

**Delta Operations for Salmonids and Sturgeon (DOSS) Group**  
**Conference call: 4/26/16 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, Mike Ford, Rhiannon Mulligan, Dan Yamanaka, James Edwards

**Reclamation:** Josh Israel, Peggy Manza

**NMFS:** Jeff Stuart, Kristin McCleery

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

**SWRCB:** Chris Carr

**FWS:** Craig Anderson, Leigh Bartoo

**Agenda Items**

1. Agenda review and introductions
2. RPA Implementation review
3. Current Operations
4. Smelt Working Group
5. Fish Monitoring: Salvage
6. Fish Monitoring: Hatchery winter-run Chinook acoustic-tracking
7. Fish Monitoring: RSTs/trawls/seines
8. Recent or Upcoming Hatchery Releases
9. DOSS Estimates of Fish Distribution and Entrainment Risk
10. DOSS Advice
11. Next DOSS meeting

**Agenda Item 2.**

**RPA Implementation Review**

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

**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 Flow Management)**

- No triggers exceeded over past week.
- Current OMR limit of -5,000 cfs is in effect for NMFS' species under this RPA action.

---

<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)

**Action IV.2.1<sup>3</sup> (I:E ratio)**

- Beginning 4/1/16, the inflow to export ratio (I:E) RPA action (*i.e.*, San Joaquin River inflow at Vernalis to combined CVP/SWP exports) is in effect.
- The current water yeartype is classified as a Dry<sup>4</sup> year, requiring an I:E ratio of 2:1. This action restricts combined exports to 50% of Vernalis flow, or 1,500 cfs, whichever is greater).
- On 4/14/16, NMFS concurred with Reclamation's request for flexibility in the I:E ratio which would allow additional water (up to 75 thousand acre feet [TAF]) released from New Melones reservoir by Oakdale Irrigation District and South San Joaquin Irrigation District (augmented water) to be diverted at a 1:1 ratio by the Projects and to move this water south of Delta. Remaining "unaugmented water" in the system, as measured at Vernalis, would be continued to be exported at the 2:1 ratio by the Projects, with a minimum export rate of 1,500 cfs for human health and safety.

**Agenda Item 3.**

**Current Operations (4/26/16)**

SWP		CVP	
<b>Exports (cfs)</b>			
Clifton Court Forebay	1,600*	Jones Pumping Plant	1,000*
<b>Reservoir Releases (cfs)</b>			
Feather - Oroville	1,050**	American - Nimbus	3,000
		Sacramento - Keswick	5,000
		Stanislaus - Goodwin	3,200***
		Trinity - Lewiston	800****
<b>Reservoir Storage (in TAF)</b>			
San Luis (SWP)	579	San Luis (CVP)	403
Oroville	3,373	Shasta	4,208
New Melones	635	Folsom	821
<b>Delta Operations</b>			
DCC	Closed	Sacramento River at Freeport (cfs)	14,799
Outflow Index (cfs)	~16,500	San Joaquin River at Vernalis (cfs)	2,980
E:I	12.3% (14-day avg.)	X2	70 km

\* Both the CVP and SWP plan to adjust export pumping (SWP adjusts inflows to CCFB) to mirror changes in the San Joaquin River flows at Vernalis and while complying with RPA Action IV.2.1 and the relaxation of the I:E ratio per the request by Reclamation to pick up augmented water released on the Stanislaus River.

\*\*Oroville Reservoir releases are at their seasonal minimum of 1,050 cfs.

\*\*\*Goodwin flows include the augmented flows as well as the required Appendix 2-e pulse volume as reshaped by the Stanislaus Operating Group. Flow peaked at 3,200 cfs on 4/26/16, and will drop to 1,400 cfs on 4/30/16. Stanislaus River spring pulse flows are expected to end no later than May 31, 2016.

<sup>3</sup> For details, see pages 68-70 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>4</sup> I:E Ratio in effect depends upon the San Joaquin basin yeartype. The yeartype is currently designated as Dry.

\*\*\*Lewiston was up to 1,200 cfs on 4/25, down to 800 cfs on 4/26, and another pulse will occur starting on 4/27.

OMR as of 4/23/16:

	USGS gauges (cfs)	Index <sup>5</sup> (cfs)
5-day	-2,070	-1,810
14-day	-1,630	-1,860

The daily OMR Index on 4/25/16 was -2,760 cfs.

Review of factors controlling Delta exports for the period 4/1/16 to 4/26/16:

- Friday (4/1/16) through Tuesday (4/26/16) the NMFS RPA action IV.2.1 has been in effect, which includes the implementation of the flexibility request from Reclamation as of 4/14/16
- FWS determination (4/19/16) to protect Delta smelt larvae with an OMR no more negative than -2500 cfs on a 14-day average remains in effect in addition to NMFS' RPA
- Since the start of the spring pulse flows on 4/16/16, the Projects have operated their exports to comply with both the NMFS' RPA IV.2.1 and the FWS determination, as each may become limiting dependent on ambient conditions

Weather forecast indicates light precipitation for tomorrow. The Weather Service forecast calls for possible scattered showers over the northern Sierras from Thursday through the weekend. Otherwise dry with above normal temperatures through Sunday.

**Agenda Item 4.**

**Smelt Working Group**

The SWG met on Monday, 4/25/16 at 10am. Bartoo (FWS) provided the following SWG meeting summary via e-mail:

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 larval and juvenile Delta Smelt for each of the flow ranges is characterized as follows:

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

The Working Group is following guidance for entrainment protections from both Action 2 (adult Delta Smelt) and Action 3 (juvenile Delta Smelt). The Working Group will continue to monitor Delta Smelt survey and salvage data and Delta conditions, and will meet again on Monday, May 2, 2016 at 10 am.

---

<sup>5</sup> Beginning 2/16/16, the OMR Index values reported in the DOSS notes were calculated using an OMR Index equation that no longer includes (per the original intent of the index equation) the Contra Costa Water District's Rock Slough diversion in the export term. Beginning February 2016, the OMR Index values reported in the monthly OMR reports on the "CVO Reports" website (<http://www.usbr.gov/mp/cvo/index.html>) were calculated using this adjusted equation without the Rock Slough diversion.

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 5.**

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

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

---

<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: April 18-April 24, 2016  
 Prepared by Bob Fujimura on April 25, 2016 20:32  
 Preliminary Results -Subject to Revision

Criteria	18-Apr	19-Apr	20-Apr	21-Apr	22-Apr	23-Apr	24-Apr	Trend	
<b>Loss Densities</b>									
Wild older juvenile CS	0	0	0	0	0	0	0	→	0
Wild steelhead	0	0	0	0	0	0	0	↘	0
<b>Exports</b>									
SWP daily export	718	1,255	992	1,101	1,111	1,074	3,058	↗	1,330
CVP daily export	1,972	1,975	1,979	1,980	1,983	1,979	1,965	→	1,978
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	0	0	→	36	56
Spring Run	4	3	↘	86	124
Late Fall Run	0	0	→	44	166
Fall Run	0	0	→	82	92
Unclassified	0	0	→	14	NC
<b>Total</b>	<b>4</b>	<b>3</b>		<b>262</b>	<b>438</b>
<b>Hatchery</b>					
Winter Run	0	0	→	213	629
Spring Run	0	0	→	650	560
Late Fall Run	0	0	→	93	298
Fall Run	0	0	→	5	7
Unclassified	0	0	→	0	0
<b>Total</b>	<b>0</b>	<b>0</b>		<b>961</b>	<b>1,494</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	↘	113	267
Hatchery	1	1	↘	1,301	3,498
<b>Total</b>	<b>1</b>	<b>1</b>		<b>1,414</b>	<b>3,764</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 4/18/16-4/24/16.



Figure 2. Daily salvage of Chinook salmon (all races) and water exports from the state and federal fish salvage facilities during March 21, 2016 through April 24, 2016.

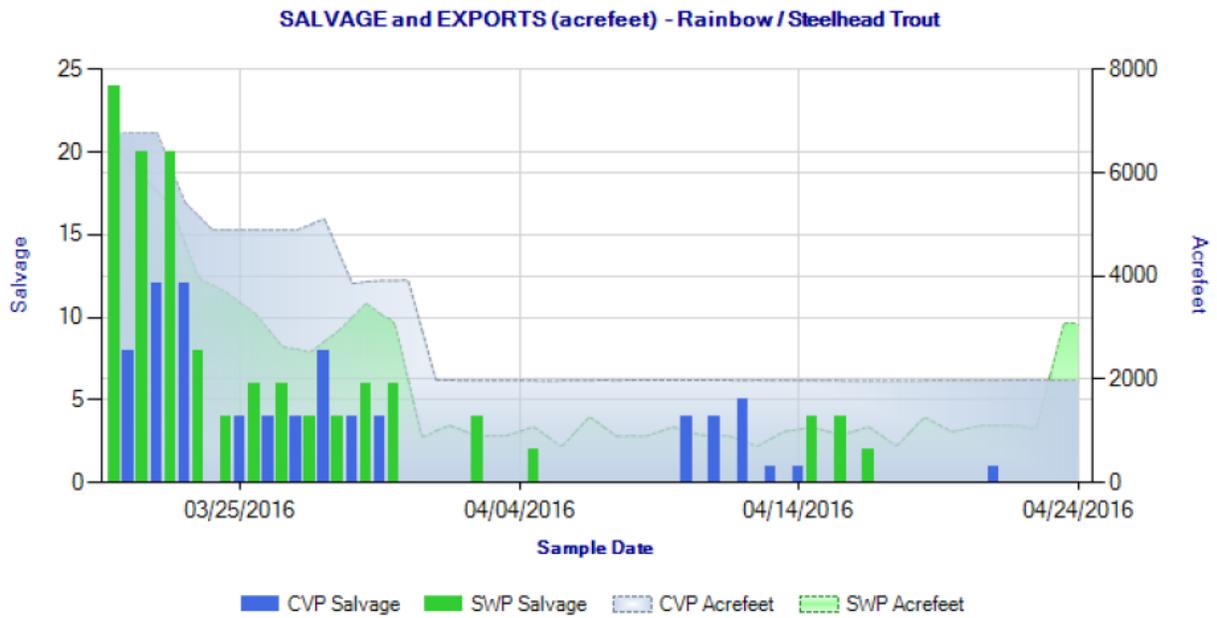


Figure 3. Daily salvage of steelhead and water exports from the state and federal fish salvage facilities during March 21, 2016 through April 24, 2016.

Preliminary salvage report for Monday, 4/25/16:

- 8 spring-run sized non-clipped Chinook and 1 clipped steelhead were observed at the CVP.

- 6 adipose clipped steelhead were observed at the SWP.
- A scheduled outage occurred yesterday at the Tracy Fish Collection Facility with 2 additional outages occurring. Total time of outage was 125 minutes to troubleshoot and install an additional generator. A fish count was missed during the outage at 1400 hours.
- There is a 1-hour scheduled outage for tomorrow.

### **Coded-wire-tag recoveries**

Mulligan (DWR) provided the following summary of coded-wire-tag recoveries at the SWP and CVP fish collection facilities. The cumulative loss of the hatchery winter-run Chinook group (released by Livingston Stone National Fish Hatchery (LSNFH) on 2/17/16 to 2/18/16) is 11.19, 0.003% of the number released. The most recent salvage of LSNFH hatchery winter-run Chinook occurred on Monday, 3/14/16. The cumulative loss of the third spring-run Chinook surrogate group (released from Coleman National Fish Hatchery on 1/12/16) continues to hold at 0.412%. Loss of Chinook within any spring-run Chinook surrogate group has not occurred since 2/12/16.

CONFIRMED HATCHERY (ADIPOSE-FIN CLIPPED) CHINOOK SALMON LOSS AT THE SWP & CVP DELTA FISH FACILITIES, 2015/2016

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>4</sup>
6/11/2015 to 6/12/2015	LF	Coleman NFH	Balls Ferry Boat Ramp, Sacramento River	Production	0.00	434,227	n/a	0.000	n/a	n/a	n/a	*	*
12/9/2015	LF	Coleman NFH	Battle Creek	Production	305.22	261,213	n/a	0.117	n/a	n/a	n/a	12/25/2015	2/12/2016
12/11/2015	LF	Coleman NFH	Battle Creek	Spring Surrogate	128.05	77,000	n/a	0.166	n/a	0.5%	1.0%	12/25/2015	1/21/2016
12/22/2015	LF	Coleman NFH	Battle Creek	Spring Surrogate	188.93	68,000	n/a	0.278	n/a	0.5%	1.0%	1/6/2016	3/29/2016
1/12/2016	LF	Coleman NFH	Battle Creek	Spring Surrogate	278.65	67,700	n/a	0.412	n/a	0.5%	1.0%	1/20/2016	2/12/2016
2/17/2016 to 2/18/2016	W	Livingstone NFH	Sacramento River	Winter Run Production	11.19	420,006	155400	0.003	0.00720	0.5%	1.0%	3/6/2016	3/14/2016
3/14/2016	F	Coleman NFH	Battle Creek	Fall run Production	0.00	864,486	n/a	0.000	n/a	n/a	n/a	*	*
3/18/2016	S	Feather River Hatchery	San Joaquin River	River restoration program	439.33	45,000	n/a	0.976	n/a	n/a	n/a	3/20/2016	4/6/2016
3/19/2016	S	Feather River Hatchery	San Joaquin River	special study	82.156	60000	n/a	0.136	n/a	n/a	n/a	3/21/2016	4/7/2016
2/1/2016	F	Coleman NFH	Yolo bypass inundated Rice fields at Knaggs Ranch	special study	0.00	6,145	n/a	0.000	n/a	n/a	n/a	*	*
3/1/2016	F	Feather River Hatchery	Yolo bypass at Toe drain and Sacramento river at Elkhorn	special study	0.00	94,000	n/a	0.000	n/a	n/a	n/a	*	*

UNCONFIRMED HATCHERY (ADIPOSE-FIN CLIPPED) CHINOOK SALMON LOSS AT THE SWP & CVP DELTA FISH FACILITIES, 2015/2016

Facility	Unknown CWT Loss <sup>5</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	35.30	0.00	0.00	0.00	0
CVP	7.95	0.00	0.00	0.00	0
TOTAL	43.25	0.00	0.00	0.00	0

SWP and CVP adipose-fin clipped Chinook lost from 10/1/2015 through 6/21/2016.

<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, no 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 4/26/2016

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

**Agenda Item 6.**

**Fish Monitoring: Hatchery winter-run Chinook acoustic-tracking**

LSNFH released approximately 420,000 hatchery winter-run Chinook at Bonnyview Bridge in Redding – one group on 2/17/16 and the other group on 2/18/16. 285 of each release group (for a total of 570) were acoustic-tagged with JSATS tags and NOAA’s Southwest Fisheries Science Center (SWFSC) is tracking movement of these acoustic-tagged fish past eight “real-time” receiver locations from Redding to Middle River.

The summary update from March 28 was the final update for this year unless additional tagged fish are detected in the real-time array. As of the final update, 49% of the acoustic-tagged hatchery winter-run Chinook had passed the Tower Bridge receiver in Sacramento.

**Agenda Item 7.**

**Fish Monitoring: RSTs/trawls/seines**

The following table presents fish monitoring data. Unless otherwise noted, reported sizes are fork length and runs are based on length at date criteria. See also:

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

Location	Chippis Is. Midwater Trawl <sup>A</sup>	Station 902/Jersey Pt./Prisoners Pt. Trawls <sup>A</sup>	Sacramento Trawl <sup>A</sup>	Beach Seines <sup>A</sup>	Knights Landing RST <sup>B</sup>	Tisdale RST <sup>C</sup>	GCID RST <sup>D</sup>	Mossdale Kodiak Trawl <sup>E</sup>
Sample Date	4/18, 4/20, 4/22	902: Jersey Pt: Pris. Pt: No data received	4/18, 4/20, 4/22	4/18-4/21	4/17-4/25	4/18-4/25	4/20-4/26	4/18-4/23
FR Chinook	224		126	115	343	50	709	55
WR Chinook			1					
SR Chinook	231		12		35	4	37	
LFR Chinook								
Ad-Clipped Chinook	124		70	1	91	12	197	3
Chinook Adult								
Steelhead (wild)								
Steelhead (ad-clip)								
Green Sturgeon								
Delta Smelt								
Splittail	1			109				
Longfin Smelt								

<b>Flows (avg. cfs)</b>					6536	7289	961	
<b>W. Temp. (avg. °F)</b>					66.5	64.3	62.4	
<b>Turbidity (avg. NTU)</b>					15.3	18.5	14.5	

<sup>A</sup> Data reported in the 4/17 to 4/23 DJFMP sampling summary. Sacramento trawls switched from Kodiak trawl net to mid-water trawl net April 1.

<sup>B</sup> Sampling period was from 4/17 at 9:15 am to 4/25 at 10:15am. 65 BBY-stained FRCS were released 1 mi up-river @ 10:10 on 4/17, 151 BBY-stained FRCS were released 1 mi up-river @ 10:10 on 4/18, and 121 BBY-stained FRCS were released 1 mi up-river @ 9:20 on 4/19.

<sup>C</sup> Sampling period was from 4/18 at 9:00 am to 4/25 at 9:15 am.

<sup>D</sup> The GCID trap was lowered on 4/19 at 3:30 pm. The trap was pulled on 4/23 due to a large amount of debris and lowered on 4/24. The trap was again raised on 4/25.

<sup>E</sup> Mossdale trawl sampling being conducted by CDFW starting April 4 through end of June. Data does not distinguish runs, only total ad-clipped and no ad-clipped Chinook salmon. 50 tows from 4/18 to 4/23.

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

USFWS biweekly report (3/25/16-4/7/16) for preliminary daily estimates of passage, 90% confidence intervals, and fork length ranges of unmarked juvenile salmonids captured by rotary screw traps at RBDD included:

<b>Run and Species</b>	<b>Biweekly Total</b>	<b>Brood Year Total</b>
Winter-run Chinook (BY2015)	1,990	338,441

The RBDD report covering the period of 4/8 through 4/21 has not been released yet.

### **Agenda Item 8.**

#### **Recent or Upcoming Hatchery Releases**

450,000 Mokelumne fall-run will be released from the net pens at Sherman Island on 4/27. Merced Hatchery fish are scheduled to be released on 4/28, and 5/6. After the DOSS meeting, Stuart received the updated release notification for the Merced Hatchery release for 4/28/16: 261,000 fish will be released from the Sherman Island net pens on 4/28/16, 150,000 of these fish will be adipose fin clipped and have CWTs, and the remaining 111,000 fish will be unmarked. On 4/25-26, CDFW will release approximately 1,000,000 brood year 2015 fall-run Chinook salmon from Feather River Hatchery into the Feather River and 1,000,000 brood year 2015 fall-run Chinook salmon from Feather River Hatchery into San Pablo Bay. These releases will include 25% marked (adipose fin clipped and CWT).

### **Agenda Item 9.**

#### **DOSS Estimates of Fish Distribution and Entrainment Risk**

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 Chipp's Island)
<i>Young-of-year (YOY) winter-run Chinook salmon<sup>1</sup></i>	<1% (Last week: same)	5% - 10% (Last week: 5% - 20%)	90% - 95% (Last week: 80% - 95%)
<i>Young-of-year (YOY) spring-run Chinook salmon*</i>	<5% (Last week: same)	5% - 15% (Last week: 10% - 20%)	80% - 90% (Last week: 75% - 85%)
<i>Hatchery winter-run Chinook salmon</i>	<1% (Last week: same)	<5% (Last week: <10%)	>95% (Last week: >90%)

\*Once hatchery fall-run releases (75% of which are unmarked) occur upstream of a monitoring location, DOSS assumes that many of the unclipped spring-run-sized Chinook observed in monitoring may be unmarked fall-run Chinook that fall into the spring-run size range. Coleman National Fish Hatchery (CNFH) has released approximately 7 million hatchery production Fall-run Chinook salmon into the upper Sacramento River at Battle Creek since mid-March 2016. The average size for the released FRCS production fish were just slightly smaller than the size at date for the minimum size of SRCS.

### **Rationale for changes in distribution**

Wild winter-run Chinook: The fraction of wild winter-run upstream of the Delta stayed the same since DOSS thinks a few stragglers may still remain upstream, but that this fraction is very small relative to the entire population. The increase in the fraction of wild winter-run having exited the Delta is based on warmer temperatures, seasonal timing (historical peak winter-run outmigration from the Delta is in March), and only 1 winter-run was reported in the Delta this week. The decrease in the Delta is due to seasonal timing and the majority having left the system.

Wild spring-run Chinook: The fraction of wild spring-run upstream of the Delta stayed the same since there are still spring-run entering the Delta and some are still being observed in tributaries. The fraction of wild spring-run in the Delta decreased due to increasing temperatures, decreased flow, and seeing 12 at Sacramento Trawl this week compared to 92 last week. The increase in the fraction of wild spring-run having exited the Delta is based on the 231 spring-run-sized wild Chinook reported in the Chipp's Trawl; some of which are assumed to be true spring-run Chinook salmon and not just larger hatchery fall-run Chinook salmon from the CNFH releases, warming temperatures, and seasonal timing. Therefore the DOSS group believes that the majority of spring-run have exited the Delta.

Hatchery winter-run Chinook: The fraction of hatchery winter-run upstream of the Delta, in the Delta, and having exited at Chipp's Island stayed the same since water conditions have not changed much in the last week and no hatchery winter-run have been since late March. DOSS estimates that most hatchery winter-run have exited the Delta since it has been 2 months since they were released and none have been seen any at the monitoring locations in recent weeks.

### **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; or fish from the San Joaquin River basin through the numerous distributaries of the mainstem San Joaquin River, 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 and San Joaquin River basins over the next week:**

Most winter-run and spring-run are out of the system, only 5%-10% winter-run and 5%-15% spring-run in the Delta. Flows have slightly decreased since last week and the number of salmon upriver has decreased. Pulse flows are being released on the Stanislaus River. Pulse flows were released on the Tuolumne River on 4/23.

- **Exposure Risk**
  - From Sacramento River origin: **LOW** (*last week: same*)
    - Flow and turbidities have decreased which are cues for salmonid movement, and most fish are likely to have moved downstream and into the Delta at this time.
  - From San Joaquin River origin: **LOW to MEDIUM** (**NEW CATEGORY**)
    - Increased pulse flows on the Stanislaus River may stimulate steelhead to emigrate downriver into the Delta from the Stanislaus. Pulse flows on the Tuolumne have also occurred in past week (April 23). Few steelhead (1) have been seen in the Mossdale trawl to date, although trawl may be inefficient at detection of steelhead smolts.
- **Routing Risk:**
  - For Sacramento River **LOW** (*last week: same*)
    - River flows have not changed much in the last week and are expected to continue muting the tidal effects at Georgiana Slough and maintain positive downstream flows during all tidal phases (reducing the risk of routing into Georgiana Slough) for those fish remaining upstream of this divergence.
  - For San Joaquin River: **LOW to MEDIUM** (**NEW CATEGORY**)

- Installation of the HOR barrier will substantially reduce the number of fish entrained into the Old River route leading to the interior of the South Delta and the Projects. Tributaries to the north (Turner, Columbia, Middle River and Old River) are still open routes to the South Delta and the Projects.
- **Overall Entrainment Risk:**
  - Sacramento River: LOW (*last week: same*)
  - San Joaquin River: **LOW to MEDIUM** (*new category*)

**CVP/SWP Facilities Entrainment Risk for listed salmonids in the Interior Delta over the next week:** Most fish have moved through the Delta, the DCC barrier is in place, and export levels are low, which is a cue for salmonids to move downstream and out of the Delta. San Joaquin Basin fish may be emigrating at this time based on pulse flows in the tributaries and historical timing of previous emigrations.

- **Exposure Risk from Sacramento River:** LOW (*last week: same*)
- **Exposure Risk from San Joaquin River:** **LOW to MEDIUM** (*new category to reflect SJR basin steelhead emigration at this time*)
- **OMR/Export Risk:**
  - OMR -2,500 cfs to -3,500 cfs:
    - LOW for Sacramento River fish (*last week: same*)
    - **LOW for San Joaquin River steelhead** (*new category to reflect SJR basin steelhead emigration at this time*)
  - OMR -3,500 cfs to -5,000 cfs:
    - MEDIUM for Sacramento River fish (*last week: same*)
    - **MEDIUM for San Joaquin River steelhead** (*new category to reflect SJR basin steelhead emigration at this time*)
- **Overall Entrainment Risk:**
  - OMR -2,500 cfs to -3,500 cfs:
    - LOW for Sacramento River fish (last week same)
    - **LOW for San Joaquin River steelhead** (*new category to reflect SJR basin steelhead emigration at this time*)
  - OMR -3,500 cfs to -5,000 cfs:
    - LOW for Sacramento River fish (*last week: same*)
    - **LOW to MEDIUM for San Joaquin River steelhead** (*new category to reflect SJR basin steelhead emigration at this time*) San Joaquin River fish are substantially protected from entrainment by the presence of the HOR barrier (although it has 8 culverts that may allow passage into Old River), and risk to entrainment along the lower mainstem of the San Joaquin River is similar to the risk faced by Sacramento fish in co-occupied river reaches. San Joaquin River basin fish have a longer route of potential diversion into the South Delta and exposure to the Projects, thus the higher risk classification.

**Agenda Item 10.**

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

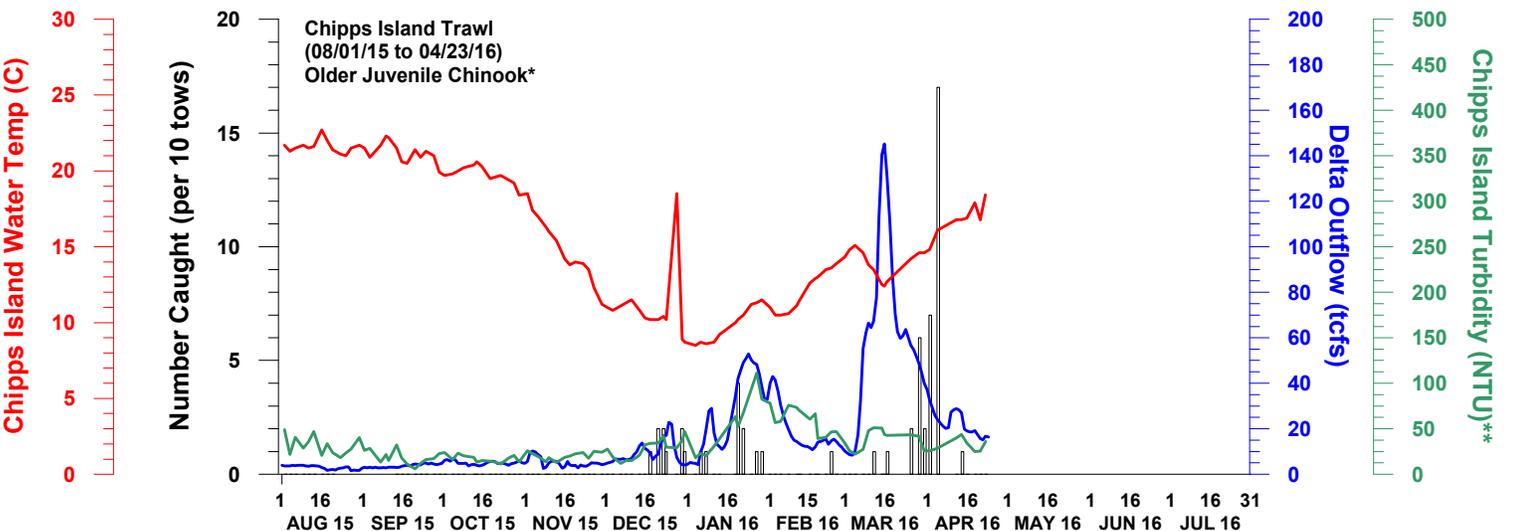
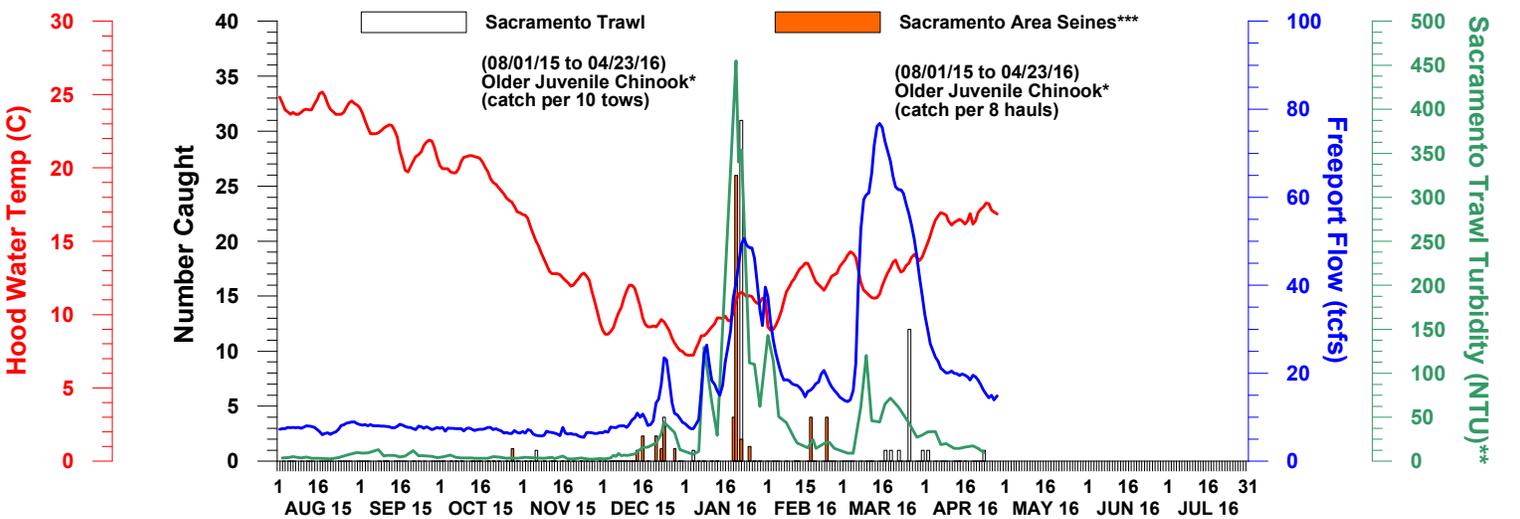
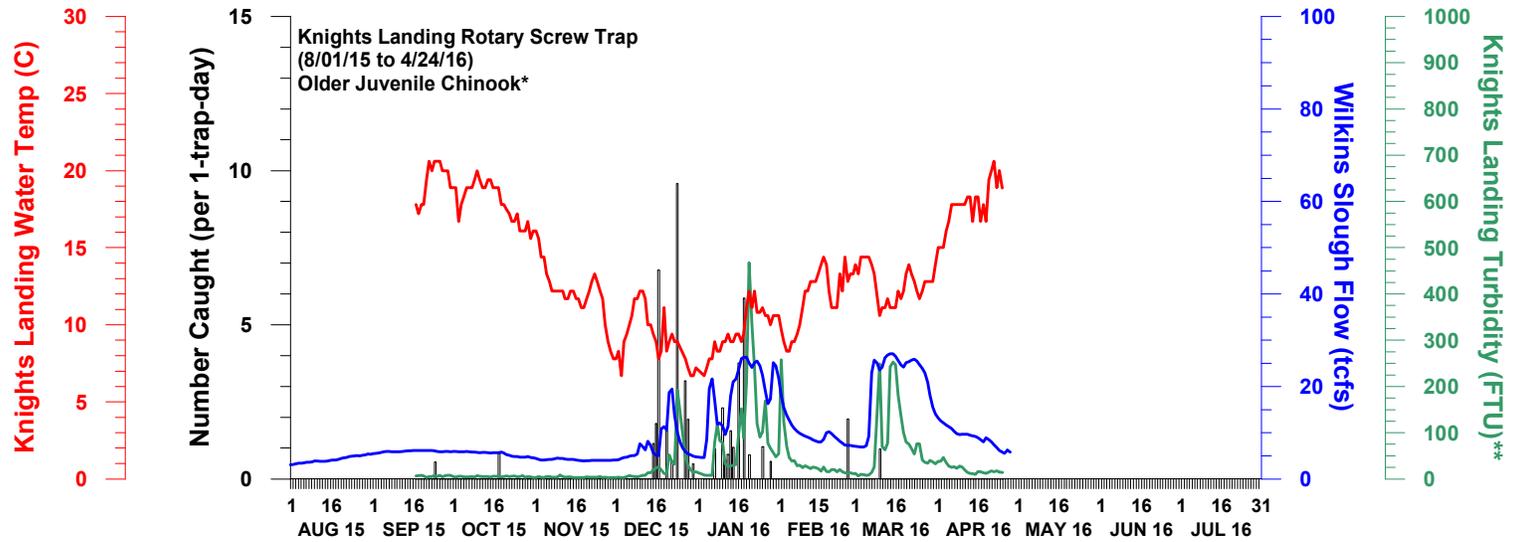
**Agenda Item 11.**

**Next Meeting:** The next DOSS conference call will be on 5/3/16 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>



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



DWR-DES 26 APRIL 2016

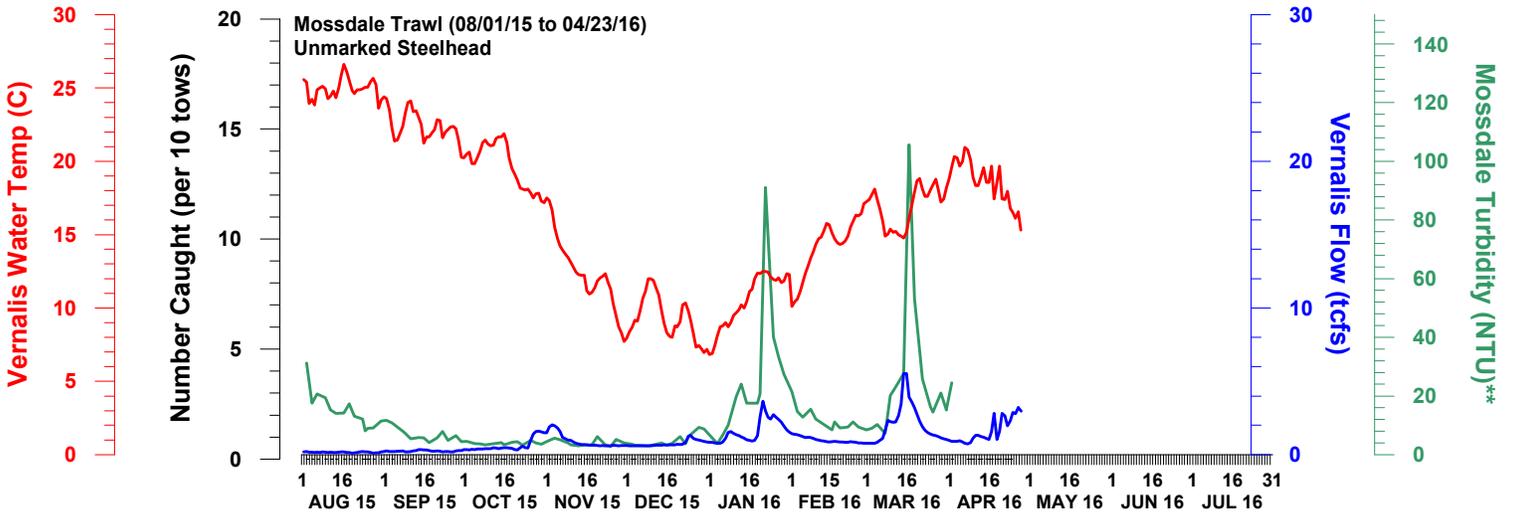
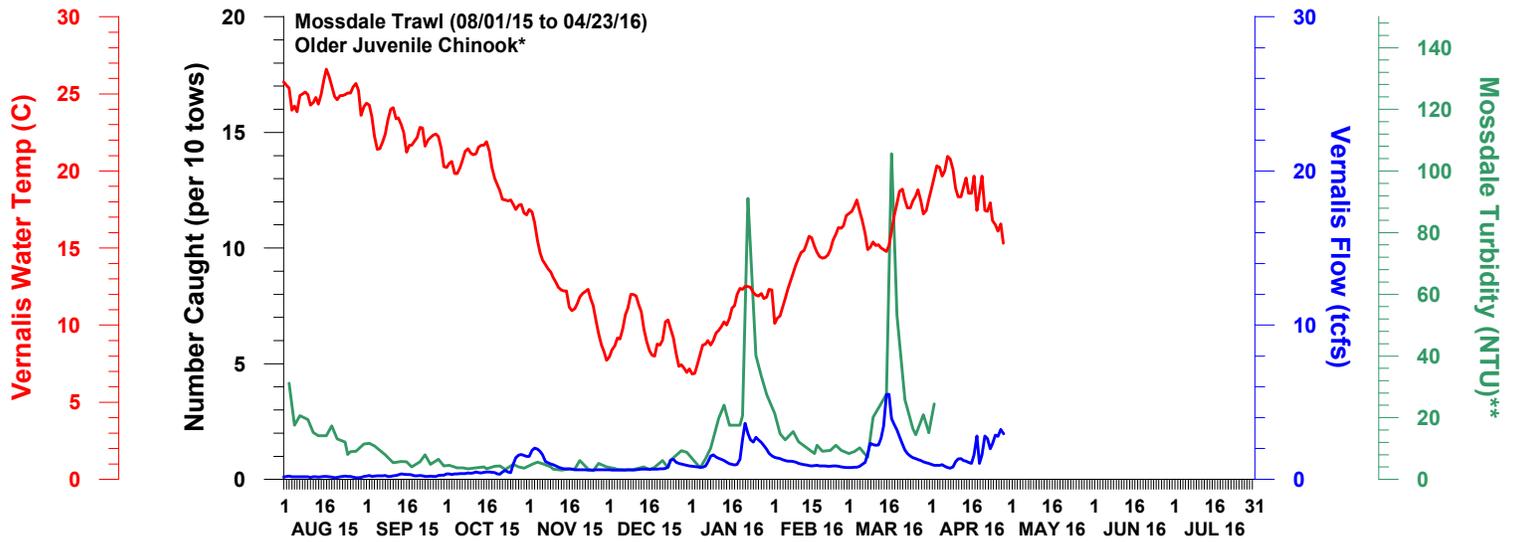
Preliminary data from DFW, FWS, and CDEC; subject to revision.

\*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



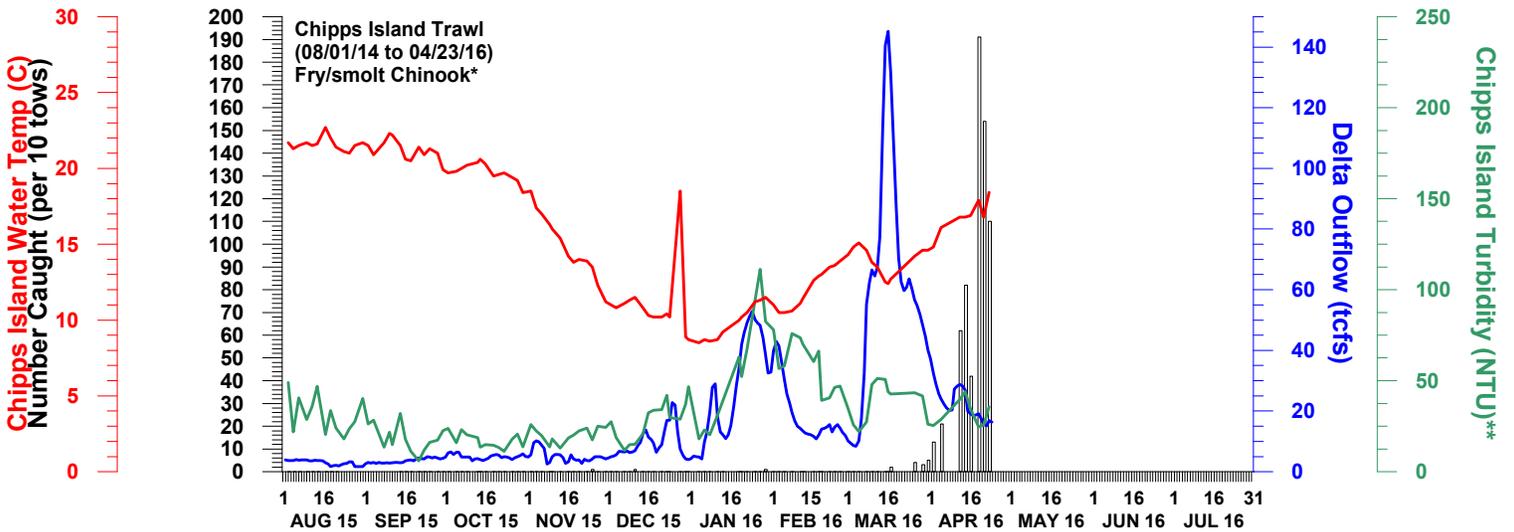
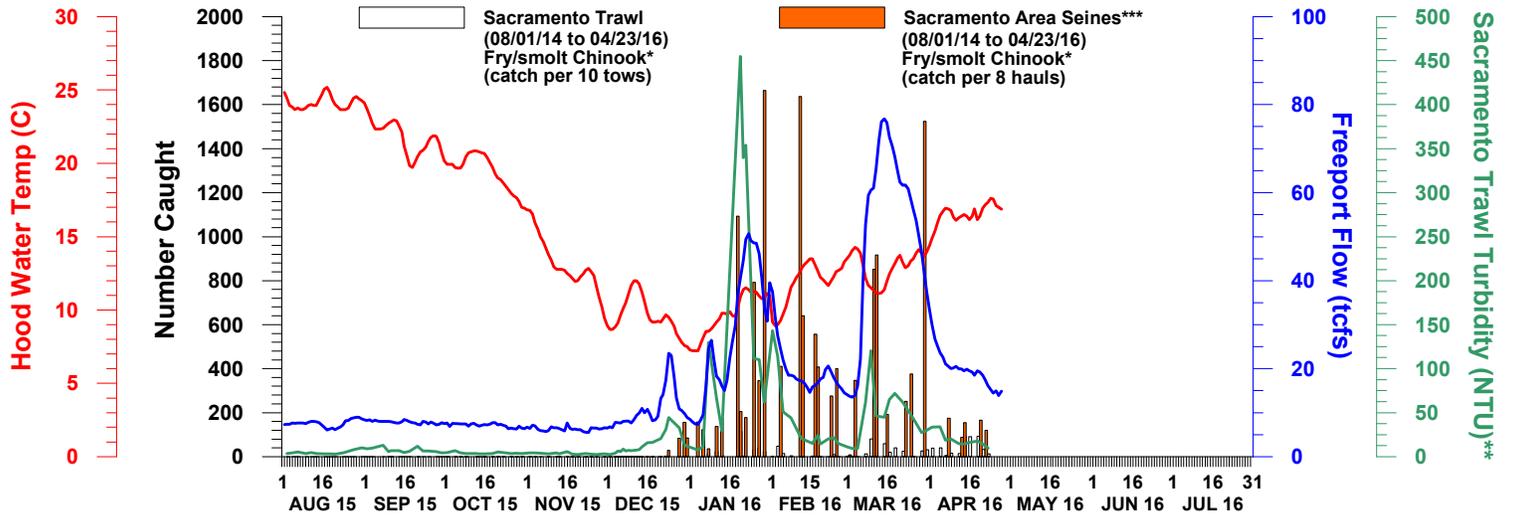
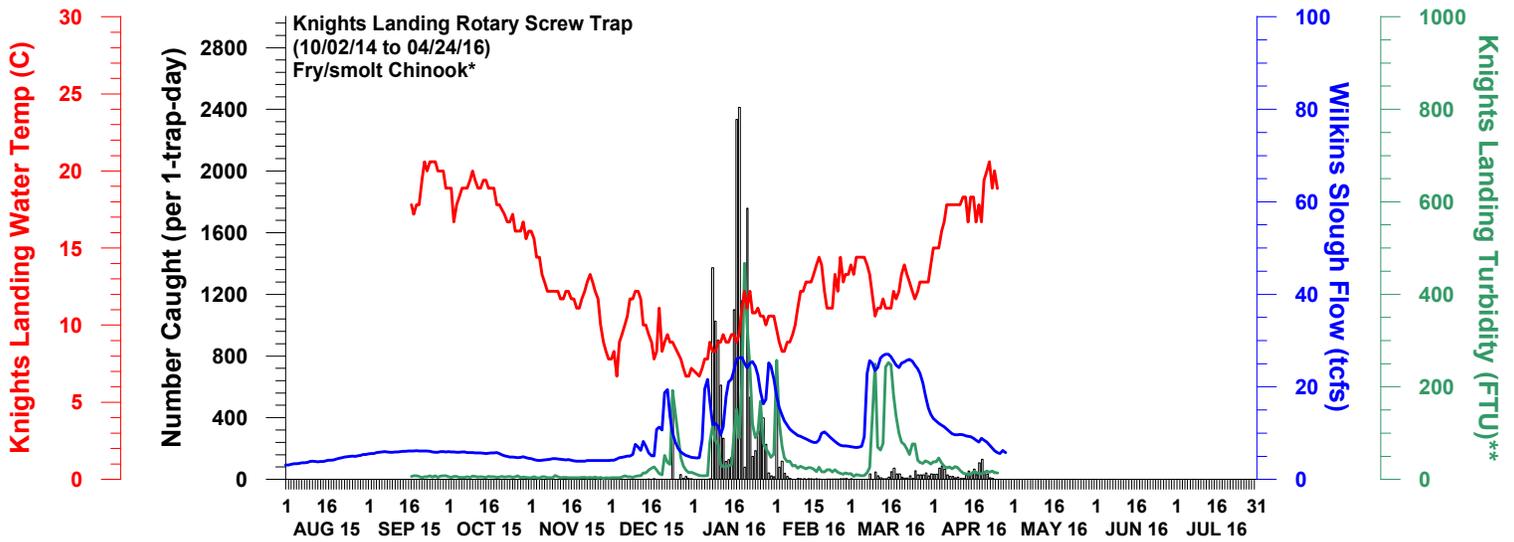
DWR-DES 26 APRIL 2016  
Preliminary data from FWS and CDEC; subject to revision.

\*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 LOWER SACRAMENTO RIVER AND CHIPPS ISLAND



DWR-DES 26 APRIL 2016

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

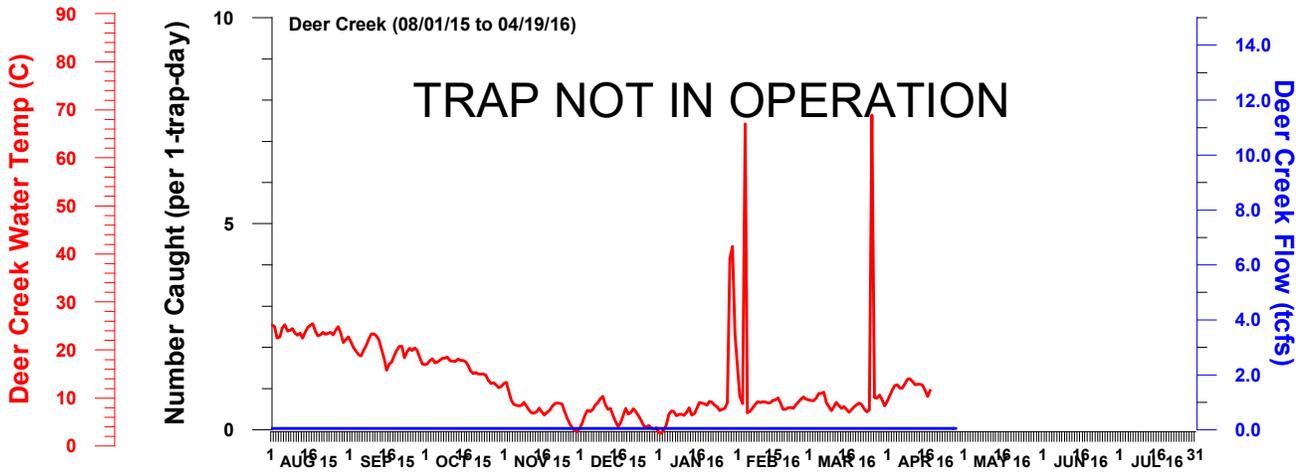
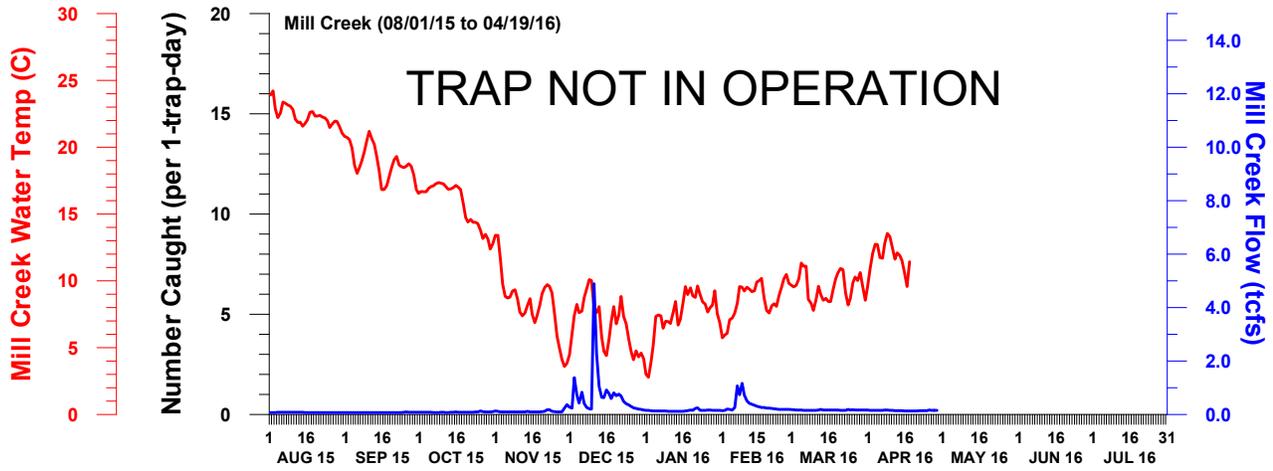
\*Fry/smolt Chinook defined as all Chinook less than the minimum winter run length-at-date criteria (Frank Fisher model).

\*\*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.

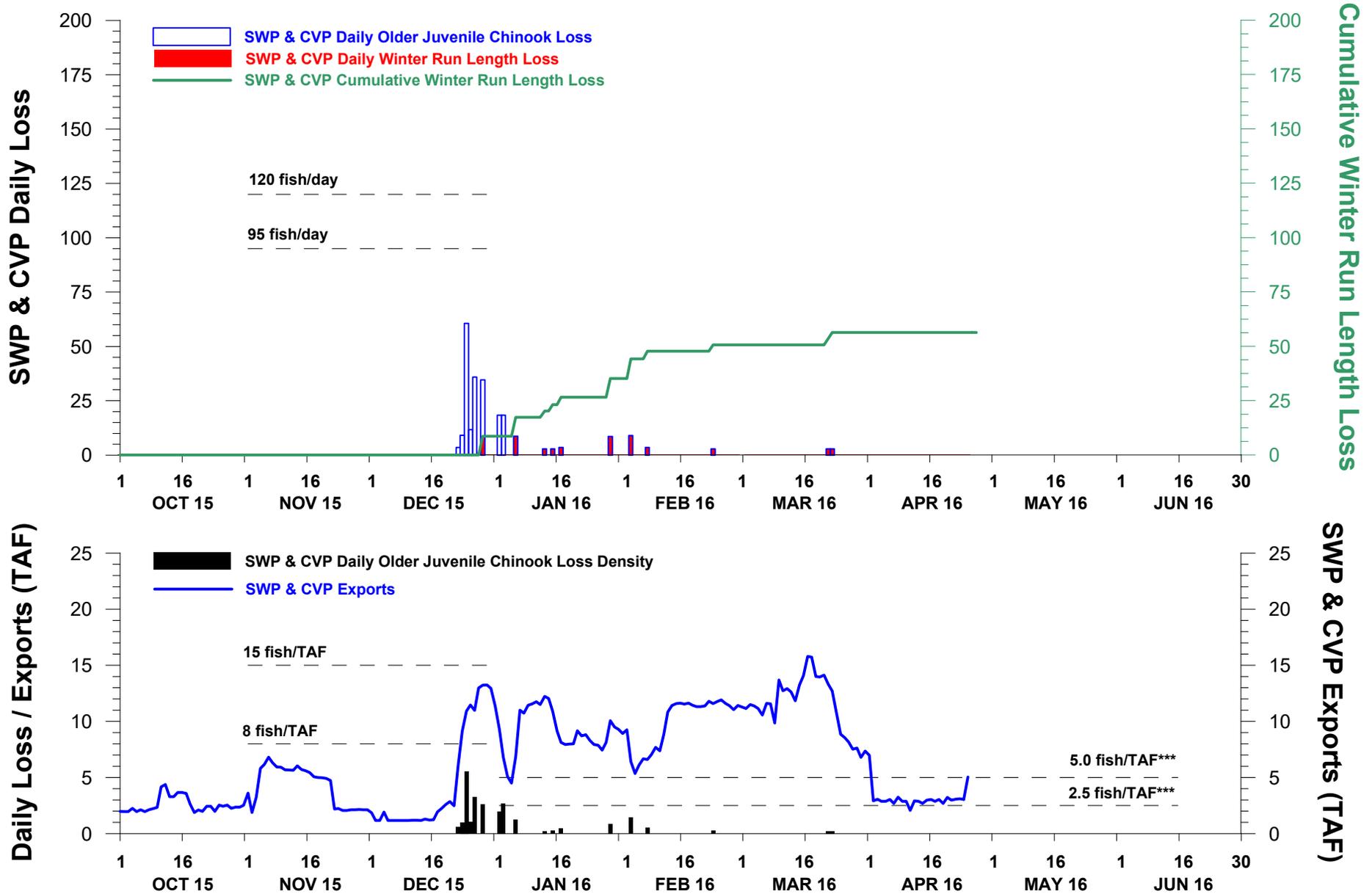
\*\*\*Sacramento area seine route consists of the following seine sites: Verona, Elkhorn, Sand Cove, Discovery Park, American River, Miller Park, Sherwood Harbor, and Garcia Bend. Bars are stacked if Chinook caught from the trawl and seines are from the same day.



# WATER TEMPERATURE AND FLOW MEASURED AT MILL AND DEER CREEK



# NON-CLIPPED WINTER RUN & OLDER JUVENILE CHINOOK LOSS AT THE DELTA FISH FACILITIES 01 OCT 2015 THROUGH 25 APRIL 2016



DWR-DES 26 APRIL 2016

Preliminary data from DFW; subject to revision.

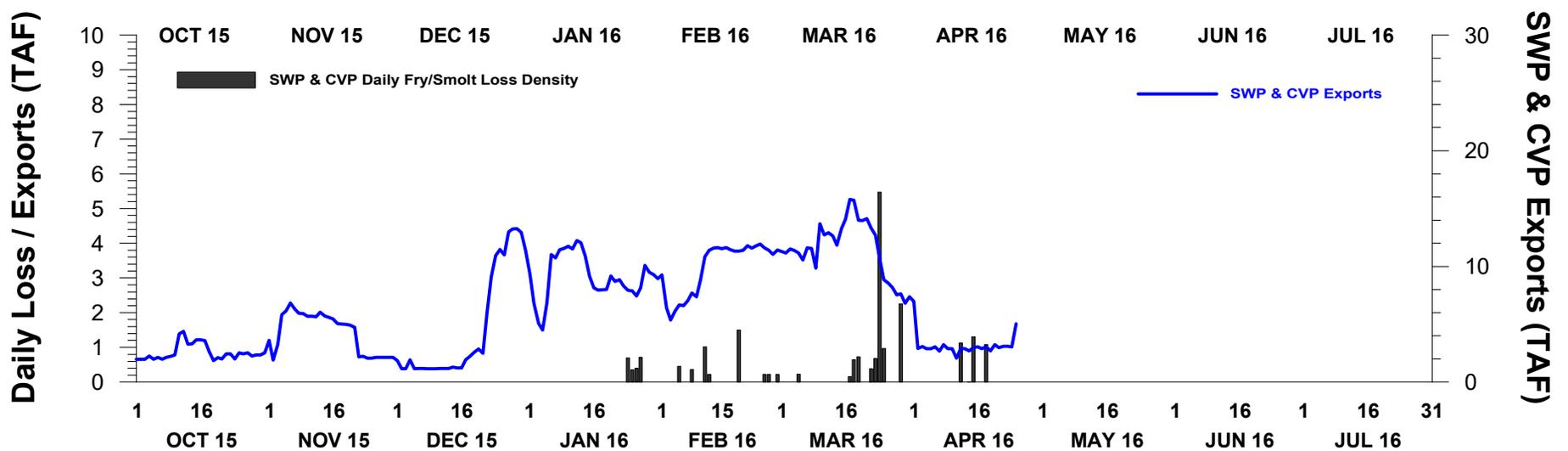
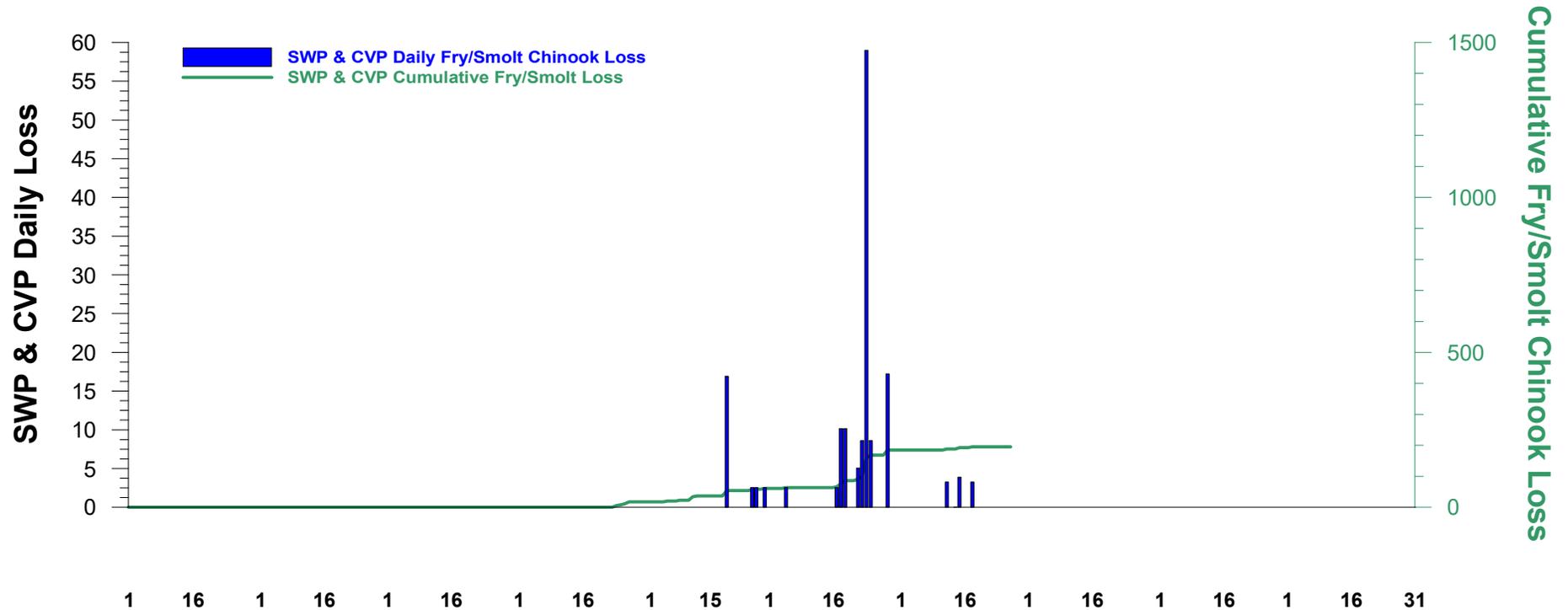
\*Older juvenile Chinook defined as all Chinook greater than or equal to the minimum winter run length-at-date criteria and less than the maximum size included in the length-at-date criteria (Delta model) for which a race is assigned on a given sampling date.

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

\*\*\*minimum value determined by NMFS



# NON-CLIPPED FRY/SMOLT CHINOOK LOSS AT THE DELTA FISH FACILITIES 01 OCT 2014 THROUGH 25 APRIL 2016

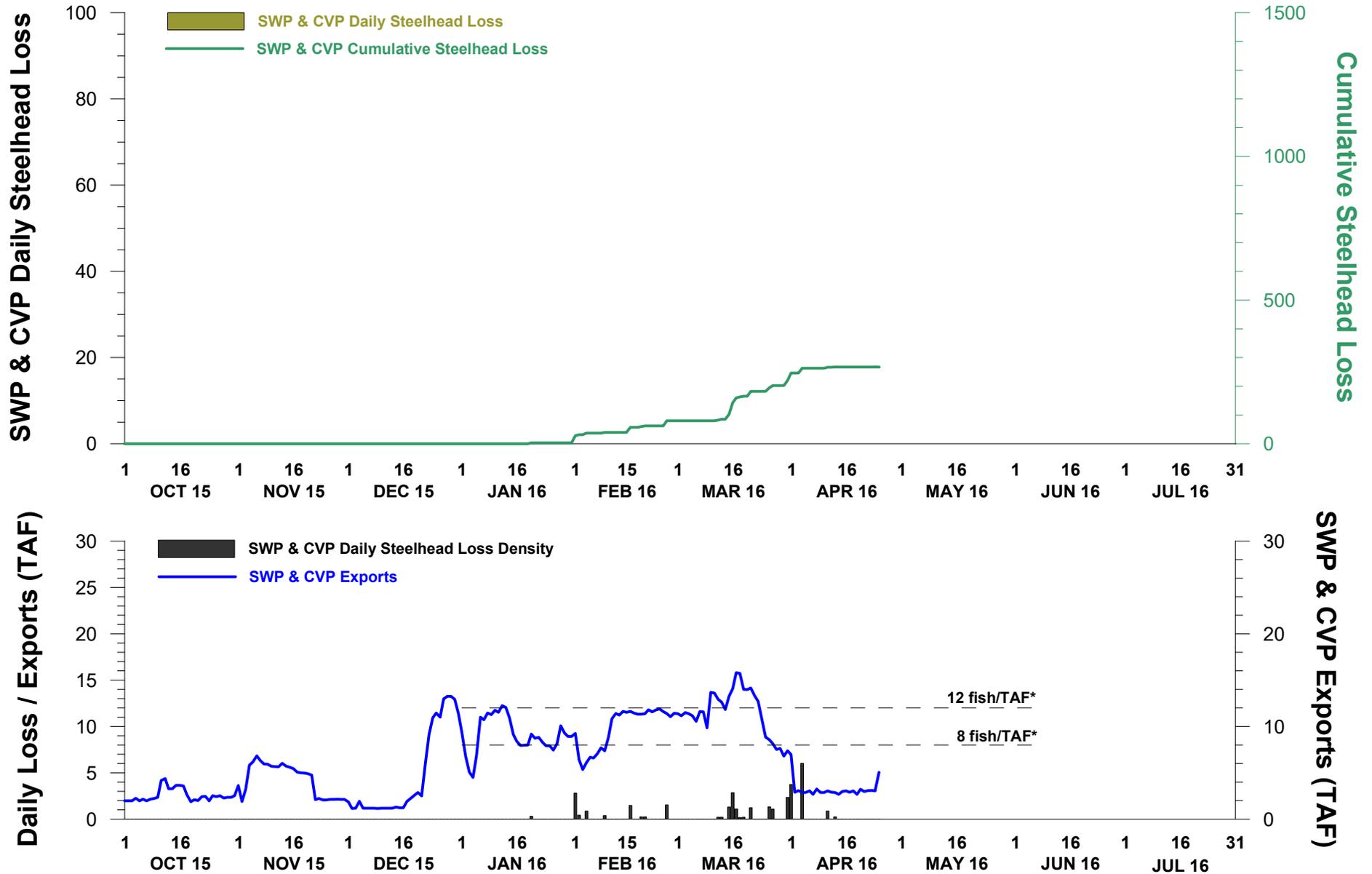


DWR-DES 26 APRIL 2016

Preliminary data from DFW; subject to revision.

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

# NON-CLIPPED STEELHEAD LOSS AT THE DELTA FISH FACILITIES 01 OCT 2015 THROUGH 24 APRIL 2016



DWR-DES 26 APRIL 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 24 APRIL 2016

