UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802-4213

MAY 1 1 2012

Mr. Donald R. Glaser
Regional Director
Mid-Pacific Region
U.S. Bureau of Reclamation
2800 Cottage Way, MP-3700
Sacramento, California 95825-1898

Mr. Mark W. Cowin
Director
California Department of Water Resources
P.O. Box 942836, Room 1115-1
Sacramento, California 94236-0001

Dear Mr. Glaser and Mr. Cowin:

On January 12, 2012, Plaintiffs, Plaintiff-Intervenor, and Federal Defendants to the Consolidated Salmonid Cases (Case 1:09-cv-01053-LJO –DLB) signed and filed with the Federal court a joint stipulation (Document 659-2) that included Central Valley Project (CVP) and State Water Project (SWP; combined, referred to as the Projects) operations for April and May 2012. On March 16, 2012, NOAA's National Marine Fisheries Service (NMFS) transmitted to the U.S. Bureau of Reclamation and the California Department of Water Resources the real-time operations technical memorandum (tech memo) required as part of the joint stipulation (Paragraph 2.a.v).

The enclosure provides the Delta Operations for Salmonids and Sturgeon group (DOSS) advice[1] to the Water Operations Management Team (WOMT) and NMFS on the third experimental period of May 16-31, as follows:

- Update the assumptions used to calculate the Railroad Cut trigger with the additional tag detection data collected during the first week of the second experimental study period, expected to result in a trigger value in the low 30s (based on a quick calculation during the DOSS call). The final trigger number would be provided to NMFS and included in the NMFS determination.
- Target an Old and Middle River (OMR) flow limit of -5,000 cfs for at least the May 16-20 period, even if the Railroad Cut trigger is met during that time period.

[1] Discussions at DOSS and the resulting advice to WOMT and NMFS were based on the assumption that the San Joaquin Valley Water Year Type Index 60-20-20 was "critical."

- If the number of tag detections at the Railroad Cut receivers meets or exceeds the Railroad Cut trigger, export reductions shall be initiated (but no earlier than May 20) to produce a 5-day running average of the tidally filtered OMR flow of -1,250 cfs, or 1,500 cfs combined exports, whichever is greater. Because it is acknowledged that changes in operations may take 48 hours to implement (possibly longer over a weekend), the initial OMR limit may be in effect as long as 7 days, even if the trigger is exceeded within the first five days.
- After 5 days at the most positive OMR (or minimum exports), the Projects can return to the experimental OMR flow of -5,000 cfs for the remainder of the period.

NMFS accepts the DOSS advice, and determines that implementing the above proposal, with the clarifications provided below, will meet the needs of the stipulation study experimental design, adequately protect steelhead, and minimizes the impact to water supply. As such, NMFS finds that the proposal and adjustments will not jeopardize the continued existence of Central Valley steelhead.

- NMFS' April 27, 2012, determination (http://swr.nmfs.noaa.gov/ocap/doss/Glaser_Cowin%20NMFS_determination_letter.pdf) formalized the switch in experimental OMR flows in May, so that during the May 16-31, 2012, experimental period, the experimental OMR flow should target -1,250 cfs. However, as a result of other regulatory contraints (*i.e.*, D-1641), the Projects were not able to implement the higher (more negative) OMR flows within the allowable range. Despite NMFS' determination acknowledging a switch in experimental OMR flows, NMFS determines that an initial experimental OMR flow of -5,000 cfs during the May 16-31, 2012, period is consistent with the intent of the NMFS' March 16, 2012, technical memorandum (tech memo, http://swr.nmfs.noaa.gov/ocap/2012-03-16_Joint_Stipulation_Tech_Memo.pdf) and supporting stipulation study plan (Attachment 3 to the tech memo), that is, to evaluate potential effects of OMR flows on reach-scale survival, migrate rate, and net migration direction of acoustically tagged juvenile steelhead in the lower San Joaquin River, Turner Cut, Columbia cut, Middle River, and Old River.
- Enclosure 2 provides the updated assumptions used to calculate the initial Railroad Cut trigger of 31 sentinel steelhead. However, since the third experimental period has not started yet, the trigger of 31 sentinel steelhead was based on an assumption that 168 sentinel steelhead will be released, with no mortalities. The following table provides the calculated trigger number based on different release group sizes, in the event the release group is less than 168. Upon confirmation of the final release number, NMFS will notify the Delta Conditions Team, DOSS, WOMT, and the planning committee e-mail list via e-mail of the official Railroad Cut trigger number.

Release Group Size	Railroad Cut Trigger
165-168	31
159-164	30
153-158	29
150-152	28

As with the proposal considered in NMFS' May 4, 2012, determination, the above proposal has the best real-time adaption of the Railroad Cut trigger while remaining closely tied to the in-depth analysis in the underlying biological opinion on the long-term operations of the CVP and SWP (*i.e.*, it retained the general calculations of the Railroad Cut trigger while adjusting various assumptions based on the results of the first sentinel steelhead release), created the greatest likelihood of experimental value while still maintaining minimum protections for steelhead, and allowed for increased exports by both lengthening the initial OMR treatment period and shortening the action response time.

Following the DOSS and WOMT meetings, NMFS was apprised of a change in the San Joaquin Valley Water Year Type Index (SJI) from "critical" to "dry" (http://cdec.water.ca.gov/cgi-progs/iodir_ss/wsi). As provided in the joint stipulation (Paragraph 2.a.v on page 5), "The DOSS will provide its information and advice to the WOMT for its consideration in developing a recommendation to NMFS for actions to protect salmonids and green sturgeon." With this change in SJI, NMFS will discuss with DOSS during its meeting next Tuesday whether any changes to the post response flow level (likely to be May 28-31, 2012) are warranted..

NMFS appreciates the continued coordination of the parties towards the implementation of the joint stipulation and the technical memorandum.

Sincerely,

Kevin Chu

for Rodney R. McInnis
Regional Administrator

Enclosures:

1. DOSS advice
2. Explanation of updates to assumptions used to calculate the Railroad Cut trigger

Enclosure 1

DOSS Advice for operations during May 16-31, 2012

Old and Middle River Flow Management per the 2012 Joint Stipulation, in lieu of Action IV.2.1 of the NMFS Biological Opinion for the Long-Term Operations of the Central Valley Project and State Water Project (NMFS Opinion)

<u>Summary of Advice from the Delta Operations for Salmonids and Sturgeon (DOSS) group:</u>

Background:

The Delta Conditions Team (DCT) met on May 7, 2012, and offered the following experimental OMR treatment levels for consideration during the May 16-31, 2012, experimental period:

- Tom Boardman (supported by Terry Erlewine and Paul Hutton): OMR at -5,000 cfs to test the higher (more negative) end of the OMR range; and
- Emily Brown (supported by Doug Obegi): OMR at -1,250 cfs to test the lower (more positive) end of the OMR range. While sentinel steelhead have been exposed to minimum exports/more positive OMR, this exposure has happened as a result of a Railroad Cut trigger, not at the beginning of an experimental period.
- After the DCT call, and prior to DOSS, Brad Cavallo sent an e-mail to the DCT with the proposal for an OMR of -1,250 cfs for the first week and -5,000 cfs for the second week of the experimental period.

DOSS discussed the above proposals, and also variations of them, in consideration of the following:

- Forecasted flows at Vernalis
- Benefits to the experiment from the various initial OMR flows
- Protection of wild steelhead in the San Joaquin River
- Expected water temperatures

DOSS advice for Tuesday 5/8/12:

DOSS advises WOMT and NMFS to consider the following proposal for implementation during the third sentinel steelhead experimental study period of May 16-31, 2012:

- Update the assumptions used to calculate the Railroad Cut trigger with the additional tag detection data collected during the first week of the second experimental study period, expected to result in a trigger value in the low 30s (based on a quick calculation during the DOSS call). The final trigger number would be provided to NMFS and included in the NMFS determination.
- Target an OMR limit of -5,000 cfs for at least the May 16-20 period, even if the Railroad Cut trigger is met during that time period.
- If the number of tag detections at the Railroad Cut receivers meets or exceeds the Railroad Cut trigger, export reductions shall be initiated (but no earlier than May 20) to produce a 5-day running average of the tidally filtered OMR flow of -1,250 cfs, or 1,500 cfs combined exports, whichever is greater. Because it is acknowledged that changes in

operations may take 48 hours to implement (possibly longer over a weekend), the initial OMR limit may be in effect as long as 7 days, even if the trigger is exceeded within the first five days.

- After 5 days at the most positive OMR (or minimum exports), the Projects can return to the experimental OMR flow of -5,000 cfs for the remainder of the period.

Rationale for DOSS advice:

Railroad Cut trigger number:

- DOSS agreed to use the Railroad Cut trigger worksheet from the March 16, 2012, technical memorandum, with updated assumptions.
- Assumptions, including the estimate of south Delta mortality, would be updated based on data from the first and second experimental periods.

Target an OMR limit of -5,000 cfs for at least the May 16-20 period, even if the Railroad Cut trigger is met during that time period.

- DOSS agreed that either extreme of the experimental OMR range (-1,250 cfs, or -5,000 cfs), as opposed to a moderate OMR flow, should be targeted as the initial OMR flow. DOSS agreed to advise the initial OMR of -5,000 cfs because:
    - there is a greater difference between the initial OMR flows in the first and second periods (approximately -2,450 cfs and -2,900 cfs, respectively) and -5,000 cfs than compared to -1,250 cfs; greater differentiation between treatment levels provides greater power to test the effect of OMR on steelhead movement.
- A minimum of 7 days at the initial OMR flow (at least 5 days at the OMR, plus 2 additional days for the Projects to implement an action response, as necessary) provides a reasonable window of time at the experimental OMR level over which to test sentinel steelhead response.

5-day action response at the most positive OMR (or minimum exports), then the Projects can return to the experimental OMR flow of -5,000 cfs for the remainder of the period through May 31, 2012.

- The 5-day duration of the action response will allow testing of the response of sentinel steelhead to a shift to more positive OMR flows. Tag detection data will be reviewed to assess whether or not (1) the more positive OMR flows slow or reverse the migration of the sentinel steelhead towards the export facilities, and (2) whether 5 days is an adequate duration to elicit a response.

Water temperatures: The group noted that the current warm water temperatures are expected get even higher near the end of May. The possibility of temperature-mediated impacts on fish condition (*e.g.*, stress) and mortality of sentinel steelhead in the central delta should be considered during the analysis of the sentinel study data.

The table below (modeled after Table 4 of the OMR Technical Memorandum) shows the trigger calculation for the May 16-May 31 experimental period, with updated assumptions highlighted in yellow.

ROW ID	VALUE	FORMULA	DESCRIPTION
Calculation of average travel distance between Railroad Cut receivers and the SWP and CVP			
A1	12	Fixed value	Approximate distance (km) from Railroad Cut receiver on Old River to SWP Clifton Court intake
A2	18	Fixed value	Approximate distance (km) from Railroad Cut receiver on Middle River to SWP Clifton Court intake
A3	2	Fixed value	Approximate distance (km) from SWP Clifton Court intake to CVP intake
A4	13.74	=(A11*A1)+[A12*(A1+A3)]	Average approximate distance(km) from Railroad Cut receiver on Old River to SWP or CVP intake, weighted according to estimated split of facility entry (value assumed in A13)
A5	19.74	=(A11*A2)+[A12*(A2+A3)]	Average approximate distance(km) from Railroad Cut receiver on Middle River to SWP or CVP intake, weighted according to estimated split of facility entry (value assumed in A13)
A6	0.25[i]	**Assumption**	Of fish passing the Railroad Cut receivers, assumed proportion that are in Old River
A7	18.23	=(A6*A4) + [(1-A6)* (A5)]	Average approximate distance (km) traveled by all fish reaching the SWP or CVP, weighted by origin (Old River or Middle River) and split of facility entry.
Calculation of exposure trigger			
A8	168[ii]	**Assumption**	Number of Acoustically Tagged Fish in release group. *Set to the actual release group size for each treatment period.*
A9	2%	Fixed value	Loss at the SWP and CVP not to exceed this value (percent of release group)
A10	3.36	=A8*A9	Loss at the SWP and CVP not to exceed this value (number of fish from release group)
A11	0.13	=A13	Of fish that enter the CVP or SWP, assumed proportion that enter the SWP
A12	0.87	=(1-A13)	Of fish that enter the CVP or SWP, assumed proportion that enter the CVP
A13	0.13[iii]	**Assumption**	Of fish that enter the CVP or SWP, assumed proportion that enters the SWP.
A14	4.33	Fixed value	SWP approximate salvage-to-loss factor

ROW ID	VALUE	FORMULA	DESCRIPTION
Calculation of exposure trigger, continued			
A15	0.68	Fixed value	CVP approximate salvage-to-loss factor
A16	0.187617261	=1*[1/(1+A14)]	For each fish entering the SWP, expected SWP salvage
A17	0.595238095	=1*[1/(1+A15)]	For each fish entering the CVP, expected CVP salvage
A18	0.812382739	=1*[A14/(1+A14)]	For each fish entering the SWP, expected SWP loss
A19	0.404761905	=1*[A15/(1+A15)]	For each fish entering the CVP, expected CVP loss
A20	TRUE	Logical formula as used in excel: =IF(A16*A14=A18, TRUE, FALSE)	Check that expected SWP salvage (A16) * SWP approximate salvage-to-loss factor (A14) = expected SWP loss (A18)
A21	TRUE	Logical formula as used in excel: =IF(A17*A15=A19, TRUE, FALSE)	Check that expected CVP salvage (A17) * CVP approximate salvage-to-loss factor (A15) = expected CVP loss (A19)
A22	TRUE	Logical formula as used in excel: =IF(A16+A18=1, TRUE, FALSE)	Check that expected SWP salvage (A16) + expected SWP loss (A18) = 1
A23	TRUE	Logical formula as used in excel: =IF(A17+A19=1, TRUE, FALSE)	Check that expected CVP salvage (A17) + expected CVP loss (A19) = 1
A24	0.45741293	=(A11*A18)+(A12*A19)	Expected loss per fish that enter the SWP or CVP, given the assumed entry proportion to each facility and the loss rate at each facility
A25	7.34566031	=A10/A24	How many fish from the release group may encounter the SWP & CVP without exceeding the loss trigger?
A26	**4.37%**	**=A25/A8**	**What percent of fish from the release group may encounter the SWP & CVP without exceeding the loss trigger?**
A27	0.77	=A11*A25*A18	Expected SWP Loss if A25 fish enter the facilities at the expected ratio
A28	2.59	=A12*A25*A19	Expected CVP Loss if A25 fish enter the facilities at the expected ratio
A29	TRUE	Logical formula as used in excel: =IF(A27+A28=A10, TRUE, FALSE)	Check that SWP loss + CVP Loss add up to loss trigger
A30	0.077[iv]	**Assumption**	Assumed mortality rate (per km) between the Railroad Cut receivers and the SWP and CVP.
A31	0.23	=(1-A30)^A7	Survival from the Railroad Cut receivers to the SWP and CVP, based on the average distance in A7.
A32	31	=A25/A31	How many fish from the release group may encounter the Railroad Cut receivers without exceeding the loss trigger?
A33	**18.5%**	**=A32/A8**	**What percent of fish from the release group encounter the Railroad Cut receivers without exceeding the loss trigger?**

[i] Because a full tag detection history from all Railroad Cut receivers, including time of each detection, is not yet available, NMFS assumed that half of the sentinel tags detected in both channels traveled through Old River and half traveled through Middle River. Of fish passing the Railroad Cut receivers for each experimental period, the proportion that is in Old River is thus estimated as: (Number of tags detected ONLY at Old River receivers + Half of the tags detected at both Old River and Middle River receivers)/Total number of tags detected at either Old River or Middle River receivers.

	Period 1: 4/15-4/30	**Partial Period 2: 5/1-5/7**
Number of tags detected ONLY at Old River receivers	3	0
Number of tags detected ONLY at Middle River receivers	18	31
Number of tags detected at BOTH Old River and Middle River receivers	28	14
Total number of tags detected at either Old River or Middle River receivers	49	45
Of fish passing the Railroad Cut receivers for each experimental period, the proportion in Old River	(3+14)/49=0.3469	(0+7)/45=0.1555
Average of two periods	**(0.3469+0.1555)/2=0.2512**	

[ii] 168 sentinel steelhead is the expected release group size. If sentinel steelhead die or not recover fully during tagging or holding, this release group size will be adjusted accordingly. The calculated trigger levels at various release group sizes are summarized in Enclosure 3.

[iii] Of fish that enter the CVP or SWP, the proportion that enter the SWP is estimated as: Number of tags detected at the receivers just inside the SWP/Total number of tags detected at the receivers just inside either the SWP or CVP.

	Period 1: 4/15-4/30	**Partial Period 2: 5/1-5/7**
Number of tags detected at the receivers just inside the SWP	2	1
Number of tags detected at the receivers just inside the CVP	13	7
Total number of tags detected at the receivers just inside either the SWP or CVP	15	8
Of fish that enter the CVP or SWP, the proportion that enter the SWP	2/15=0.1333	1/8=0.125
Average of two periods	**(2/15 + 1/8)/2= 0.1292**	

[iv] Sentinel tag detections at the receivers near Railroad Cut in Old River and Middle River, as well as at the receivers just inside the SWP and CVP, were used to update the estimate of south Delta mortality per the calculation method shown below.

Updated mortality estimate based on the reported number of tags at Railroad Cut and entering the CVP or SWP.				
ROW ID	**VALUE for Period 1: 4/15-4/30** *(column a)*	**VALUE for partial Period 2: 5/1-5/7** *(column b)*	**FORMULA**	**DESCRIPTION**
B1	49	45	Fixed value	Number of tags detected at Railroad Cut receivers
B2	15	8	Fixed value	Number of tags detected entering the CVP or SWP
B3	34	37	B1-B2	Number of tags that "died" between the Railroad Cut receivers and the CWP or SWP
B4	0.69387755	.82222222	B3/B1	Percent of tags that "died" between the Railroad Cut receivers and the CWP or SWP
B5	18.2341837	18.2341837	A7 *(from above table)*	Average distance (km) for all fish reaching facilities, weighted by origin (and split of facility entry)
B6	0.93714208	.90962365	(B2/B1)^(1/B5)	Migration survival rate (per km)
B7	0.06285792	.09037635	1-B6	Updated Estimate of Migration Mortality Rate (per km)
B8	**0.07661714**		**(B7a + B7b)/2**	**Average of two periods**