



United States Department of the Interior

BUREAU OF RECLAMATION
Mid-Pacific Region
Bay-Delta Office
801 I Street, Suite 140
Sacramento, CA 95814-2536

IN REPLY REFER TO:

BDO-100
ENV-7.00

MAR 14 2014

Ms. Maria Rea
Assistant Regional Administrator
California Central Valley Area Office
National Marine Fisheries Service
650 Capitol Mall, Suite 5-100
Sacramento, CA 95814

Subject: Interim Contingency Plan for March Pursuant to Reasonable and Prudent Alternative (RPA) Action I.2.3.C of the 2009 Coordinated Long-term Operation of the Central Valley Project (CVP) and State Water Project (SWP) Biological Opinion (2009 BiOp)

Dear Ms. Rea:

Maria

The Bureau of Reclamation and the Department of Water Resources (DWR) prepared a Temporary Urgency Change (TUC) Petition which served as a drought contingency plan for the months of February and March, consistent with the drought exception procedures outlined in the 2009 BiOp reasonable and prudent alternative (RPA) Action I.2.3.C. Reclamation and DWR propose to adjust the drought contingency plan through the end of March. Additionally, Reclamation and DWR propose to modify the implementation of RPA Action IV.2.3 in the 2009 BiOp, necessary as a result of the current drought. Reclamation is seeking concurrence from the National Marine Fisheries Service (NMFS) that these drought response actions proposed by Reclamation and DWR for the remainder of March are within the limits of the Incidental Take Statement (ITS) of the 2009 BiOp. Additionally, because these actions are in compliance with the drought exception procedures described in the 2009 BiOp, these actions do not jeopardize species or adversely modify or destroy designated critical habitats addressed in the 2009 BiOp.

The water situation in California continues to be dire. As a result of this continued aridity, CVP and SWP reservoir levels are forecast to be significantly below historic conditions. In response to this water shortage crisis, Reclamation and DWR have, since January, been coordinating closely with your office, the U.S. Fish and Wildlife Service (Service), and the State Water Resources Control Board (State Board). This coordination has resulted in a TUC Order from the State Board dated January 29, 2014, with subsequent modifications on both February 7, 2014, and February 28, 2014. Additionally, this coordination resulted in correspondence between Reclamation and NMFS, and Reclamation and the Service, acknowledging compliance with section 7 of the Endangered Species Act.

The TUC Order currently allows Reclamation and DWR to conserve additional water in the Project reservoirs for protection of aquatic species, water quality, and water deliveries by modifying Table 3 of D-1641 such that Delta Outflow may be no less than 3,000 cubic feet per second (cfs). In addition to the above modification to Table 3, Reclamation and DWR are requesting that the State Board further modify its Order to also allow for the following:

For the remainder of March 2014, Table 3 of D-1641 will be further modified to allow for compliance with the Delta Outflow objective through a 7,100 cfs outflow on a 3-day average and/or X2 position at Collinsville. Project diversions from Old River for periods when Delta Outflow is at or above 7,100 will continue to conform to existing Biological Opinions and the D-1641 Export to Inflow Ratio. The Delta Cross Channel (DCC) Gates will remain closed when outflow is at or above 7,100. For lower outflows, the current DCC opening protocol recommended by the fishery agencies will be followed.

In addition to the above changes in outflow, and in an attempt to capture additional natural flow in the Delta available because of recent storm events, Reclamation and DWR are proposing to adjust implementation of RPA Action IV.2.3 in the salmonid BiOp for the next 7 days. This RPA action provides Old and Middle River (OMR) flow limits of no more negative than -5,000 cfs using a 14-day running average under current conditions. The action similarly provides that a 5-day running average flow shall be calculated and be no more than 25 percent more negative than the targeted requirement flow for the 14-day average flow. Reclamation and DWR propose to operate in a manner to capture additional natural flow available in the Delta that is anticipated to result in up to 7 days of OMR flows between -5,000 cfs, and -6,000 cfs. Reclamation and DWR would be operating to OMRs more positive than -5,000 cfs for 10 days to the end of the month. The first and second stage salvage-based triggers prescribed by the NMFS 2009 BiOp RPA Action IV.2.3 remain in effect.

The exigency of the extended drought, and the lack of anticipated precipitation in the forecast, necessitates the prudent decision to take advantage of the rise in natural flow over the next several days. Prior to recommending this action, however, Reclamation and DWR completed a biological review (attached) that examines the effects of these two drought actions (D1641 compliance point modification and OMR negative flow adjustment) to winter-run and spring-run Chinook salmon, steelhead, and green sturgeon. While our analysis found that these measures are likely to result in additional adverse effects to the species, however unquantifiable, any effects will be minimized through the projected operations starting March 20 – March 31 that are expected to result in less negative OMRs than -5,000 cfs and the continued implementation of first and second stage density triggers included in RPA Action IV.2.3.

The enclosed biological review supports the conclusion that modifications to the existing State Board TUC Order and additional drought response actions proposed by Reclamation and DWR for the remainder of March, are consistent with the drought exception procedures of the 2009 BiOp. The analysis further shows that any incidental take resulting from these changes are within the limits of the existing incidental take limits in the 2009 BiOp. Because these actions are in compliance with the drought exception procedures described in the 2009 BiOp, they do not jeopardize species or adversely modify or destroy designated critical habitat addressed in the

2009 BiOp. In the Order dated April 9, 2013, the District Court indicated that “any ‘modifications’ to the RPAs must be made consistent with procedures required by law.” (See *Consolidated Salmonid Cases* 1:09-cv-01053 LJO BAM). These adjustments and the process we have followed to document and analyze the adjustments are consistent with the court’s directive. As such, these adjustments and the process we have followed to document and analyze the adjustments are consistent with law.

Reclamation and DWR will continue close coordination on current and projected operations on a weekly basis through existing meetings (Delta Operations for Salmonids and Sturgeon, Delta Conditions Team, Water Operations Management Team, etc.). Additionally, DWR and Reclamation will continue to host the Real-Time Drought Operations Management Team as provided in the last order.

We look forward to working with you and your staff as we navigate through this extremely challenging water year and appreciate your willingness to work with us on this time sensitive matter.

Sincerely,



Susan M. Fry
Area Manager, Bay-Delta Office

Enclosures – 1

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Status of Species

The status of species during the fall and early winter of water year 2014 was described in supplemental information attached to the February Temporary Urgency Change (TUC) Petition’s Endangered Species Act compliance materials (Reclamation 2014). Changes to the status of the species are updated again to identify potential exposure in the Sacramento River and Delta experienced by salmonids and green sturgeon under the proposed drought operational changes during the remainder of March.

Winter-run Chinook salmon

During weekly DOSS calls, the topic of the position of Winter-run Chinook salmon has been discussed. There has been agreement that at least 75% of the 2013 brood-year juvenile population of Winter-run Chinook have entered the Delta as of March 10. This is supported by monitoring at Red Bluff Diversion Dam (RBDD) and Glen-Colusa Irrigation District (GCID) intake canal on the upper Sacramento River, which suggests most of the 2013 brood year has migrated past these locations (Figure 1-2), monitoring at Tisdale Weir, on the Middle Sacramento River, and Knights Landing, in the Lower Sacramento River, where more juvenile Winter-run Chinook have been observed in February and early March than in the prior four months of water year 2014 (Figure 3-4), and recovery of juvenile Winter-run Chinook salmon in the lower Sacramento River and Delta beach seine and trawl fish monitoring surveys. At these lower Sacramento and Delta fish monitoring locations, the vast majority of the cumulative catch reported in Table 1 for WY 2014 occurred in February and March 2014.

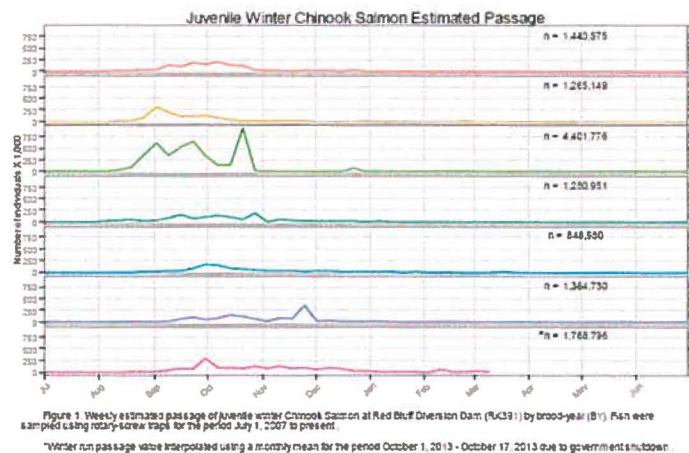


Figure 1. Red Bluff Diversion Dam Rotary Screw Trap older juvenile Chinook salmon catch data and associated environmental data.¹

¹ Figure supplied by DWR to DOSS on March 12 2014.

Salmonid and Green Sturgeon Supporting Information for Endangered Species Act Compliance Regarding Delta Water Quality

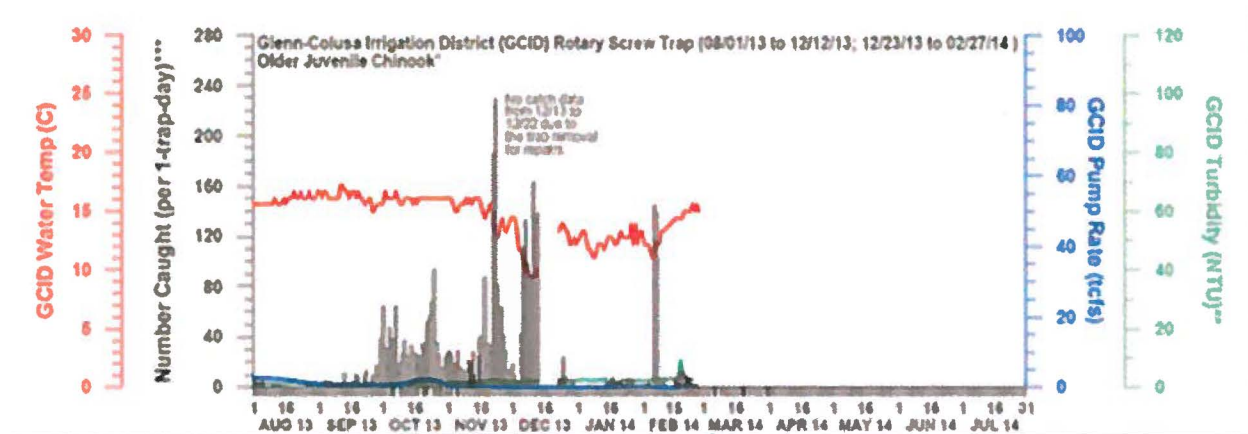


Figure 2. Glen-Colusa Irrigation District Rotary Screw Trap older juvenile Chinook salmon catch data and associated environmental data.²

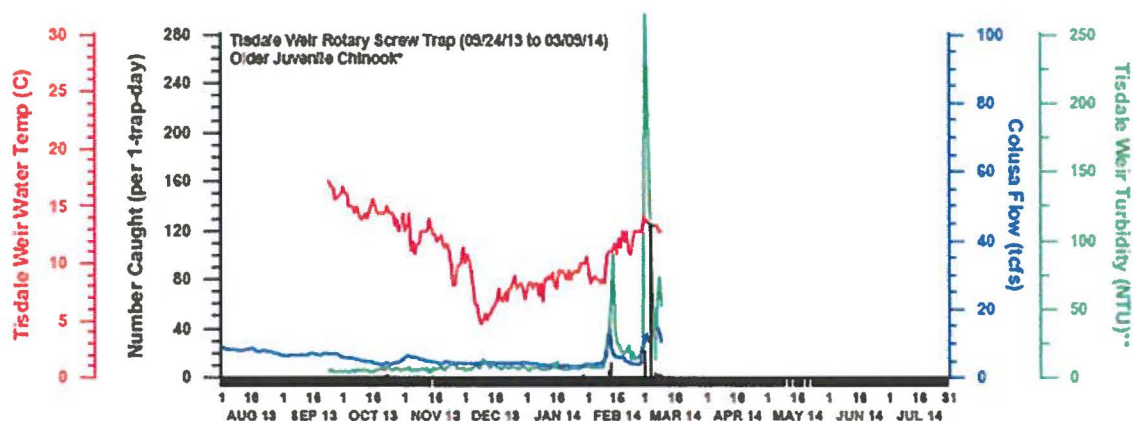
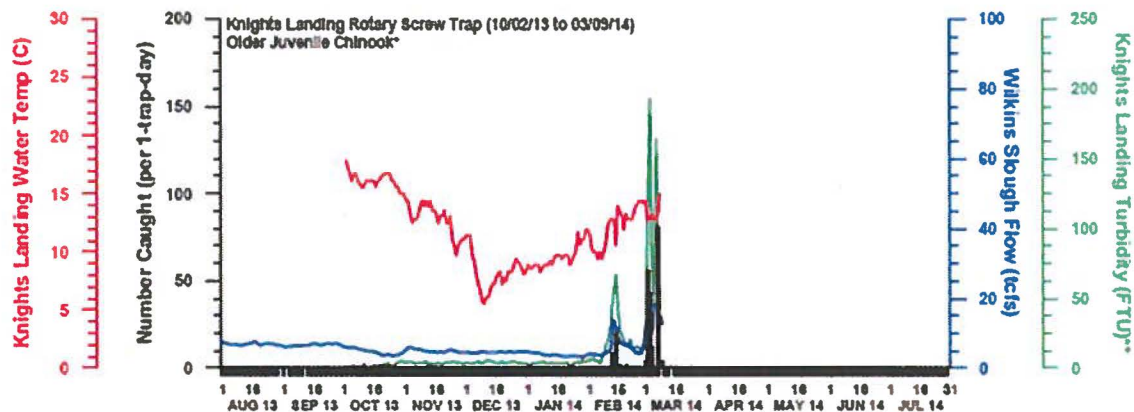


Figure 3. Tisdale Weir older juvenile Chinook salmon catch data, which include Winter-run Chinook and yearling Spring-run Chinook salmon, and associated environmental data.³



² Figure supplied by DWR to DOSS on March 12 2014.

³ Figure supplied by DWR to DOSS on March 12 2014.

Figure 4. Knights Landing older juvenile Chinook salmon catch data, which include Winter-run Chinook and yearling Spring-run Chinook salmon, and associated environmental data.⁴

Typically, fry and parr that cannot sustain territories in river flows out migrate past Knights Landing and into the Lower Sacramento River when late fall/early winter Sacramento Valley rainstorms increase flows to greater than 7,500 cfs at Wilkins Slough. Flows associated with the storms during February and March exceeded this level and subsequently exceeded the 14,125 cfs, which exceeded flow volumes identified to initiate juvenile Winter-run migration past Knights Landing (Del Rosario et al 2013; Figure 5). During WY 2014, an expanded salvage of 46.5 natural origin Winter-run sized Chinook salmon have been estimated at the federal fish collection facility at the South Delta CVP export pumps and 26 natural origin juvenile Winter-run sized juvenile Chinook were estimated at the state fish collection facility at the South Delta SWP export pumps through March 11. All of these fish were recovered over the past eight days (since March 3rd). One hatchery Winter-run sized juvenile Chinook has been salvage, but in fact was from the second Late-Fall production release group, and was not a hatchery origin Winter-run.

On the weekly DOSS calls, the topic of the proportion of the population of Winter-run Chinook salmon that has exited the Delta has also been discussed. There has been agreement that less than 10% of the juvenile Winter-run Chinook salmon have passed Chipps Island and exited the Delta region. Twenty-two Winter-run sized, and one hatchery origin Chinook salmon have been observed in the Chipps Island trawl, which is considered the exit point for the Delta (Figure 6). This evidence suggests that a majority of the 2013 brood-year juvenile population of Winter-run Chinook are currently residing in the Delta as of March 10, with a small proportion remaining in the middle Sacramento River and a small proportion having exited the Delta.

During March, adult Winter-run Chinook salmon will continue entering the Sacramento River and migrating to the upper reaches of the Sacramento River in preparation for spawning during

⁴ Figure supplied by DWR to DOSS on March 12 2014.

the summer of 2014.

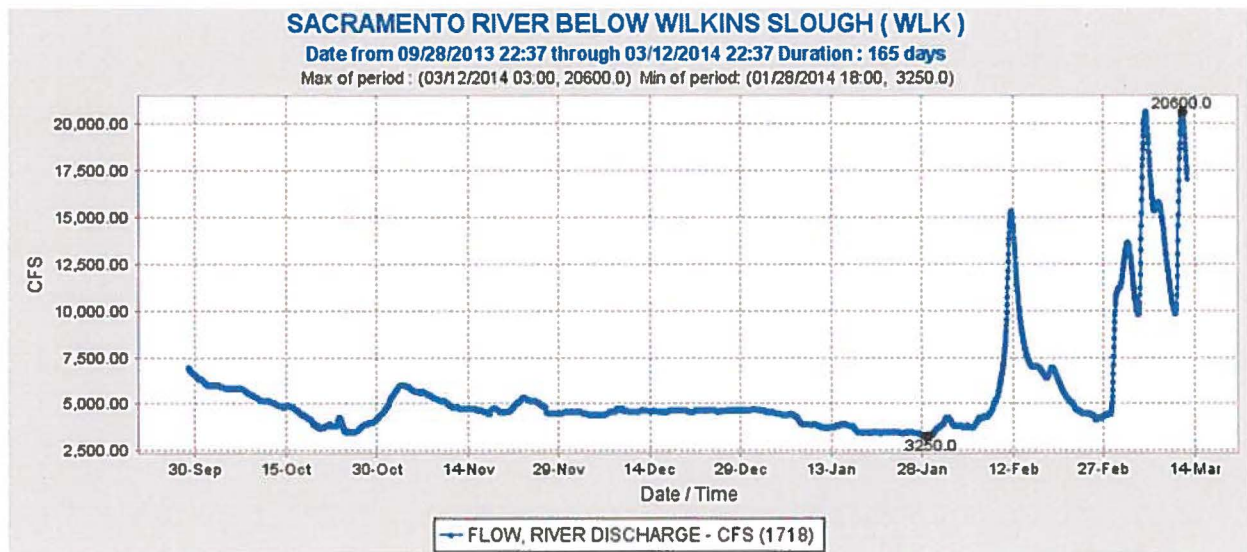


Figure 5. Sacramento River discharge (cubic feet per second) measured at Wilkins Slough during water year 2014.⁵

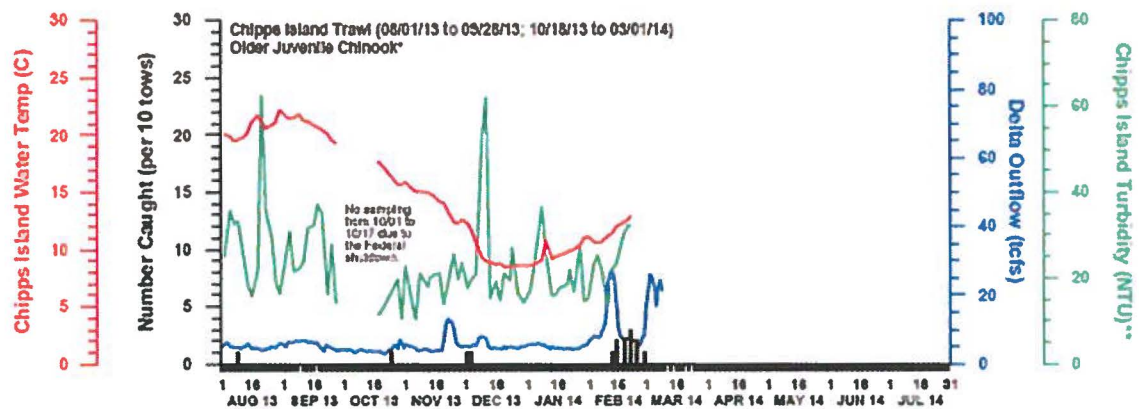


Figure 6. Chippes Island Trawl older juvenile Chinook salmon catch data, which include Winter- run Chinook and yearling Spring-run Chinook salmon, and associated environmental data.⁶

⁵ Downloaded from CDEC on March 12, 2014

⁶ Figure supplied by DWR to DOSS on March 12 2014.

*Salmonid and Green Sturgeon Supporting Information for Endangered Species Act Compliance
Regarding Delta Water Quality*

Seine region	Wild juveniles				Ad clipped			Region Total
	Fall	Late Fall	Spring	Winter	Steelhead	Steelhead	Chinook	
Bay East	0	0	0	0		0	0	0
Bay West	0	0	0	0	0	0	0	0
Central Delta	195	0	1	0	1	1	0	198
Lower Sac	466	0	5	0	0	0	0	471
North Delta	1550	1	3	3		0	2	1559
*Sacramento	27,144	0	86	67	0	40	4	27341
South Delta	0	0	0	0	0	0	0	0
San Joaquin	0	0	0	0	0	0	0	0
Trawl								0
Chippis	0	5	3	31	3	42	38	122
Sacramento	21089	0	102	60	5	261	33	21550
Species Total	50444	6	200	161	9	344	77	
*Includes lower Sac & Sacramento, and N.Delta & Sac. Sites from FWS metadata.								

Table 1. Lower Sacramento River and Delta beach seine recoveries of salmonids during WY 2014.⁷

⁷ Trawl and beach seine data updated through March 10, 2014. Provided by USFWS Delta Juvenile Fish Monitoring Program.

Spring-run Chinook salmon

Similar to February, thousands of Spring-run Chinook salmon juveniles continue to be observed weekly in fish monitoring at Red Bluff Diversion Dam (Figure 7). Also in February, a pulse of juvenile Spring-run Chinook was observed during the month's early storm event. From February 1 through February 27, 310 young-of-year Spring-run Chinook salmon were observed in the rotary screw trap sampling station at the GCID intake canal, and trapping ended there on February 27th. This level of recovery is equal to the number of young-of-year Spring-run Chinook salmon observed at GCID over the previous four months of water year 2014. At the Tisdale Weir and Knights Landing fish monitoring stations, greater catches of older juvenile Chinook salmon, which would include yearling Spring-run Chinook salmon, were observed during the February and March storms than had been observed prior to the storms (Figure 3-4). Similar to February, Spring-run Chinook salmon from Butte Creek, and the Feather and Yuba rivers are outmigrating into the Delta during March. During February, Spring-run Chinook salmon have been observed in the lower Sacramento and Delta beach seine and trawl fish monitoring surveys in addition to being observed exiting at Chipps Island (Table 1), but not at the state and federal fish collection facilities at the South Delta CVP/SWP export pumps. On the weekly DOSS calls, the topic of the proportion of the population of Spring-run Chinook salmon that have entered the Delta has been discussed. DOSS participants agreed at least 75% of the yearling Spring-run Chinook salmon have entered the Delta and approximately 10% have exited the Delta past Chipps Island. This is similar to Winter-run Chinook salmon. Regarding young-of-year Spring-run Chinook salmon, DOSS participants agreed approximately 25% have entered the Delta with less than 5% having exited the Delta past Chipps Island.

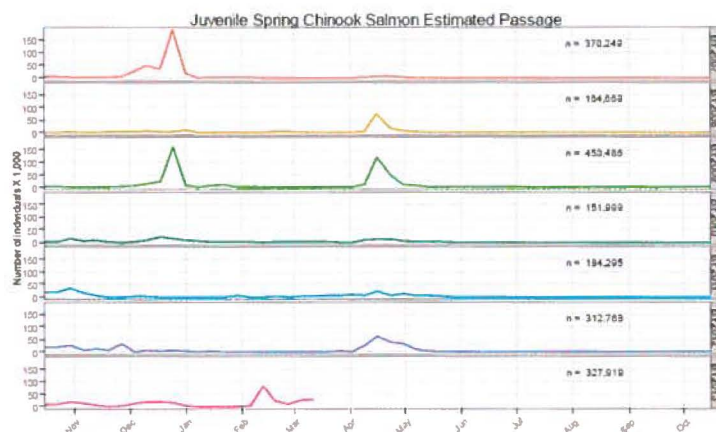


Figure 7. Weekly estimated passage of juvenile Spring Chinook Salmon at Red Bluff Diversion Dam (RK391) by brood-year (BY). Fish were sampled using rotary-screw traps for the period October 15, 2007 to present.

Figure 7. Weekly Estimated Passage of Juvenile Spring-Run Chinook salmon at Red Bluff Diversion Dam (RK 391) by Brood-Year (BY).⁸

⁸ Fish were sampled using rotary-screw traps for the period July 1, 2007 to present. Figure supplied by USFWS (March 12, 2014).

Steelhead

Steelhead smolts are seldom recovered in Sacramento River and Delta fish monitoring due to sampling biases related to their larger fish size and their enhanced swimming ability. During February, five wild steelhead were observed in GCID fish monitoring before trapping efforts ended there on February 27th. In combination with the eight steelhead captured at GCID in October, one in December, and two in January; the total recovery of wild steelhead at GCID in WY 2014 is 16 individuals. At the Tisdale Weir and Knights Landing monitoring stations, no steelhead were observed prior to the February storm, but 144 hatchery and 25 wild steelhead smolts have been observed since then. Between 1998 and 2011, temporal observations of wild steelhead juveniles (n=2137) collected in these monitoring efforts in the Delta occurs less than 10% of the time in January, >30% of the time during February, >30% of the time during February, and >20% of the time during March. Prior to February, one steelhead was observed in the Sacramento Trawl (one 210mm fish on 01/31/14) and one steelhead was observed in the Chipps Island Trawl (one 300mm fish on 12/11/13). As of March 10, 9 wild steelhead (5 in Sacramento trawl, 3 in Chipps trawl) and 303 adipose-clipped steelhead (261 in Sacramento trawl, 42 in Chipps trawl) have been recovered. As of March 12, an expanded salvage of 55 natural origin and 97.5 clipped steelhead have been counted at the state and federal fish collection facilities at the South Delta CVP/SWP export pumps. As of March 10, 1 outmigrating steelhead has been observed in the Mossdale trawl this water year.

Green sturgeon

Information on green sturgeon is extremely limited and their recovery in monitoring is limited due to their low vulnerability to monitoring techniques. Adult green sturgeon are expected to start their 2014 spawning migration during March. On February 9, one juvenile green sturgeon (212mm TL) was recovered in Red Bluff Diversion Dam fish monitoring. As of March 10, no green sturgeon were observed in lower Sacramento and Delta fish monitoring surveys or at the state and federal fish collection facilities at the South Delta CVP/SWP export pumps. It is expected that brood year 2013 juvenile green sturgeon have migrated downstream from their natal spawning areas and are overwintering in the Lower Sacramento River and Delta (Israel and Klimley 2009).

Proposed Action

Forecasted March North Delta Outflow and Old and Middle River Indices

Under the proposed action, the Net Delta Outflow Index (NDOI) would be estimated based on a 3-day average period instead of a calculation method in the current TUC Order. The change would result in the outflow index being less than the 3-day average of 7,100 cfs approximately two days earlier than under the existing D-1641 daily outflow objective of 11,400 cfs. The proposed action will cause OMR flows to range between approximately -5,000 and -6,250 cfs for approximately seven days (Table 2), which is an adjustment from the Action IV.2.3 objective of

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the 14-day average not exceeding -5,000 cfs, and thus the NDOI drops below 7,100 cfs sooner. Following deviation of OMR flow management objectives, the proposed action is anticipated to include more positive OMR flows during the remainder of the month. The proposed action's monthly average daily OMR flow is projected not to be more negative than -4,000 cfs. Under the proposed action, the 14-day average flows are projected to range from -5836 and -1944 cfs. These effects to outflow and Old and Middle River flows is based on the forecasted remainder-of-March operations and may not hold if operations deviate from these projections.

Date	Projected Without Proposed Action					Projected With Proposed Action				
	Combined pumping	NDOI	Old and Middle River Flow		QWEST	Combined pumping	NDOI	Old and Middle River Flow		QWEST
			Daily Index	14-d Average				Daily Index	14-d Average	
24-Feb-14	1494	6614	-1250	-3526	635	43188	6614	-1250	-3526	635
25-Feb-14	1494	6366	-1258	-3372	526	43189	6366	-1258	-3372	526
26-Feb-14	1498	5885	-1249	-3174	498	43194	5885	-1249	-3174	498
27-Feb-14	1498	6374	-1251	-2921	1855	43195	6374	-1251	-2921	1855
28-Feb-14	1518	7127	-1250	-2669	1965	43216	7127	-1250	-2669	1965
1-Mar-14	1505	10964	-1150	-2408	7386	43204	10964	-1150	-2408	7386
2-Mar-14	3954	15494	-3240	-2295	6179	45654	15494	-3240	-2295	6179
3-Mar-14	4283	21430	-3594	-2205	5994	45984	21430	-3594	-2205	5994
4-Mar-14	4642	24056	-3973	-2175	4769	46344	24056	-3973	-2175	4769
5-Mar-14	5663	24455	-4919	-2275	3896	47366	24455	-4919	-2275	3896
6-Mar-14	5805	21436	-5045	-2424	-5	47509	21436	-5045	-2424	-5
7-Mar-14	6785	20768	-5981	-2686	497	48490	20768	-5981	-2686	497
8-Mar-14	6788	21369	-6016	-2950	520	48494	21369	-6016	-2950	520
9-Mar-14	6546	22835	-5791	-3283	-413	48253	22835	-5791	-3283	-413
10-Mar-14	6822	21137	-6020	-3624	-1318	48530	21137	-6020	-3624	-1318
11-Mar-14	6772	17677	-5963	-3960	-2335	48481	17677	-5963	-3960	-2335
12-Mar-14	6300	14571	-5550	-4267	-2325	48010	14571	-5550	-4267	-2325
13-Mar-14	5800	13914	-5094	-4542	-1459	47511	13414	-6461	-4640	-2959
14-Mar-14	5200	15564	-4559	-4778	-683	46912	14397	-6381	-5006	-2683
15-Mar-14	3900	16940	-3375	-4937	91	45613	14773	-6108	-5360	-2939
16-Mar-14	3900	15900	-3386	-4948	-401	45614	13234	-6119	-5566	-3401
17-Mar-14	3900	13052	-3397	-4934	-745	45615	10052	-6130	-5747	-3745
18-Mar-14	3900	10470	-2395	-4821	-1011	45616	7804	-5219	-5836	-3011
19-Mar-14	3000	8623	-2407	-4641	-409	44717	6957	-2589	-5670	-409
20-Mar-14	2800	7573	-2407	-4453	-236	44518	6907	-2407	-5481	-236
21-Mar-14	2800	7107	-2418	-4198	-295	44519	7107	-2418	-5227	-295
22-Mar-14	2300	7107	-1974	-3910	146	44020	7107	-1974	-4938	146
23-Mar-14	2000	7140	-1701	-3618	419	43721	7140	-1701	-4646	419
24-Mar-14	2000	7173	-1712	-3310	360	43722	7173	-1712	-4338	360
25-Mar-14	1800	7123	-1530	-2993	534	43523	7123	-1530	-4021	534
26-Mar-14	1500	7057	-1268	-2687	775	43224	7057	-1268	-3715	775
27-Mar-14	1500	7007	-1268	-2414	748	43225	7007	-1268	-3345	748
28-Mar-14	1500	6873	-1279	-2180	689	43226	6873	-1279	-2980	689
29-Mar-14	1500	6657	-1279	-2030	662	43227	6657	-1279	-2635	662
30-Mar-14	1500	6440	-1279	-1880	636	43228	6440	-1279	-2290	636
31-Mar-14	1500	6223	-1291	-1729	577	43229	6223	-1291	-1944	577

Table 2. Observed (through March 11) and projected combined exports, Net Delta Outflow Index, Daily and 14-day Old and Middle River Old and Middle River flows, and QWEST. The NDOI is calculated as either a 7-day or 3-day running average.

Effects Analysis

Delta Habitat Effects Regarding Salmonids and Green Sturgeon

Outflow Action

Juvenile and adult salmonids would experience reduced outflows of approximately 3,000cfs daily under the proposed action in the next week (until March 20) compared to the existing D-1641 11,400 cfs outflow objective (Table 2). During the remainder of March, outflow conditions under this proposed action are similar to outflow conditions regardless of export operations, since CVP/SWP reservoir releases are not supplementing outflow in accordance with the February TUC Order. The change in the outflow objective will lead to a more eastwardly daily X2 position. These changes would influence hydrodynamics along the Sacramento River salmonid migration corridors through the north Delta, western Delta, and Lower Sacramento River regions. Under the proposed lower outflow objective for the remainder of March, the proportion of positive daily flow velocities will decrease in Miner Slough and on the mainstem Sacramento River south of approximately Rio Vista (Figure 8). The increase in flow reversals will expose migrating salmonids and green sturgeon to greater entrainment into Georgiana Slough. There is a low level of uncertainty in this conclusion.

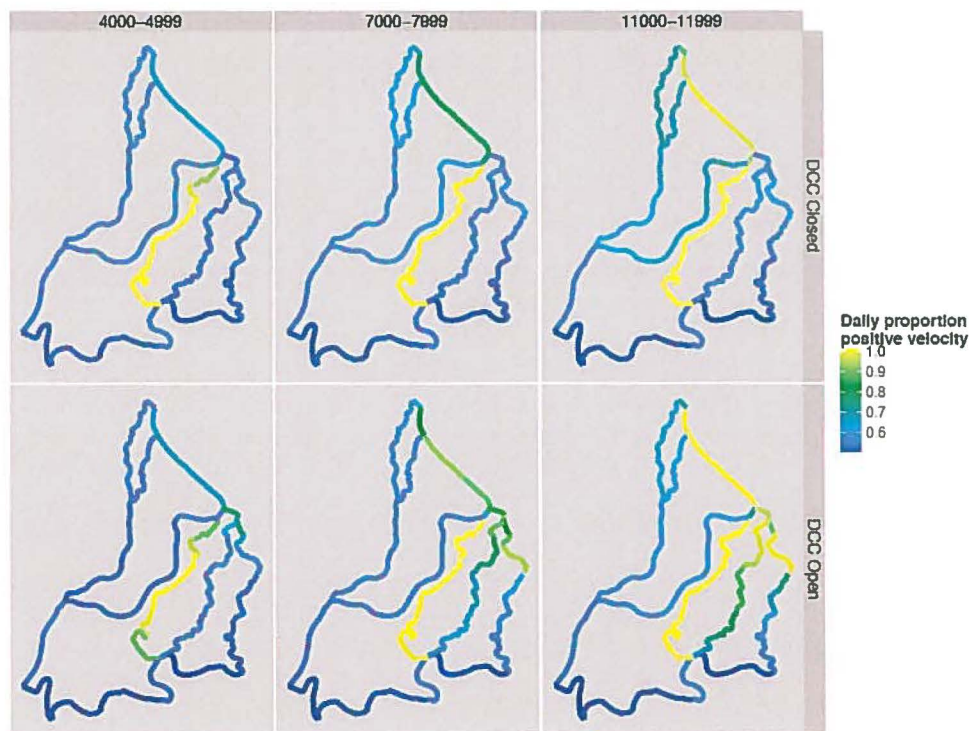


Figure 8. Maps of the North, Interior, and western Delta regions with the channels color coded for daily proportion positive velocity. Figure provided by CFS, March 12, 2014.

Additionally, daily mean velocity is reduced in the North Delta's sloughs and mainstem Sacramento River upstream of Cache Slough (Figure 9) due to reduced outflow. Increased

reverse flows and slower mean velocities result in longer travel times for migrating fish, which has been shown to reduce outmigration survival (Singer et al 2013, Perry 2010, Romine et al 2013). There is a low level of uncertainty in this conclusion. Decreased daily mean velocities may result in increased residence time of Winter-run and Spring-run Chinook salmon, which is hypothesized to result in an increased size at ocean entry. There is a high level of uncertainty in this conclusion.

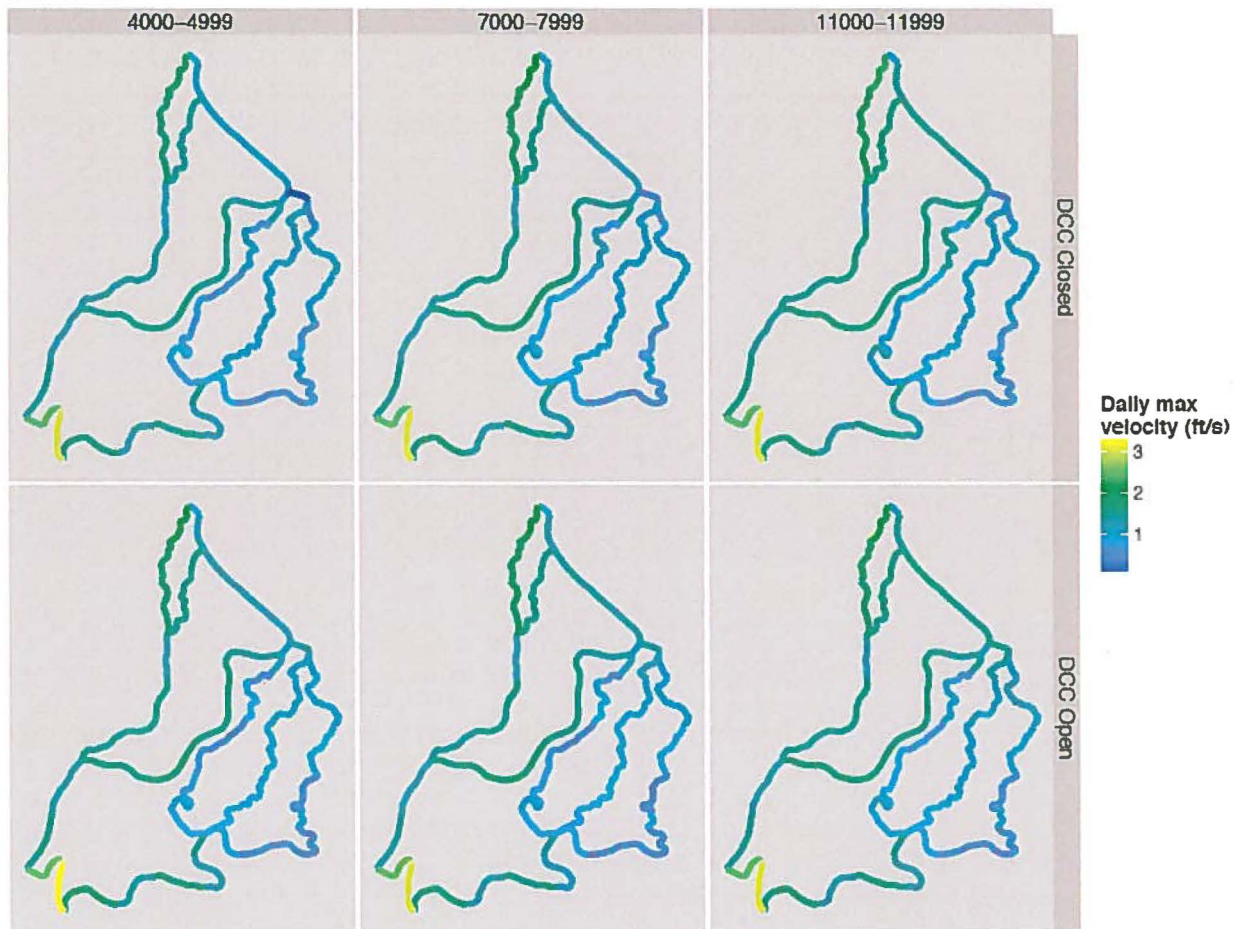


Figure 9. Maps of the North, Interior, and western Delta regions with the channels color coded for daily maximum velocity. Figure provided by CFS, March 12, 2014.

Differences between the frequency of 15-minute velocities under flow ranges similar to D-1641 outflow objective (>11400 cfs) and the proposed outflow objective (>7100 cfs) are immeasurable in the western Delta downstream of Freeport, the Lower San Joaquin, and Three Mile Slough (Figure 10-12). In these western and central regions of the Delta, hydrodynamic effects are dominated by tidal conditions and thus fish in these regions will not experience a measurable change in outflow. During March, green sturgeon adults may experience similar outflow conditions as described above for adult Winter-run Chinook salmon here. There is a low level of uncertainty in these conclusions.

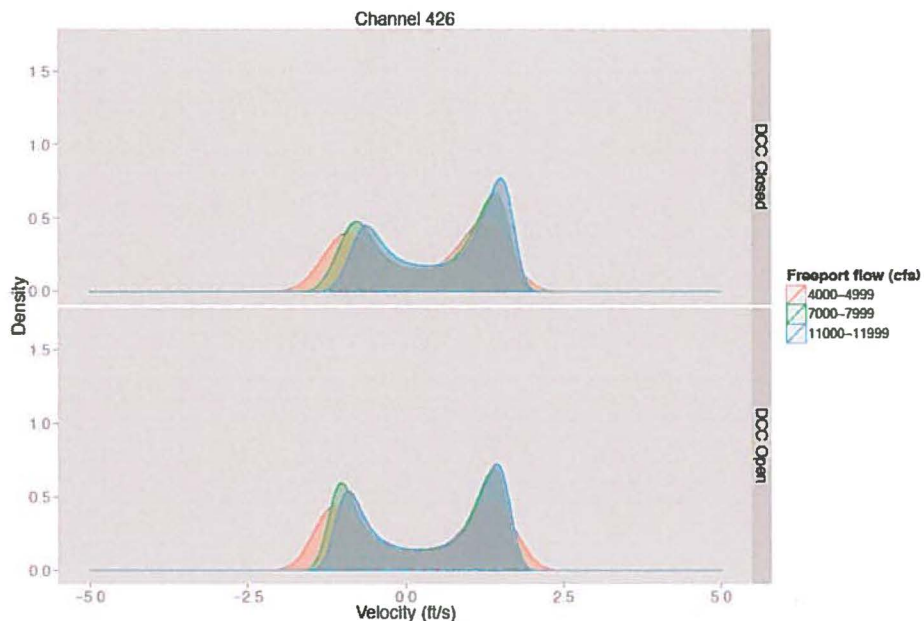


Figure 10. Density plot of velocity (ft/s) observed at DSM2 node 426 (approximately Rio Vista) for three outflow ranges.

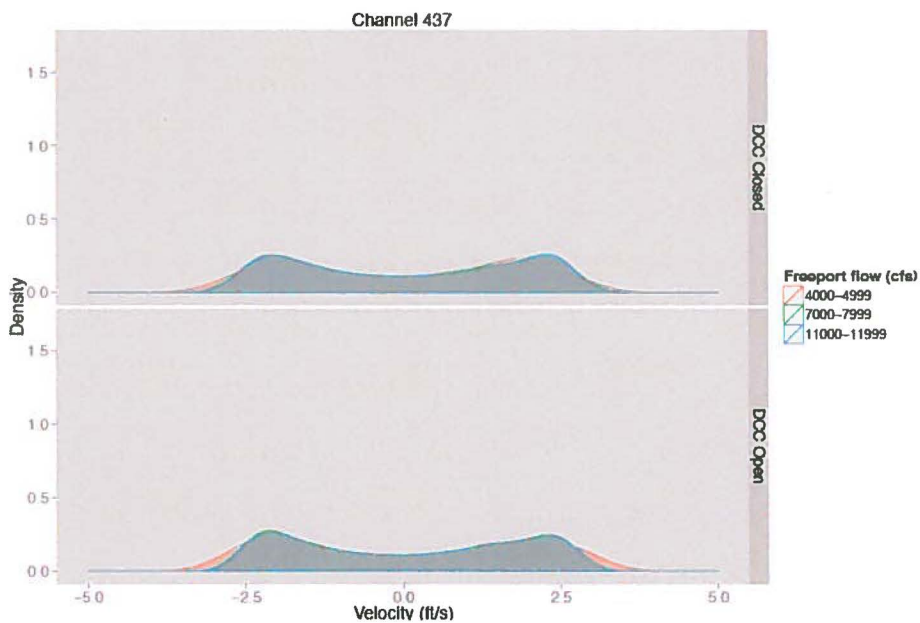


Figure 11. Density plot of velocity (ft/s) observed at DSM2 node 437 (approximately Chipps Island) for three outflow ranges.

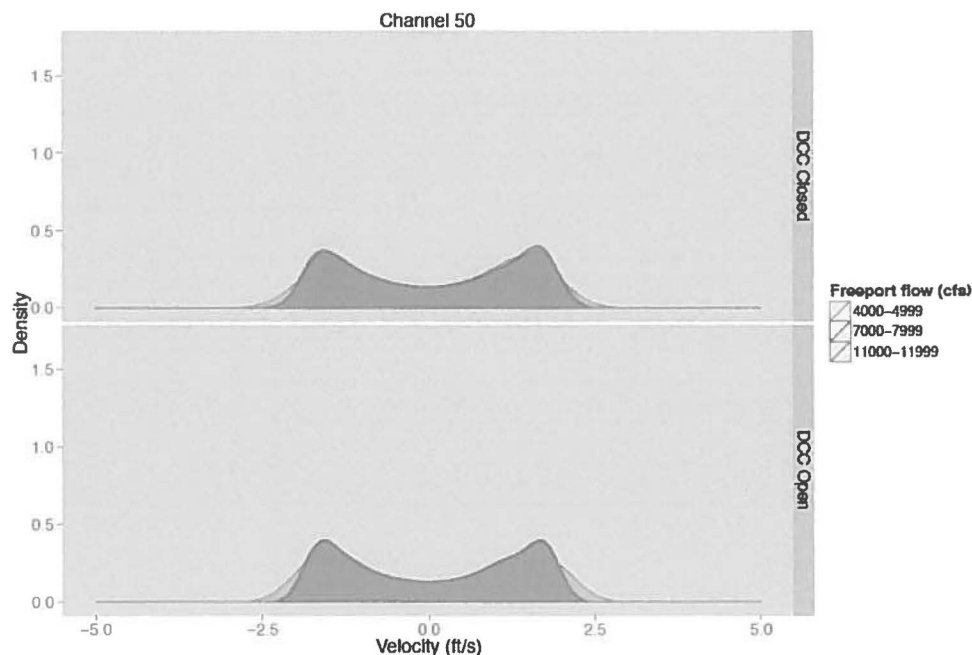


Figure 12. Density plot of velocity (ft/s) observed at DSM2 node 50 (approximately West False River) for three outflow ranges.

Old and Middle River Action

The proposed action would attain similar Old and Middle River conditions for the majority of the remainder of March, except during the next week (until approximately March 20) at which time outflow is projected to be less than 7,100 cfs and pumping would revert to Health and Safety levels. Thus, the proposed change to increase export pumping above Health and Safety levels until the 3-day average outflow at Collinsville is less than 7,100 cfs will create adjusted Old and Middle River flow measurements from the NMFS BiOp (2009) Action IV.2.3 Old and Middle River flow management objective of 14-day average OMR flows no more negative than -5,000 cfs for approximately 7 days (Table 2). The 14-day average flows in Old and Middle River ranged from, -1004 to -2210 cfs in January 2014, -246 to -3203 cfs during February 2014, and -1978 to -3224 cfs thus far in March (Figure 13). Under the proposed action the 14-day average flows are projected to range from -5836 and -1944 cfs.,

The current distribution of Winter-run and Spring-run Chinook salmon and steelhead in the Delta and at the facilities suggest that export levels that create OMR flows more negative than -5,000 may increase the likelihood of exceeding Action IV.2.3's biological triggers associated with loss density and/or daily loss sooner. Old and Middle River flows more negative than -5000 cfs are likely to increase loss of out-migrating salmonids and green sturgeon that are in the South Delta region. During the period when daily and 14-day running average OMR flows are more negative than -5000 cfs, NMFS Biop Action IV.2.3 will continue to use fish loss density, daily loss, and loss of specific Coleman National Fish Hatchery (CNFH) releases of Late Fall and Winter-run Chinook salmon as triggers to reduce the vulnerability of emigrating ESA-listed salmon,

steelhead, and green sturgeon to entrainment into South Delta channels and at the pumps between January 1 and June 15. Depending on what level of fish trigger is exceeded, combined exports are managed to a level so that the 5-day net average OMR flow is not more negative than -3,500 or -2,500 cfs OMR until fish densities return below levels of concern.

Old and Middle River flows more negative than -5,000 cfs are likely to increase the susceptibility of salmonids and green sturgeon in the Interior Delta and Lower San Joaquin River regions to entrainment into the South Delta. Increased duration of OMR flows more negative than -5,000 cfs are likely to affect listed salmonids entering the Delta from the Sacramento River corridor and hypothesized to affect San Joaquin River steelhead migrating through the San Joaquin River migration to an even greater degree. Although the proposed action includes a period with less negative OMR flow, which is hypothesized to reorient fish entrained in the south Delta, this region is a low survival zone for migrating and rearing salmonids (SJRGA 2013, DWR 2014), and subsequently these fish will incur lower survival rates. There is a low to moderate level of uncertainty in these conclusions.

In March, impacts to juvenile and sub adult life stages of green sturgeon are anticipated to remain minimal. Age 1 to 3 green sturgeons are expected to be rearing in the Delta, and are typically exposed to a broad spectrum of flows over the course of the year during this rearing phase and freely move throughout the Delta to find suitable conditions for their needs and the proposed action is hypothesized not to effect any life stage of green sturgeon in the Delta. There is a low level of uncertainty in this conclusion

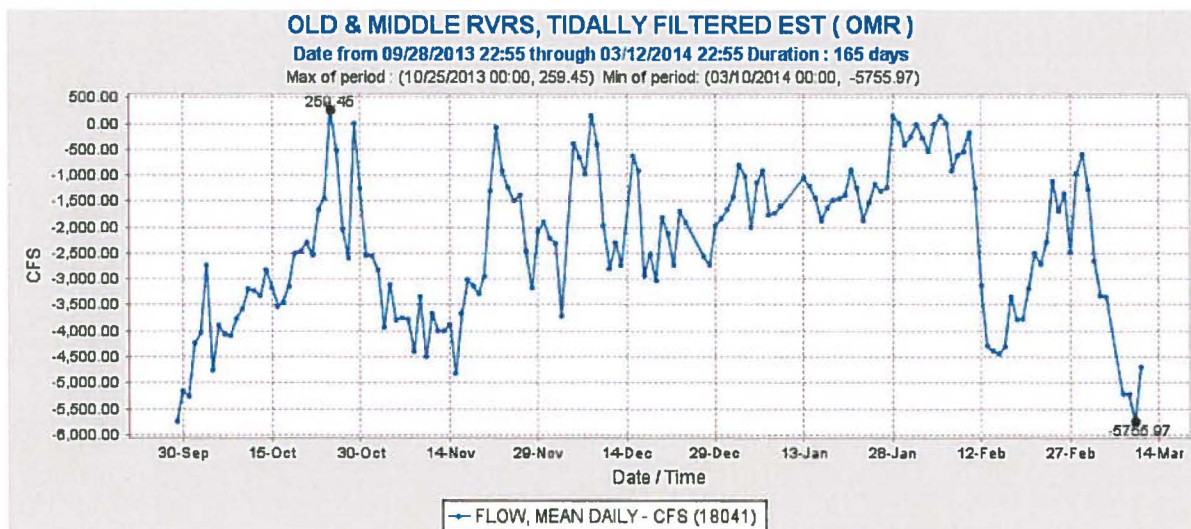


Figure 13. Old and Middle River tidally-filtered daily flows for WY 2014.⁹

⁹ Downloaded from CDEC on March 10, 2014.

Cumulative Effects of Action

Cumulatively, the proposed change in outflow and Old and Middle River flows will reduce through Delta survival of juvenile listed salmonids, steelhead and green sturgeon, and may modify their designated critical habitat. The action proposes to: 1) reduce the Delta outflow standard for March from a monthly average of 11,400 cfs at Chipps Island to a three-day average outflow of 7,100 cfs at Collinsville, and 2) operate at daily OMR flows more negative than -5,000 cfs. The action will likely cause unquantifiable reductions in survival in multiple rearing regions and migration corridors through the Delta. The modification of juvenile Winter-run and Spring-run Chinook salmon and steelhead survival due to changes in hydrodynamics would occur primarily through the North Delta downstream of the Head of Sutter Slough and upstream of the confluence of Cache Slough and the mainstem Sacramento and San Joaquin rivers for the remainder of March, and South Delta for approximately seven days, while OMR flows towards the facilities are more negative than -5,000 cfs. The proposed action will increase risks to Winter-run and Spring-run Chinook, steelhead, and green sturgeon associated with CVP/SWP entrainment loss. Similar to the existing biological opinion, exports will conform to existing BiOps when NMFS BiOp Action IV.2.3's fish triggers are exceeded. While the proposed action may increase the likelihood of exceeding these triggers, it does not pose any additional risk to exceeding the annual take limit of Winter-run or Spring-run Chinook salmon.

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*Salmonid and Green Sturgeon Supporting Information for Endangered Species Act Compliance
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