

**Delta Operations for Salmonids and Sturgeon (DOSS) Group**  
**Conference call: 5/24/16 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:** Rhiannon Mulligan, Dan Yamanaka, Brian Schreier, Reza Shahcheraghi, Kevin Reece, Mike Ford

**Reclamation:** Josh Israel, Peggy Manza

**NMFS:** Jeff Stuart, Kristin McCleery

**CDFW:** Bob Fujimura, Ken Kundargi, Jerry Morinaka

**SWRCB:** Brittany Kammerer, Chris Carr, Matt Holland

**FWS:** Craig Anderson

**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 May:**

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

- DCC gates have been closed since 12/15/15. DCC gates will be open this weekend (May 27-31). Gates can be closed for up to 14 days between May 21 and June 15 per the 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)

**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.

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

- Currently, the Dry<sup>4</sup> year 2:1 ratio (San Joaquin River inflow at Vernalis to combined CVP/SWP exports) is in effect. This action restricts combined exports to 50% of Vernalis flow, or 1,500 cfs for human health and safety, whichever is greater.
- On 4/14/16, NMFS concurred with Reclamation's request for flexibility in the I:E ratio to allow additional releases from New Melones reservoir by Oakdale Irrigation District (OID) and South San Joaquin Irrigation District (SSJID) (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, will continue 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. Today is the last day of the 30-day augmented flow.
- On 5/3/16, FWS issued a determination stating that the OMR flow should be no more negative than -3,000 cfs on a 14-day average with a simultaneous 5-day running average of no more negative than -3,750 cfs (within 25%).

**Agenda Item 3.**

**Current Operations (5/24/16)**

SWP		CVP	
<b>Exports (cfs)</b>			
Clifton Court Forebay	600*	Jones Pumping Plant	2,000*
<b>Reservoir Releases (cfs)</b>			
Feather - Oroville	5,250**	American - Nimbus	5,000***
		Sacramento - Keswick	6,500****
		Stanislaus - Goodwin	1,100*****
		Trinity - Lewiston	4,200*****
<b>Reservoir Storage (in TAF)</b>			
San Luis (SWP)	408	San Luis (CVP)	357
Oroville	3,342	Shasta	4,194
New Melones	850	Folsom	842
<b>Delta Operations</b>			
DCC	Closed	Sacramento River at Freeport (cfs)	14,689
Outflow Index (cfs)	~12,525	San Joaquin River at Vernalis (cfs)	1,221

<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)

<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.

E:I	11% (14-day avg.)	X2	75 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, the relaxation of the I:E ratio per the request by Reclamation to pick up augmented water released on the Stanislaus River, and water quality and river flows required by D-1641. Tomorrow (5/25) exports at Clifton Court Forebay will drop to 500 cfs and then will increase to 700 cfs on 5/28 and remain at that level through the end of May. Exports at Jones Pumping Plant are at 2,000 cfs today, will decrease to 1,000 cfs on 5/25, and decrease to 800 cfs on 5/28. Combined exports will be 1,500 cfs.

\*\* Oroville is 5,250 today (5/24) and will decrease to 4,250 by 2 PM in the afternoon.

\*\*\* Folsom Reservoir releases will decrease to 4,500 cfs on 5/26 and to 4,000 cfs on 5/27.

\*\*\*\* Keswick Reservoir will increase their release to 7,500 cfs on 6/1.

\*\*\*\*\* Goodwin flows include the augmented flows as well as the required Appendix 2-e pulse volume as reshaped by the Stanislaus Operating Group. Stanislaus River spring pulse flows are expected to end no later than May 31, 2016. Flows will decrease over the next week and will target 800 cfs on 5/25, and 650 cfs by 5/31.

\*\*\*\*\* Trinity releases continue to follow the pulse flow schedule.

OMR as of 5/21/16:

	USGS gauges (cfs)	Index <sup>5</sup> (cfs)
5-day	-2,040	-1,440
14-day	-2,450	-2,330

The daily OMR Index on 5/23/16 was -2,960 cfs.

Review of factors controlling Delta exports for the period 5/24/16 to 5/31/16:

- The San Joaquin River I:E ratio is expected to control exports this week. Elevated upstream reservoir releases in the Sacramento River basin continue to be necessary to comply with Delta outflow and water quality criteria per D-1641.
- FWS determination of OMR flow no more negative than -3,000 cfs on a 14-day average with a simultaneous 5-day running average of no more negative than -3,750 cfs (± 25% of the 14-day average).
- Vernalis flows to exports 1:1 ratio stipulated by D-1641 during the 30-day pulse period.

The weather forecast predicts unsettled cloudy weather today over the Central Valley and mountains with no appreciable rain in the forecast. Temperatures in the 80's and 90's are expected by the end of the week.

**Agenda Item 4.**

**Smelt Working Group**

The SWG met on Monday, 5/23/16 at 10am. Bartoo (FWS) provided the following draft SWG meeting summary via e-mail:

---

<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.

The Working Group agreed that given present distribution, current salvage, and Delta conditions, there was no indication that the projected combined exports of approximately 1,500 cfs for the week (potentially resulting in daily average OMR flows of approximately -2,000 cfs) beginning May 25 need to be modified for the protection of Delta Smelt adults and larvae. Should the projected combined exports increase from 1,500 cfs prior to May 31; the Working Group will need to reconvene to reassess the risk of entrainment.

The Working Group is following guidance for entrainment protections from 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 Tuesday, May 31, 2016 at 10 am.

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>**

Morinaka (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: May 16-May 22, 2016

Prepared by Jerry Morinaka on May 23, 2016 15:45

Preliminary Results -Subject to Revision

Criteria	16-May	17-May	18-May	19-May	20-May	21-May	22-May	Trend	
<b>Loss Densities</b>									
Wild older juvenile CS	0	0	0	0	0	0	0	→	0.00
Wild steelhead	0	0	0	0	0	0	0	→	0.00
<b>Exports</b>									
SWP daily export	1,802	2,132	1,001	1,082	1,640	1,493	3,386	↘	1,791
CVP daily export	3,169	1,620	810	844	819	812	1,576	↘	1,379
SWP reduced counts	0%	0%	0%	0%	40%	60%	7%	↗	15%
CVP reduced counts	0%	0%	17%	0%	0%	0%	0%	→	2%

= missed count collection  
 = fish salvage facility outage occurred

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	4	↘	158	298
Late Fall Run	0	0	→	44	166
Fall Run	4	18	↘	119	223
Unclassified	0	0	→	14	NC
<b>Total</b>	<b>8</b>	<b>22</b>		<b>371</b>	<b>743</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	→	118	288
Hatchery	4	3	↘	1,321	3,566
<b>Total</b>	<b>4</b>	<b>3</b>		<b>1,439</b>	<b>3,854</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 5/16/16-5/22/16.

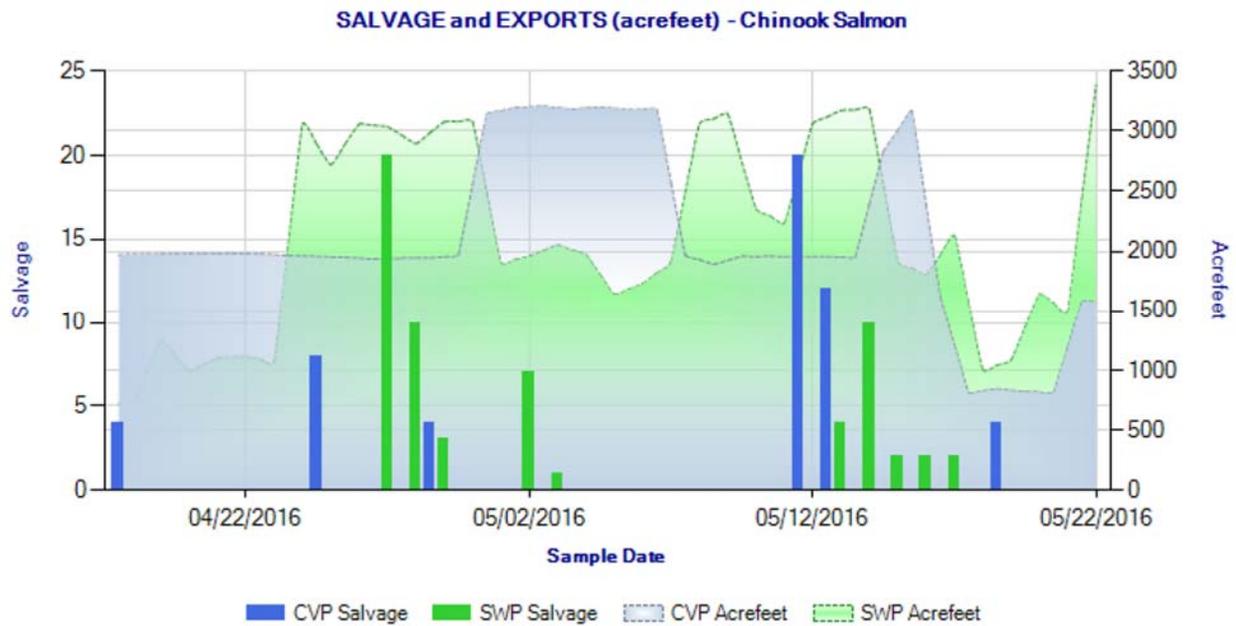


Figure 2. Daily salvage of Chinook salmon (all races) and water exports from the state and federal fish salvage facilities during April 18, 2016 through May 22, 2016.

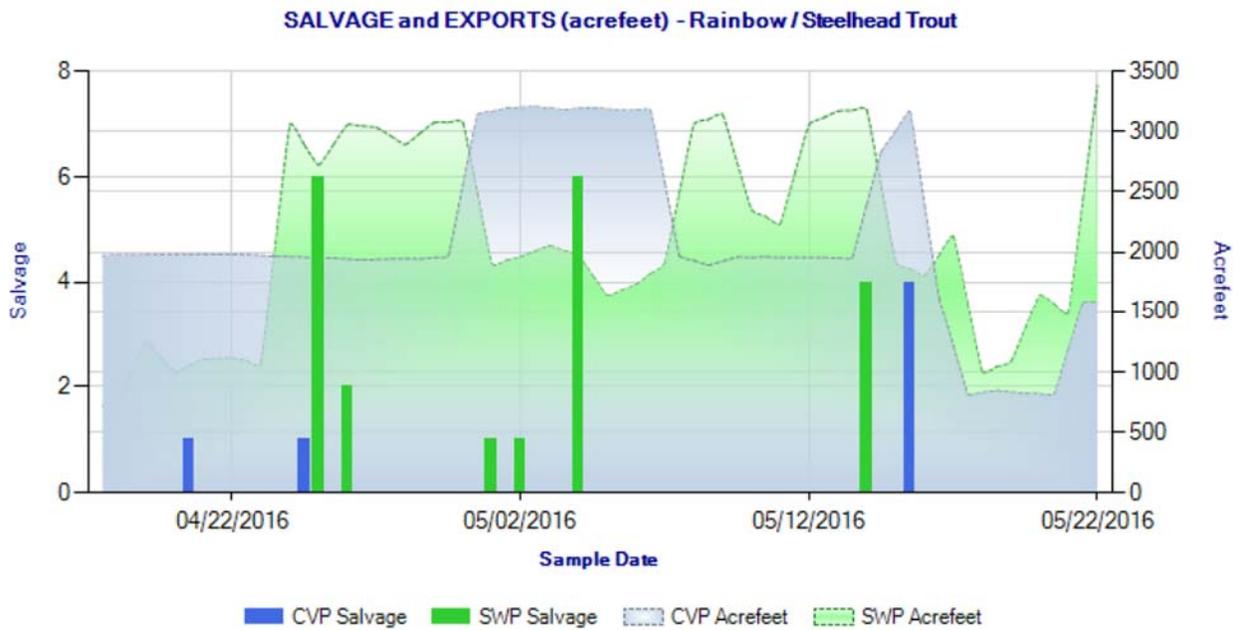


Figure 3. Daily salvage of Steelhead and water exports from the state and federal fish salvage facilities during April 18, 2016 through May 22, 2016.

Preliminary salvage report for Monday, 5/23/16:

- 4 unclipped FRCS (SWP) and 4 unclipped SRCS (CVP) were salvaged this week.
- 4 hatchery steelhead was salvage at the CVP. 1 unclipped steelhead salvaged at SWP during predator flush.
- On 5/18, a 2-hour outage occurred at the CVP for repairs to the traveling screen. A 2-hour fish count was missed.
- On 5/22 a 15 minute outage occurred for predator removal.
- On 5/20 and 5/22 reduced fish count times were due to an excessive amount of larval and juvenile fish in salvage.

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

Mulligan (DWR) provided the following summary of coded-wire-tag recoveries at the SWP and CVP fish collection facilities. No changes to the cumulative losses of either hatchery winter-run Chinook salmon or the yearling spring-run surrogate releases of LFRCS have occurred since the end of March. 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 3/29/16.

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	155,400	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	River Restoration	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	River restoration program	82.156	60,000	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 5/22/2016.

<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 5/24/2016

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

**Agenda Item 6.**

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

No detections of tagged winter-run hatchery fish has occurred in the last week. 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	5/16, 5/18, 5/20	902: Jersey Pt: Pris. Pt: No data received	5/16, 5/18, 5/20	5/16-5/19	5/16-5/23	No data received	No data received	5/16, 5/17, 5/19
FR Chinook	51		7					24
SR Chinook	14							
WR Chinook								
LFR Chinook								
Ad-Clipped Chinook	14		4					
Chinook Adult								
Steelhead (wild)								
Steelhead (ad-clip)								
Green Sturgeon								
Delta Smelt								
Splittail	1			1334				77
Longfin Smelt								
Flows (avg. cfs)					3331			
W. Temp. (avg. °F)					72.6			
Turbidity (avg. NTU)					11.6			

<sup>A</sup> Data reported in the 5/15 to 5/21 DJFMP sampling summary.

<sup>B</sup> Sampling period was from 5/16 at 11:00 am to 5/23 at 8:30 am. Traps are not fishing effectively due to flows below 3,500 cfs.

<sup>C</sup> Tisdale RST was last operated on 5/3/16.

<sup>D</sup> The GCID trap was raised on 5/12/16 due to high volume of debris, which is potentially hazardous to fish in the trap, and has not been lowered.

<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. 60 total tows this week.

Water temperatures at Knights Landing reached 74° F this week, which will likely preclude additional sampling for salmonids with the RSTs. CDFW will be discussing this situation this week.

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

USFWS biweekly report (5/6/16 to 5/19/16) 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 (90% CI)</b>
Winter-run Chinook (BY2015)	0	338,897 (235,961; 441,833)

### **Agenda Item 8.**

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

On 5/23/16 to 5/25/16, CDFW will release approximately 1,616,192 brood year 2015 fall-run Chinook salmon from Feather River Hatchery into the San Pablo Bay via net pens from Conoco-Phillips. This release will include 25% marked (adipose fin clip and CWT) fish.

On 5/25/16, CDFW will release approximately 160,000 brood year 2015 Chinook salmon from Mokelumne River Hatchery into the Coastside Fishing Club net pens at Pillar Point Harbor. This release will be the final of three releases totaling 480,000 fish. This release will include 100% marked (adipose fin clip and CWT) fish.

On 5/26/16, CDFW will release approximately 200,000 brood year 2015 Mokelumne River Hatchery Fall Run Chinook into the Mokelumne River and 200,000 at Wood Bridge. This release will include 100% marked (adipose fin clip and CWT) fish.

On 5/27/16 to 5/28/16, CDFW will release approximately 900,000 brood year 2015 Mokelumne River Hatchery fall-run Chinook salmon into the Sherman Island net pens on the San Joaquin River. This release will include 25% marked (adipose fin clip and CWT) fish.

### **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 Chipps Island)
<i>Young-of-year (YOY) winter-run Chinook salmon<sup>1</sup></i>	0% (Last week: <1%)	<1% (Last week: ≤5%)	>99% (Last week: ≥95%)
<i>Young-of-year (YOY) spring-run Chinook salmon*</i>	<1% (Last week: same)	<1% (Last week: ≤5%)	>98 (Last week ≥95%)
<i>Hatchery winter-run Chinook salmon</i>	0% (Last week: <1%)	<1% (Last week: <5%)	>99% (Last week: >95%)

\*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. 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: No wild winter-run Chinook salmon have been observed in the system for the last 3 weeks. Water temperatures continue to warm creating inhospitable environmental conditions in the Delta and upriver in the Sacramento River mainstem. These factors and seasonal timing indicate that the majority of wild winter-run Chinook salmon have left the system.

Wild spring-run Chinook: The fractions of wild spring-run upstream of the Delta remained at less than 1 percent since DOSS thinks a few may still remain upstream in the tributaries and these are likely to remain as yearlings in the upper watersheds. The fraction in the Delta was reduced since water temperatures have increased and the majority of spring-run are likely to have left the system. The fraction of wild spring-run having exited the Delta increased due to warming temperatures, seasonal timing, and the lack of precipitation forecasted for the Central Valley. 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 and in the Delta decreased due to warming water temperatures and not seeing any at monitoring locations. DOSS estimates that the majority of hatchery winter-run Chinook salmon have exited the Delta since it has been more than 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:** Less than 1% of winter-run and only 2% of spring-run are considered to be in the Delta. Flows in the Sacramento River and San Joaquin River have not changed significantly since last week.

- **Exposure Risk**
  - From Sacramento River origin: **LOW** (*last week: same*)
    - Water temperatures continue to warm and most fish are likely to have moved downstream and out of the Delta at this time.
  - **From San Joaquin River origin: LOW TO MEDIUM** (*last week: same*)
    - Stanislaus River, Tuolumne, and Merced Rivers are at their base flows. No steelhead were observed in the Mossdale trawl this week, although trawl may be inefficient at detection of steelhead smolts.
- **Routing Risk:**
  - For Sacramento River **LOW to MEDIUM** (*last week: same*)
    - River flows have decreased in the last week and reverse flows are becoming more prevalent on the flood tide. Water temperatures are continuing to rise.
  - **For San Joaquin River: LOW TO MEDIUM** (*last week: same*)
    - The HOR barrier will stay in place until 6/1, which will substantially reduce the number of fish entrained into the Old River route leading to the interior of the South Delta and the Projects, although 8 open culverts are present in the barrier. Distributaries 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** (*last week: same*)

**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 (*last week: same*)
- **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** (*last week: same*)
  - OMR -3,500 cfs to -5,000 cfs:
    - MEDIUM for Sacramento River fish (*last week: same*)
    - **MEDIUM for San Joaquin River steelhead** (*last week: same*)
- **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** (*last week: same*)  
Wild steelhead are present in the San Joaquin River, but low exports (more positive OMR levels) and reduced entrainment potential into interior Delta channels due to the presence of the HOR barrier create a low risk of overall entrainment.
  - OMR -3,500 cfs to -5,000 cfs:
    - LOW for Sacramento River fish (*last week: same*)
    - **LOW for San Joaquin River steelhead** (*last week: same*)  
San Joaquin River fish are substantially protected from entrainment into the upper Old River channel corridor to the export facilities by the presence of the HOR barrier (although it has 8 culverts that may allow some 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. Although San Joaquin River basin fish have a longer route of potential diversion into the South Delta and a longer time of exposure to the Projects, some members of DOSS believe the predominant tidal changes in the mainstem San Joaquin River channel are substantially greater than the difference between the -2500 and -5,000 cfs OMR flows contained in the risk assessment and thus negate the relatively small differences in the effects of the two OMR flow levels considered. Other members of DOSS indicated that the risk to entrainment at the facilities under the more negative OMR flows provided an elevated risk of **LOW to MEDIUM** to fish that were already present within the south Delta channels and should be considered in the overall risk assessment. Through the discussion of these two viewpoints, the DOSS working group decided to assign an overall entrainment risk of **LOW** to SJ River steelhead entrainment due to OMR flows between -3500 to -5000 cfs. Assessment of the factors influencing the

characterization of entrainment risk will be further discussed by the DOSS group after the end of this migration season. Discussion will focus on further clarification of the conceptual model of entrainment risk factors faced by fish in the southern Delta.

**Agenda Item 10.**

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

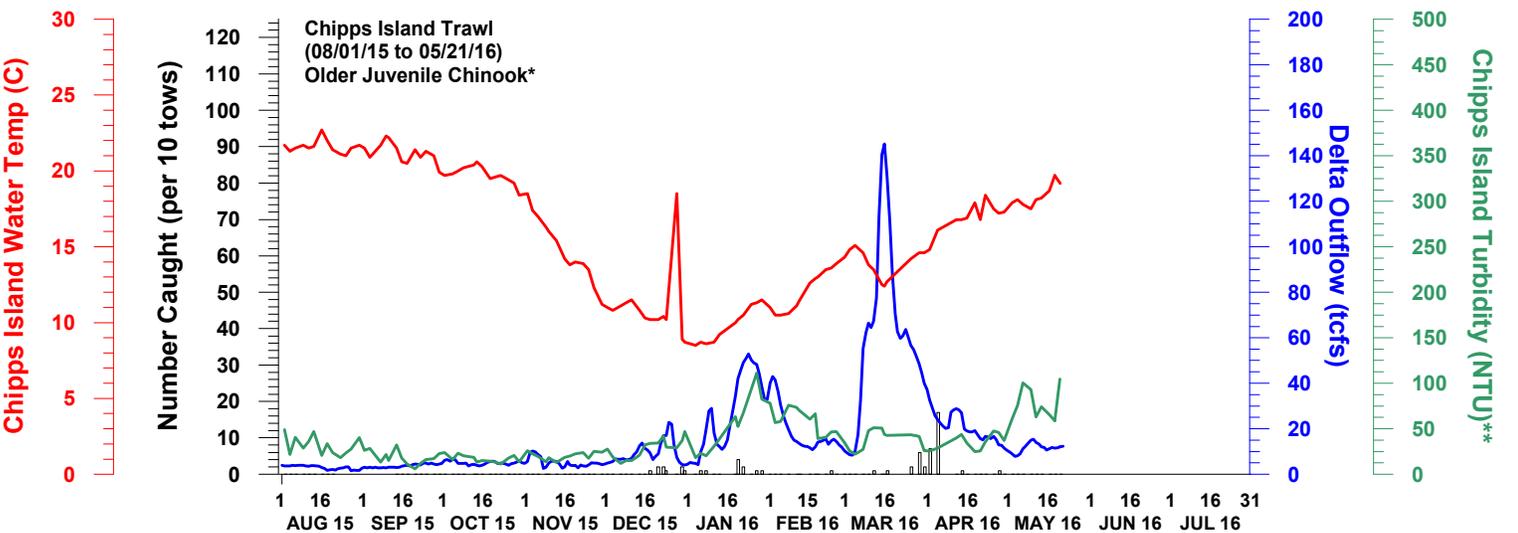
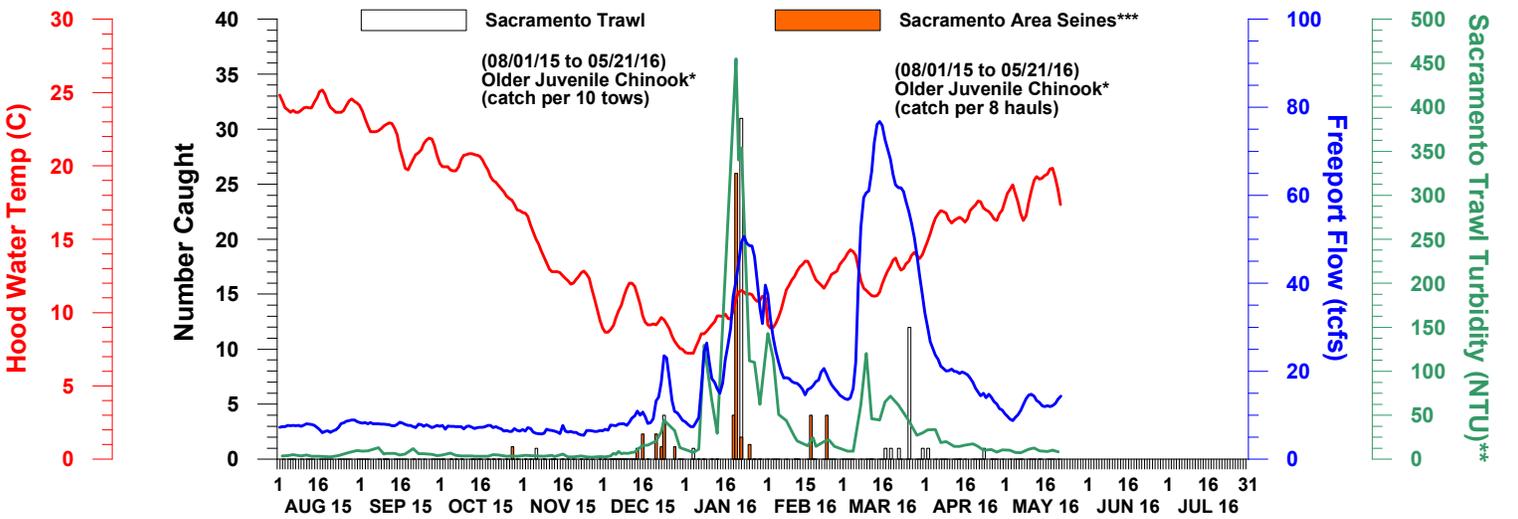
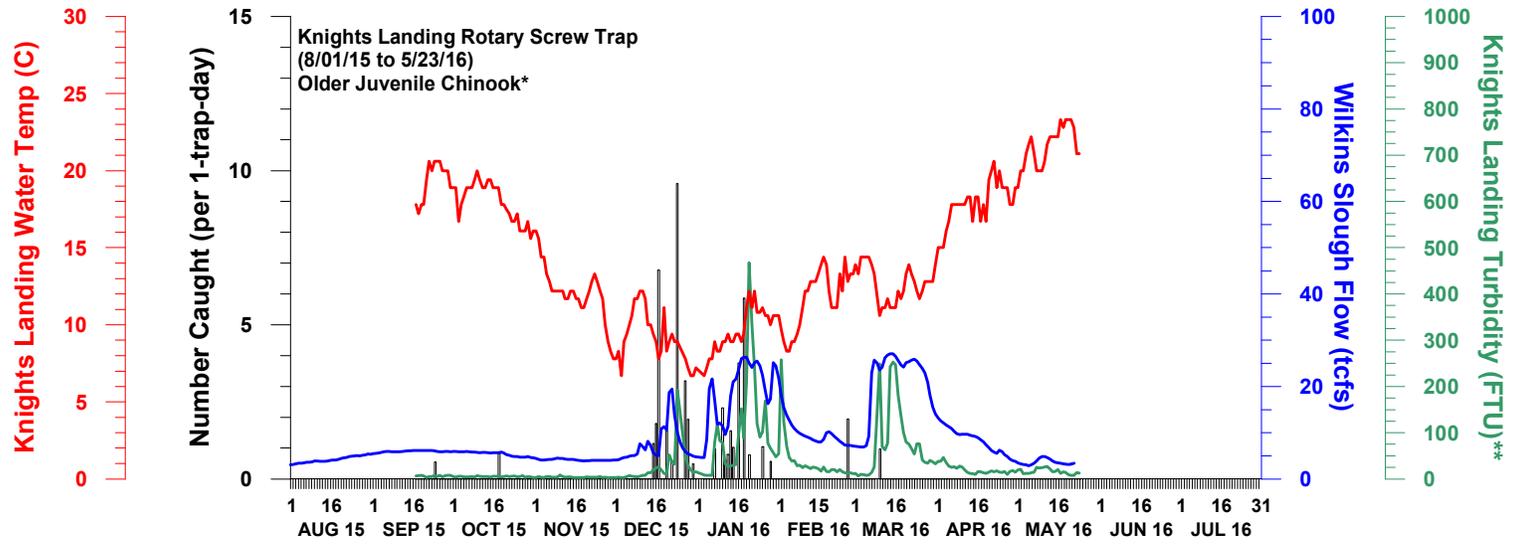
**Agenda Item 11.**

**Next Meeting:** The next DOSS conference call will be on 5/31/16 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 24 MAY 2016

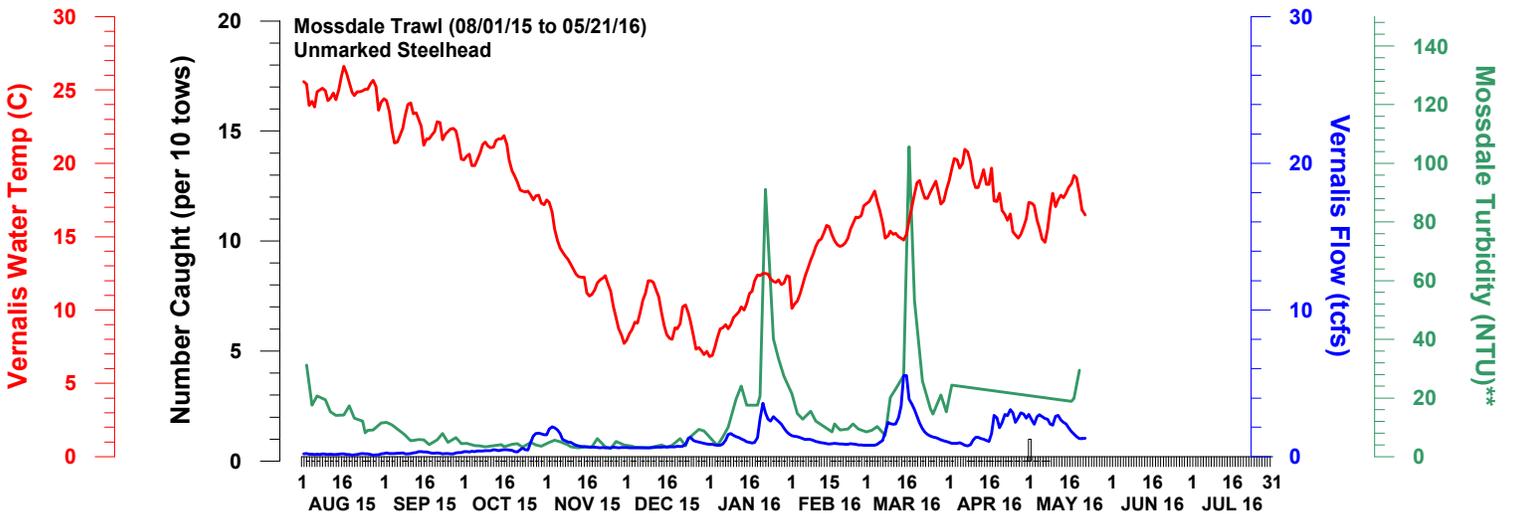
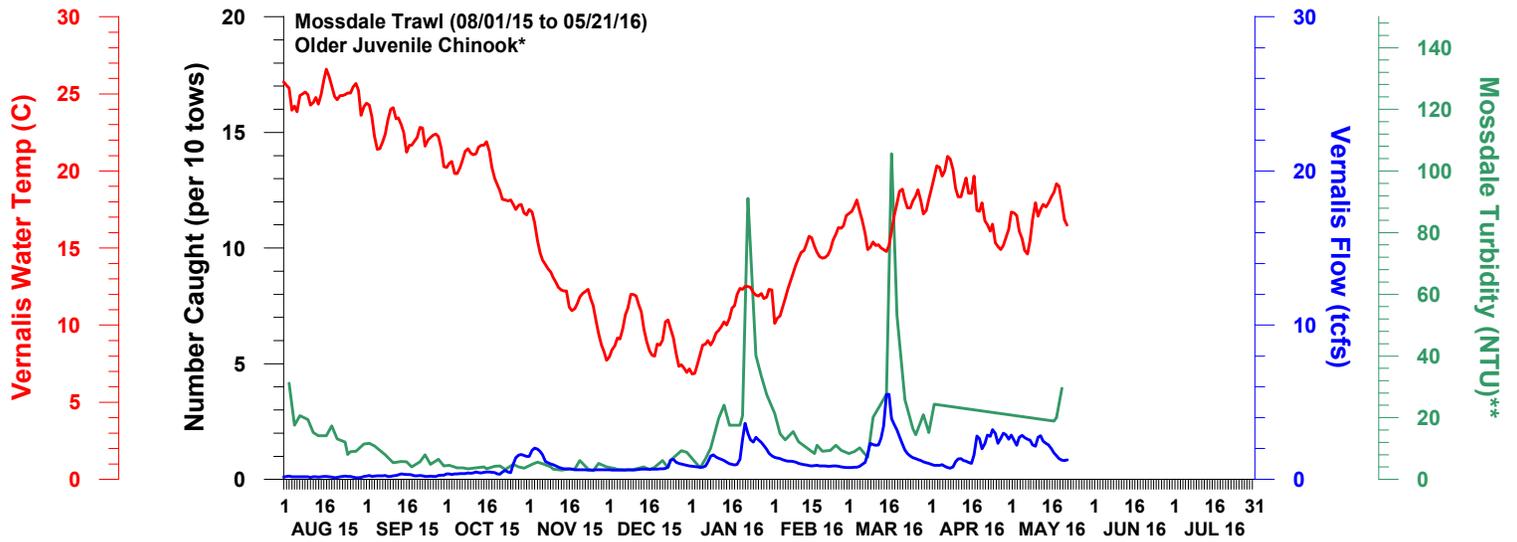
Preliminary data from DFW, FWS, and CDEC; subject to revision.

\*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



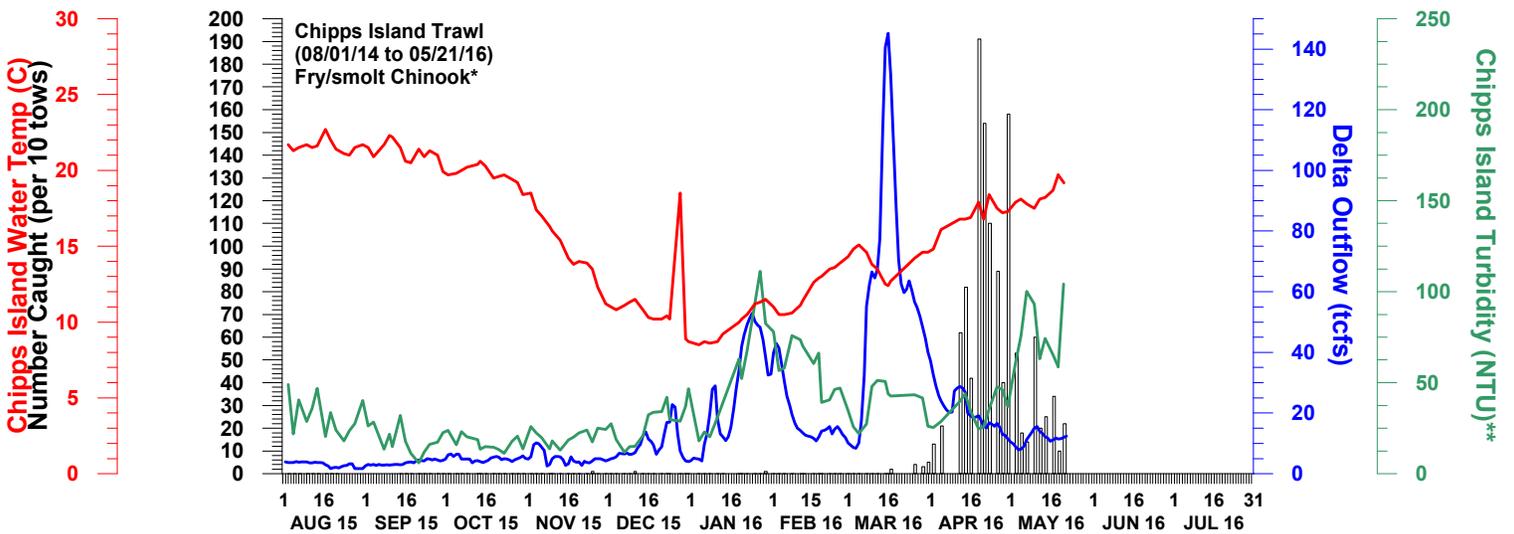
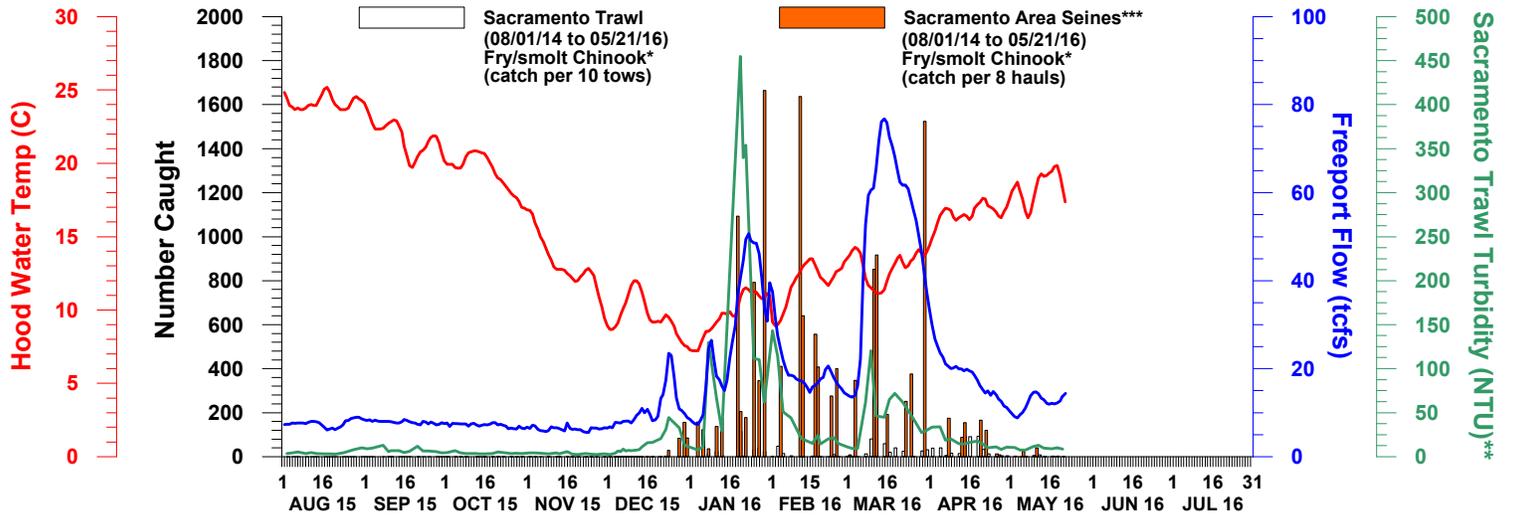
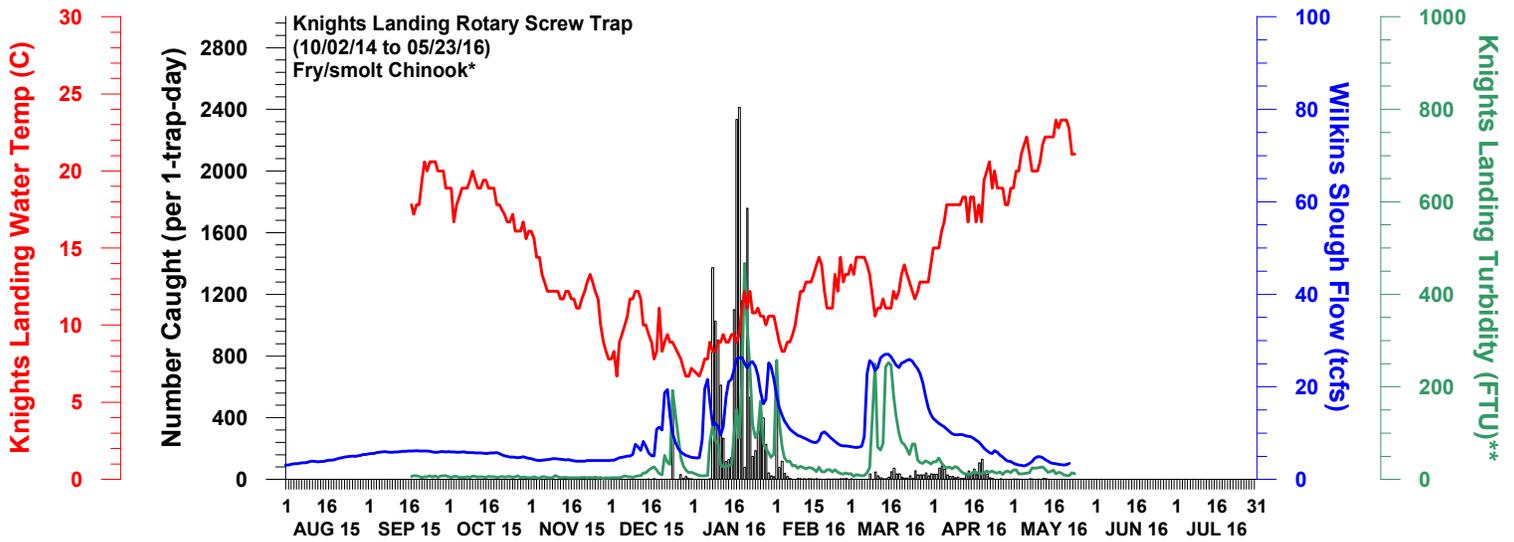
DWR-DES 24 MAY 2016  
Preliminary data from FWS,CDFW, and CDEC; subject to revision.

\*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 24 MAY 2016

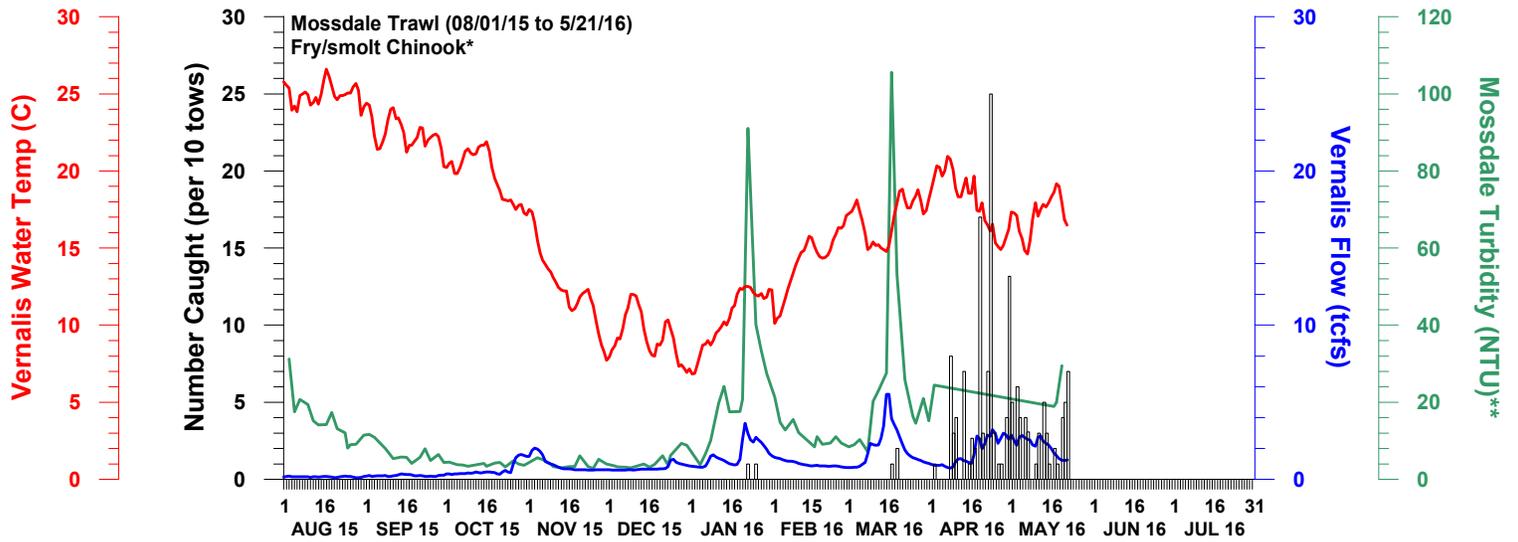
Preliminary data from DFW, FWS, and CDEC; subject to revision.

\*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



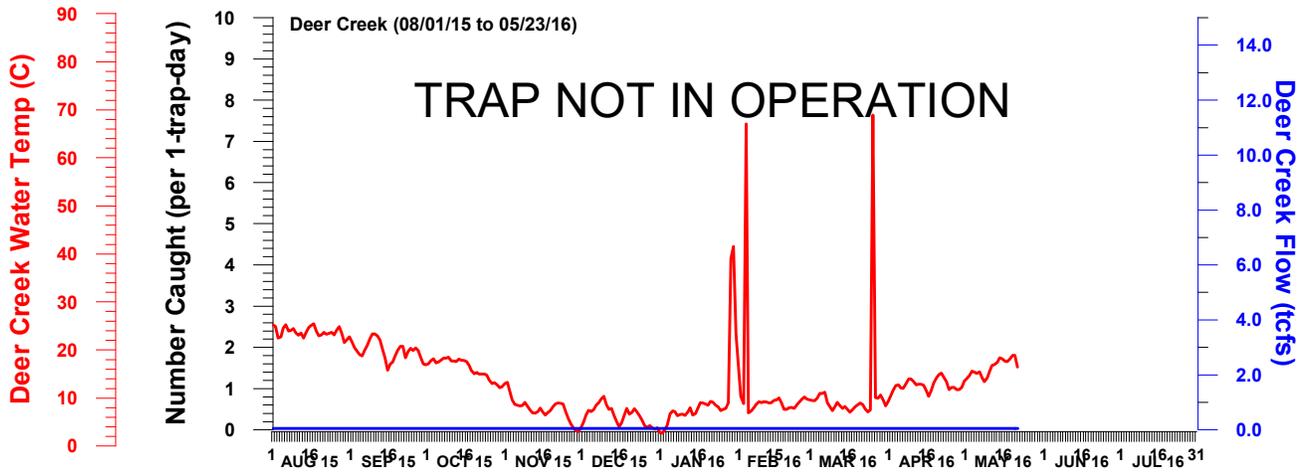
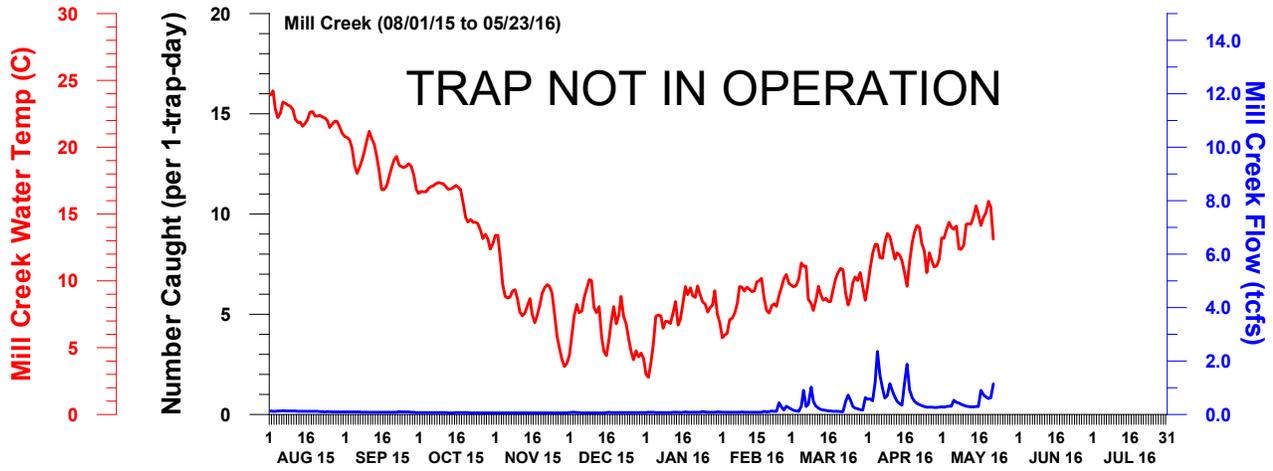
DWR-DES 24 MAY 2016

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/>).

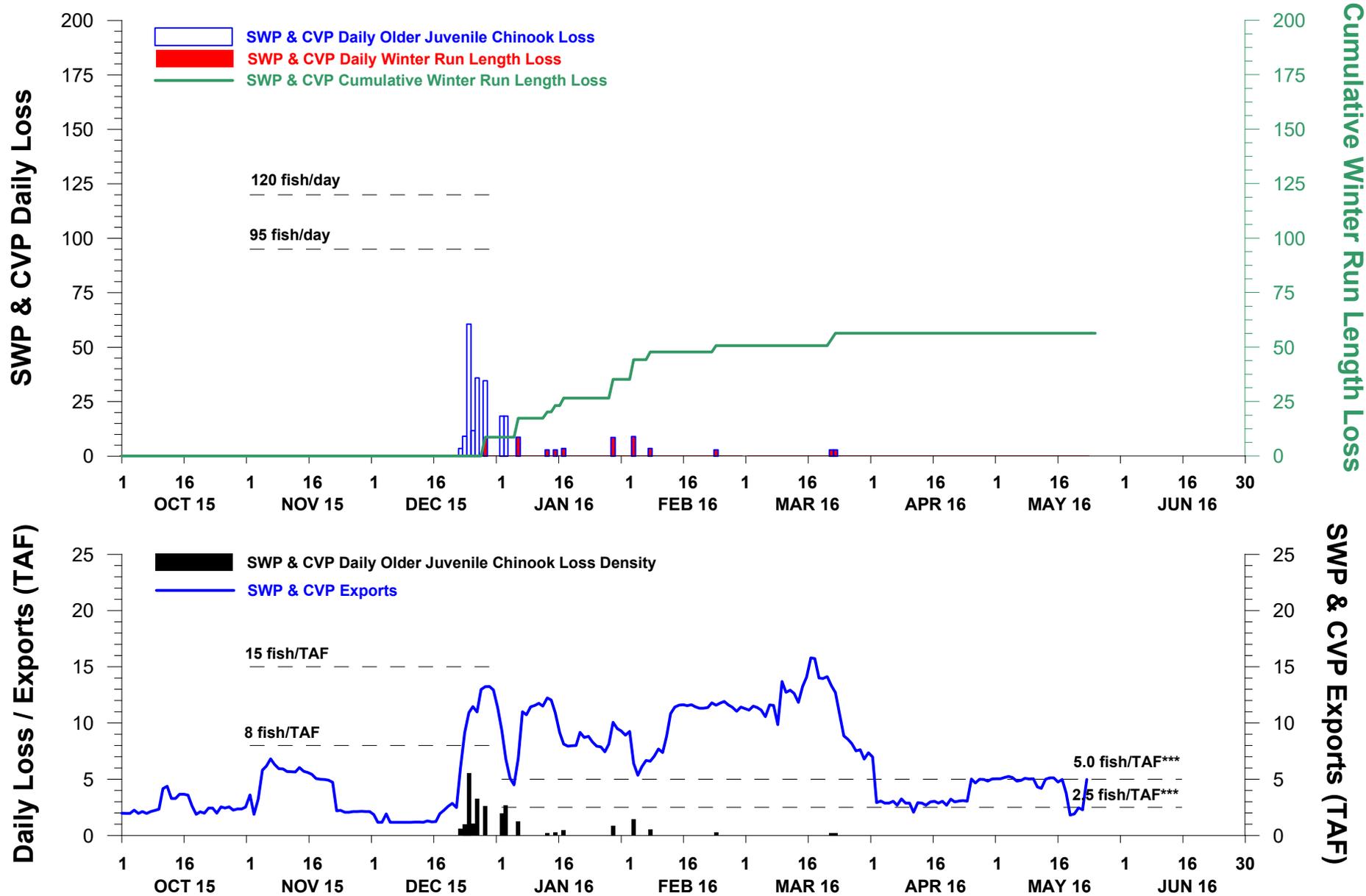
Mossdale Trawl data were either obtained directly from FWS, Stockton Fish and Wildlife Office or from DFW (Region 4).

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.

---

<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 22 MAY 2016



DWR-DES 24 MAY 2016

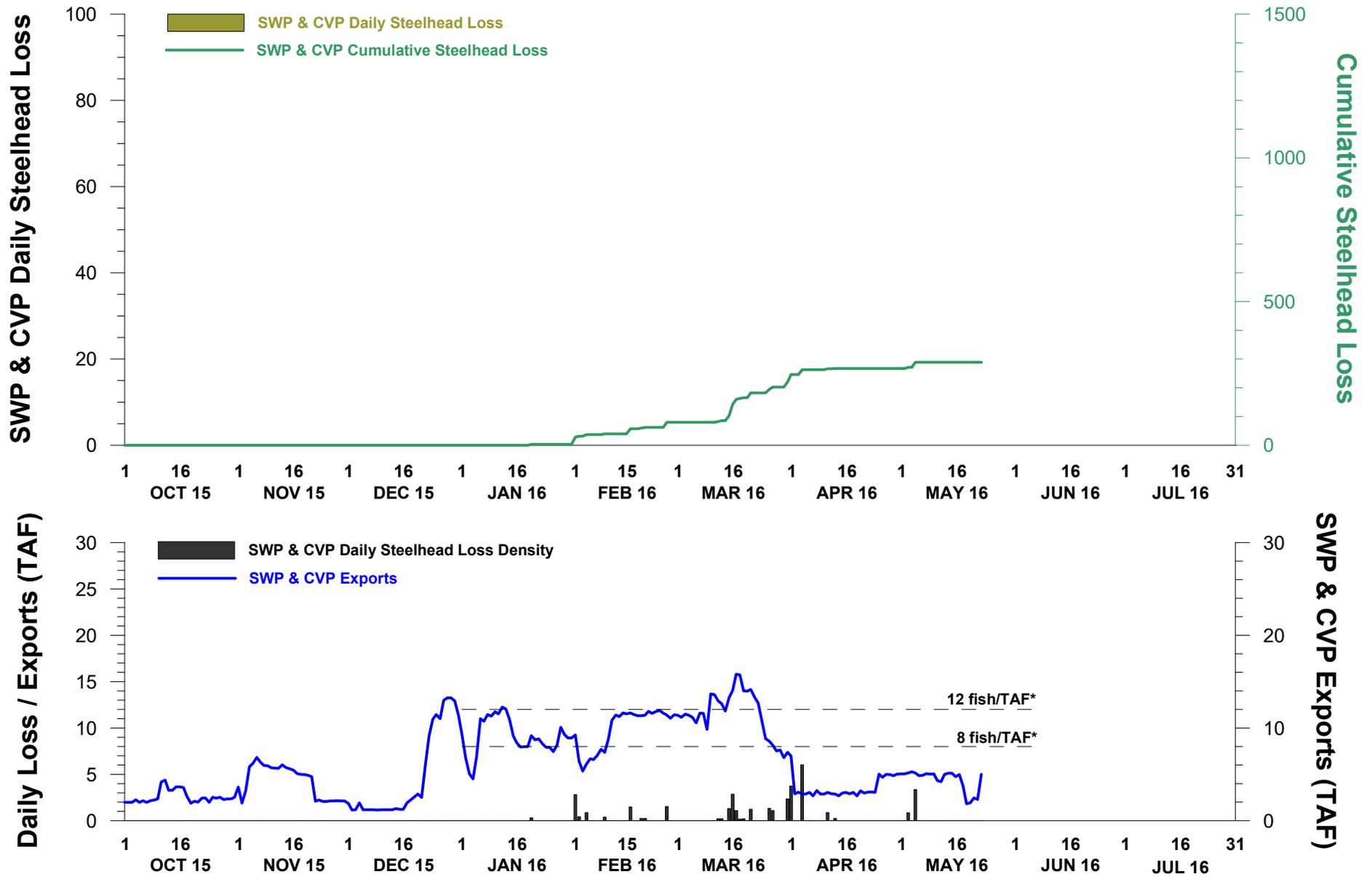
Preliminary data from DFW; subject to revision.

\*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 22 MAY 2016

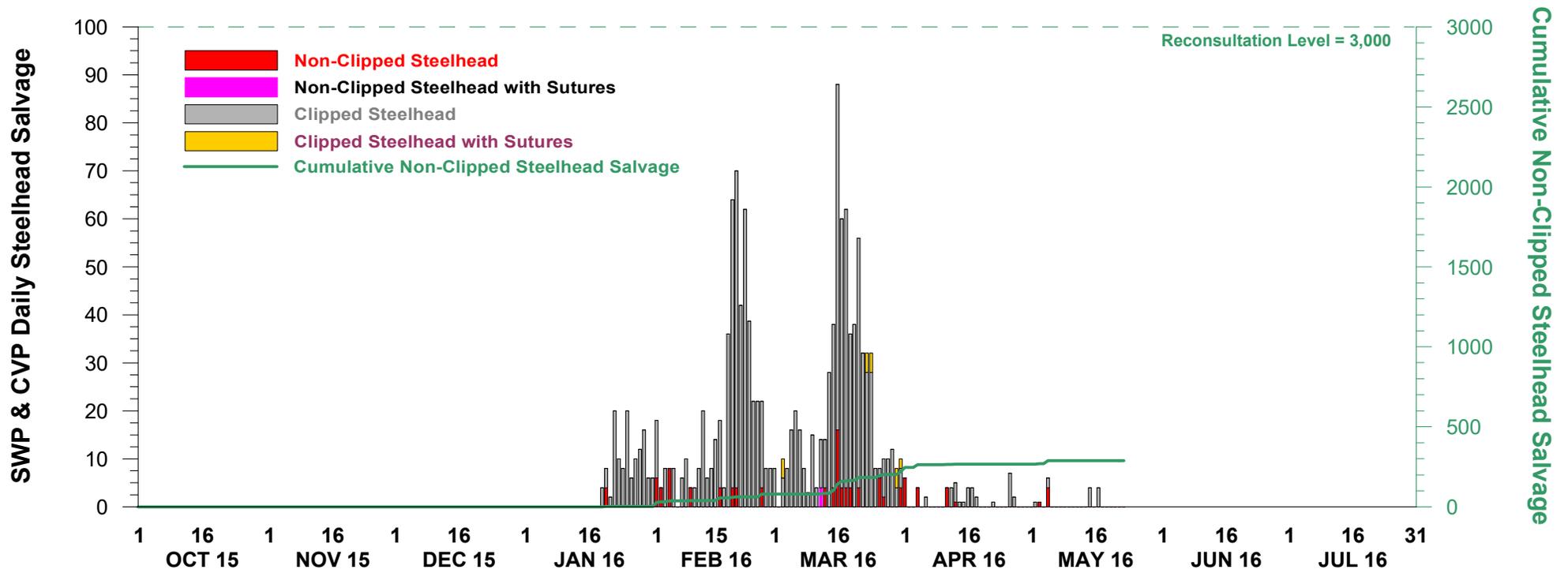


DWR-DES 24 MAY 2016

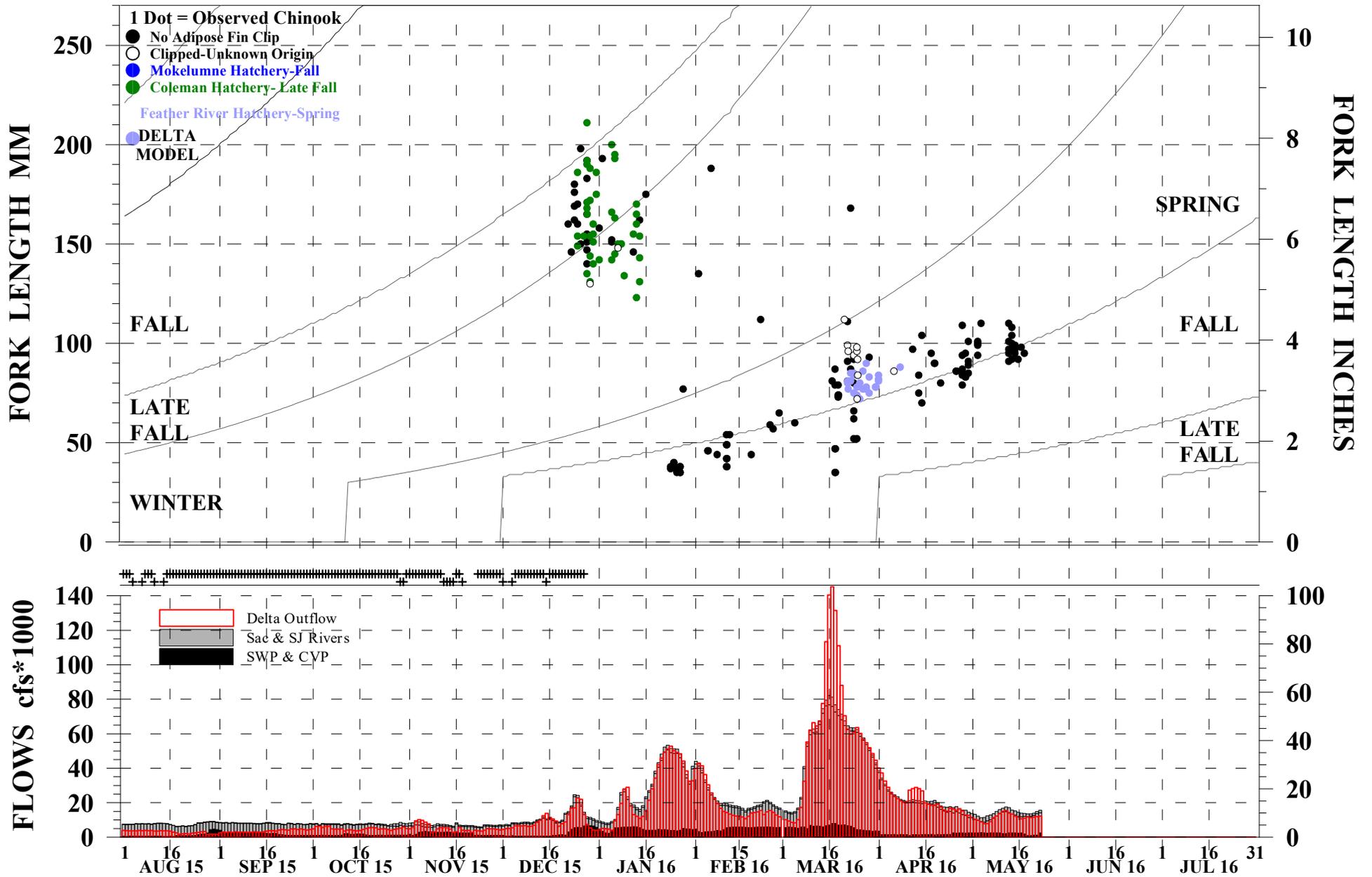
Preliminary data from DFW; subject to revision.

\*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 22 MAY 2016



# OBSERVED CHINOOK SALVAGE AT THE SWP & CVP DELTA FISH FACILITIES 08/01/2015 THROUGH 05/22/2016

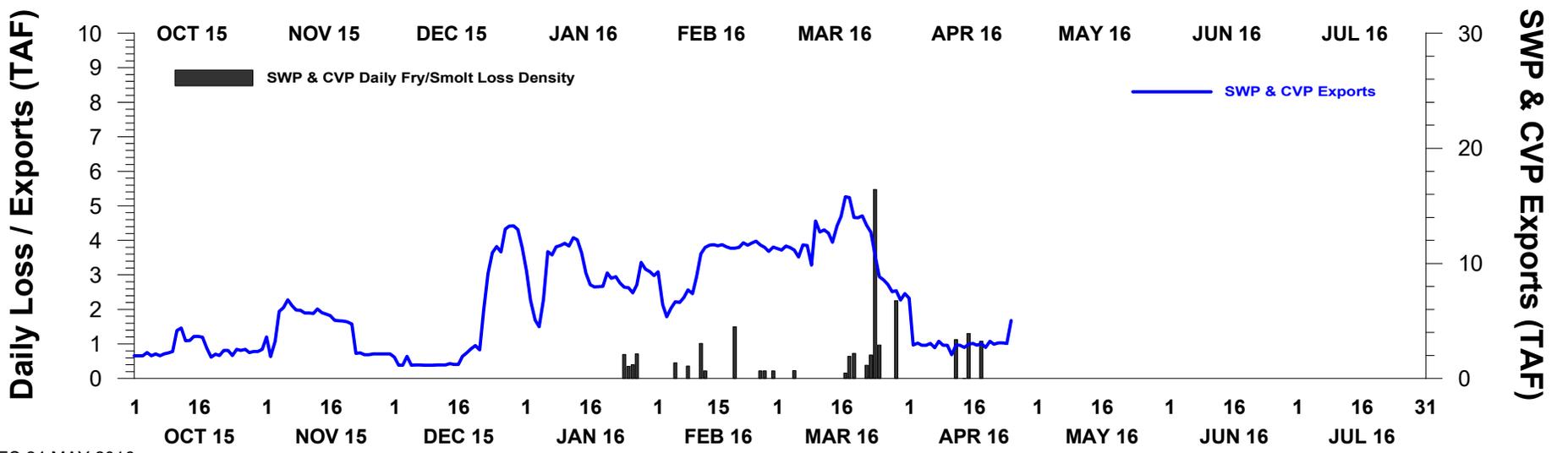
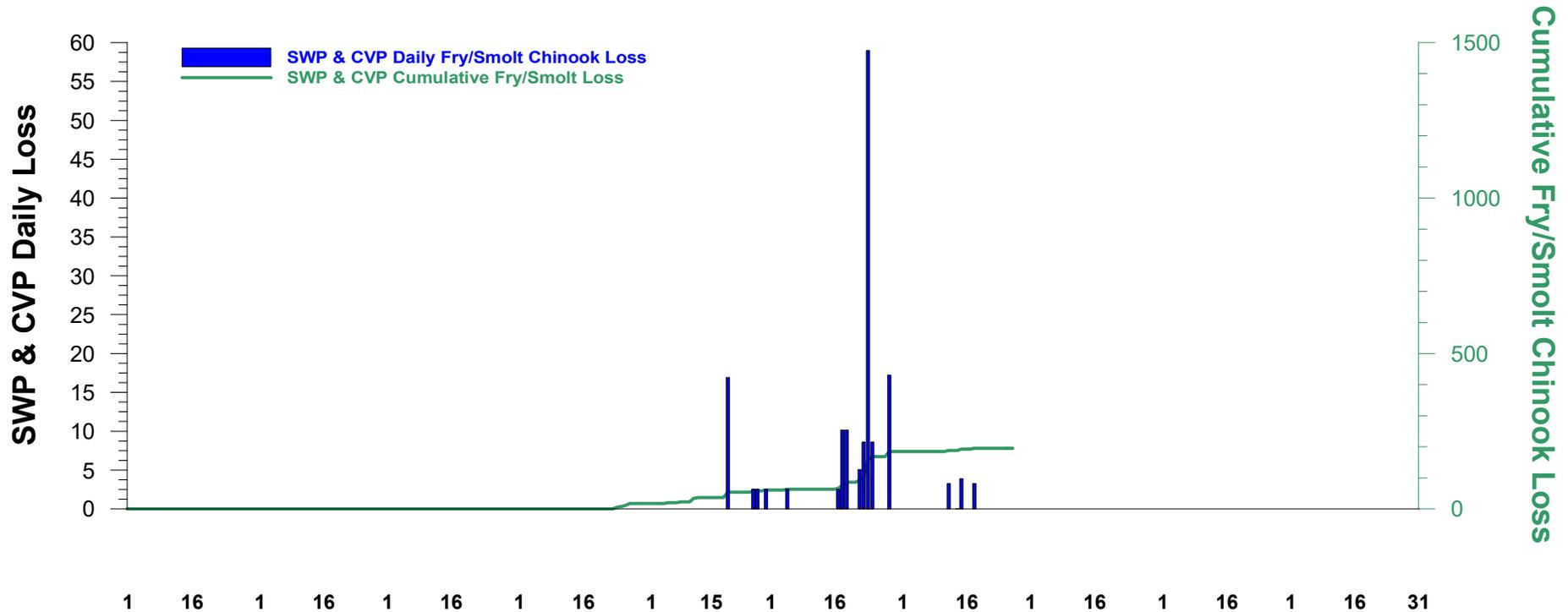


DWR-DES 24 MAY 2016

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.

# NON-CLIPPED FRY/SMOLT CHINOOK LOSS AT THE DELTA FISH FACILITIES 01 OCT 2014 THROUGH 22 MAY 2016



DWR-DES 24 MAY 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).