Criterion 4). For these reasons, we are not recommending this study.

Examine Environmental and Physiological Factors Associated with Juvenile Salmon Survival and Fitness as Related to Spring Pulse Flows for Outmigration

This study would examine the environmental and physiological factors associated with juvenile salmon survival and fitness in relation to conditions in the Merced River and the San Joaquin River to determine the appropriate timing, magnitude, and duration for spring pulse flows for juvenile salmon outmigration.

In its February 28, 2011 response to the new study request, MID states that the Water Board does not take into account the overlap of the study request and the existing approved 2002 CDFG/MID MOU studies that would fulfill the goals and objectives of the requested study. In studies agreed to by a MOU with CDFG, MID plans to conduct experimental flow schedules and also assess the survival of juvenile salmon using several different methodologies including use of a rotary screw trap and predator assessments.

As previously indicated, out-migration of juvenile anadromous salmon may be a result of many factors including, but not limited to, flow, water temperature, hormonal triggers, the lunar cycle, and density-dependent effects, such as schooling. Success of outmigration is again related to a multitude of factors including, but not limited to fitness, predation, flow, water temperature, and suitability and availability of habitat. We note that the approved *Evaluation of Anadromous Salmonid Rearing Habitats in the Lower Merced River Study*, *Chinook Salmon Egg Viability Study, Instream Flow (PHABSIM) Downstream of Crocker-Huffman,* and the *Water Temperature and Water Balance/Operations Models* can provide information related to the timing of juvenile outmigration as well as suitable water temperature and habitat as they relate to project effects in the lower Merced River from Crocker-Huffman to Shaffer Bridge (Study Criterion 4). For these reasons, we are not recommending this study.

Evaluate Relationship between Flow and Connectivity with Salmon Predator Habitat Outside Main Channel; Develop Map of Potential Juvenile Salmon Predator Habitat and Sampling Locations Juvenile Salmon Predator Habitat Mapping Study

This study would evaluate the relationship between flow and connectivity with juvenile salmon predator habitat outside the main channel and would create a map that shows the location of potential juvenile salmon predator habitat occurs and identifies the locations where predator sampling occurred.

In its February 28, 2011 response to the new study request, MID states that this study is outside the FERC licensing proceeding and that the Water Board does not take into account the overlap of the study request and the existing approved 2002 CDFG/MID MOU studies that would fulfill the goals and objectives of the requested study. MID states that as a result of the MOU studies, MID and CDFG will investigate areas where high densities of predators are found with an acoustic camera to better document and

describe habitat usage and obtain information regarding areas where predators are collected and where high densities occur.

Results of the Water Temperature and Water Balance/Operations models suggest that during the non-irrigation season (approximately November – February) the magnitude and duration of releases from New Exchequer dam may have a direct effect upon flow magnitude and duration downstream of Crocker-Huffman. Existing information suggests that bass may primarily utilize habitat created by mining activities, such as side-channels and pits, in the lower Merced River. Therefore, project-related operations may have an effect upon flow conditions that connect predator habitat with the primary river channel. We find that an understanding of the project's effect upon the connectivity of bass habitat, presumed to be a primary source of predation among Chinook salmon, could potentially provide information useful for the development of license conditions (Study Criterion 5). We note that our recommended *Instream Flow (PHABSIM) Downstream of Crocker-Huffman Study* would provide project-related flow-habitat information for several fish species including juvenile Chinook salmon. Therefore, we recommend that this study plan also include descriptions of flow and habitat connectivity for adult smallmouth bass and adult largemouth bass.

Health Assessment of Juvenile Salmon during Spring Outmigration in the Merced River.

This study would assess potential impacts to fish health due to poor water quality and in particular elevated water temperatures from 2011 through 2014. The Water Board requests MID consult with FWS California-Nevada Fish Health Center regarding the set of fish health status and physiological assays and analysis to be used to determine at a minimum but not limited to the extent of infection with proliferative kidney disease (PKD) and other pathogens.

In its February 28, 2011 response to the new study request, MID states that the Water Board does not explain why this study was not requested earlier in the licensing proceeding, nor does it discuss proposed changes to the project or new information that supports the new study request. Furthermore, MID questions the need for an intensive fish health study as there is no existing documentation of health issues in juvenile salmon in the lower Merced River. MID states the existing 2002 CDFG/MID MOU studies will assess egg viability and monitor for disease, will trap visibly juvenile salmonids for signs of disease, and also observe juvenile salmonid habitat usage over multiple years.

To our knowledge, there is no existing information that indicates juvenile Chinook salmon experience poor health as a result of PKD and other pathogens in the lower Merced River (Study Criterion 4). Furthermore, the Water Board provides no indication of new or existing information material to the study objective, pursuant to section 5.15(e)(4). The Water Board indicates that the proposed study would assess potential impacts to fish health, based upon poor water quality, and in particular, elevated water

temperatures. We note that results of the *Water Temperature Model Study* provide information regarding potential project effects upon water temperature downstream of Crocker-Huffman. The existing Water Temperature Model may also be utilized to evaluate differing operating scenarios for the purposes of examining potential mitigation measures, including, but not limited to, downstream water temperature conditions that would be unfavorable to the proliferation of PKD (Study Criterion 4). For these reasons, we are not recommending a *Health Assessment of Juvenile Salmon during Spring Outmigration in the Merced River.*

Water Quality Monitoring Study

We address this requested study in the *Proposals to modify the existing study plan* section below.

Dissolved Oxygen Study

We address this requested study in the *Proposals to modify the existing study plan* section below.

Fish Tissue Mercury Study

This study would assess the tissue concentrations of mercury in three species of fish at four locations downstream in the lower Merced River downstream of Crocker-Huffman.

In its February 28, 2011 response to the new study request, MID states that existing information collected by licensee and others indicate that mercury is bioaccumulating in project waters and downstream; these data are summarized in the Pre-Application Document (PAD) or have been provided directly by Merced ID to the Water Board. Additionally, MID states that surface water samples analyzed in the approved *Water Quality Study* showed that mercury and methylmercury were detected upstream, within, and downstream of the Project, albeit at concentrations less than the California Toxics Rule (CTR)'s aquatic life protective criteria.

In the Dispute Determination we noted that the baseline for our NEPA analysis of the project is existing conditions. We found that because MID is not proposing to alter project operations, to increase water fluctuations, or mobilize substrates the project, as proposed, would not perform any actions associated with the release or methylation of mercury. We therefore concluded that a study of mercury bioaccumulation was not warranted.

Since the original mercury bioaccumulation study request, there have been no significant changes to the project proposal that would indicate the potential for project

effects upon the release or methylation of mercury. As MID indicates, results of the *Water Quality Study* indicate that mercury and methylmercury in the project area occur within state benchmark concentrations. The Water Board provided no indication of any new information material to the study objectives, pursuant to section 5.15(e) of the Commission's regulations. Because MID does not propose any operations or actions related to the bioaccumulation of mercury, we find there is no nexus between project operations and effects on the resource to be studied (Study Criterion 5). For these reasons, we are not this study.

Toxicity Bioassays Study

This study would conduct one 96-hour acute and one 7-day chronic toxicity bioassay using the water flea (*Ceriodaphnia dubmia*) annually for a 2-year period with water collected in the Merced River during a rainstorm event between January 15 and March 15 and during the summer low flow period between August and September.

In its February 28, 2011 response to the new study request, MID states the Water Board does not explain why this study was not requested earlier in the licensing proceeding nor does it discuss proposed changes to the project or new information that supports the new study request.

Results of the approved *Water Quality Study* showed that except for copper, no toxics exceeded benchmark standards within the project area. Results of this study provided no indication of any spatially-related increase of toxics concentrations downstream from Lake McClure. The Water Board has provided no indication of significant changes to the project proposal that would indicate the potential for project effects upon toxics downstream of Crocker-Huffman dam, pursuant to section 5.15(e) of the Commission's regulations. Because MID does not propose any operations or actions related to the downstream concentration of toxics, nor does existing information suggest a relationship between project operations and the downstream concentration of toxics, we find there is no nexus between project operations and effects on the resource to be studied (Study Criterion 5). For this these reason, we are not recommending this study.

Proposals to modify the existing study plan

Riparian Habitat and Wetlands Study

The Bureau of Land Management (BLM) requested that the *Riparian Habitat and Wetlands Study* be modified by:

- visiting an additional site in the Piney Creek East riparian area and determining if BLM agrees with the proper functioning condition (PFC) rating.

- developing additional riparian vegetation plots in the semi-permanently flooded stretch of the Piney Creek East reach located on public land administered by BLM.

In response to comments, MID states BLM does not provide any evidence concerning why the requested modification should be approved. MID states that BLM does not contend that the study was not performed in accordance with the approved study plan and only questions the result of the study, not the study methodology. In addition, MID states BLM does not base its request on anomalous conditions or that conditions have changed. MID indicates that the study was performed under typical conditions and conditions have not changed since the Commission directed MID to perform the study.

Pursuant to section 5.15 (e)(3) of the Commission's regulations, any proposal for new information gathering must be accompanied by a showing of good cause why the proposal should be approved. BLM provided no reason for the visiting of an additional site in the Piney Creek East riparian area or for the developing of additional riparian vegetation plots in the semi-permanently flooded stretch of the Piney Creek East reach. We conclude that the goals and objectives of the study can be met with the current methodology. As such, we do not recommend BLM's request to modify the *Riparian Habitat and Wetlands Study*. However, MID has agreed to modify the study as requested by BLM.

Recreation Use and Visitor Surveys

In the September 14, 2009, Study Determination MID was required to conduct visitor trail use surveys at Bagby Campground Access and Railroad Flat as well as mailback trail questionnaires and a web-based trail survey to collect unmet project recreation demand information for trails. BLM, National Park Service (NPS), and the Merced River Conservation Committee requested that the Recreation and Use and Visitor Survey Study be modified due to the lack of surveys completed for the Merced River Trail. These entities request extending the time frame for the collection of the survey data regarding trail use and demand through July 15, modifying the trail use survey to solicit responses about demand for additional trails, and convening focus groups of potential trail users to assess the status of the Merced River Trail as well as the demand for additional development of trails.

In response to comments, MID states the response rate of the trail survey in the interim Recreational Use and Visitor Surveys Technical Memorandum was incorrectly reported. MID indicates that, as of January 2011, the total number of completed Merced River Trails surveys was 50, not 23, as previously stated. MID further states that although the target number of surveys was 100, that number was developed based on a conservatively high, best guess at the time of the user population for the Merced River Trail. MID concludes that while its initial estimate of annual use was high; recreational

use of this resource appears to be very low.

The unmet demand trail survey was a separate survey instrument to specifically address unmet demand not only for the Merced River Trail, but also for the need and location of trail opportunities at the project reservoirs. MID believes the survey data collected from the 50 complete Merced River Trail surveys and the 76 unmet demand trail surveys is adequate to address the study objectives related to unmet demand for trail opportunities at the project (specifically the need for trails and locations for trails including the Merced River Trail) and barriers, type of use, and seasonality of use at the Merced River Trail. MID does not believe conducting a focus group would provide any better information than from the 50 completed surveys on this relatively low use trail.

During the study plan development process, the entities noted above did not provide any comments on the Recreation and Use and Visitor Survey Study or the attached questionnaires. Further, none of the commenting entities demonstrated that the approved studies were not conducted as provided for in the approved study plan or that the study was conducted under anomalous environmental conditions (section 5.15(d)(1-2) of the Commission's regulations). Although MID proposed a target number of 100 trail use surveys in their final proposed study plan, we agree with MID that recreational use of this resource appears to be low. Between the onsite visitor trail use surveys, the mailback trail questionnaires, and the web-based trail survey we suggest that information on existing recreational trail use and unmet demand for recreation trails at the project is sufficient and do not see a need to extend or modify the survey. Because both the mailback trail questionnaires and web-based trail survey specifically target regional hiking clubs, mountain biking organizations, and equestrian organizations (as well as individual users through local service/equipment retailers) we do not see the value of convening a focus group. Therefore, we find that the parties' request that the Recreation and Use and Visitor Survey Study be modified is not warranted.

Visual Quality

In the September 14, 2009 Study Determination, MID was required to, in consultation with BLM, identify key observation points (KOPs), photograph project facilities, and map and describe the locations. Three recreation sites at Bagby Recreation Area (Sheperd's Point Primitive Area, Bagby Campground, and Bagby Boat Launch) were originally identified by MID and BLM as KOPs for the Visual Quality study. BLM now requests three additional KOPs on the Merced River Trail be included in the Visual Quality Study. BLM states the three points should be looking across the Merced River or reservoir at the upper, middle, and lower Bagby Recreation Area and the licensee should include photographs and GPS recorded sites for each location.

In response to comments, MID states BLM did not provide a reason for the requested modification nor did BLM contend that the study was not performed in

accordance to the approved study plan.

Pursuant to section 5.15 (e)(3) of the Commission's regulations, any proposal for new information gathering must be accompanied by a showing of good cause why the proposal should be approved. Again, we note that no reason was provided by BLM for the additional requested KOPs. All three recreation sites at Bagby Recreation Area already provide views, looking up, across, and down river, looking at land administered by BLM or Merced ID land. It is unclear how the three KOPs requested by the BLM would provide additional information to the study. As such, we do not recommend BLM's request to modify the Visual Quality Study. However, again we note that MID has agreed to modify the study to include the additional KOPs as requested by BLM.

Water Quality Monitoring Study

In the December 22, 2009 Dispute Determination, the Director approved a study of water quality. In the investigations of 60 physical water quality parameters and chemical constituents, the approved study area included all project areas within the project boundary and the Merced River from Merced Falls dam to Crocker-Huffman, but included a phased mechanism for the investigation of any project-related effects on water quality downstream of Crocker-Huffman to Shaffer Bridge if any water quality parameters that exceeded state standards were identified. As requested by the Water Board, this study represents a modification of the existing approved *Water Quality Study*.

The Water Board's proposed modifications to the existing *Water Quality Monitoring Study* include the collection data on constituents in the current Commission-approved *Water Quality Study* as well as additional constituents not included in the currently approved study plan, including Group A pesticides, boron, pyrethroids, suspended sediments, DDE, and DDT. Furthermore, the Water Board requests that MID collect water quality samples at four locations downstream of Crocker-Huffman to Snelling Road Bridge and at three sites in the San Joaquin River. Two additional sampling sites within the San Joaquin River would be mandated if results from the first year of sampling indicate that water quality objectives are not being met at the San Joaquin River sampling site located downstream of the confluence with the San Joaquin River.

In response to comments, MID states the Water Board requested water quality sampling downstream of Crocker-Hoffman Diversion in its July 2009 comments on MID's April 2009 proposed study plan and again on MID's August 2009 revised study plan. In the 2009 Study Determination, we found that MID's proposal to study downstream effects of any water quality parameter that exceeded state standards after examination of historic and current data would adequately address any potential cumulative effects of the project downstream of Crocker-Huffman Diversion. In the December 22, 2009 Dispute Determination, we similarly found that the *Water Quality*

Study would be adequate to identify potential project effects upon water quality within the project area, and that the study's scope should be expanded if the evaluation of historic and current data indicated a need.

In its February 28, 2011 response to the request for study modification, MID states that it has not been able to identify water quality parameters requested by the Water Board's new study that would inform license conditions compared to the data collected. Further, MID states the Water Board does not discuss proposed changes to the project or new information that supports the new study request. MID also indicates that the proposed water quality constituents list includes pesticides and other constituents that are not used by or introduced by MID into the Merced River.

Results of the approved *Water Quality Study* suggest that concentrations for most water quality constituents were within state exceedance criteria, and that there is no apparent pattern of increasing chemical concentrations from upstream to downstream of the project. The study did find instances where two constituents exceeded benchmarks (pH and copper).

Our preliminary analysis suggests that results of the approved *Water Quality Study* do not indicate any apparent pattern of increasing chemical concentrations from upstream to downstream of the project. Most of the constituents exhibited concentrations within bounds of state or federal benchmarks. We believe that the observed exceedances of standards with relation to pH and dissolved copper represent isolated events and do not appear to be indicative patterns associated with normal project operations or maintenance. Furthermore, pursuant to section 5.15(e)(4) of the Commission's regulations, the Water Board does not demonstrate any significant changes in the project proposal or any significant new information, material to the study objectives that would warrant an expanded study of water quality. For these reasons, we are not recommending a modification *Water Quality Monitoring Study*.

Dissolved Oxygen Study

This study would collect continuous data on dissolved oxygen concentration for a two-week period in each summer and fall beginning in 2011 and continuing through 2010 at two locations: 1) Shaffer Bridge and 2) at River Road, upstream of the confluence with the San Joaquin River.

In the December 22, 2009 Dispute Determination, the Director approved a study of water quality. For dissolved oxygen (DO), the approved study's scope included all project areas within the project boundary, the Merced River from Merced Falls dam to Crocker-Huffman, and also, if collaboratively agreed to, the Merced River immediately downstream of Crocker-Huffman. The approved study methodology also included a phased mechanism for the investigation of any project-related effects on water quality

downstream of Crocker-Huffman to Shaffer Bridge if any water quality parameters that exceeded state standards were identified.

In its February 28, 2011 response to the new study request, MID states that "DO was monitored (1) at the Highway 49 Bridge in the Merced River upstream of Lake McClure; (2) in McSwain Reservoir downstream of New Exchequer Powerhouse; (3) in Merced Falls Reservoir downstream of McSwain Powerhouse; (4) in the Merced River downstream of Merced Falls Powerhouse; and (5) in the Merced River upstream of the Crocker-Huffman Diversion dam impoundment."[10] MID also states that "the downstream study area also has several other influential factors to water quality, such as non-Project diversions that can alter DO and create further question to the potential nexus of the goals and objectives proposed."

Our preliminary analysis suggests that results of the approved *Water Quality Study* indicate some exceedances of state benchmarks for DO concentrations. Generally, the percentage of individual sampling events that produced exceedance concentrations reduced with distance downstream of Lake McClure. MID reports that downstream of Crocker-Huffman, in portions of 10 days, 9% of samples indicated dissolved concentrations of less than the state standard of 8µg/L.

While the Water Board requests the evaluation of DO concentrations at Shaffer Bridge (downstream of Crocker-Huffman) and one site near the confluence with the San Joaquin, it does not note any significant new information, material to the study objectives that would warrant a new *Dissolved Oxygen Monitoring Study*, nor does it indicate how monitoring dissolved oxygen near the confluence of the San Joaquin River would inform potential license requirements (Study Criterion 5). As previously discussed, results of the *Water Balance/Operations Model Study* and the *Water Temperature Model Study* suggest that direct project effects upon water temperature exhibit limited geographic extent, beyond which the influence of ambient meteorology exerts a more primary influence upon water temperatures. Additionally, non-project related variables such as localized land use, riparian zones, and the backwater effects of the San Joaquin are likely to have a more primary influence on the dissolved oxygen concentration of the lower Merced River near the confluence of the San Joaquin. For these reasons, we are not recommending the *Dissolved Oxygen Monitoring Study* as requested by the Water Board.

While it is not necessary to monitor DO near the confluence with the San Joaquin, we agree that further DO monitoring downstream of Crocker-Huffman may be needed. As previously stated, methodology of the approved *Water Quality Study* provides for

[10] We note that in its November 15, 2010 Initial Study Report, in addition to the study sites listed here, MID reports study results of a DO monitoring site located in the Merced River immediately downstream of Crocker-Huffman.

additional study of any "constituent of interest", should results of the first study season indicate a need. MID does not propose to perform additional studies of water quality parameters. We note that results of the *Water Balance/Operations Model Study* and the *Water Temperature Model Study* suggest potential project effects upon water temperature downstream of Crocker-Huffman. Because water temperature and DO concentration are inextricably linked, and because existing study results indicate some exceedances of state benchmarks for DO concentrations downstream of Crocker-Huffman, we find that DO conforms to the "constituent of interest" criteria developed in the approved study plan. Because MID has not conducted the approved *Water Quality Study* as provided for in the approved study plan, pursuant to section 5.15(d)(1), we recommend a modification of the approved *Water Quality Study* to provide for an additional study season of DO sampling downstream of Crocker-Huffman. MID should conduct sampling during the same time period as DO sampling in the previous study season, and should occur at three locations: (1) the existing site immediately downstream of Crocker-Huffman dam (approximately RM 52), and (2) an additional site at Snelling Road Bridge (approximately RM 45.2) (3) an additional site located at Shaffer Road Bridge (approximately RM 33). Limiting the downstream scope of the study to Shaffer Bridge will be sufficient to document any direct project effects upon the dissolved oxygen concentration in the lower Merced River. This additional study season and additional sites should provide more information regarding potential project effects on DO downstream of Crocker-Huffman, as well as provide information on the downstream extent of project effects. We recommend that MID file the results this additional DO monitoring with its preliminary licensing proposal pursuant to section 5.16(3) of the Commission's regulations.