UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
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OCT 3 2014

Mr. David Murillo
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Re: Modifications of the Continuing Drought Response Measures under the Drought Operations Plan for the Central Valley Project and State Water Project from April 1 through November 15, 2014

Dear Mr. Murillo:

This letter is in response to the U.S. Bureau of Reclamation's (Reclamation) September 26, 2014, letter, wherein Reclamation proposes to modify its operations described in its April 8, 2014, Central Valley Project (CVP) and State Water Project (SWP) Drought Operations Plan (Plan) for April 1 through November 15, 2014. The Plan was developed in coordination with Reclamation, the California Department of Water Resources (DWR), U.S. Fish and Wildlife Service, California Department of Fish and Wildlife, State Water Resources Control Board (State Water Board), and NOAA's National Marine Fisheries Service (NMFS, collectively "six agencies"). The Plan outlines a likely range of coordinated operations for the CVP and SWP through November 15, 2014, including modifications, as deemed prudent under the current low storage conditions, to several reasonable and prudent alternative[1] (RPA) actions from NMFS' June 4, 2009, biological and conference opinion on the long-term operation of the CVP and SWP (NMFS 2009, NMFS BiOp).

Reclamation now requests concurrence from NMFS that the modified drought response actions currently proposed by Reclamation during the beginning of Water Year (WY) 2015, will have roughly equivalent effects as what was previously analyzed and will result in a level of take that is within the limits of the existing Incidental Take Statement from the NMFS BiOp. This letter represents NMFS' analysis of whether or not the proposed modifications to the Plan will result in effects greater than already analyzed in the Plan, which serves as the Contingency Plan in accordance with RPA Action 1.2.3.C in the NMFS BiOp.

NMFS understands that California is continuing to experience unprecedented drought conditions, and is currently in its third straight year of below-average rainfall and very low snowpack. Calendar year 2013 was the driest year in recorded history for many parts of California, resulting in the low initial storage at the beginning of WY 2014. On January 17, 2014, the Governor of California announced an Emergency Proclamation, finding that "conditions of extreme peril to the safety of persons and property exist in California due to water shortage and drought

[1] On April 7, 2011, NMFS issued an amended RPA (http://www.westcoast.fisheries.noaa.gov/publications/Central_Valley/Water%20Operations/Operations,%20Criteria%20and%20Plan/040711_ocap_opinion_2011_amendments.pdf).

conditions." Since that declaration, NMFS has acted to provide the assistance needed to manage through drought conditions in California. NMFS has continued to work quickly and collaboratively with the other fish agencies and the operators of the CVP and SWP to protect health and safety while providing needed protections for and minimizing adverse effects to listed anadromous fish species under the Endangered Species Act (ESA), as demonstrated in the exchange of letters[2] in January, February, March, and April regarding requested changes in specific operating parameters.

The implementation of the Plan was supported by NMFS as a reasonable approach to minimize adverse effects to species given the constraints of WY 2014. With the continued severe drought conditions experienced over the summer of 2014, Reclamation has proposed to add the following modifications to the April 8, 2014, Plan under Section VII. Proposed Delta Operations – June Through November 15:

E. <u>San Joaquin River Flows at Vernalis and Water Transfer Window</u>

- D-1641 San Joaquin River flows at Vernalis
  - Reduce the month-long average fall attraction base flows from 1,000 cubic feet per second (cfs) to 800 cfs for 31 days.
  - This action will occur between October 1, 2014 and November 15, 2014, with the release schedule starting date to be based on recommendations from the fish agencies.
- Water transfer window
  - Extend the water transfer window through November 15, 2014, to allow for the conveyance of approximately 75,000-90,000 acre feet (AF) of transfer water (excluding the loss of carriage water) that has been retained in Shasta and Folsom reservoirs for diversion from the south Delta Federal facilities at the Jones Pumping Plant.
  - Incorporate the alerts and triggers related to the presence of listed threatened or endangered fish species from the NMFS BiOp that will reduce or suspend conveyance of transfer water while listed fish movement is assessed (based on recommendations from the state and federal fish agencies using monitoring triggers and alerts in RPA action IV.1.1).

The Plan developed in April 2014, anticipated the necessity to make further modifications to the operations of the SWP and CVP based on continually changing hydrological and biological information with the passage of time. Reclamation indicates that the proposed modifications for fall operations in 2014 are based on current environmental conditions that were not known in the spring of 2014 during the development of the Plan. Although spring CVP water transfers were considered by Reclamation, they failed to occur due to restrictive operational constraints required by the ongoing drought conditions and the difficulty of managing the cold-water pool in Shasta and Folsom reservoirs over the summer. Reclamation believes that the DWR will complete its water transfers within the SWP by October 1, 2014, thus the proposed Plan modifications extending the water transfer window will only apply to the diversion and transfer of water within the federal CVP facilities.

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[2] All NMFS letters regarding 2014 drought operations are posted online under "Biological Opinion Actions" at: http://www.westcoast.fisheries.noaa.gov/central_valley/water_operations/

Reclamation intends to submit a revised Temporary Urgency Change Petition (TUC) Petition to the State Water Board to specifically modify the October flows in the San Joaquin River, as measured at Vernalis, resulting in a decrease in the average monthly flows from 1,000 cfs to 800 cfs for a period of 31 days. The conditions forecasted by Reclamation for storage in New Melones Reservoir in March 2014, have not been realized, and the storage volume is less than anticipated. Currently (September 29, 2014), the storage volume of New Melones reservoir is 520,010 AF which is 22% of total reservoir storage capacity and 39% of the historical average volume for this date. Reservoir releases from New Melones Reservoir comprise the majority of San Joaquin River flows at Vernalis. Therefore, Reclamation's request to reduce the average monthly flows required by D-1641 at Vernalis for the month of October will reduce the diminishment of water storage in New Melones Reservoir during this period.

The area that will be affected by the proposed modifications to the DOP includes the following geographic locations:

1.) The Sacramento River downstream of Keswick Dam to the Delta,
2.) The waterways of the Delta,
3.) The American River downstream of Nimbus Dam to its confluence with the Sacramento River,
4.) The Stanislaus River downstream of Goodwin Dam to its confluence with the San Joaquin River, and
5.) The San Joaquin River downstream of its confluence with the Stanislaus River to the Delta.

Table 1 identifies the species and life stages that are expected to be present in the area that will be affected by the proposed modifications to the DOP.

Table 1. Listed Species and life stages present in the area that will be affected by the proposed modifications to the DOP.

Species	Status	Life Stage in Action Area
Central Valley spring-run Chinook salmon (*Oncorhynchus tshawytscha*)	FT, ST	Adults, eggs
Sacramento River winter-run Chinook salmon (*O. tshawytscha*)	FE, SE	Eggs, fry
California Central Valley steelhead (*O. mykiss*)	FT	Parr, adults
North American green sturgeon (*Acipenser medirostris*), Southern Distinct Population Segment	FT	Juveniles, sub-adult, adult,

Reclamation has conducted a Biological Review which includes species status updates on the abundance and distribution in WY 2014 of ESA-listed salmonids and sturgeon covered by the NMFS BiOp, and summarizes the generalized effects of project operations, including most of the proposed modifications, on those species. Inherent in the Plan is the objective to meet multiple needs with limited water resources. The proposed modifications to the Plan will have the potential to affect listed species due to changes in tributary flow patterns and Delta exports. NMFS incorporates this document by reference, and supplements it with additional data or analyses, as provided below.

Winter-run Chinook salmon

Sacramento River mainstem: Releases from Keswick Dam into the upper Sacramento River have been approximately 5,000 cfs for the last week of September 2014, and have declined steadily over the past 90 days from over 10,000 cfs, as measured at Keswick Dam (see Figure 1) in July. Daily average water temperatures exceeded the temperature compliance criterion of 56°F for over half of August and from September 3, 2014, to the present at the Clear Creek temperature compliance point on the Sacramento River. Daily variation in the water temperatures at the Clear Creek water quality gauge location was substantial, with the range between minimum and maximum values reaching 10°F by September (see Figure 2). Currently, the remaining winter-run eggs and any emergent alevins still in the gravel will be subjected to warmer interstitial water temperatures than believed optimal for their growth and survival. Warmer water temperatures can lead to increased mortality, deformities, and disease in the exposed eggs and alevins.

In 2014, aerial redd surveys detected all of the 2014 winter-run Chinook salmon redds to be upstream of the 2014 water temperature compliance point at the Clear Creek temperature monitoring station. The first spawning activity was observed at the end of May, 2014, and no new spawning activity has been observed after the August 8, 2014, survey. Winter-run fry are estimated to have begun emerging from their redds by August 13, 2014, from the initial spawning activity observed in May. Winter-run Chinook salmon fry continue to emerge from redds and brood year 2014 fish are starting to be observed in fish monitoring at Red Bluff Diversion Dam. Emergence timing for winter-run was calculated based on water temperatures at the above Clear Creek temperature gauge and the spawning timing from aerial redd surveys. Water temperatures at this location, which is ten miles below Keswick Dam, are very close to those released at Keswick, so they are an accurate approximation of temperatures in the areas of incubating winter-run eggs. Approximately 30% of the alevins are predicted to still be in the gravel at the beginning of October when the water transfers are proposed to begin and will be exposed to this warmer water. The majority of the alevins should have emerged from the gravel by October 18, with expected emergence from all redds by November 7 (Table 2).

The proposed transfer water releases are expected to result in river flows between 3,250 and 6,000 cfs, based on Reclamation's Biological Review, and that these flows will have water temperatures in excess of 56°F due to current reservoir conditions and the status of the remaining cool water pool. Given the temperatures of the reservoir releases, the impacts to winter-run eggs and alevins still in the gravel will be mitigated to the greatest extent practicable through the real time coordination of the fish agencies and the Real Time Drought Operations Management Team to make operational decisions, as described in Reclamation's letter and Biological Review. NMFS expects that this coordination will reduce impacts to a level that is compliant with the incidental take associated with the Plan. The releases of transfer water are not expected to create situations resulting in redd dewatering of winter-run Chinook salmon or create flow pulses that induce downstream migration over the normal levels currently observed.

Table 2. Estimation of winter-run Chinook fry emergence timing in 2014.

Spawned by Date BY 2014 (from aerial surveys)[1]	5-30	6-5	6-12	6-19	6-27	7-2	7-9	7-17	7-25	7-31	8-7	8-22
Fry emerged by date (from Sac R. above Clr Crk H_2O Temps and 1000 ATU (C°)	8-13	8-19	8-26	9-2	9-9	9-14	9-21	9-28	10-5	10-11	10-18	
Redds	7	3	15	1	8	30	26	19	8	7	3	No redds
Proportion of Redds	6%	2%	12%	1%	6%	24%	20%	15%	6%	6%	2%	
Cumulative Redds	7	10	25	26	34	64	90	109	117	124	127	
Cumulative proportion	6%	8%	20%	20%	27%	50%	71%	86%	92%	98%	100%	
Calculations used actual water temperatures through 9-11-14 and daily temps of 14°C after 9-11-14												

[1]Three additional redds were detected after 8/22 with estimated emergence dates of 10/27, 10/31, and 11/7/2014.

Spring-run Chinook salmon

Sacramento River mainstem: The proposed Shasta Reservoir water transfer will augment flows in the Sacramento River between October 1 and November 15. However, based on current data, the temperature of released water will exceed the temperatures required for optimal survival and development of incubating spring-run eggs through this period, due to the reduction of the cold water pool in Shasta Reservoir to maintain downstream water temperatures for incubating winter-run eggs earlier in the season. The increase in released water temperature is not a function of the proposed water transfers, but a condition pertaining to the ongoing drought and the reduction of the cold water pool in Shasta Reservoir to maintain suitable conditions for winter-run Chinook salmon. The proposed transfer water releases are expected to result in river flows between 3,250 and 6,000 cfs based on Reclamation's Biological Review and that these flows will have water temperatures in excess of 56°F due to current reservoir conditions and the status of the remaining cool water pool. Given the temperatures of the reservoir releases, the impacts to spring-run eggs in the gravel will be mitigated to the greatest extent practicable through the real time coordination of the fish agencies and the Real Time Drought Operations Management Team to make operational decisions. NMFS expects that this coordination will reduce impacts to a level that is compliant with the incidental take associated with the Plan.

Delta: Should precipitation events occur during the proposed transfer window which stimulate downstream emigration of yearling spring-run Chinook salmon from their natal tributaries and into the mainstem Sacramento River, the RPA Actions IV.1 and IV.3 are in place to provide protection to these fish during the proposed modifications to the Plan. Since the brood year 2014 spring-run Chinook salmon eggs will still be in the gravel in the upper Sacramento River during the proposed water transfer window, actions in the Delta related to the water transfers are not expected to have any influence or impacts to these fish.

California Central Valley Steelhead

Lower Stanislaus River and San Joaquin River: The proposed reduction in the 31-day average flow at Vernalis occurs during the period when California Central Valley steelhead are migrating

into the system. Ambient water conditions are warmer in the San Joaquin Basin than is considered optimal for the development of eggs in female steelhead. Therefore, since female steelhead are migrating while egg development is still occurring, there is the potential for reduced egg viability due to exposure to warmer water temperatures. However, the proposed modification to the D-1641 San Joaquin River flows at Vernalis is not predicted to result in measureable temperature-related effects to egg viability than would normally occur for adult steelhead migrating through the Delta and lower San Joaquin River system in typical years. Reclamation considered this reduction in egg viability to have low uncertainty since reduced egg viability in female steelhead associated with high water temperatures have not been observed in the San Joaquin River basin. However this has not also been the subject of directed studies in the basin and may be a factor. Based on historical Stanislaus River weir data (2008-2013), it is predicted that on average, adult migration occurring between October 1 and November 15 will account for approximately 20% of WY 2015 total escapement; therefore, the proportion of the migrating population exposed to the reduced Vernalis flows that could experience reduced egg viability or straying is on average 20% (but likely less in consideration of a 31-day average flow at Vernalis during the October 1 through November 15 timeframe). Given that the proposed modifications to the 31-day average flow at Vernalis will not affect the temperature of water releases at New Melones Reservoir or the natural cooling of the water to ambient air temperature in the tributaries and lower San Joaquin River beyond that typically observed, the proposed modification should not result in any discernable effects to water temperature.

Southern DPS of North American Green Sturgeon

Sacramento River mainstem: Within the mainstem of the Sacramento River, the additional flows created by the release of water transfers from Shasta Reservoir are unlikely to alter the behavior of the different life stages of green sturgeon occupying this habitat. Adult green sturgeon that have not already left the basin and travelled down river to the marine environment following spawning, will likely hold in upriver pools until winter precipitation events and cooler water conditions occur. Post-spawn fish may hold for several months in the Sacramento River and out migrate in the fall, or move into and out of the river quickly during the summer months, although the holding behavior is the behavior that is most commonly observed (Heublein *et al.* 2009). Acoustic tagging studies on the Rogue River (Erickson *et al.* 2002) have shown that adult green sturgeon will hold for as much as 6 months in deep (> 16 feet), low gradient reaches or off channel sloughs or coves of the river during summer months when water temperatures were between 59°F and 73.4°F. When ambient temperatures in the river dropped in autumn and early winter (<50°F) and flows increased, fish moved downstream and into the ocean. The release of transfer water is unlikely to move adult fish downriver due to the change in water temperaure in the sections of the Sacramento River occupied by the post-spawn fish. Likewise, juvenile green sturgeon are not likely to be moved down into the Delta by this release of water. Typically, juvenile green sturgeon will drift downriver following after hatching, but then hold in upriver locations during the winter prior to finishing their migration to the Delta. Kynard *et al.*'s (2005) laboratory studies indicated that juvenile fish continued to migrate downstream at night for the first 6 months of life. When ambient water temperatures reached 46.4°F, downstream migrational behavior diminished and holding behavior increased. These data suggest that 9- to 10-month old fish would hold over in their natal rivers during the ensuing winter following hatching, but at a location downstream of their spawning grounds. It is not likely that the

increase in flows related to the transfer water will either reduce the ambient water temeprature sufficently to cause emigration or be of sufficient volume to move fish downriver by behavioral cues.

Delta: It is likely that juvenile (older than 1 year), sub-adults and adults will be in the Delta during the transfer window period. Juvenile and sub-adult fish may occupy the Delta year round and juveniles may spend up to three years rearing in the Delta prior to making the transition to the marine phase of their life history. The projected increase in exports associated with the Proposed Project are within the range of exports normally seen in the Delta over the course of a year and would not be anticipated to create an unusual condition for these fish that would alter their entrainment risk or movements within the Delta waterways that would be uniquely different than those that were assessed in the NMFS BiOp.

Conclusion

Reclamation concluded in its Biological Review, that cumulatively, the extension of the water transfer window until November 15, 2014, the transfer of up to 90,000 AF of water, the reduction in the month-long average of the D-1641 Vernalis flow standard, and implementing the 31-day average between October 1, 2014 and November 15, 2014, will not result in any adverse effects in the action area that were not already within the effects analyzed in the NMFS BiOp.

NMFS supports the general findings and conclusions drawn by Reclamation in its Biological Review, though notes that its effects analyses are, for the most part, considered as single parameters affecting the fish rather than effects acting in concert. It is difficult to assess the cumulative effect of the proposed modifications to the Plan because of the uncertainties described in the analysis, particularly the effects of future weather patterns and the uncertainties regarding air temperature and precipitation events. NMFS supports in general the implementation of the Plan as a reasonable approach to minimize adverse effects to listed species given the constraints of this water year, including the actions proposed to modify the Plan in Reclamation's September 26, 2014 letter. Nevertheless, NMFS is concerned that the current environmental conditions in the Central Valley will create conditions that reduce the level of egg and alevin survival for spring-run Chinook salmon spawning in the upper Sacramento River below Keswick Dam. Close coordination between Reclamation and the fish agencies is required to balance the desire to transfer water and not degrade water temperature and flow conditions for these fish to the greatest extent possible given the overlying environmental conditions. Likewise, environmental conditions in the San Joaquin River basin area also necessitate the same cooperation between agencies to achieve desirable outcomes. As environmental conditions change to provide more hospitable migratory water temperatures, attraction flows and base flows become more critical to migratory success for salmonids, including the listed California Central Valley steelhead in the San Joaquin River basin. NMFS re-emphasizes that Reclamation should continue to work with the fish agencies on a real-time basis to manage the Central Valley operations to meet the needs of listed fish populations to the greatest extent practicable, as well as utilizing the Real Time Drought Operations Management Team to manage the Drought Operations Plan during these trying drought conditions.

Based on Reclamation's Biological Review, supplemented by the additional data or analyses, above, NMFS has determined that the anticipated incidental take associated with the proposed modifications to the drought operations plan, falls within the incidental take statement issued as part of the NMFS BiOp.

We look forward to continued close coordination with you and your staff throughout these extremely challenging drought conditions in WY 2015. If you have any questions regarding this letter, please contact me at will.stelle@noaa.gov, (206) 526-6150, or contact Maria Rea at (916) 930-3600, maria.rea@noaa.gov.

Sincerely,

Maria Rea
for William W. Stelle, Jr.
Regional Administrator

cc: Copy to file 151422SWR2006SA00268

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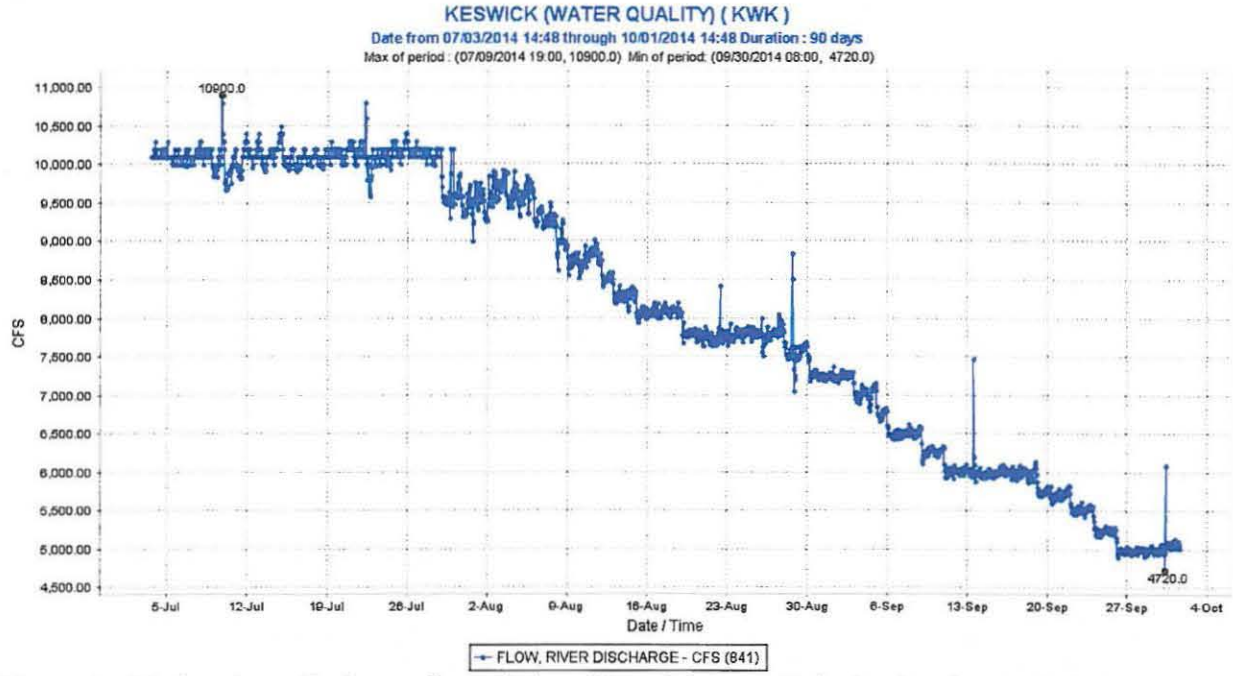

Figure 1. 90-day river discharge flows below Keswick Dam (July 3– October 1, 2014). Available at: http://cdec.water.ca.gov/cgi-progs/staMeta?station_id=KWK.

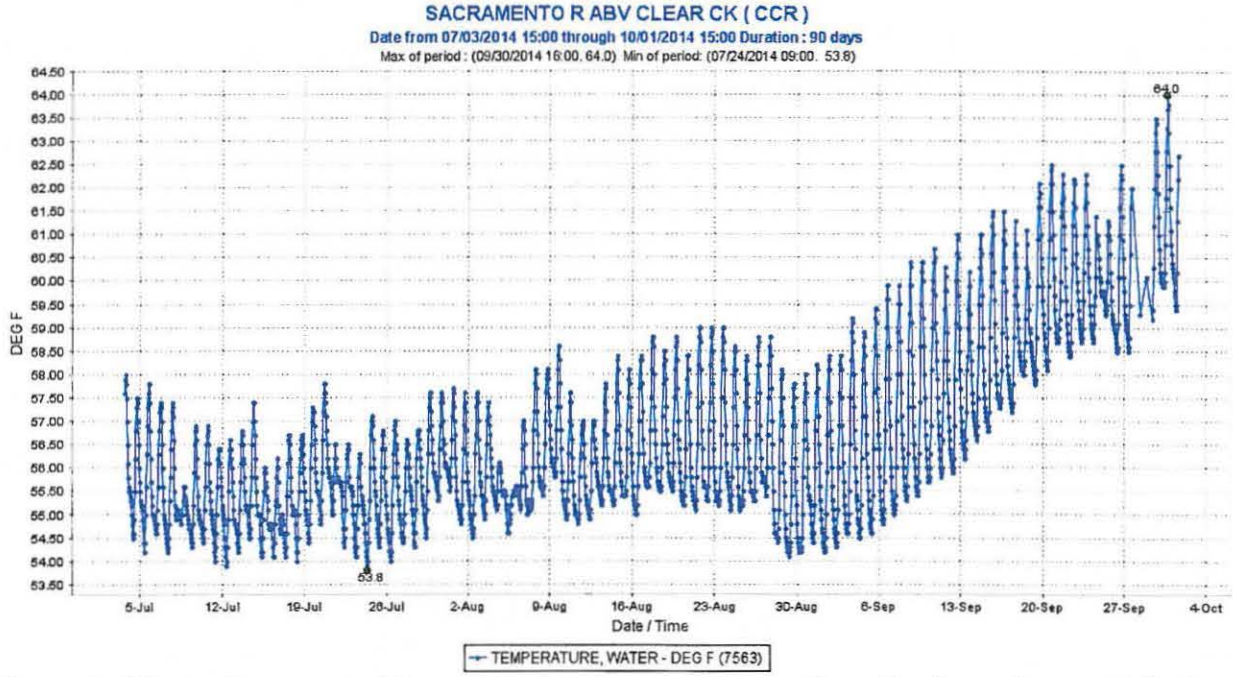

Figure 2. 90-day Sacramento River water temperatures above Clear Creek confluence (July 3 – October 1, 2014). Available at: http://cdec.water.ca.gov/cgi-progs/staMeta?station_id=CCR.