

**Delta Operations for Salmonids and Sturgeon (DOSS) Group**  
**Conference call: 02/24/2015 at 9:00 a.m.**

**Objective:** Provide advice to the Water Operations Management Team (WOMT) and National Marine Fisheries Service (NMFS) on measures to reduce adverse effects from Delta operations of the Central Valley Project and the State Water Project on salmonids and green sturgeon. DOSS will work with other technical teams. DOSS notes and advice can be found at: [http://www.westcoast.fisheries.noaa.gov/central\\_valley/water\\_operations/doss.html](http://www.westcoast.fisheries.noaa.gov/central_valley/water_operations/doss.html).

**DWR:** Farida Islam, Kevin Reece, Aaron Miller, Rhiannon Mulligan, Dan Yamanaka, Bryant Giorgi, James Edwards

**Reclamation:** Michelle Palmer, Josh Israel, Peggy Manza

**NMFS:** Barb Byrne, Jeff Stuart, Meiling Roddam

**USFWS:** Roger Guinee, Leigh Bartoo, Jim Smith

**CDFW:** Bob Fujimura, Duane Linander, Ken Kundargi

**SWRCB:** Matt Holland

**EPA:** Erin Foresman

**Agenda Items**

1. Agenda review and introductions
2. RPA Implementation review
3. Current Operations
4. Smelt Working Group
5. Fish Monitoring
6. DOSS Advice

**Agenda Item 2.**

***RPA Implementation Review***

**Delta RPA Actions affecting operations during December/January/February:**

**Action IV.1.2 (DCC gate operations):**

- Default DCC gate closure started Monday, December 1.

**Action IV.2.3 (OMR Management)**

- On 2/9/15, the Projects requested flexibility in OMR implementation. On 2/10/15, NMFS provided its determination. See details of both letters, available under “Biological Opinion Actions” at: [http://www.westcoast.fisheries.noaa.gov/central\\_valley/water\\_operations/](http://www.westcoast.fisheries.noaa.gov/central_valley/water_operations/).
- Since 2/11/15, daily OMR targets have been based on daily assessment of conditions and a decision by the Directors.
- While the daily OMR flow index has not been more negative than -5,000 over the past week, the 14-day average of the daily OMR index is more negative than -5,000, but not more negative than -5,500, as allowed per the NMFS determination.

### **Agenda Item 3.**

#### **Current Operations (02/24/2015)**

SWP		CVP	
<b>Exports (cfs)</b>			
Clifton Court Forebay	3,250	Jones Pumping Plant	850
<b>Reservoir Releases (cfs)</b>			
Feather - Oroville	950	American - Nimbus	800
		Sacramento - Keswick	3,250
		Stanislaus - Goodwin	300*
		Trinity – Lewiston	
<b>Reservoir Storage (in TAF)</b>			
San Luis (SWP)	907	San Luis (CVP)	364
Oroville	1,717	Shasta	2,589
New Melones	605	Folsom	559
<b>Delta Operations</b>			
DCC	Closed	Sacramento River at Freeport (cfs)	13,284
Outflow Index (cfs)	~ 9,900	San Joaquin River at Vernalis (cfs)	848
E:I	17 % (14-day Avg.)	X2	~ 72 km

\*Reduced at 1 am today, from 400 cfs.

Turbidity management (for smelt concerns) is currently controlling exports.

The daily OMR index for 2/24 is -3,500 cfs. The 5-day OMR to 2/21 was -4,700 based on the index and was -4,350 based on the USGS gauges. The 14-day OMR to 2/21 was -5,115 based on the index and was -4,710 based on the USGS gauges. The 14-day OMR index of -5,115 is allowed per the NMFS determination<sup>1</sup> regarding flexibility in OMR implementation.

DWR reported that, per D-1641 (notwithstanding the SWRCB Order approving lower Delta outflow), 1 “Chipps day” was required in February (based on the January 8-River Index of 805 TAF) and that 31 Chipps Day would likely be required in March. The projects expect to have ~20 carryover days for March.

The weather forecasts a small amount of precipitation this weekend.

### **Agenda Item 4.**

#### ***Smelt Working Group (SWG)***

Bartoo (FWS) provided the following update:

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<sup>1</sup> See details in the 2/9/15 letter to NMFS from Reclamation, and the 2/10/15 NMFS determination; both available under “Biological Opinion Actions” at: [http://www.westcoast.fisheries.noaa.gov/central\\_valley/water\\_operations/](http://www.westcoast.fisheries.noaa.gov/central_valley/water_operations/)

The Working Group described the risk of entrainment under the Service-provided advice framework. Under this framework the relative risk of entrainment for each of the three OMR flow ranges is discussed and assessed. For the current week the risk of entrainment for each of flow ranges is characterized as follows:

- -1250 to -2000 cfs has a low risk of entrainment,
- -2000 to -3500 cfs has a medium risk of entrainment, and
- -3500 to -5000 cfs has a high risk of entrainment.

These flow ranges have the potential for a higher level of relative risk, if and when increased central Delta turbidity connects with the export facilities. These relative risk levels are based upon a review of Delta Smelt relative abundance and distribution data, Delta Smelt salvage data, and Delta conditions data, including turbidity. The Working Group is following guidance for entrainment protections from both Action 2 (adult Delta Smelt) and Action 3 (juvenile Delta Smelt). The risk values provided for this week refer only to adult fish as there is currently no evidence of hatching.

**Agenda Item 5.**

**Fish Monitoring:** The following table presents fish monitoring data. Unless otherwise noted, reported sizes are fork length. See also:

<http://www.water.ca.gov/swp/operationscontrol/calfed/calfedmonitoring.cfm>.

Location	Chippis Is. Midwater Trawl	Prisoners Pt/ Jersey Pt.	Sacramento Trawl	Mossdale Kodiak Trawl	GCID RST <sup>A</sup>	Knights Landing RST <sup>C</sup>	Tisdale RST <sup>E</sup>	Beach Seines
Sample Date	2/15-2/21	2/15-2/21	2/15-2/21	2/15-2/21	2/17-2/23	2/16-2/23	2/15-2/23	2/15-2/21
Total Catch	151	355	41	0	196	89 (34mm-93mm)	143	218
FR Chinook	2	308	21		31	61	113	206
WR Chinook	5	2	1		13	3	4	1
SR Chinook	3				3	7	3	9
LFR Chinook	2				1			
Ad-Clipped Chinook	49	12	14		147 <sup>B</sup>	16 <sup>D</sup>	23	
Delta Smelt	1 (67mm)	15 (61mm-70mm)						
Splittail	22	2						
Longfin Smelt	19 (57mm-106mm)	2 (79mm-83mm)						
Steelhead	45	14	5		1	2		1

(ad-clip)								
Steelhead (wild)	3							1
Green Sturgeon								
W. Temp. (avg. °F)					990	9,323	8,725	
Flows (avg. cfs)					54	56	54	
Turbidity (avg. NTU)					6.7	34	29	

<sup>A</sup> Trap set on 2/17 at 8:30 am.

<sup>B</sup> The 147 ad-clipped Chinook were winter-run sized.

<sup>C</sup> Sampling period was from 2/16 at 10:00 am to 2/23 at 10:45am. Both RSTs modified to sample at 50% efficiency.

<sup>D</sup> The 16 ad-clipped Chinook were winter-run sized.

<sup>E</sup> Sampling period was from 2/15 at 3:45 pm to 2/23 at 3:00 pm. Both RSTs modified to sample at 50% efficiency.

### **Preliminary Prisoner’s Point/Jersey Pt. and Sacramento Trawl Data**

2/22: Jersey Point—7 Delta smelt (63mm-77mm), 28 Fall-run Chinook, 1 Spring-run Chinook (64mm), 2 ad-clipped Chinook (94mm-98mm)

2/23: Prisoner’s Point—2 Fall-run Chinook, 1 ad-clipped Chinook (103mm), 1 ad-clipped steelhead (253mm)

2/23: Sherwood Harbor Trawl—2 Fall-run Chinook

### **Acoustic-tagged Hatchery Winter-Run Chinook Tracking with Real-Time Receivers:**

- 251 and 321 acoustic-tagged fish released on 2/4 and 2/6, respectively, in Redding (379 river km upstream of Sacramento)
- Single detections could be false positives. The tag detections are reported based on both “single” and “2 or more” detections, and the associated percentages calculated based on all detections (may overestimate passage if some single detections are false positives) and based on “2 or more” detections (may underestimate passage if some single detections are correctly detecting tags).
- DOSS noted that the proportion of tagged fish detected may represent the minimum estimate of the actual proportion of tagged fish (and, presumably, the non-acoustic-tagged hatchery winter-run production release) passing a receiver because it is assumed that (especially after the first storm pulse) some mortality is occurring before fish pass the real-time receivers.
- Proportion of tag codes<sup>2</sup> observed passing I80/I50 bridge receiver as of 6:10am on Tuesday, 2/24/15 (see table below):

<sup>2</sup> A tag detection indicates that a tag has passed the receiver, but it is possible that the tag could be in a predator that ate a tagged winter-run Chinook. There is limited ability to apply a “predator filter” even with tag detection data from the entire acoustic receiver array (most of which are not real-time receivers); no predator filter is attempted on the reported real-time data.

	Release 1	Release 2	All releases
number released:	251	321	571
Number of fish with only 1 detection:	26	36	62
Number of fish with 2 or more detections:	51	90	141
Total detects of valid IDs:	77	126	203
Percent detected all detections:	30.7	39.3	35.6
Percent detected with 2 or more detectons:	20.3	28.0	24.7
<b>Detections over time: 2+ detects (single detects listed in parentheses)</b>			
Number of fish 2/9/2015	16 (17)	3 (4)	
Number of fish 2/10/2015	7 (13)	22 (30)	
Number of fish 2/11/2015	4 (6)	10 (15)	
Number of fish 2/12/2015	4 (6)	4 (8)	
Number of fish 2/13/2015	3 (7)	7 (14)	
Number of fish 2/14/2015	8 (12)	7 (15)	
Number of fish 2/15/2015	1 (5)	5 (7)	
Number of fish 2/16/2015	5 (7)	6 (6)	
Number of fish 2/17/2015	2 (2)	4 (4)	
Number of fish 2/18/2015	0 (1)	5 (5)	
Number of fish 2/19/2015	1 (1)	1 (1)	
Number of fish 2/20/2015	0 (0)	6 (7)	
Number of fish 2/21/2015	0 (0)	3 (3)	
Number of fish 2/22/2015	0 (0)	8 (8)	
Number of fish 2/23/2015	0 (0)	1 (1)	
Number of fish 2/24/2015	0 (0)	0 (0)	

- Proportion of tag codes<sup>3</sup> observed at Middle River receiver as of 6:15am on Tuesday, 2/24/15 (see table below):

	Release 1	Release 2	All releases
number released:	251	321	571
Number of fish with only 1 detection:	0	0	0
Number of fish with 2 or more detections:	1	0	1
Total detects of valid IDs:	1	0	1
Percent detected all detections:	0.4	0.0	0.2
Percent detected with 2 or more detectons:	0.4	0.0	0.2
<b>Detections over time: 2+ detects (single detects listed in parentheses)</b>			
Number of fish 2/17/2015	0 (0)	0 (0)	
Number of fish 2/18/2015	0 (0)	0 (0)	
Number of fish 2/19/2015	0 (0)	0 (0)	
Number of fish 2/20/2015	0 (0)	0 (0)	
Number of fish 2/21/2015	0 (0)	0 (0)	
Number of fish 2/22/2015	1 (1)	0 (0)	

<sup>3</sup> A tag detection indicates that a tag has passed the receiver, but it is possible that the tag could be in a predator that ate a tagged winter-run Chinook. There is limited ability to apply a “predator filter” even with tag detection data from the entire acoustic receiver array (most of which are not real-time receivers); no predator filter is attempted on the reported real-time data.

## Fish Salvage<sup>4</sup>:

Fujimura (DFW) provided the following summaries of salvage and loss at the SWP and CVP fish collection facilities. The two salvage figures were generated from data on CDFW's salvage monitoring web-page: <http://www.dfg.ca.gov/delta/apps/salvage/SalvageExportCalendar.aspx>.

**DOSS Weekly Salvage Update**  
 Reporting Period: February 16-22, 2015  
 Prepared by Bob Fujimura on February 23, 2015 20:09  
 Preliminary Results - Subject to Revision

Criteria	16-Feb	17-Feb	18-Feb	19-Feb	20-Feb	21-Feb	22-Feb	Trend	
<b>Loss Densities</b>									
Wild older juvenile CS	0	0	0	0	0	0	0	→	0.00
Wild steelhead	1.40	3.31	0	0	0	0	0	↗	0.67
<b>Exports</b>									
SWP daily export	10,780	8,815	9,841	7,262	7,584	7,371	6,519	↘	8,310
CVP daily export	1,635	1,640	1,618	3,022	3,655	3,637	2,568	↗	2,539
SWP reduced counts	0%	0%	0%	0%	0%	0%	0%	↘	0%
CVP reduced counts	0%	0%	17%	58%	100%	100%	100%	↗	54%

Loss Density = fish lost/TAF; water export = AF; Trend = compared to previous week; wild = adipose fin present  
 Loss = estimated number of fish lost at the CVP and SWP Delta export facilities based on estimated salvage (see below)  
 Reduced counts = percentage of time that routine salvage sample time were less than 30 min per 2 hours of salvage and export operations

**Chinook Salmon Weekly/Season Salvage and Loss**  
 Combined salvage and loss for both CVP and SWP fish facilities  
 Race determined by size at date of capture; hatchery = adipose fin missing;

Category	Weekly Total			Season Total	
	Salvage	Loss	Trend	Salvage	Loss
<b>Wild</b>					
Winter Run	0	0	→	52	102
Spring Run	0	0	→	0	0
Late Fall Run	0	0	→	6	26
Fall Run	12	9	↗	12	9
Unclassified	0	0	→	24	NC
<b>Total</b>	<b>12</b>	<b>9</b>		<b>94</b>	<b>137</b>
<b>Hatchery</b>					
Winter Run	0	0	→	52	170
Spring Run	0	0	→	0	0
Late Fall Run	0	0	→	136	340
Fall Run	0	0	→	41	180
Unclassified	0	0	→	12	NC
<b>Total</b>	<b>0</b>	<b>0</b>		<b>241</b>	<b>691</b>

Trend = weekly loss per race; Salvage = estimated number of fish collected by the CVP and SWP fish protective facilities per unit of time  
 NC = can not be calculated

**Steelhead Weekly/Season Salvage and Loss**  
 Combined salvage and loss for both CVP and SWP fish facilities

Category	Weekly Total			Season Total	
	Salvage	Loss	Trend	Salvage	Loss
Wild	12	52	↗	16	69
Hatchery	144	478	↗	186	659
<b>Total</b>	<b>156</b>	<b>530</b>		<b>202</b>	<b>728</b>

State Water Project loss = salvage x 4.33; Central Valley Project loss = salvage x 0.68

Figure 1. DOSS weekly salvage update for the reporting period 02/16/15-02/22/15.

<sup>4</sup>Salvage data reported in this section represent the total estimated and expanded salvage based on the number of fish observed at the fish collection facility. For example, if one steelhead is observed in the typical ½-hour sampling period within a 2-hour operation period, the single steelhead is expanded to a salvage of four.

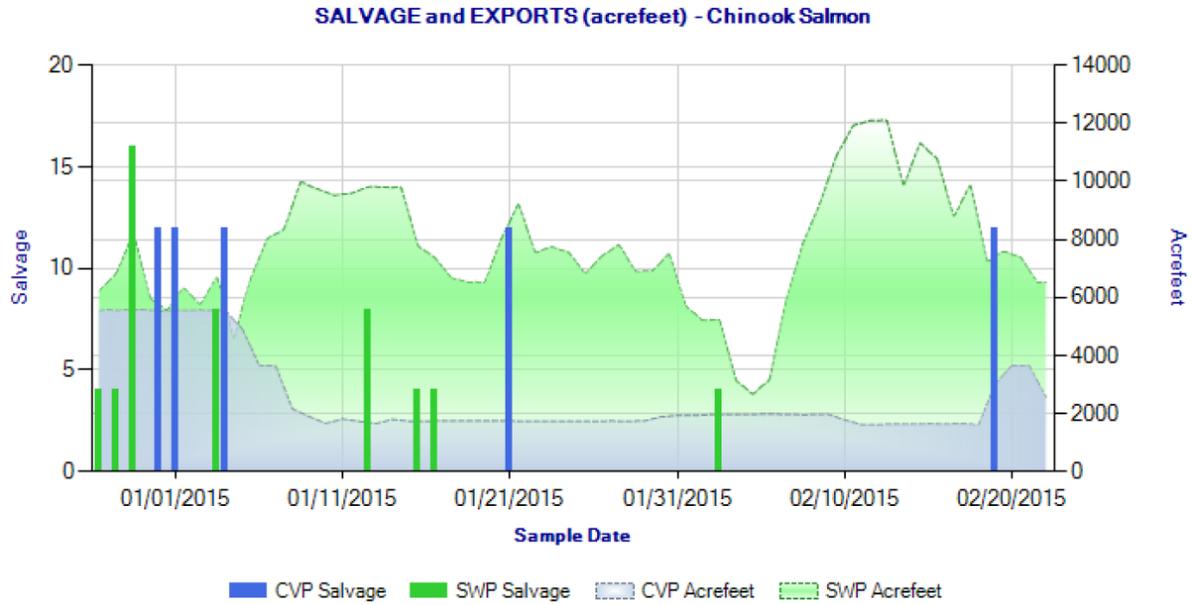


Figure 2. Daily salvage of Chinook salmon (all races) and water exports from the state and federal fish salvage facilities during 12/28/14 through 02/22/15.

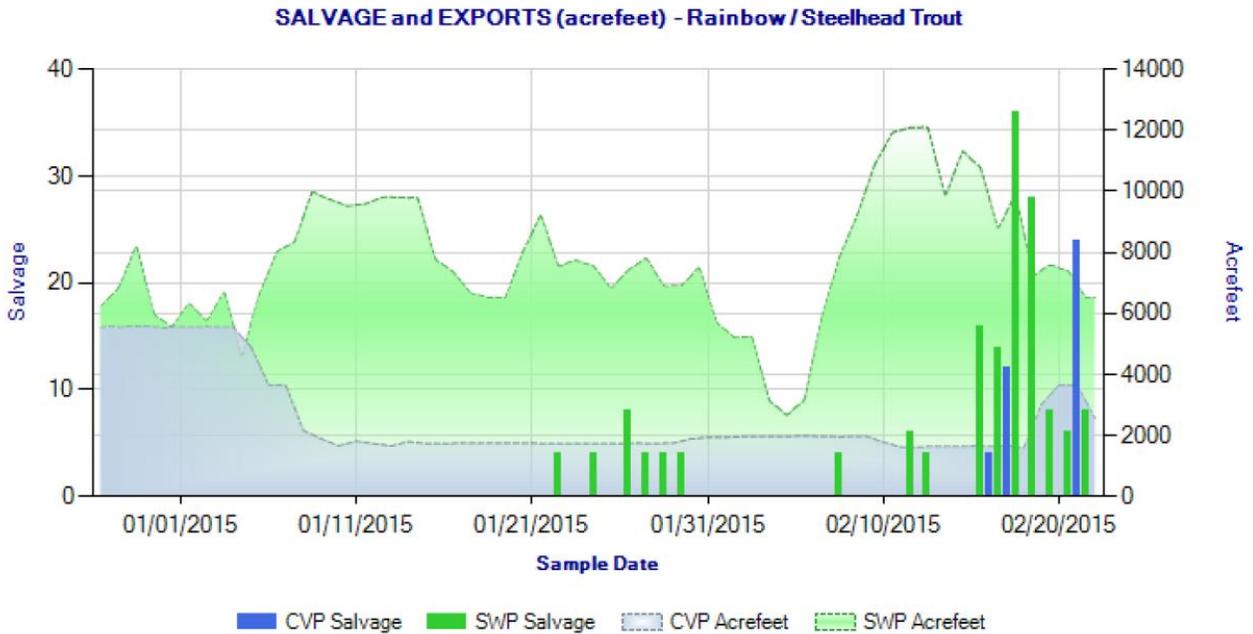


Figure 3. Daily salvage of steelhead and water exports from the state and federal fish salvage facilities during 12/28/14 through 02/22/15.

Islam (DWR) provided the following summary of coded-wire-tag recoveries at the SWP and CVP fish collection facilities.

CONFIRMED HATCHERY (ADIPOSE-FIN CLIPPED) CHINOOK SALMON LOSS AT THE SWP & CVP DELTA FISH FACILITIES, 2014/2015

Release Date	CWT Race	Hatchery	Release Site	Release Type	Confirmed Loss	Number Released <sup>1</sup>	Total Entering Delta	% Loss of Number Released <sup>2</sup>	% Loss of Total Entering Delta <sup>3</sup>	First Concern Level	Second Concern Level	Date of First Loss <sup>4</sup>	Date of Last Loss <sup>5</sup>
12/1/2014	LF	Coleman NFH	Battle Creek	Production	574.59	853,100	n/a	0.067	n/a	n/a	n/a	12/12/2014	1/16/2015
12/4/2014	LF	Coleman NFH	Battle Creek	Spring Surrogate	34.98	77,000	n/a	0.045	n/a	0.5%	1.0%	12/25/2014	12/29/2014
12/18/2014	LF	Coleman NFH	Battle Creek	Spring Surrogate	45.42	78,000	n/a	0.058	n/a	0.5%	1.0%	1/1/2015	1/17/2015
2/5/2015	LF	Coleman NFH	Battle Creek	Spring Surrogate	0.00	83,100	n/a	0.000	n/a	0.5%	1.0%	*	*
2/4 - 2/6/2015	W	Livingstone NFH	Sacramento River	Production	0.00	612,056	188500	0.000	0	0.5%	1.0%	*	*

UNCONFIRMED HATCHERY (ADIPOSE-FIN CLIPPED) CHINOOK SALMON LOSS AT THE SWP & CVP DELTA FISH FACILITIES, 2014/2015

Facility	Unknown CWT Loss <sup>6</sup>	Unread CWT Loss <sup>6</sup>	Unknown Hatchery Loss <sup>7</sup>	Acoustic Tag Loss <sup>8</sup>	Number of Unassigned CWTs <sup>9</sup>
SWP	0.00	0.00	0.00	0.00	0
CVP	26.62	0.00	0.00	0.00	0
TOTAL	26.62	0.00	0.00	0.00	0

SWP and CVP adipose-fin clipped Chinook lost from 10/1/2014 through 2/22/2015.

<sup>1</sup>Number released with the adipose-fin clipped and a coded-wire tag (CWT).

<sup>2</sup>% Loss of Number Released = (Confirmed Loss/Number Released)\*100.

<sup>3</sup>% Loss of Total Entering Delta = (Confirmed Loss/Total Entering Delta)\*100.

<sup>4</sup>Date of first and last loss accounts for all CWT loss even those from special studies where salvage and loss=0.

<sup>5</sup>Adipose-fin clipped Chinook was observed during fish count, but tag code could not be determined (e.g., damaged tag, lost tag, or Chinook released).

<sup>6</sup>Adipose-fin clipped Chinook was collected during fish count and has not been processed yet.

<sup>7</sup>CWT has been read, but hatchery release information not yet available.

<sup>8</sup>Adipose-fin clipped Chinook released due to presence of sutures.

<sup>9</sup>CWT cannot currently be assigned to a salvage record with certainty since the CWT was lost and then found. CWT may be assigned to a salvage record if new information is available.

<sup>10</sup>Chinook outside of the length-at-date criteria (Delta model) are not reported.

\*\* Information not yet available.

DWR-DES Revised 2/23/2015  
Preliminary data from DFW, DWR, FWS, and Reclamation; subject to revision.

## DOSS Estimates of Fish Distribution

DOSS estimates of the current distribution of listed Chinook, as a percentage of the population, are based on recent monitoring data and historical migration timing patterns. The table below reflects current distribution. Over the next week, DOSS expects to see a steady stream of fish moving, but at lower abundances compared to catches observed in sampling during and soon after the storm.

Location	Yet to Enter Delta (Upstream of Knights Landing)	In the Delta	Exited the Delta (Past Chippis Island)
<i>Young-of-year (YOY) winter-run Chinook salmon(naturally produced)</i>	Few stragglers only (last week: Same)	> 95% (last week: same)	< 5% (last week: same)
<i>YOY winter-run Chinook salmon (hatchery-produced)</i>	35% - 55% (last week: ~75%)	40% - 60% (last week: ~25%)	~5% (last week: 0%)
<i>YOY spring-run Chinook salmon</i>	5% - 20% (last week: same)	80% - 95% (last week: same)	< 5% (last week: same)
<i>Yearling spring-run Chinook salmon*</i>	Few stragglers only (last week: same)	~75% (last week: 75% -85%)	~25% (last week: 15% -25%)
<i>Hatchery Steelhead**</i>	~10% (last week: 10% - 20% of all hatchery fish)	~80% (last week: 80% - 90% all hatchery fish)	~10% (last week: Few to <5% all hatchery fish)
<i>Sacramento River steelhead (naturally- produced)</i>	Limited catch data		
<i>San Joaquin River steelhead***</i>	~80% (last week: same)	~20% (last week: same)	0% (last week: same)

\* No yearling spring-run Chinook salmon have been caught in 2014 monitoring. In general, very few yearling spring-run Chinook salmon are observed because of their relatively large size and strong swimming (and associated gear avoidance) abilities.

\*\*Difficult to assess now that three hatchery releases are in the system (CNFH, Feather River Fish Hatchery, and Mokelumne Fish Hatchery). Percentages are intended to capture distribution of steelhead that migrate out; not those that may residualize.

\*\*\*Have not observed juvenile steelhead in monitoring data; Distribution estimates are based on 10 years of historical data from Mossdale Trawls, and RST data from Caswell Park on the Stanislaus River.

## DOSS Feedback on Entrainment Risk

### Entrainment of fish from the Sacramento River into the Interior Delta

DOSS noted that generally, there is an increased risk of entrainment into the interior Delta during spring tides, compared to during neap tides, at any OMR level. Currently, the Delta is experiencing neap tides; spring tides will occur in about a week.

### Entrainment of fish in the Interior Delta into the CVP/SWP facilities

DOSS assessed the current risk of entrainment for YOY winter-run Chinook salmon. For both naturally-produced and hatchery-produced YOY winter-run in the Delta, the current risk of entrainment for each OMR flow ranges was characterized as follows:

- -1,200 to -2,000 cfs has a medium risk of entrainment
- -2,000 to -3,500 cfs has a medium to high risk of entrainment
- -3,500 to -5,000 cfs has a high risk of entrainment
- > -5,000 cfs has a higher risk of entrainment

DOSS estimated a high risk of entrainment at OMR flows of -3,500 cfs or more negative than -3,500 cfs, since salvage of salmonids (including 4 clipped Chinook -- in the winter-run size range based on the length-at-date criteria -- at the SWP on Monday, 2/23) has been observed over recent days at those OMR levels. More positive ranges of OMR flow were considered to create medium or medium-high risk of entrainment because 1) currently there are physiological cues for migration (*i.e.* high temperatures) which increases the vulnerability of migrating fish across even the lower ranges of OMR; and 2) the threshold for exceeding a trigger is low, which means that even low salvage is associated with a fairly high risk of exceeding an OMR trigger.

#### **Agenda Item 6.**

**DOSS Advice to WOMT and NMFS:** None.

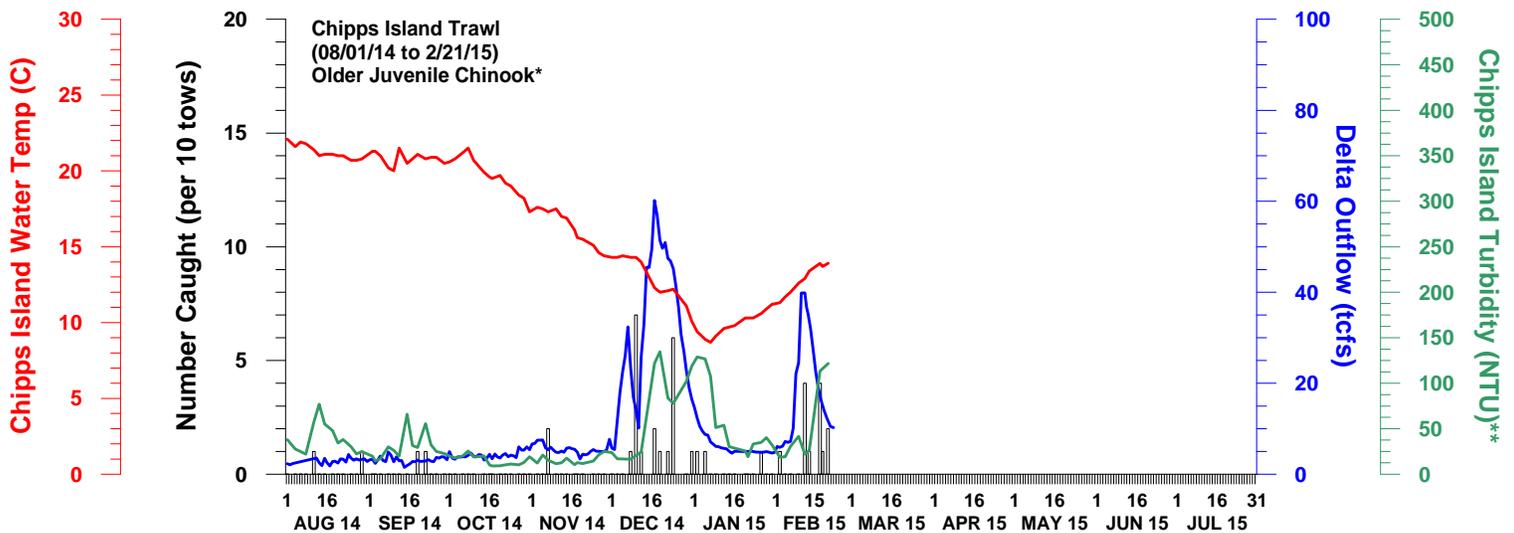
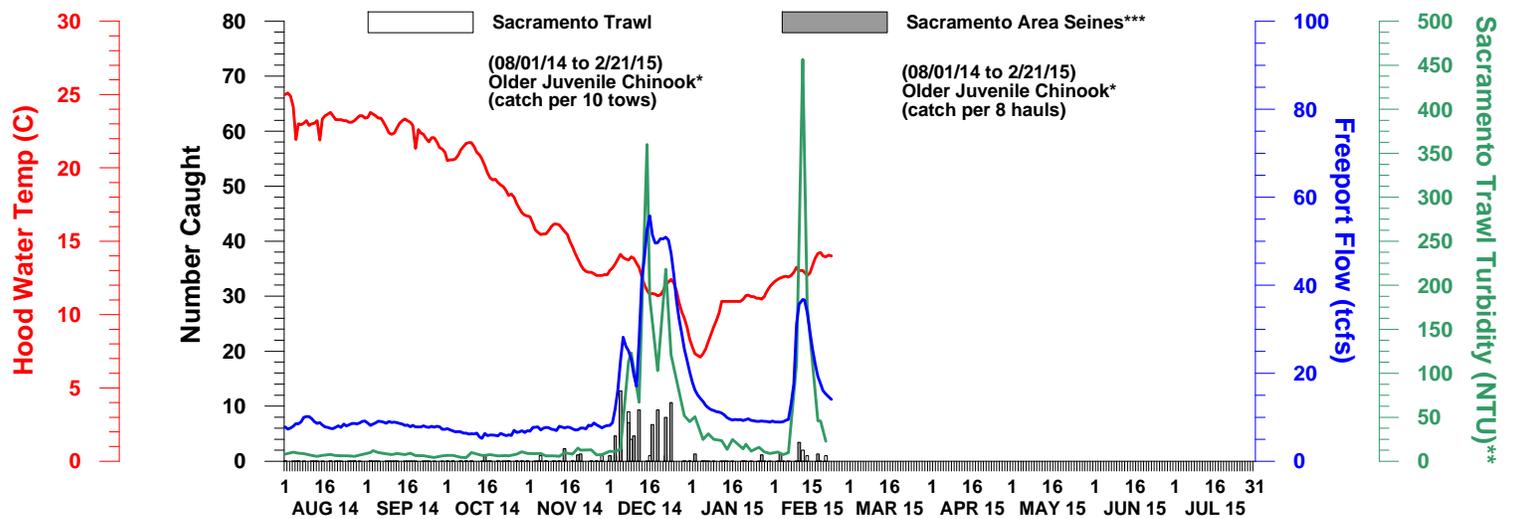
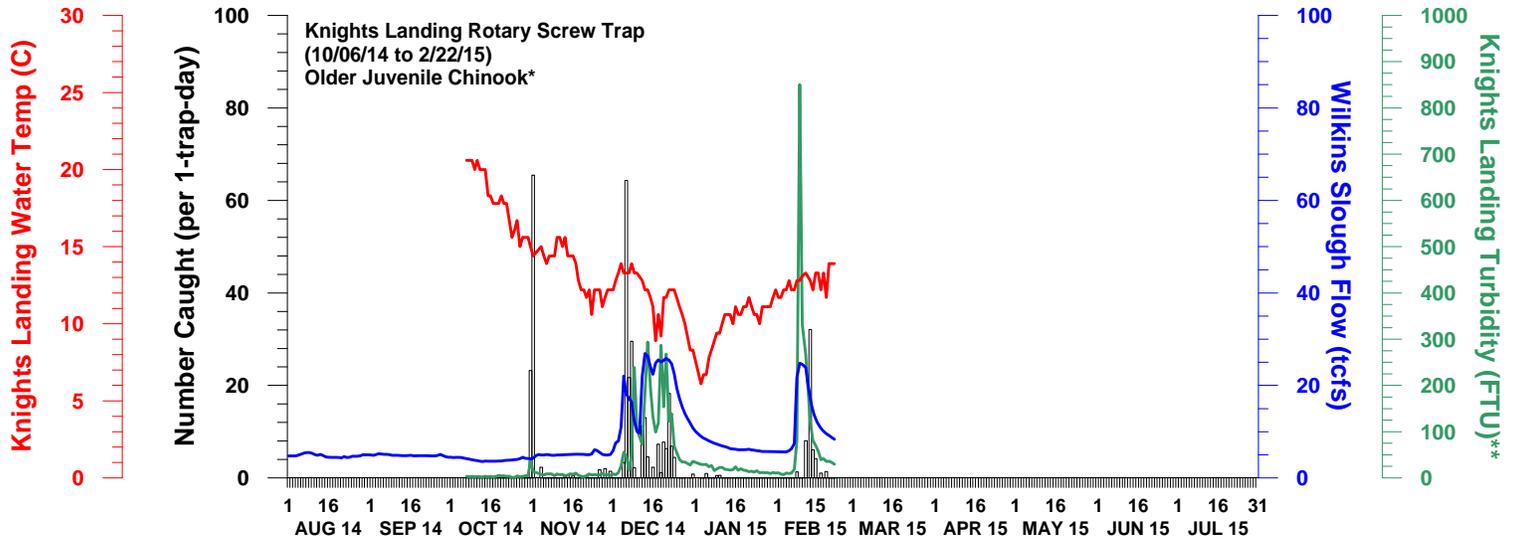
**Next Meeting:** The next DOSS conference call will be on 03/03/15 at 9am.

The following graphs were provided by DWR for Chinook salmon and steelhead observed at monitoring locations in the Sacramento and San Joaquin rivers and Delta. For additional graphs, please visit the DWR website at:

<http://www.water.ca.gov/swp/operationscontrol/calfed/calfedmonitoring.cfm>



# NUMBER OF UNMARKED OLDER JUVENILE CHINOOK MEASURED IN THE LOWER SACRAMENTO RIVER AND CHIPPS ISLAND



DWR-DES 23 FEBRUARY 2015

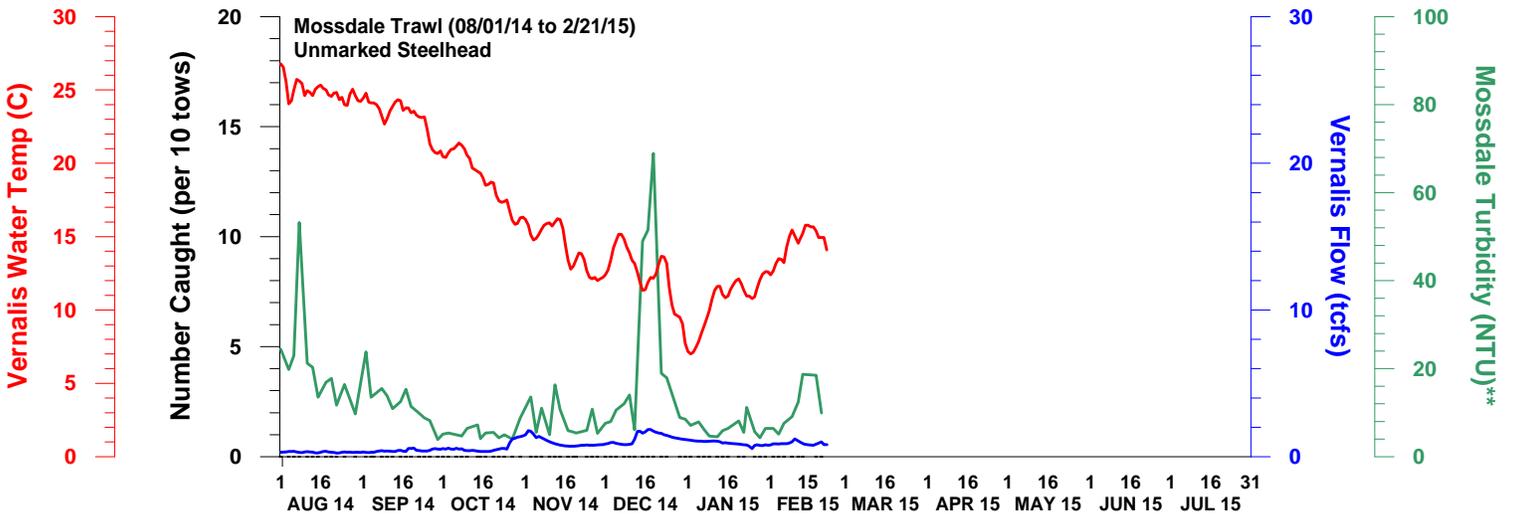
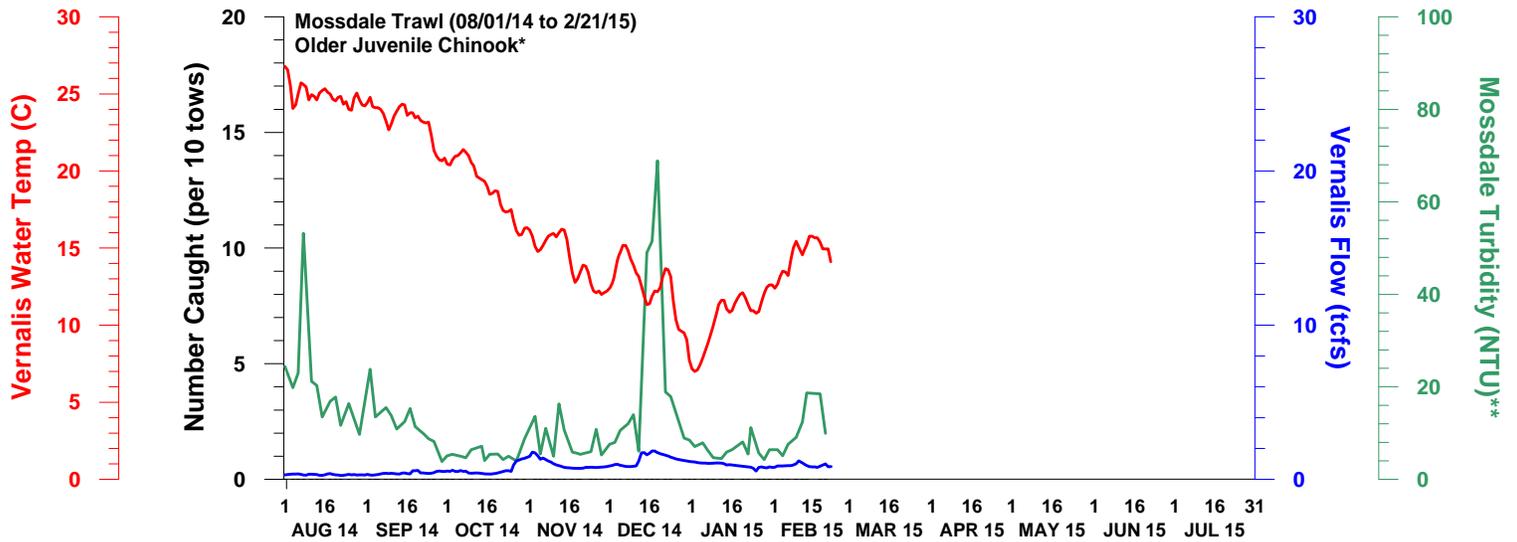
Preliminary data from DFW, FWS, and CDEC; subject to revision.

\*Older juvenile Chinook defined as all Chinook greater than or equal to the minimum winter run length-at-date criteria and less than the maximum size included in the length-at-date criteria (Frank Fisher Model) for which a race is assigned on a given sampling date.

\*\*Turbidity is a discrete measurement and is not measured continuously. Therefore, data are interpolated on days when turbidity was not measured unless data are missing for more than five days. Knights Landing turbidity measured in FTU, which should be roughly equivalent to NTU.

\*\*\*Sacramento area seine route consists of the following seine sites: Verona, Elkhorn, Sand Cove, Discovery Park, American River, Miller Park, Sherwood Harbor, and Garcia Bend. Bars are stacked if Chinook caught from the trawl and seines are from the same day.

# NUMBER OF UNMARKED OLDER JUVENILE CHINOOK AND STEELHEAD MEASURED IN THE SAN JOAQUIN RIVER

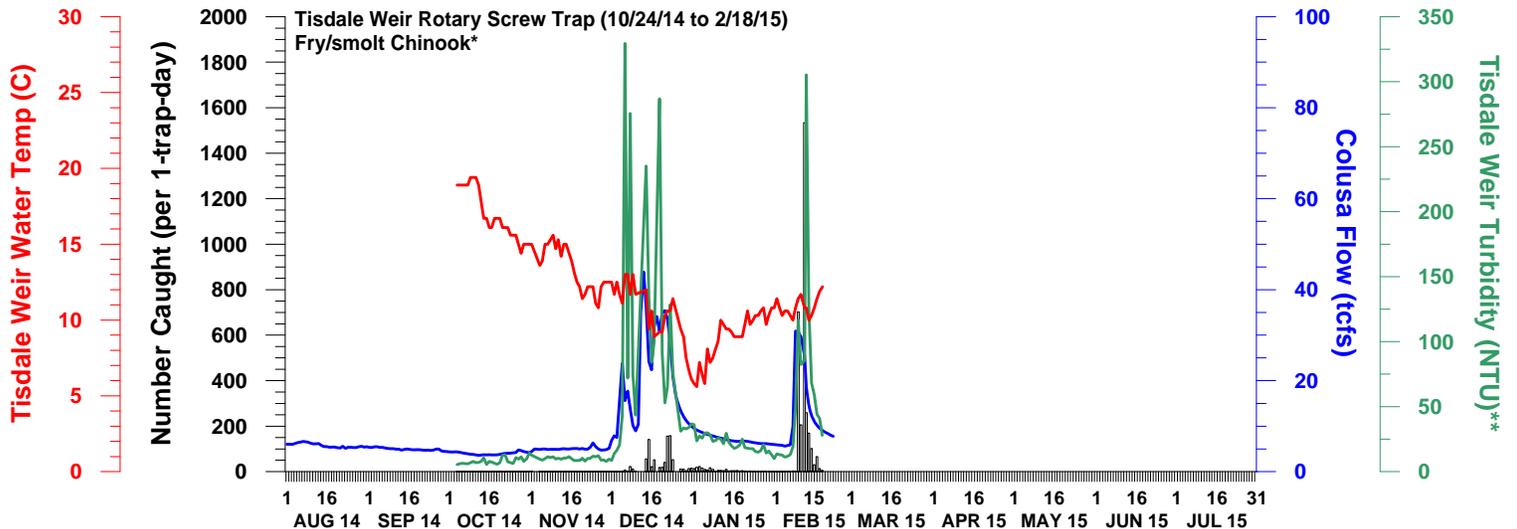
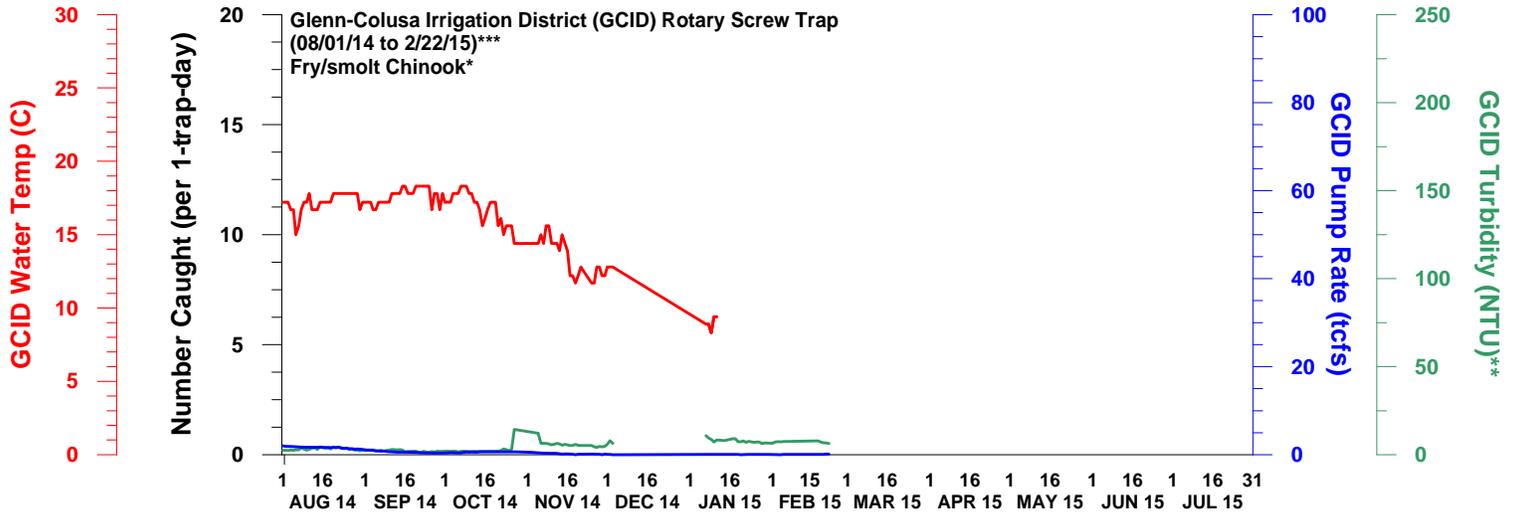
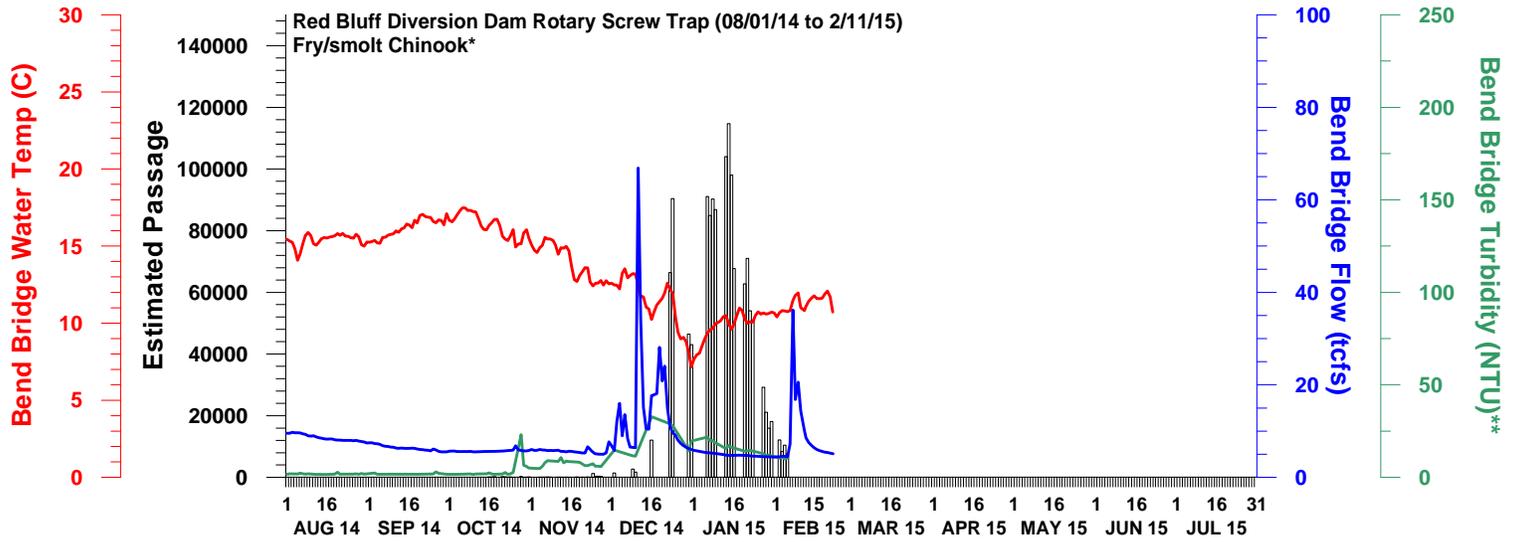


DWR-DES 23 FEBRUARY 2015  
Preliminary data from FWS and CDEC; subject to revision.

\*Older juvenile Chinook defined as all Chinook greater than or equal to the minimum winter run length-at-date criteria and less than the maximum size included in the length-at-date criteria (Frank Fisher model) for which a race is assigned on a given sampling date.

\*\*Turbidity is a discrete measurement and is not measured continuously. Therefore, data are interpolated on days when turbidity was not measured unless data are missing for more than five days.

# NUMBER OF UNMARKED FRY/SMOLT CHINOOK MEASURED IN THE SACRAMENTO RIVER



DWR-DES 23 FEBRUARY 2015

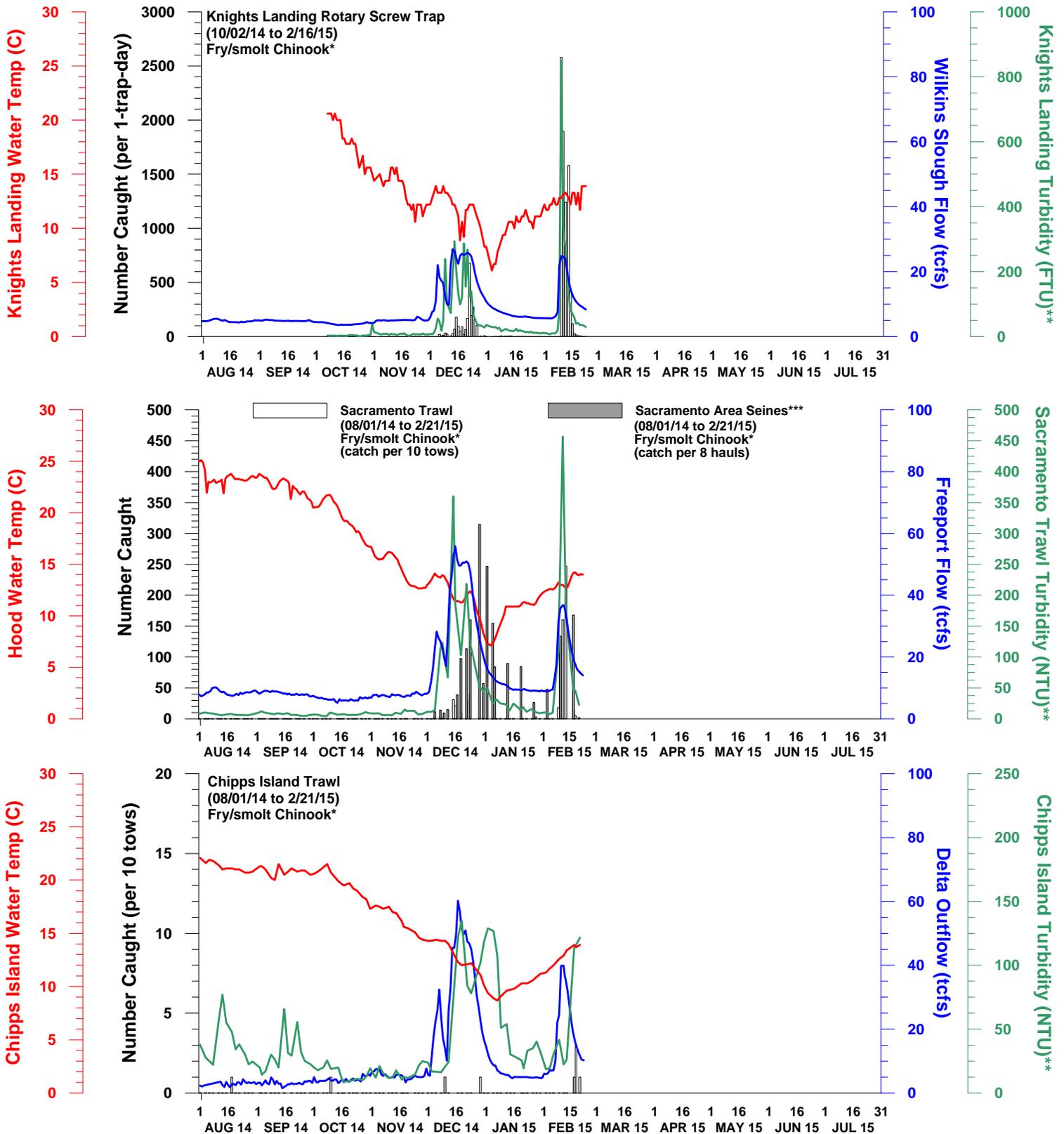
Preliminary data from DFW, FWS, GCID, and CDEC; subject to revision.

\*Fry/smolt Chinook defined as all Chinook less than the minimum winter run length-at-date criteria (Frank Fisher model).

\*\*Turbidity is a discrete measurement and is not measured continuously. Therefore, data are interpolated on days when turbidity was not measured unless data are missing for more than five days.

\*\*\*Trap was pulled on 10/28/14 due to extremely turbid conditions, heavy debris, and high number of listed winter run Chinook and has resumed since 11/5/14.

# NUMBER OF UNMARKED FRY/SMOLT CHINOOK MEASURED IN THE LOWER SACRAMENTO RIVER AND CHIPPS ISLAND



DWR-DES 23 FEBRUARY 2015

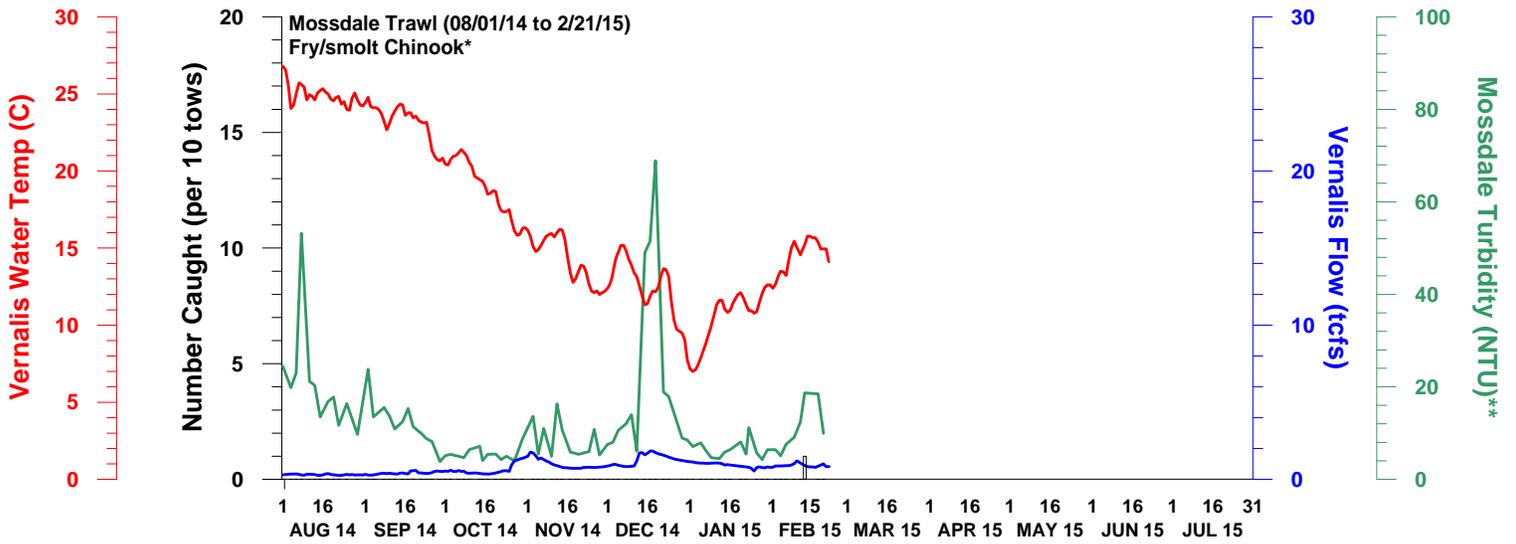
Preliminary data from DFW, FWS, and CDEC; subject to revision.

\*Fry/smolt Chinook defined as all Chinook less than the minimum winter run length-at-date criteria (Frank Fisher model).

\*\*Turbidity is a discrete measurement and is not measured continuously. Therefore, data are interpolated on days when turbidity was not measured unless data are missing for more than five days. Knights Landing turbidity measured in FTU, which should be roughly equivalent to NTU.

\*\*\*Sacramento area seine route consists of the following seine sites: Verona, Elkhorn, Sand Cove, Discovery Park, American River, Miller Park, Sherwood Harbor, and Garcia Bend. Bars are stacked if Chinook caught from the trawl and seines are from the same day.

# NUMBER OF UNMARKED FRY/SMOLT CHINOOK MEASURED IN THE SAN JOAQUIN RIVER



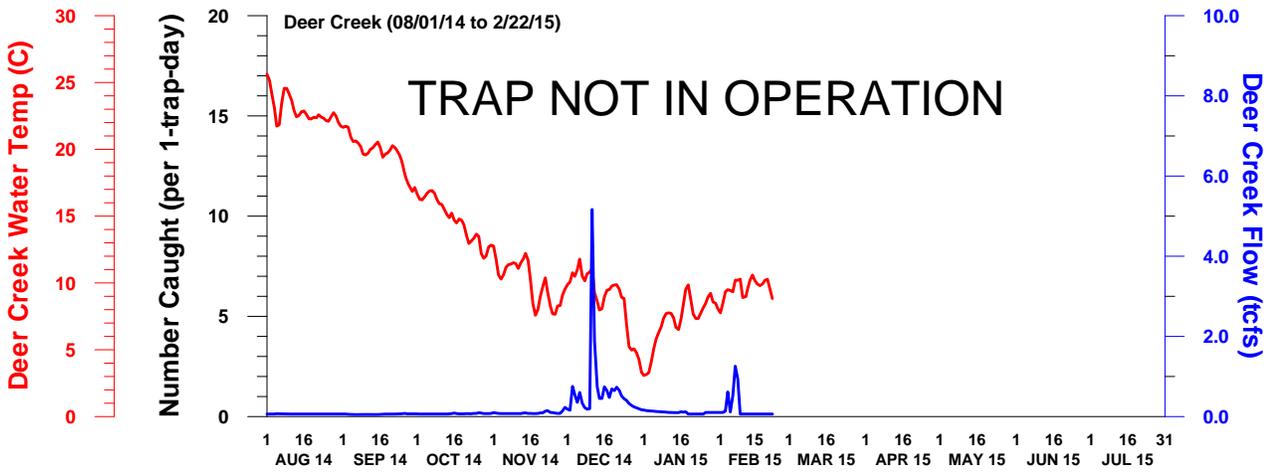
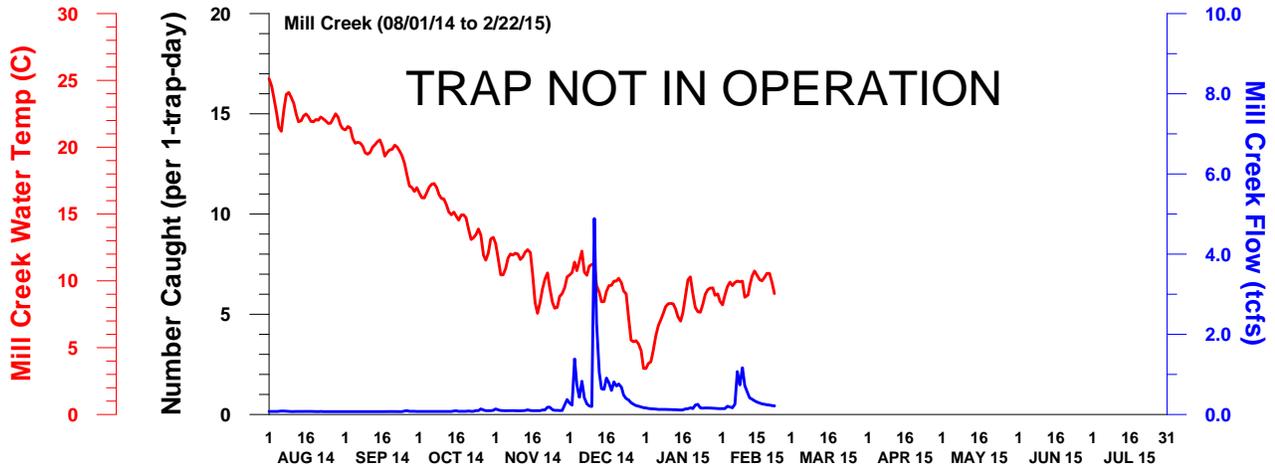
DWR-DES 23 FEBRUARY 2015

Preliminary data from FWS and CDEC; subject to revision.

\*Fry/smolt Chinook defined as all Chinook less than the minimum winter run length-at-date criteria (Frank Fisher model).

\*\*Turbidity is a discrete measurement and is not measured continuously. Therefore, data are interpolated on days when turbidity was not measured unless data are missing for more than five days.

# WATER TEMPERATURE AND FLOW MEASURED AT MILL AND DEER CREEK



**Data Acquisition:**

All data are preliminary and subject to revision.

The estimated passage data for the Red Bluff Diversion Dam were obtained directly from the US Fish and Wildlife Service (FWS), Red Bluff Fish and Wildlife Office ([http://www.fws.gov/redbluff/rbdd\\_biweekly.aspx](http://www.fws.gov/redbluff/rbdd_biweekly.aspx)).

The catch data for Glenn-Colusa Irrigation District (GCID) were obtained directly from GCID.

The catch data for Tisdale Weir and Knights Landing were obtained directly from the California Department of Fish and Wildlife (DFW)<sup>1</sup>, North Central Region.

Sacramento River Trawl, Sacramento Area Beach Seine, and Chipps Island Trawl data were obtained directly from FWS, Stockton Fish and Wildlife Office (<http://www.fws.gov/stockton/ifmp/>).

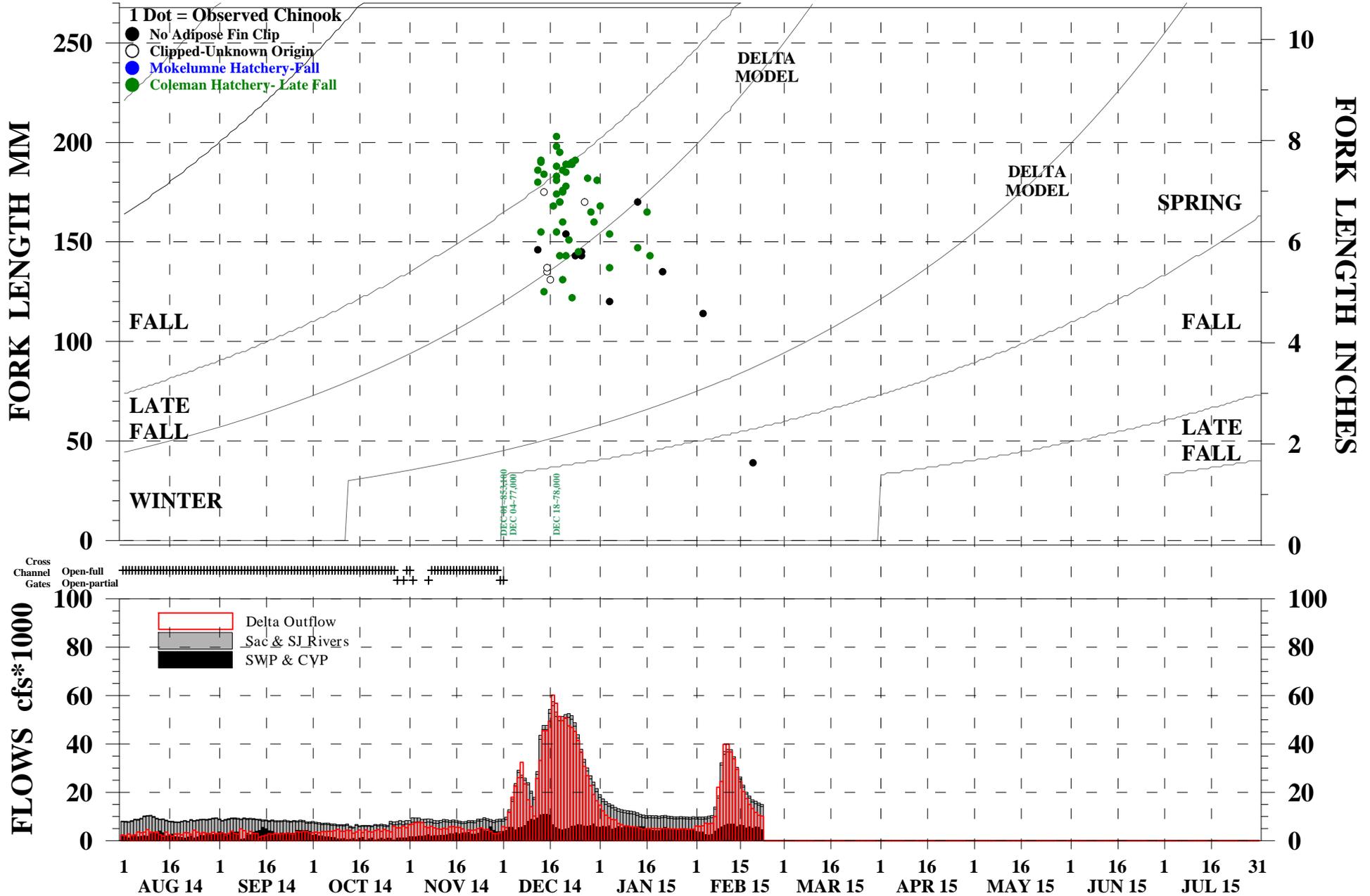
Mossdale Trawl data were either obtained directly from FWS, Stockton Fish and Wildlife Office or from DFW (Region 4).

The hydrology data were either downloaded from the California Data Exchange Center (CDEC) (<http://cdec.water.ca.gov>) or obtained directly from the California Department of Water Resources, Operations Control Office.

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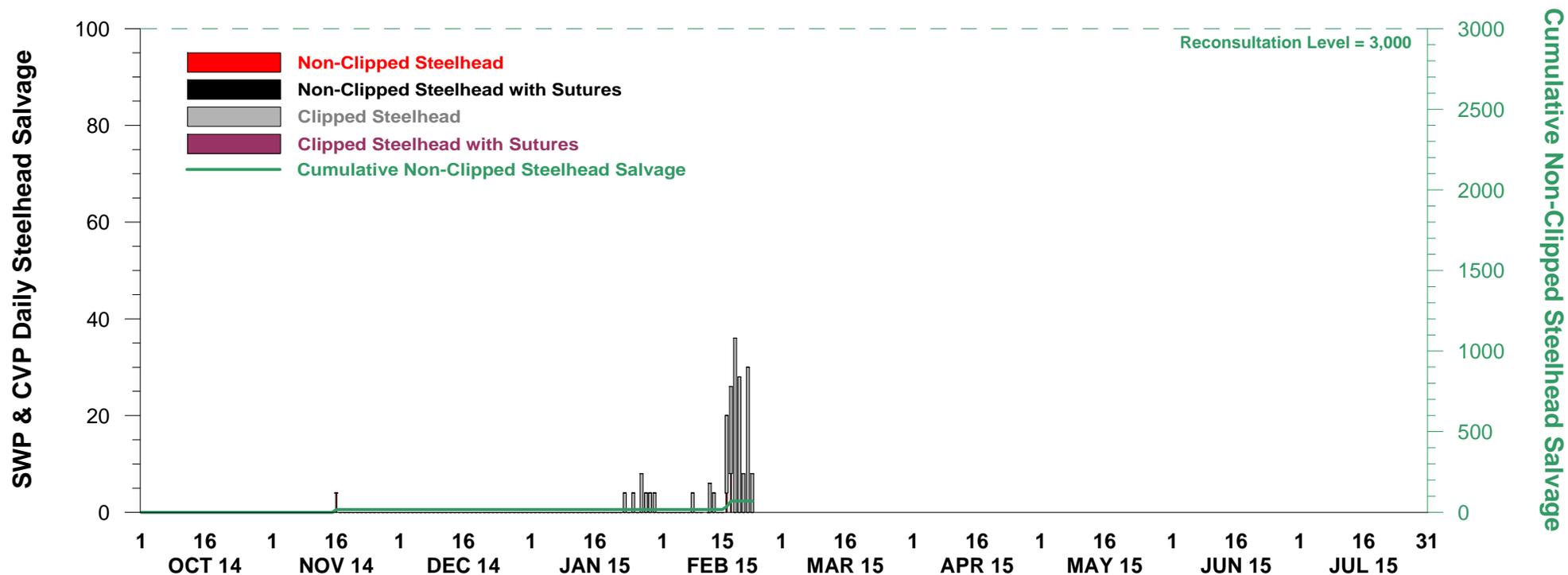
<sup>1</sup> Formerly known as the California Department of Fish and Game (DFG).

# OBSERVED CHINOOK SALVAGE AT THE SWP & CVP DELTA FISH FACILITIES 08/01/2014 THROUGH 2/22/2015

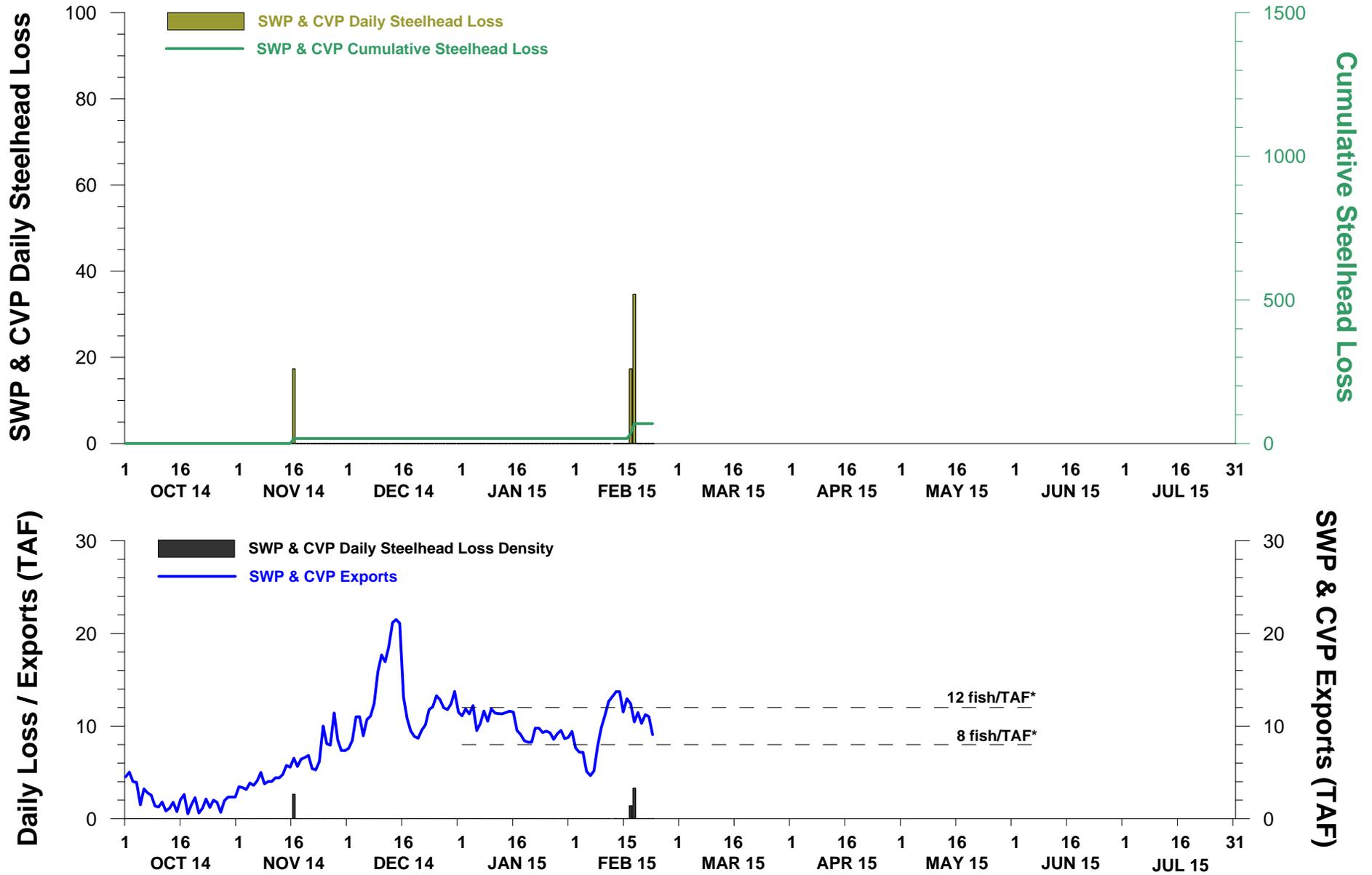


DWR-DES 23 FEB 2015  
 Preliminary data from DFW, DWR, FWS, Reclamation, and CDEC; subject to revision.  
 \*Chinook not measured for length and Chinook outside of the length-at-date criteria (Delta model) are not reported.

# STEELHEAD SALVAGE AT THE DELTA FISH FACILITIES 01 OCT 2014 THROUGH 22 FEBRUARY 2015



# NON-CLIPPED STEELHEAD LOSS AT THE DELTA FISH FACILITIES 01 OCT 2014 THROUGH 22 FEBRUARY 2015



DWR-DES 23 FEBRUARY 2015

Preliminary data from DFW; subject to revision.

\*Used to roughly estimate whether the daily loss is greater than 8 fish/TAF multiplied by the volume exported in TAF or 12 fish/TAF multiplied by the volume exported in TAF.