UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
650 Capitol Mall, Suite 5-100
Sacramento, CA 95814-4700

FEB 20 2014

Mr. Paul Fujitani
Acting Operations Manager, Central Valley Project
U.S. Bureau of Reclamation
3310 El Camino Avenue, Suite 300
Sacramento, California 95821

Dear Mr. Fujitani:

Thank you for the opportunity to review the U.S. Bureau of Reclamation's (Reclamation) initial February forecast and water supply allocation for water year 2014. Your February 20, 2014, letter included a partial 90 and 50 percent exceedence forecast, water temperature modeling, and this year's initial water supply allocation. Recognizing the extreme drought conditions in California at this time, the forecasted operations are not yet completely developed. This information is reviewed prior to the first water supply allocation of the year for purposes of compliance with reasonable and prudent alternative (RPA) Action I.2.3 (page 23 of the 2009 RPA with 2011 amendments, http://www.westcoast.fisheries.noaa.gov/publications/Central_Valley/Water%20Operations/Operations,%20Criteria%20and%20Plan/040711_ocap_opinion_2011_amendments.pdf in NOAA's National Marine Fisheries Service's (NMFS) biological opinion (issued June 4, 2009) on the long-term operations of the Central Valley Project (CVP) and State Water Project (CVP/SWP Opinion). The objective of using the February 90 percent exceedence forecast is to use the most conservative forecast as early as possible to protect the cold water pool in Shasta Reservoir so that suitable spawning habitat can be maintained in the Sacramento River during the summer and fall seasons for federally listed endangered Sacramento River winter-run Chinook salmon (*Oncorhynchus tshawytscha*), and threatened Central Valley spring-run Chinook salmon (*O. tshawytscha*).

NMFS has reviewed Reclamation's preliminary CVP operations forecasts (enclosure 1) and corresponding water temperature model runs (enclosure 2) for the Sacramento River, based on the latest reservoir profiles, inflows, and snow surveys. The forecast is based on estimated runoff within the Sacramento River basin as of February 1, 2014. The Sacramento River Valley Index is classified as a Critical water year type, with the forecasted inflow to Shasta Lake at 1.98 million acre-feet (MAF) under a 90 percent exceedence forecast, and 2.57 MAF under a 50 percent exceedence forecast. The projected end-of-September (EOS) carryover storage in Shasta Reservoir is forecasted to range between 150 and 690 thousand acre-feet (TAF) in the 90 percent exceedence forecast (*i.e.*, most conservative forecast). The projected EOS storage in the 50 percent exceedence forecast is 1.155 MAF. However, inflows into Shasta Lake are currently tracking more conservative than the 90 percent forecast due to an exceptionally dry January and February. Therefore, the current conditions are actually worse than the forecast. The resulting

water temperature model runs based on the 90 percent forecast indicate that a Clear Creek compliance point may not be achievable throughout the winter-run and spring-run Chinook salmon spawning and incubation period (*i.e.*, May 15 through October 31). Based on the projected EOS storage in Shasta Reservoir below 1.9 MAF and temperature model runs, NMFS agrees with Reclamation that RPA Action I.2.3.C should be implemented this year.

In this type of drought year, the CVP/SWP Opinion, RPA Action I.2.3.C requires that a contingency plan be developed by March 1st. Reclamation and the California Department of Water Resources (DWR) have already taken initial steps by submitting a Temporary Urgency Change (TUC) Petition to the State Water Resources Control Board (SWRCB) on January 29, 2014. In a January 31, 2014, response letter (http://www.westcoast.fisheries.noaa.gov/publications/Central_Valley/Water%20Operations/20140131_nmfs_contingency_plan_response_letter_with_enclosures.pdf), NMFS concurred that the TUC Petition, as modified by more specific Delta Cross Channel Gate closure criteria, was consistent with RPA Action 1.2.3.C and meets the specified criteria for a drought contingency plan.

Reclamation's initial water supply allocations based on the 90 percent exceedence forecast include the following: 0 percent to North of Delta (NOD) agricultural water service contractors, 40-75 percent to NOD refuges, 40-75 percent to Water Rights Settlement Contractors, 40-75 percent to Water Rights Exchange Contractors, 0 percent to South of Delta (SOD) agricultural contractors, and 40-75 percent to SOD refuges.

In order to balance the need to conserve storage for temperature requirements this summer with water quality requirements in the Delta, Keswick releases were reduced to the minimum allowed [3,250 cubic feet second (cfs)] for most of the time period from December through March. The California Department of Fish and Wildlife (CDFW), the U.S. Fish and Wildlife Service (USFWS), SWRCB, Reclamation, and DWR are working in coordination with NMFS to develop an interim contingency plan to submit to NMFS by March 1, and a final contingency plan scheduled to be completed by April 1, that protects both ESA-listed fish species and provides water to downstream water rights holders during the drought. This information and additional measures to conserve storage are being discussed in several forums (*i.e.,* Real Time Drought Operations Team, Sacramento River Temperature Task Group, B2 Interagency Team, and a special Winter-run Interagency Team). NMFS concurs with Reclamation's draft February forecast and initial water supply allocation, which calls for a final contingency plan by April 1st, and considers this action to be consistent with the RPA requirements.

In order to protect sensitive Chinook salmon life-stages (*i.e.*, egg and pre-emergent fry) the CVP/SWP Opinion requires that Reclamation implement RPA Action I.2.3.C. NMFS is requesting that the Sacramento River Temperature Task Group meet earlier than normal, in March, to discuss management of cold water releases in April. Additional monitoring or temperature modeling may be necessary this year to wisely use the cold water resources available. NMFS will re-assess any changes in operations based on additional temperature model runs in March.

Thank you for the recent discussions with your staff in meeting the initial 2014 February forecast requirements in the CVP/SWP Opinion. I look forward to further communication between our agencies to fully meet the requirements provided in RPA Action I.2.3.C of the CVP/SWP Opinion. If you have any questions regarding this letter, please feel free to contact me, or have your staff contact Mr. Bruce Oppenheim at (916) 930-3603, or via e-mail at bruce.oppenheim@noaa.gov.

Sincerely,

Maria C. Rea
Assistant Regional Administrator
California Central Valley Area Office

Enclosure 1: 90 and 50 percent operations forecast, 2 pages
Enclosure 2: Upper Sacramento River – February 2014 Preliminary Temperature Analysis, 5 pages

cc: Copy to file – ARN 151422SWR2006SA00268
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February Operations Analysis
50% Exceedence Hydrology

	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Reservoir Storage (TAF)								
Trinity	1187	1257	1302	1178	993	818	636	457
Shasta	1795	1942	1993	1995	1770	1462	1221	1155
Foisom	290	405	419	454	367	326	285	281
New Melor	1055	1054	994	891	774	656	539	452
Reservoir Release (cfs)								
Lewistion	300	300	600	1498	782	450	450	450
Keswick	3500	3250	5000	6250	9250	9923	8723	6000
Nimbus	500	500	1630	686	2149	1232	1250	500
Goodwin	214	245	480	410	536	364	368	240
Exports (TAF)								
Jones PP	125	100	45	46	45	70	115	235

February Operations Analysis
90% Exceedence Hydrology

	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Reservoir Storage (TAF)								
Trinity	1148	1150	1111	963	795	639	484	334
Shasta	1678	1703	1566 to 1625	1326 to 1462	948 to 1244	442 to 928	194 to 707	150 to 690
Folsom	290	310	312 to 315	316 to 321	273 to 302	210 to 273	174 to 254	127 to 235
New Melones	1051	1026	962	876	782	875	569	491
Reservoir Release (cfs)								
Lewistion	300	300	600	1498	782	450	450	450
Keswick	3250	3250	5900 to 4900	7850 to 6600	10600 to 7900	12000 to 8889	7595 to 7095	4501 to 4000
Nimbus	500	500	500	534 to 500	908 to 500	1054 to 500	798 to 500	973 to 500
Goodwin	214	268	480	410	561	396	352	240
Exports (TAF)								
Jones PP	55	45	45	46	45	45	63 to 45	153 to 45

February 19, 2014

Upper Sacramento River – February 2014 Preliminary Temperature Analysis

Summary of Temperature Target Results by Month

Initial Target Location	JUN	JUL	AUG	SEP	OCT
90%-Exceedance Outlook (Figure 1)					
Sac. R. above Clear Creek (CCR)	**CCR**	**CCR**	**Keswick** ~ 56°F to 62°F		
50%-Exceedance Outlook (Figure 2)					
Sac. R. above Clear Creek (CCR)	**CCR**	**CCR**	**CCR**	**Keswick** ~ 56°F to 57°F	

Temperature Model Inputs, Assumptions, Limitations and Uncertainty:

1. Operation is based on the February 2014 Operation Outlooks (monthly flows, reservoir release, and end-of-month reservoir storage) for the 90% and 50% exceedances.
2. The profiles used for Shasta, Trinity and Whiskeytown were taken on February 5, February 17 (2010), and February 11, respectively.
3. Guidance on forecasted flows from the creeks (e.g., Cow, Cottonwood, Battle, etc.) between Keswick Dam and Bend Bridge is not available beyond 5 days. Model input side flows (Cottonwood Cr & Bend Bridge local flow w/o Cottonwood Cr) were selected from the historical record, and are consistent with the forecast exceedance frequency. During spring, the relatively warm creek flows can be a significant percentage of the flows at Bend Bridge.
4. Although mean daily flows and releases are temperature model inputs, they are based on the mean monthly values from the operation outlooks. Mean daily flow patterns are user defined.
5. Cottonwood Creek flows, Keswick to Bend Bridge local flows, and diversions are mean daily synthesized flows based on the available historical record for a 1922-2002 study period.
6. Meteorological inputs were derived from a database of 86 years of meteorological data (1920-2005). The meteorological inputs in the model represent "Average" meteorological conditions.
7. Meteorology, as well as flow volume and pattern, significantly influences reservoir inflow temperatures and downstream tributary temperatures; and consequently, the development of the cold-water pool during winter and early spring.

Temperature Analysis Results:

Note that for all exceedances, Lake Shasta storage is too low to utilize the upper gates of the TCD. This TCD limitation, along with the relatively small cold-water pool volume, significantly impacts temperature management.

90%-Exceedance:
A temperature target location at Clear Creek is possible through July (Figure 1). By August, the TCD intake level will be through the side gates. Shasta Dam release temperature is expected to exceed 56˚F by mid-August, nearing 62˚F by mid-September.

50%-Exceedance:
A temperature target location at Clear Creek is possible through mid-September (Figure 2). By September, the TCD intake will be through the side gates. Shasta Dam release temperature is expected to exceed 56˚F by early October.

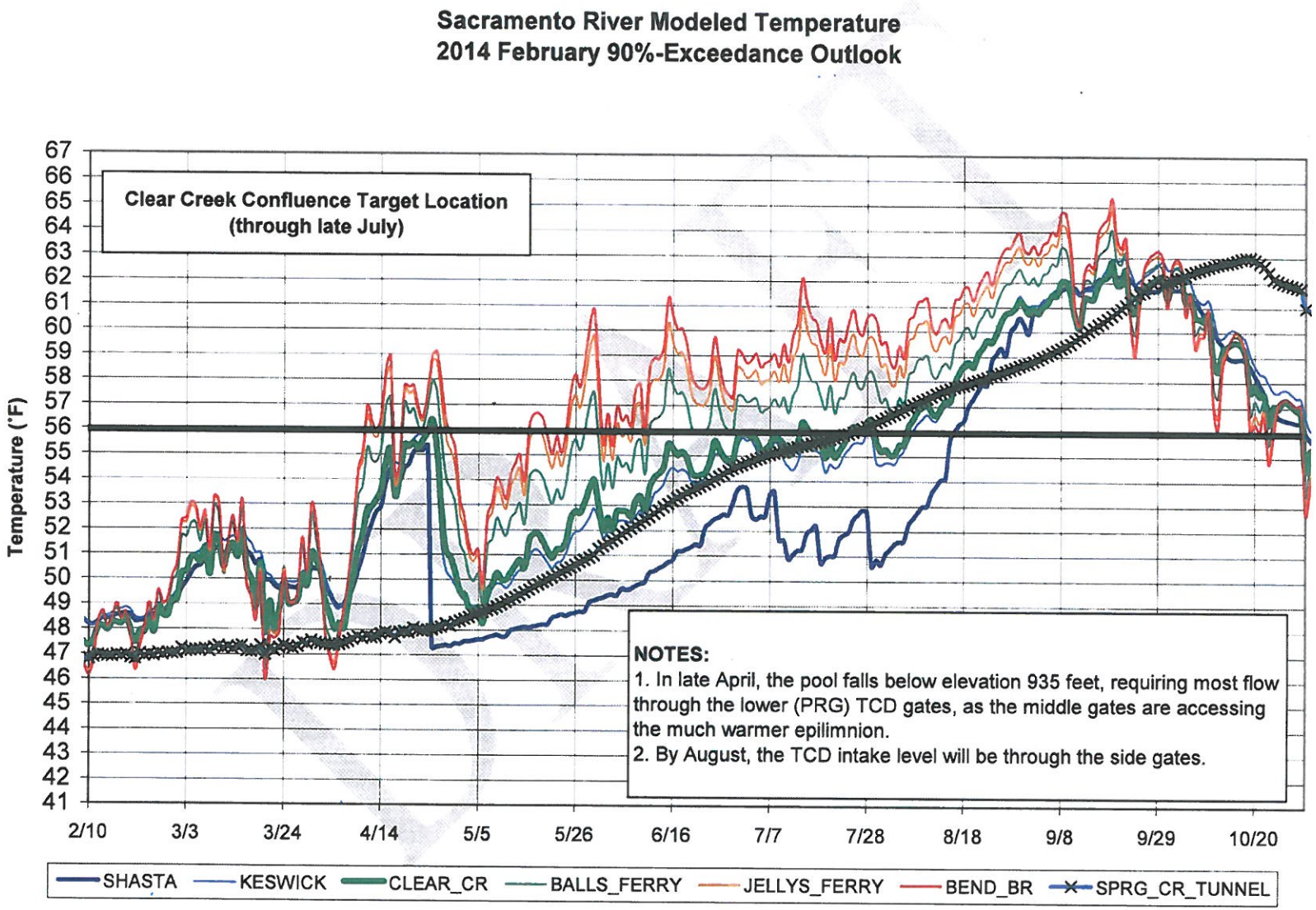
Sacramento River Modeled Temperature
2014 February 90%-Exceedance Outlook
Clear Creek Confluence Target Location
(through late July)
Temperature (°F)
67
66
65
64
63
62
61
60
59
58
57
56
55
54
53
52
51
50
49
48
47
46
45
44
43
42
41
2/10
3/3
3/24
4/14
5/5
5/26
6/16
7/7
7/28
8/18
9/8
9/29
10/20
NOTES:
1. In late April, the pool falls below elevation 935 feet, requiring most flow through the lower (PRG) TCD gates, as the middle gates are accessing the much warmer epilimnion.
2. By August, the TCD intake level will be through the side gates.
SHASTA
KESWICK
CLEAR_CR
BALLS_FERRY
JELLYS_FERRY
BEND_BR
SPRG_CR_TUNNEL

Figure 1

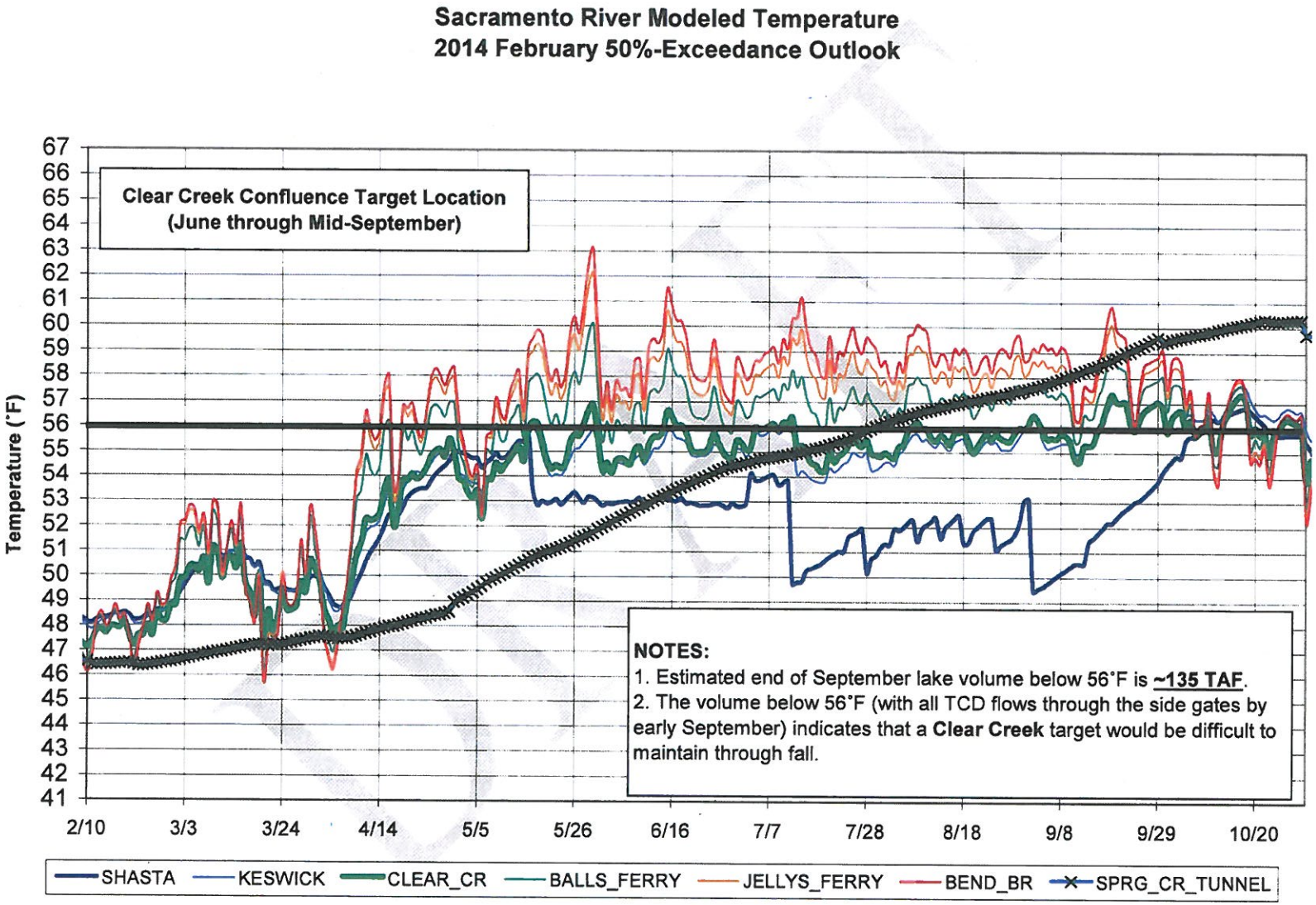
Sacramento River Modeled Temperature
2014 February 50%-Exceedance Outlook
Clear Creek Confluence Target Location
(June through Mid-September)
Temperature (°F)
67
66
65
64
63
62
61
60
59
58
57
56
55
54
53
52
51
50
49
48
47
46
45
44
43
42
41
2/10
3/3
3/24
4/14
5/5
5/26
6/16
7/7
7/28
8/18
9/8
9/29
10/20
NOTES:
1. Estimated end of September lake volume below 56°F is ~135 TAF.
2. The volume below 56°F (with all TCD flows through the side gates by early September) indicates that a Clear Creek target would be difficult to maintain through fall.
SHASTA
KESWICK
CLEAR_CR
BALLS_FERRY
JELLYS_FERRY
BEND_BR
SPRG_CR_TUNNEL

Figure 2

Model Performance and Fall Temperature Index:

1. Based on past analyses, the temperature model does not perform well from late September through fall. One factor is that the modeled release temperatures are cooler than has historically been achieved when all release is through the side gates (lowest gates), especially when there's a large temperature gradient between the pressure relief gates (PRG) and the side gates.
2. Based on historical records, the end-of-September Lake Shasta volume below 56°F is a reasonable indicator of fall water temperature in the river reach to Balls Ferry.
3. For river temperatures not to exceed 56 °F downstream to Balls Ferry, the end-of-September lake volume less than 56°F should be greater than about 650 TAF, see figure below: