

**Delta Operations for Salmonids and Sturgeon (DOSS) Group**  
**Conference call: 2/2/16 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:** Aaron Miller, Kevin Reece, Rhiannon Mulligan

**Reclamation:** Josh Israel, Peggy Manza

**NMFS:** Barb Byrne

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

**SWRCB:** Larry Lindsay

**FWS:** Craig Anderson

**Agenda Items**

1. Agenda review and introductions
2. RPA Implementation review
3. Juvenile Production Estimate (JPE) for winter-run Chinook
4. Current Operations
5. Smelt Working Group
6. Fish Monitoring
7. Reclamation/UW project for fish monitoring data synthesis
8. DOSS Advice
9. Next DOSS meeting

**Agenda Item 2.**

**RPA Implementation Review**

**Delta RPA Actions that may affect operations during February:**

**Action IV.1.2<sup>1</sup> (DCC gate operations):**

- DCC gates have been closed since 12/15/15.

**Action IV.2.3<sup>2</sup> (OMR Management based on salvage triggers)**

- No triggers exceeded over past week.
- OMR limit of -5,000 cfs is in effect (but not controlling Delta exports)

**Agenda Item 3.**

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<sup>1</sup> For details, see pages 62-66 in Enclosure 2 of the 2011 Amendments to the 2009 RPA document at: [http://www.westcoast.fisheries.noaa.gov/publications/Central\\_Valley/Water%20Operations/Operations,%20Criteria%20and%20Plan/040711\\_ocap\\_opinion\\_2011\\_amendments.pdf](http://www.westcoast.fisheries.noaa.gov/publications/Central_Valley/Water%20Operations/Operations,%20Criteria%20and%20Plan/040711_ocap_opinion_2011_amendments.pdf)

<sup>2</sup> For details, see pages 74-79 in Enclosure 2 of the 2011 Amendments to the 2009 RPA document at: [http://www.westcoast.fisheries.noaa.gov/publications/Central\\_Valley/Water%20Operations/Operations,%20Criteria%20and%20Plan/040711\\_ocap\\_opinion\\_2011\\_amendments.pdf](http://www.westcoast.fisheries.noaa.gov/publications/Central_Valley/Water%20Operations/Operations,%20Criteria%20and%20Plan/040711_ocap_opinion_2011_amendments.pdf)

**Juvenile Production Estimate (JPE) for winter-run Chinook**

NMFS issued the Juvenile Production Estimate (JPE) of Brood Year 2015 winter-run Chinook; the 1/28/16 letter is posted 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/).

- JPE = 101,716 (the number of wild winter-run Chinook estimated to enter the Delta)
- Incidental take limit (ITL) for wild winter-run Chinook = 1,017 (1% of the JPE, using genetic race assignment)

Byrne (NMFS) noted that because all unclipped salmonids salvaged at the CVP & SWP export facilities will have their tissues analyzed for genetics-based race assignment, the ITL was set directly to 1% of the JPE. Without genetic testing, take is tracked based on winter-run-sized fish assigned based on the length-at-date tables used at the export facilities and, allowing for 50% misclassification, the ITL is set to 2% of the JPE.

One DOSS member asked how the JPE-based OMR triggers should be calculated this year, since, for example, the first stage loss density threshold is defined as “incidental take limit divided by 2000 (2 percent WR JPE ÷ 2000)”. Byrne (NMFS) noted that, in the case of the BY 2015 JPE, both 1% of JPE÷2000 and 2% of JPE÷2000 are less than the minimum trigger value of 2.5 fish/TAF, so the minimum trigger thresholds of 2.5 fish/TAF and 5 fish/TAF are in effect no matter the interpretation of the trigger calculation.

**Agenda Item 4.**  
**Current Operations (2/2/16)**

SWP		CVP	
<b>Exports (cfs)</b>			
Clifton Court Forebay	1,500	Jones Pumping Plant	1,600
<b>Reservoir Releases (cfs)</b>			
Feather - Oroville	950	American - Nimbus	800
		Sacramento - Keswick	3,250
		Stanislaus - Goodwin	200
		Trinity - Lewiston	300
<b>Reservoir Storage (in TAF)</b>			
San Luis (SWP)	506	San Luis (CVP)	191
Oroville	1,558	Shasta	2,376
New Melones	396	Folsom	545
<b>Delta Operations</b>			
DCC	Closed	Sacramento River at Freeport (cfs)	42,452
Outflow Index (cfs)	~42,900	San Joaquin River at Vernalis (cfs)	1,483
E:I	8.7% (14-day avg.)	X2	60 km

Review of factors controlling Delta exports over past week:

- *Tues (1/26/16):* -2,500 cfs OMR limit (per 1/21/16 FWS determination<sup>3</sup>)
- *Weds (1/27/16):* -3,000 OMR limit (per transition to -3,500 cfs OMR limit in 1/26/16 FWS determination<sup>4</sup>)
- *Thurs (1/27/16)-Monday (2/1/16):* -3,500 OMR limit (per 1/26/16 FWS determination)
- *Tuesday (2/2/16):* -2,500 cfs OMR limit (per Reclamation & DWR voluntary flow proposal, described in 2/2/16 FWS Memo<sup>5</sup>)

OMR as of 1/30/16:

	USGS gauges (cfs)	Index (cfs)
5-day	-2,890	-3,180
14-day	-2,740	-3,060

Miller (DWR) noted that Reclamation and DWR are considering removing Contra Costa Water District's (CCWD's) Rock Slough diversion from the CCWD term in the current OMR Index equation to meet the originally-intended implementation of the index formula.

**Agenda Item 5.**

**Smelt Working Group**

The SWG met on Monday, 2/1/16 at 10am. Byrne (NMFS) read the following SWG meeting summary:

The Working Group reviewed current Delta Smelt distribution, salvage data, and Delta conditions. The Working Group described the risk of entrainment under the Service-provided advice framework. Under this framework the relative risk of entrainment for OMR flow ranges is discussed and assessed. For the current week, the risk of entrainment of delta smelt for each of the flow ranges is characterized as follows:

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

These levels of risk are anticipated to drop as turbidity in the Old River corridor and south Delta decreases. Once turbidity decreases to 8 NTU or less in these areas, the risk of entrainment of Delta Smelt for each of the flow ranges will be as follows:

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

The Working Group will continue to monitor Delta Smelt survey and salvage data and Delta conditions, and will meet again on Monday, February 8, 2016 at 10 am.

<sup>3</sup> [http://www.fws.gov/sfbaydelta/documents/smelt\\_working\\_group/Determination\\_memo\\_to\\_bor\\_2016\\_01\\_21.pdf](http://www.fws.gov/sfbaydelta/documents/smelt_working_group/Determination_memo_to_bor_2016_01_21.pdf)

<sup>4</sup> [http://www.fws.gov/sfbaydelta/documents/smelt\\_working\\_group/Determination\\_memo\\_to\\_bor\\_2016\\_01\\_26.pdf](http://www.fws.gov/sfbaydelta/documents/smelt_working_group/Determination_memo_to_bor_2016_01_26.pdf)

<sup>5</sup> [http://www.fws.gov/sfbaydelta/documents/smelt\\_working\\_group/Memo\\_to\\_BOR\\_Voluntary\\_Actions\\_2-2-2016.pdf](http://www.fws.gov/sfbaydelta/documents/smelt_working_group/Memo_to_BOR_Voluntary_Actions_2-2-2016.pdf)

SWG meeting notes are available at: [http://www.fws.gov/sfbaydelta/cvp-swp/smelt\\_working\\_group.cfm](http://www.fws.gov/sfbaydelta/cvp-swp/smelt_working_group.cfm).

**Agenda Item 6.**

**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	Station 902/ Prisoners Pt. Trawls	Sacramento Trawl	Beach Seines	Knights Landing RST <sup>A</sup>	Tisdale RST <sup>B</sup>	GCID RST <sup>C</sup>	Mossdale Kodiak Trawl
Sample Date	1/24-1/30	1/24-1/30	1/24-1/30	1/24-1/30	1/25-2/1	1/25-1/31	1/26-1/29	1/24-1/30
Total Catch	11	60	99	2,008	1945	987	182	1
FR Chinook	1	46	94	1,996	1924	982	156	1
WR Chinook	2			1	1	1	6	
SR Chinook			2	8	5	2	0	
LFR Chinook							2	
Ad-Clipped Chinook	3			1		1	1	
Chinook Adult								
Steelhead (wild)					2		3	
Steelhead (ad-clip)	3	4	3	1	13	1	14	
Green Sturgeon								
Delta Smelt		10		1				
Splittail	2							
Longfin Smelt								
Flows (avg. cfs)					21889	24,117		
W. Temp. (avg. °F)					50.6	49.9		
Turbidity (avg. NTU)					128.4	107.7		

<sup>A</sup> Sampling period was from 1/25 at 12:45 pm to 2/1 at 2:45 pm. Traps were modified to 50% catch.

<sup>B</sup> Sampling period was from 1/25 at 9:30 am to 1/31 at 3:00 pm. Traps were modified to 50% catch.

<sup>C</sup> Sampling period was from 1/26 at 1:00 pm to 1/29 at 3:00 pm. RST cone was raised on 1/29 in anticipation of high flows; was lowered on 2/1 at 10:00 am.

Byrne (NMFS) noted that the catch of 659 fall-run Chinook at the Discovery Park beach seine on 1/29 was the 18<sup>th</sup> highest single-site catch in the 41-year Delta Juvenile Fish Monitoring Program history (seining since 1976).

**Monitoring Summary for DCC and Early Warning surveys:**

Location	Prisoners Pt. Trawls	Sacramento Trawl	Station #902 Trawls
Sample Date	2/1	2/1	1/31
Total Catch	7	2	3
FR Chinook	7	2	3
WR Chinook	0	0	0
SR Chinook	0	0	0
Ad-Clipped Chinook	0	0	0
Delta Smelt	0	0	0

**Red Bluff Diversion Dam (RBDD) Monitoring**

USFWS biweekly report (1/15/16-1/28/16) for preliminary estimates of passage by brood-year and run for unmarked juvenile Chinook salmon captured by rotary screw traps at RBDD included:

Run and Species	Biweekly Total	Brood Year Total
Winter-run Chinook (BY2015)	11,471	332,584

**Upcoming Hatchery Releases**

- DFW reported that Nimbus Hatchery would be releasing a total of ~300,000 steelhead over February 10-11, 2016.
  - 50 of the steelhead will be tagged with 69 kHz acoustic tags.
  - No real-time receivers for the 69 kHz tag technology are planned

**Fish Salvage<sup>6</sup>:**

Fujimura (CDFW) provided the following summaries of salvage and loss at the SWP and CVP fish collection facilities. The salvage figure was generated on the CDFW salvage monitoring web-page: <http://www.dfg.ca.gov/delta/apps/salvage/SalvageExportCalendar.aspx>.

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<sup>6</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.

**DOSS Weekly Salvage Update**  
 Reporting Period: January 25-January 31, 2016  
 Prepared by Bob Fujimura on February 1, 2016 18:21  
 Preliminary Results - Subject to Revision

Criteria	25-Jan	26-Jan	27-Jan	28-Jan	29-Jan	30-Jan	31-Jan	Trend	
<b>Loss Densities</b>									
Wild older juvenile CS	0	0	0	0.85	0	0	0	↗	0.12
Wild steelhead	0	0	0	0	0	0	0	↘	0
<b>Exports</b>									
SWP daily export	2,936	3,281	3,818	5,212	4,643	4,406	4,065	↗	4,052
CVP daily export	4,947	4,173	4,321	4,867	4,867	4,891	4,865	→	4,704
SWP reduced counts	0%	0%	0%	0%	0%	0%	0%	↘	0%
CVP reduced counts	0%	0%	0%	0%	0%	0%	0%	→	0%

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  
 Yellow highlighted dates indicate TFCF salvage outage occurred

**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	2	9	↗	18	35
Spring Run	0	0	→	0	0
Late Fall Run	0	0	→	44	166
Fall Run	16	12	↗	28	35
Unclassified	0	0	→	10	NC
<b>Total</b>	<b>18</b>	<b>20</b>		<b>100</b>	<b>236</b>
<b>Hatchery</b>					
Winter Run	31	96	↘	158	470
Spring Run	0	0	↘	0	0
Late Fall Run	12	25	↘	93	298
Fall Run	0	0	↘	1	4
Unclassified	0	0	↘	0	0
<b>Total</b>	<b>43</b>	<b>121</b>		<b>252</b>	<b>772</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	0	0	↘	4	3
Hatchery	76	285	↗	128	408
<b>Total</b>	<b>76</b>	<b>285</b>		<b>132</b>	<b>411</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 1/25/16-1/31/16.

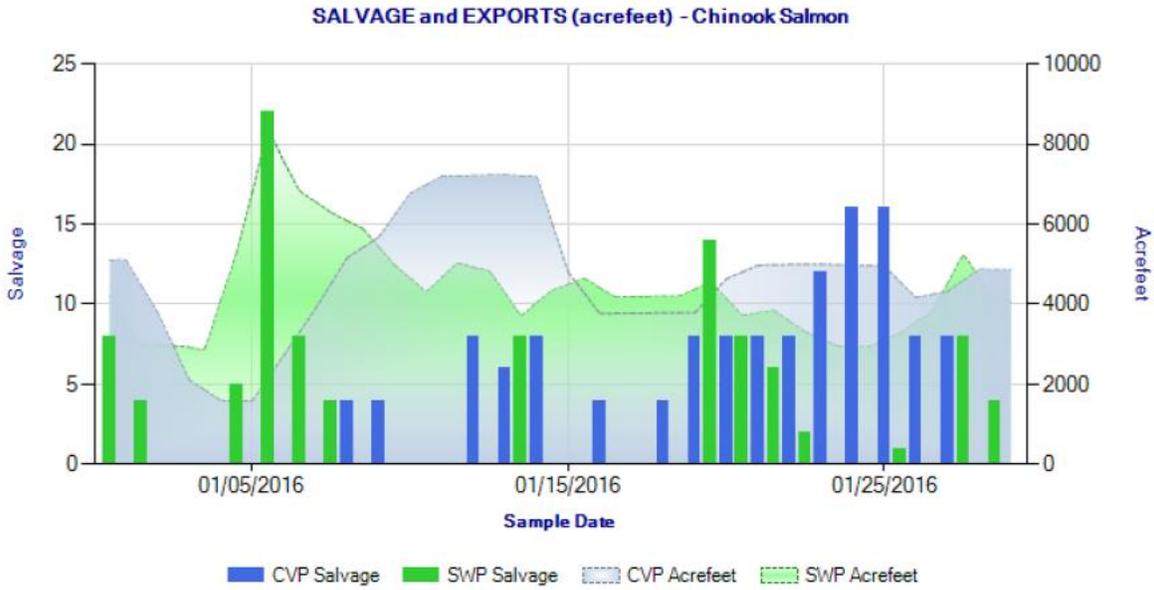


Figure 2. Daily salvage of Chinook salmon (all races) and water exports from the state and federal fish salvage facilities during January 25, 2016 through January 31, 2016.

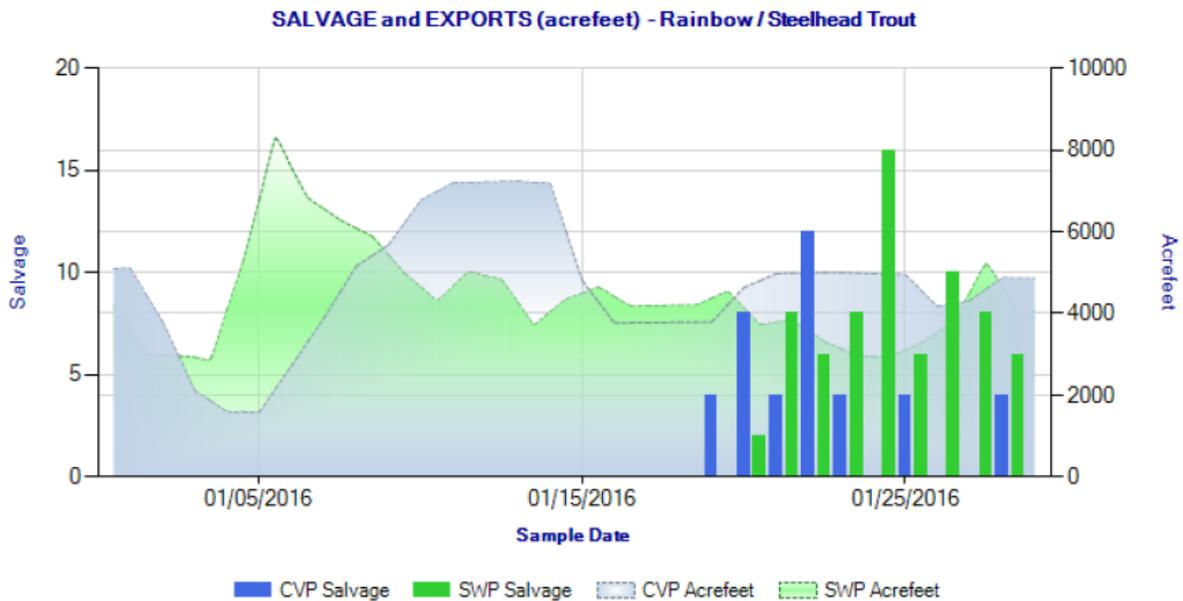


Figure 3. Daily salvage of steelhead and water exports from the state and federal fish salvage facilities during January 25, 2016 through January 31, 2016.

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

CONFIRMED HATCHERY (ADIPPOSE-FIN CLIPPED) CHINOOK SALMON LOSS AT THE SWP & CVP DELTA FISH FACILITIES, 2016/2018

Release Date	CWT Race	Hatchery	Release Site	Release Type	Confirmed Loss	Number Released	% Loss of Total Entering Delta	First Concern Level	Second Concern Level	Date of First Loss	Date of Last Loss
5/11/2015 to 6/12/2015	LF	Coleman NFH	Bate Ferry Boat Ramp, Sacramento River	Production	0.00	434,227	n/a	n/a	n/a	-	-
12/9/2015	LF	Coleman NFH	Batte Creek	Production	256.10	281,213	n/a	n/a	n/a	12/25/2015	1/20/2016
12/11/2015	LF	Coleman NFH	Batte Creek	Spring Surrogate	128.05	77,000	n/a	0.5%	0.7%	12/25/2015	12/1/2016
12/22/2015	LF	Coleman NFH	Batte Creek	Spring Surrogate	161.52	88,000	n/a	0.5%	0.7%	16/2/2016	12/1/2016
1/12/2016	LF	Coleman NFH	Batte Creek	Spring Surrogate	167.70	87,700	n/a	0.5%	0.7%	1/20/2016	1/29/2016

UNCONFIRMED HATCHERY (ADIPPOSE-FIN CLIPPED) CHINOOK SALMON LOSS AT THE SWP & CVP DELTA FISH FACILITIES, 2016/2018

Facility	Unknown CWT Loss	Unread CWT Loss	Unknown Hatchery Loss	Accounting Loss	Number of Unassigned CWTs
SWP	18.15	0.00	0.00	0.00	0
CVP	0.00	0.00	0.00	0.00	0
TOTAL	18.15	0.00	0.00	0.00	0

SWP and CVP adipse-fin clipped Chinook lost from 12/9/2015

-Number released with the adipse-fin clipped and a code-wire tag (CWT).

% Loss of Number Released = (Confirmed Loss/Number Released)\*100.

% Loss of Total Entering Delta = (Confirmed Loss/Total Entering Delta)\*100.

-Date of first and last loss accounts for all CWT loss even those from special studies where salvage and loss=0.

-Adipse-fin clipped Chinook was observed during fish count, but tag code could not be determined (e.g., damaged tag, lost tag, no tag, or Chinook accidentally released).

-Adipse-fin clipped Chinook was collected during fish count and has not been processed yet.

-CWT has been read, but hatchery release information not yet available.

-Adipse-fin clipped Chinook released due to presence of culture.

-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.

\*\* Information not yet available.

DWR-OES Revised 02/02/2016

Preliminary data from CFW, 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. As monitoring information is received, listed species distribution will be updated and included in the following table.

Location	Yet to Enter Delta (Upstream of Knights Landing)	In the Delta	Exited the Delta (Past Chipps Island)
<i>Young-of-year (YOY) winter-run Chinook salmon</i>	5-10% (Last week: 10%)	90-95% (Last week: 90%)	0% - 5% (Last week: same)
<i>Young-of-year (YOY) spring-run Chinook salmon*</i>	35% - 45% (Last week: same)	55% - 65% (Last week: same)	0% - 5% (Last week: same)

\*When reviewing monitoring data, DOSS assumes that some of the juvenile Chinook categorized as fall-run (based on the length at date criteria) are actually genetic spring-run Chinook.

**DOSS Feedback on Entrainment Risk**

DOSS provides weekly entrainment risk outlooks by considering (a) two different categories of entrainment risk based on listed fish distribution and (b) factors that influence their potential for entrainment. The two entrainment risk categories considered include:

- **Interior Delta Entrainment Risk**- fish in the Sacramento River that have the potential to be entrained into the Interior Delta through the Delta Cross Channel (when open) and/or Georgiana Slough; and
- **CVP/SWP Facilities Entrainment Risk**- fish in the Interior Delta that have the potential to be entrained into the CVP/SWP facilities.

Influencing factors considered include:

- **Exposure Risk** (both categories)- estimated scale (low, medium, high) of fish anticipated to be in vicinity of an entrainment risk,
- **Routing Risk** (Interior Delta Entrainment Risk)- estimated scale (low, medium, high) that flow split conditions could result in fish migrating into the interior delta instead of remaining in main channel, and
- **OMR/Export Risk** (CVP/SWP Facilities Entrainment Risk)- for fish in the Interior Delta, estimated scale (low, medium, high) that OMR and/or Export levels could result in entrainment associated with CVP/SWP facilities.

To provide an overall assessment of entrainment risk, the estimated current status of these influencing factors are described below for each of the entrainment risk categories.

**Interior Delta Entrainment Risk for listed salmonids in the Sacramento River over the next week:**

- **Exposure Risk: HIGH**
  - Flow and turbidity increases, which cue salmonid movement, are expected in response to forecasted rains
- **Routing Risk: LOW to MEDIUM**

- Because increased river flows are expected to mute the tidal effects at Georgiana Slough (reducing the risk of routing into Georgiana Slough), the highest outflow for the week has a low risk, and lower flows have a medium risk.
- **Overall Entrainment Risk: MEDIUM**

**CVP/SWP Facilities Entrainment Risk for listed salmonids in the Interior Delta over the next week:**

- **Exposure Risk: MEDIUM**
  - Listed runs are expected to have previously migrated into and be rearing within the Interior Delta.
- **OMR/Export Risk:**
  - OMR -2,500 cfs to -3,500 cfs: LOW
  - OMR -3,500 cfs to -5,000 cfs: MEDIUM to HIGH
- **Overall Entrainment Risk:**
  - OMR -2,500 cfs to -3,500 cfs: LOW to MEDIUM
  - OMR -3,500 cfs to -5,000 cfs: MEDIUM

**Agenda Item 7.**

**Reclamation/UW project for fish monitoring data synthesis**

Israel (Reclamation) mentioned that he is working with U. Washington to develop a Central Valley analog to the Columbia River DART (Data Access in Real Time) website<sup>7</sup>. He asked DOSS for suggestions on the types of data comparisons that would be helpful to include on the site, and will share the draft tool with DOSS once further developed.

**Agenda Item 8.**

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

**Agenda Item 9.**

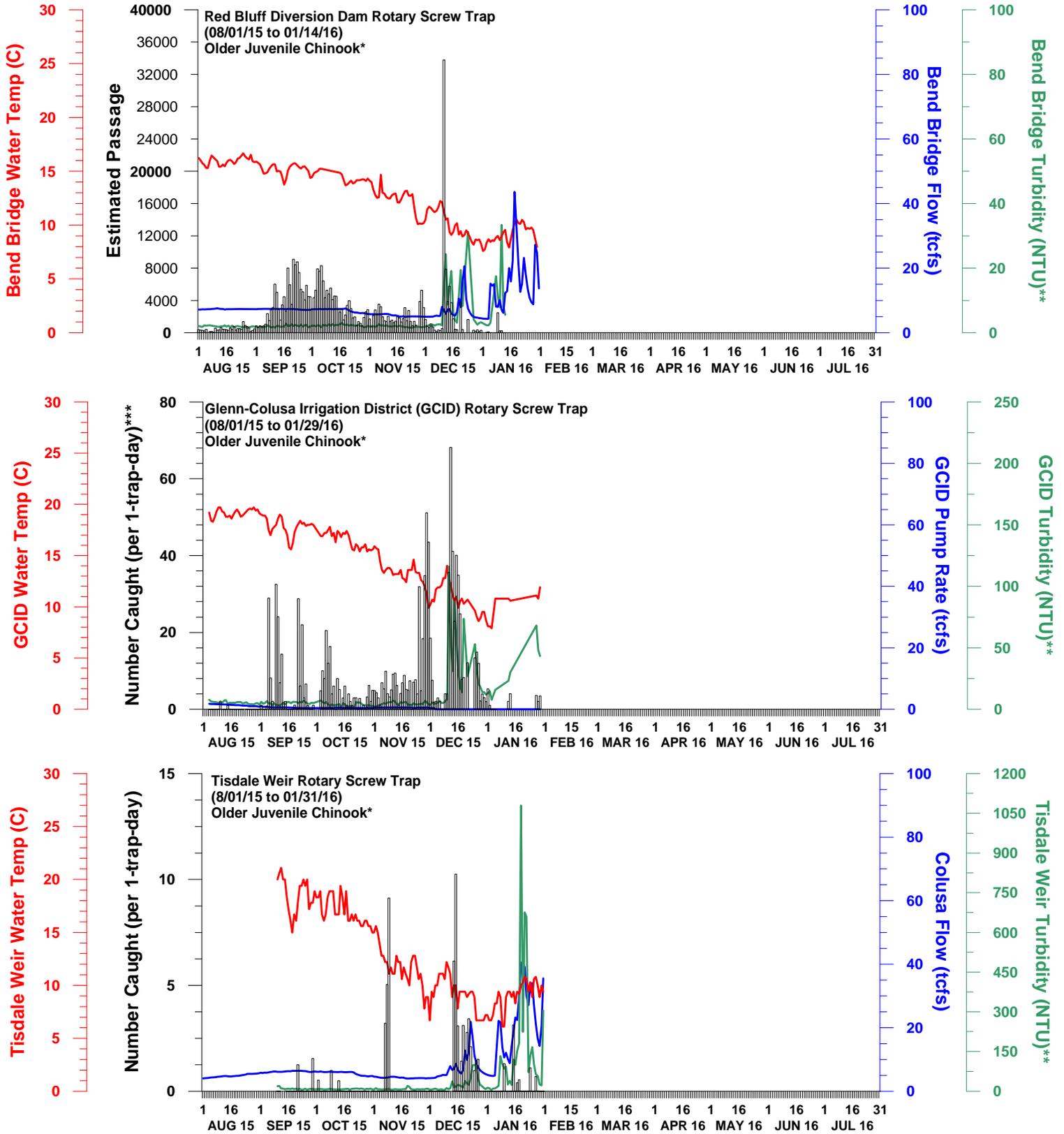
**Next Meeting:** The next DOSS conference call will be on 2/9/16 at 9am.

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

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<sup>7</sup> <http://www.cbr.washington.edu/dart>

# NUMBER OF UNMARKED OLDER JUVENILE CHINOOK MEASURED IN THE SACRAMENTO RIVER

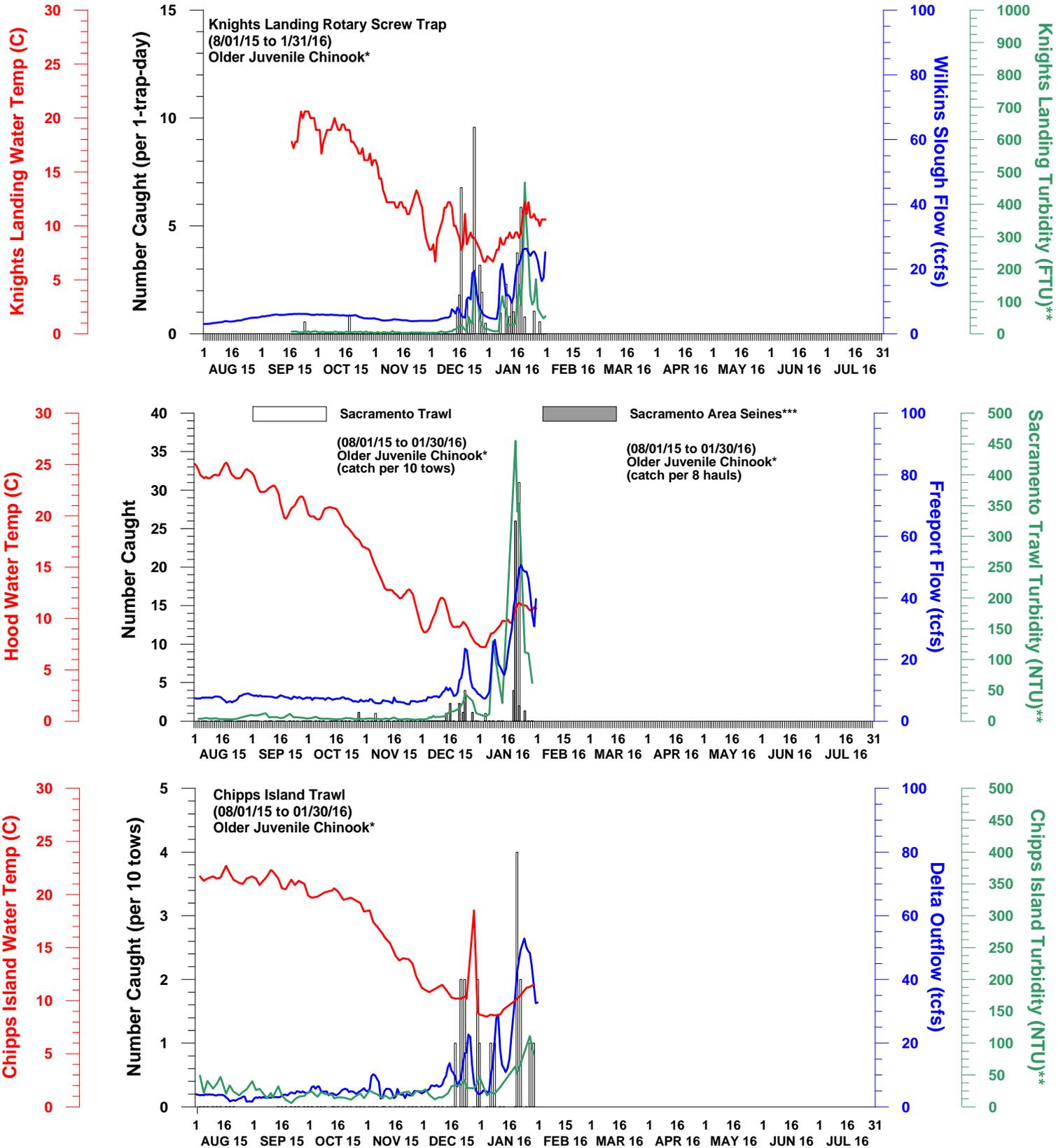


DWR-DES 02 FEB 2016  
 Preliminary data from DFW, FWS, GCID, and CDEC; subject to revision.

\*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.

-Tisdale: 12/12/2015-12/13/2015 there was a river right revolution malfunction.

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



DWR-DES 2 FEB 2016

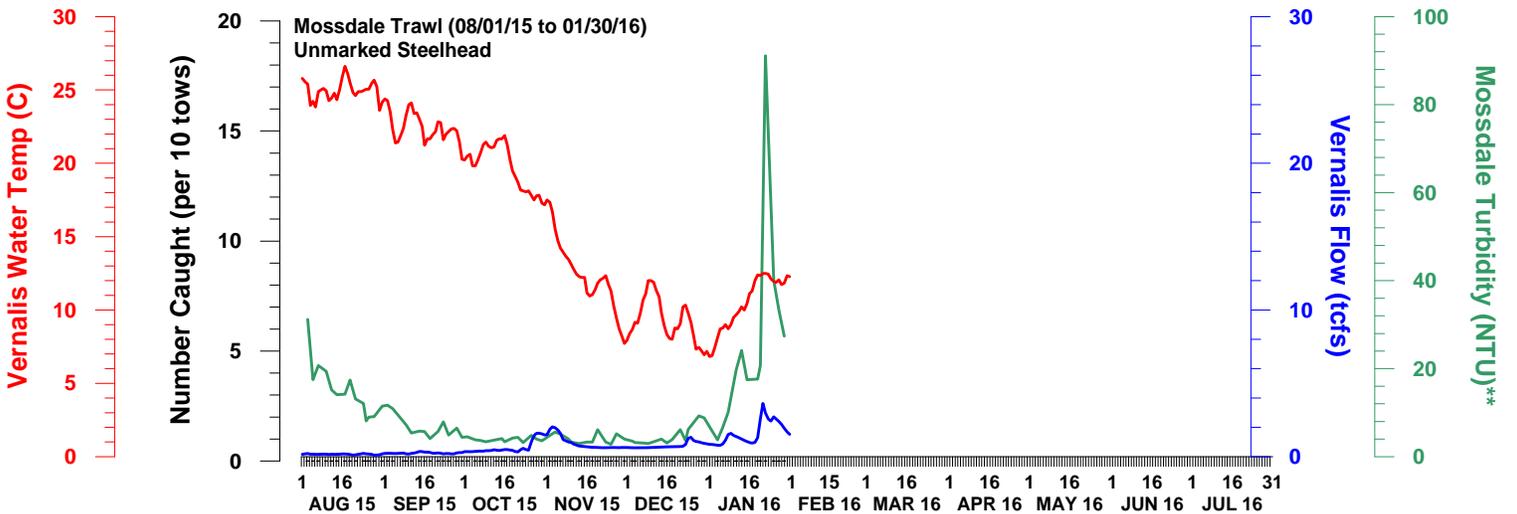
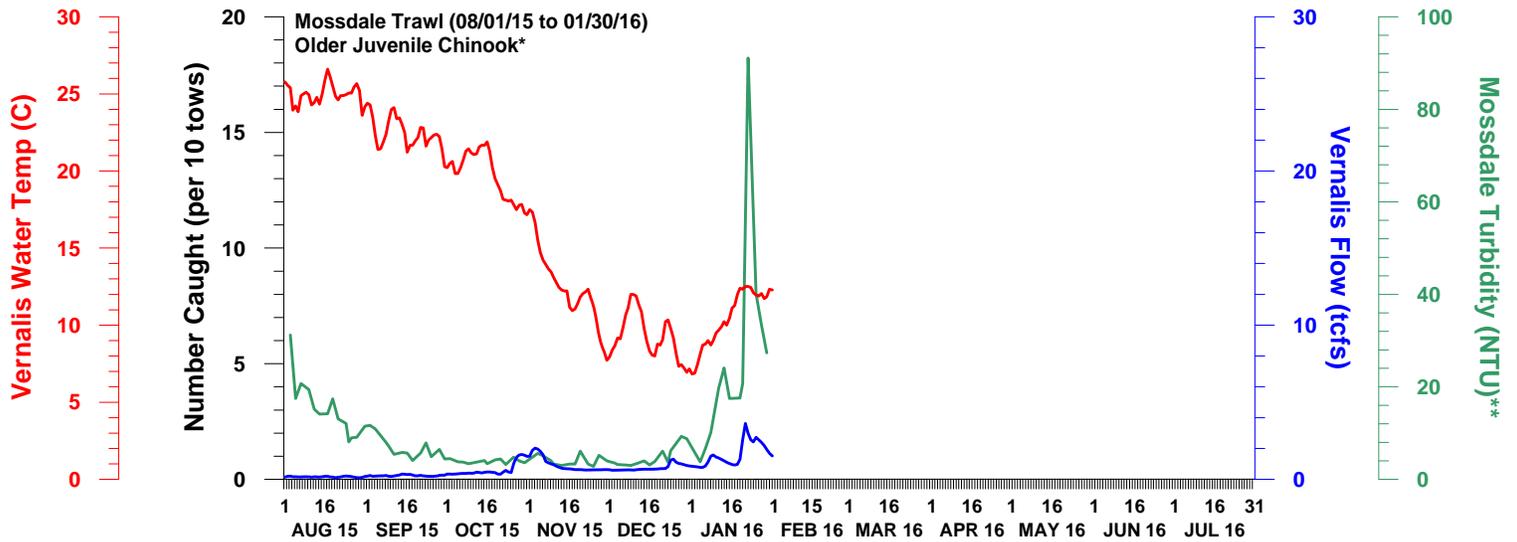
Preliminary data from DFW, FWS, and CDEC; subject to revision.

\*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

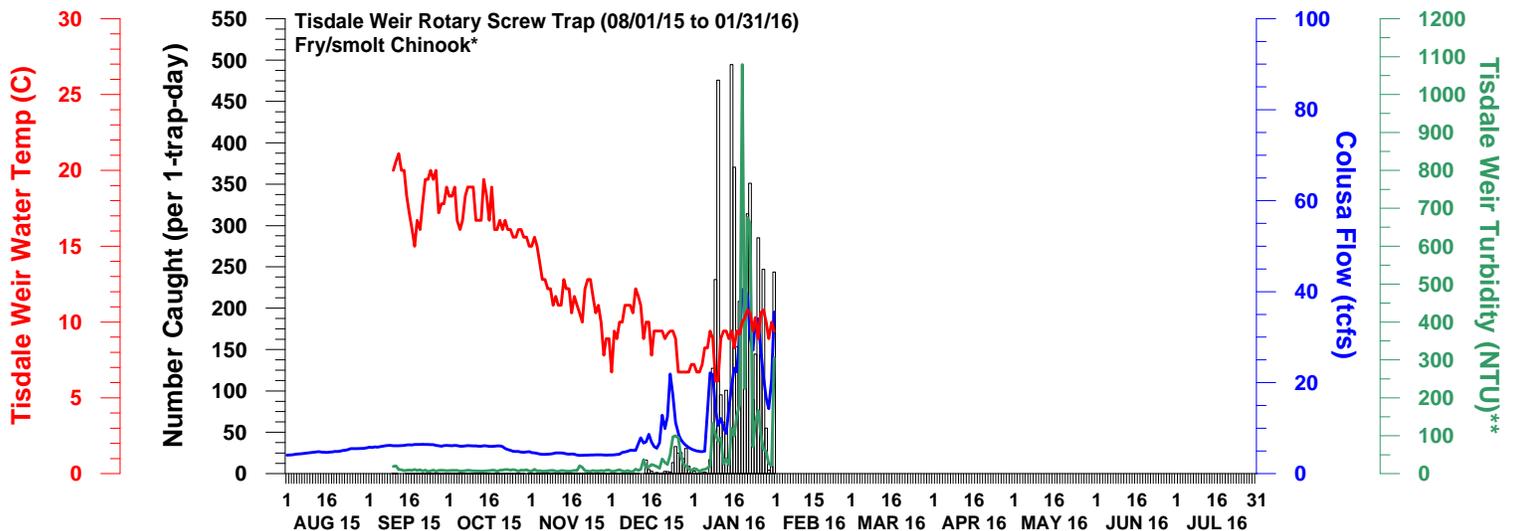
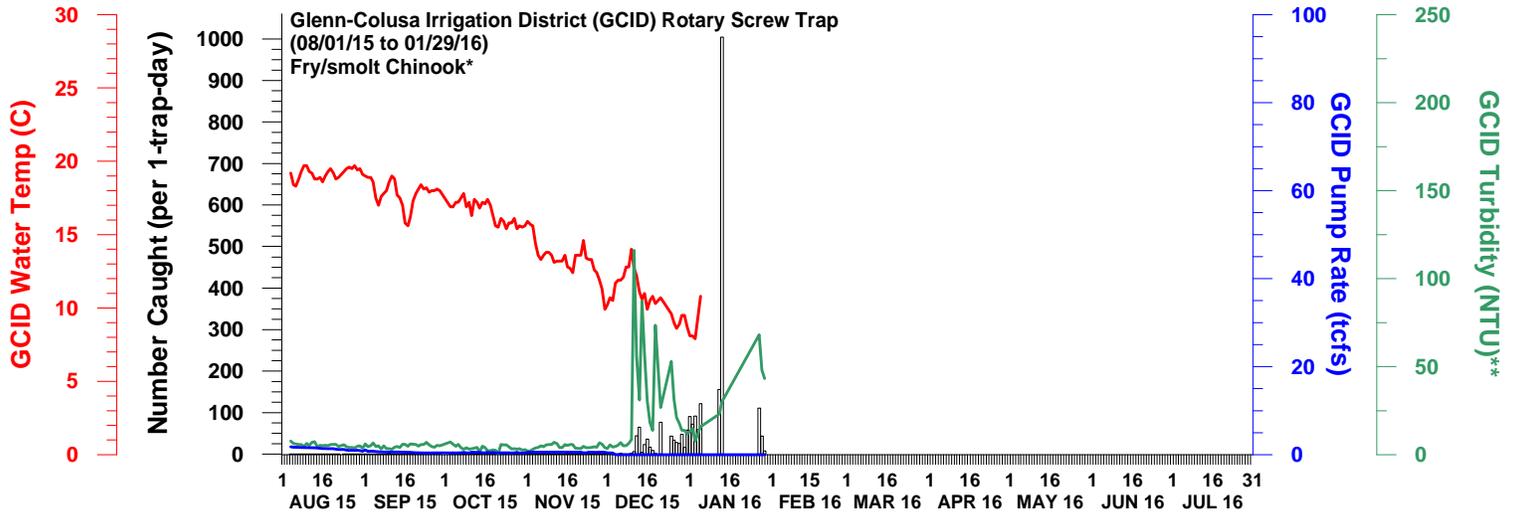
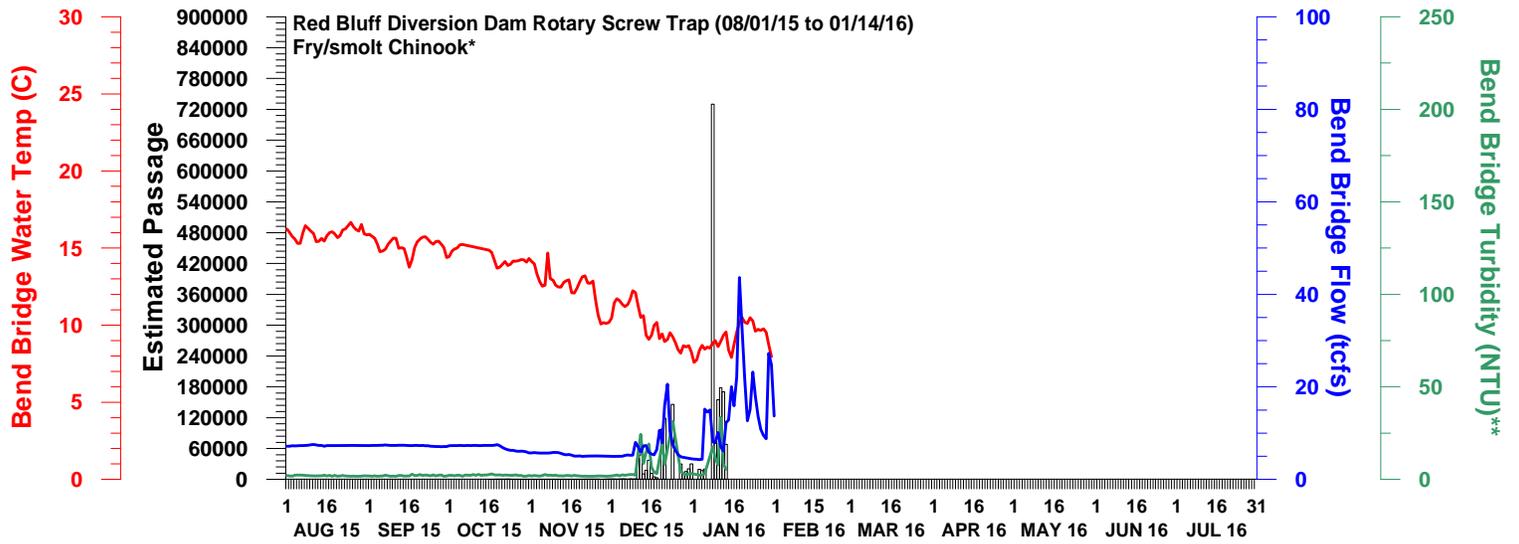


DWR-DES 2 FEB 2016  
Preliminary data from FWS and CDEC; subject to revision.

\*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



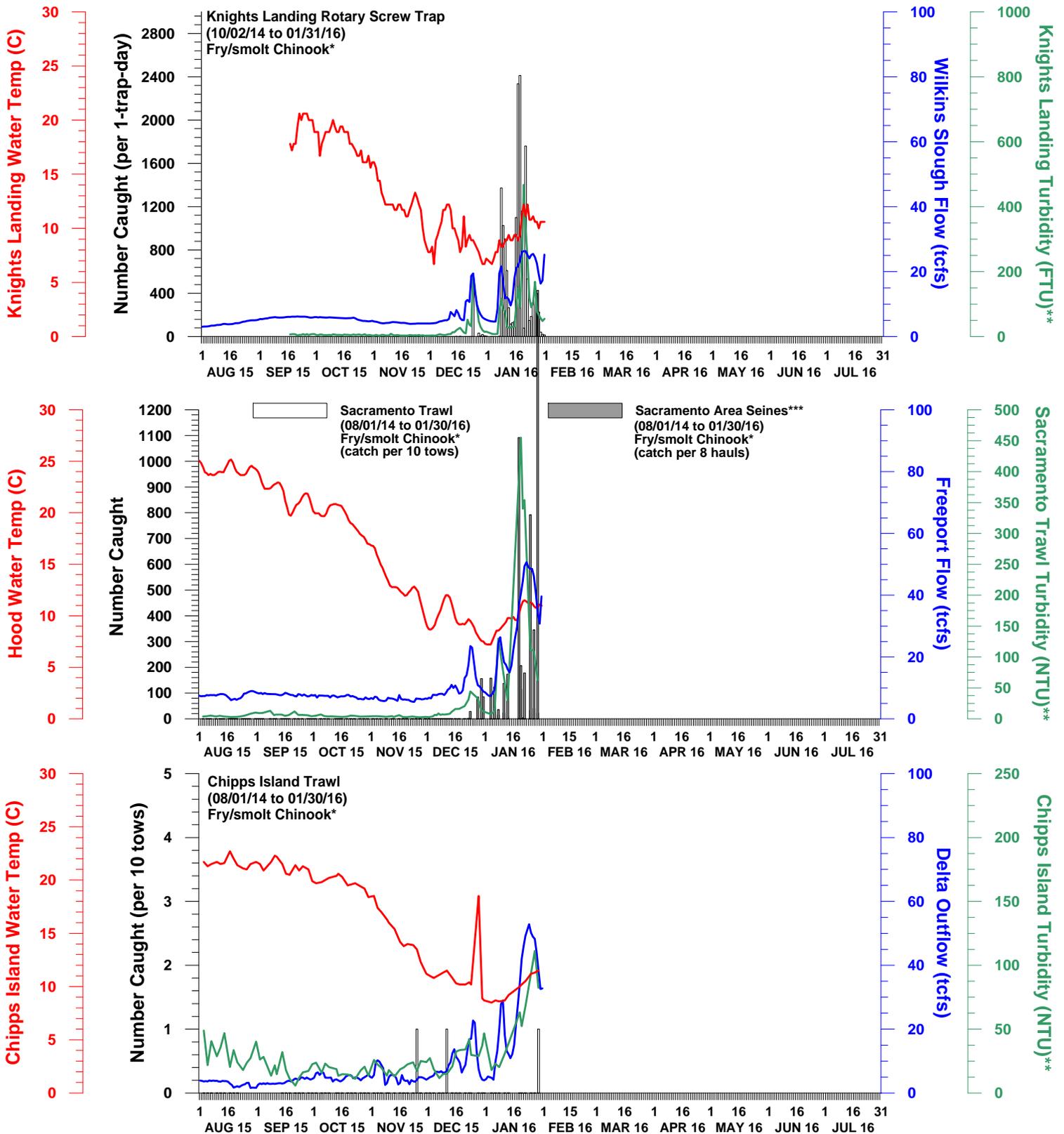
DWR-DES 2 FEB 2016

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.

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



DWR-DES 2 FEB 2016

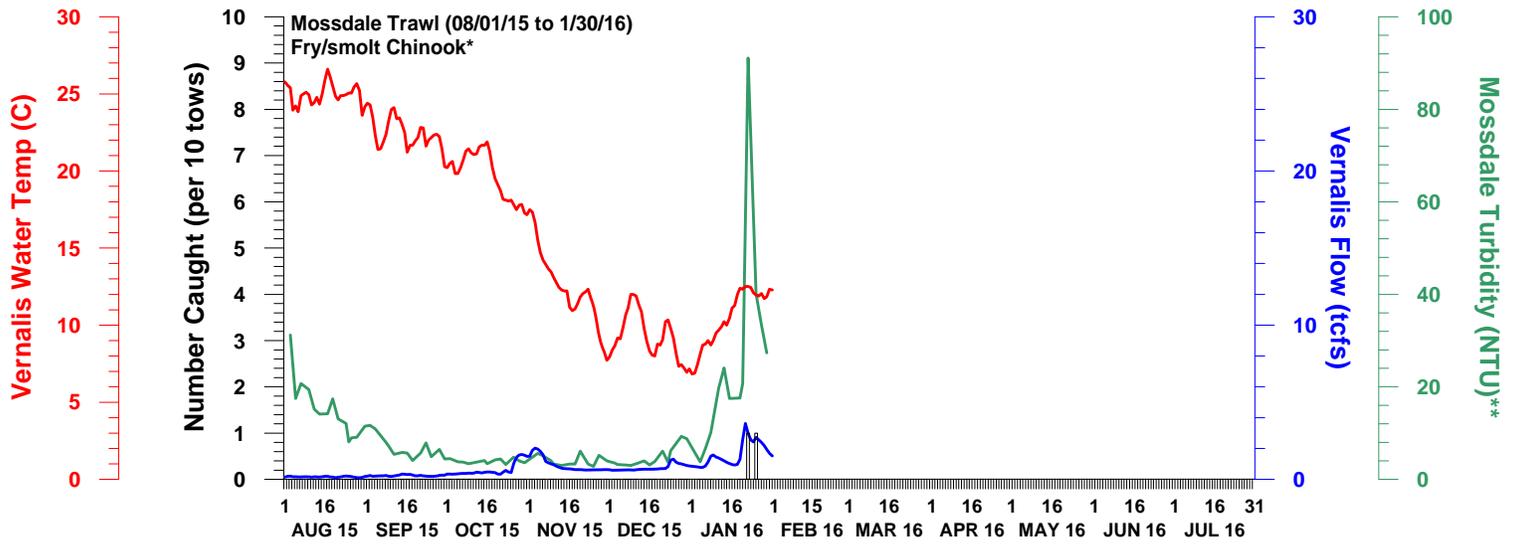
Preliminary data from DFW, FWS, and CDEC; subject to revision.

\*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



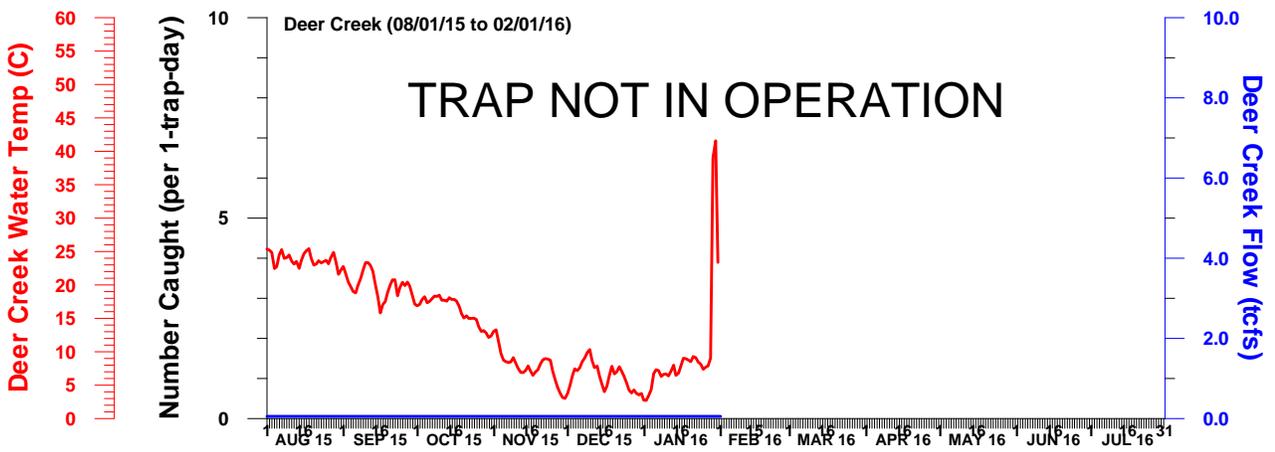
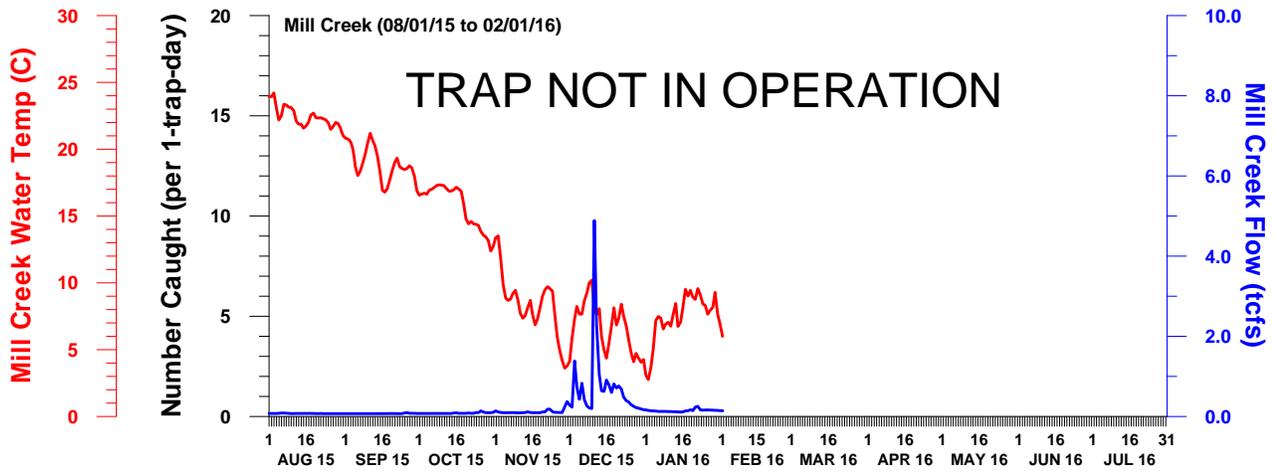
DWR-DES 2 FEB 2016

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\\_final.html](http://www.fws.gov/redbluff/rbdd_biweekly_final.html)).

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).

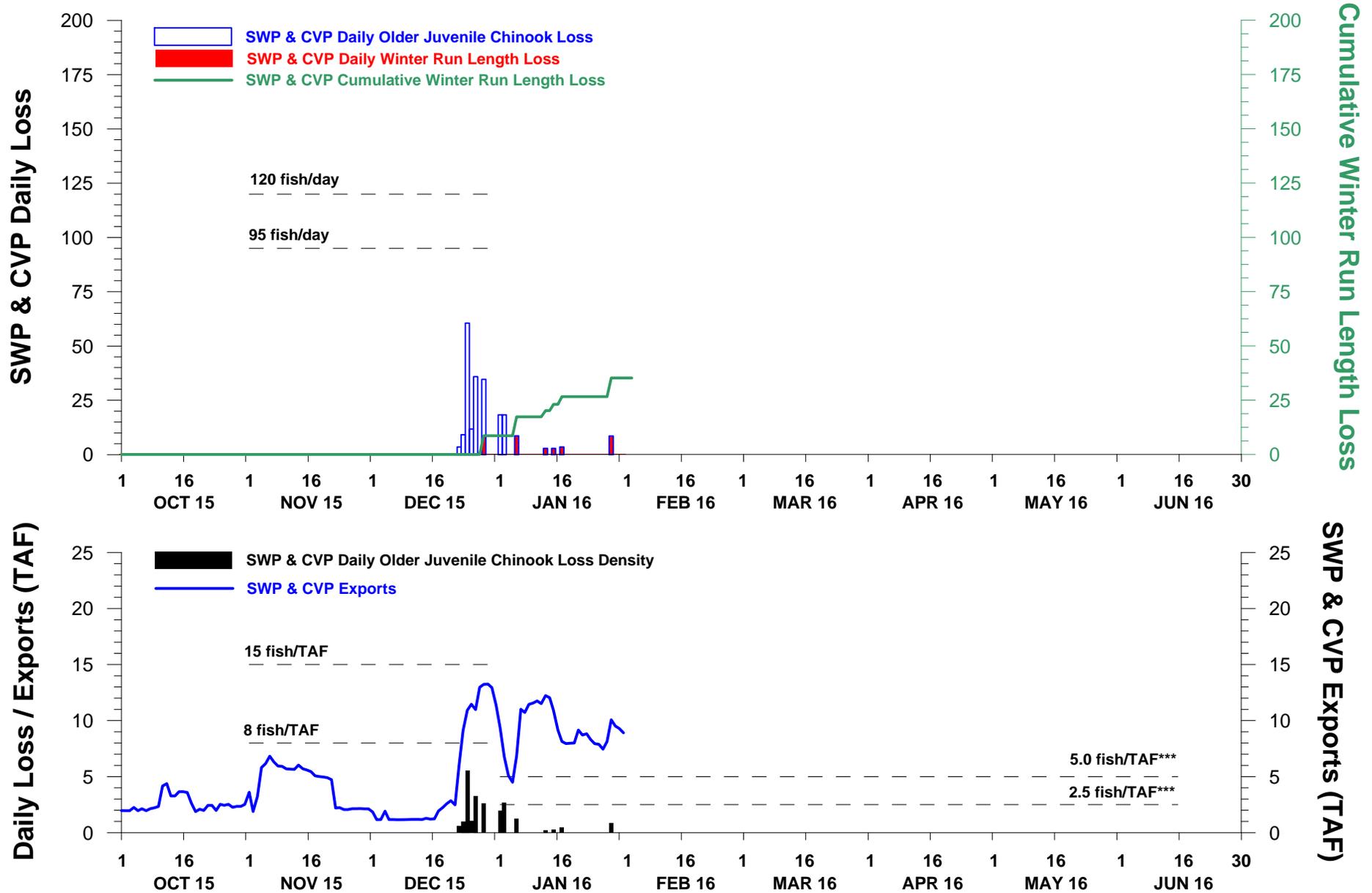
The hydrology data were either downloaded from the California Data Exchange Center (CDEC) (<http://cdec.water.ca.gov>) or obtained directly from the California Department of Water Resources, Operations Control Office.

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



# NON-CLIPPED WINTER RUN & OLDER JUVENILE CHINOOK LOSS AT THE DELTA FISH FACILITIES 01 OCT 2015 THROUGH 26 JAN 2016



DWR-DES 02 FEB 2016

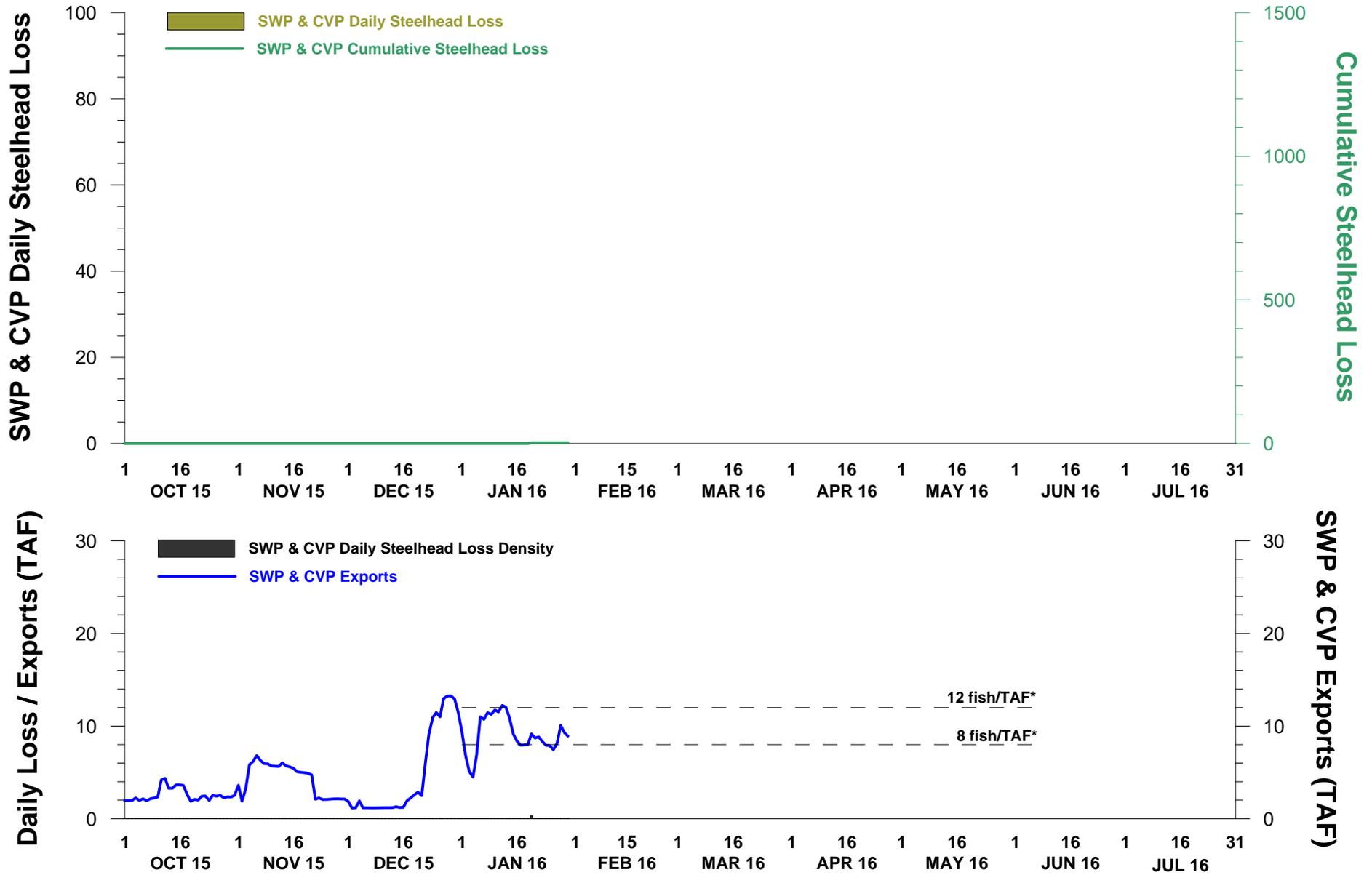
Preliminary data from DFW; subject to revision.

\*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 (Delta model) for which a race is assigned on a given sampling date.

\*\*ITL (Incidental Take Limit) is based on the JPE, which is not yet available.

\*\*\*minimum value determined by NMFS

# NON-CLIPPED STEELHEAD LOSS AT THE DELTA FISH FACILITIES 01 OCT 2015 THROUGH 2 FEB 2016



DWR-DES 2 FEB 2016

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.

# STEELHEAD SALVAGE AT THE DELTA FISH FACILITIES 01 OCT 2015 THROUGH 26 Jan 2016

