

**Delta Operations for Salmonids and Sturgeon (DOSS) Group**  
**Conference call: 5/26/2015 at 9:00 a.m.**

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

**DWR:** Farida Islam, Rhiannon Mulligan, Aaron Miller, Kevin Reece, Dan Yamanaka

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

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

**USFWS:** Craig Anderson

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

**SWRCB:** Matt Holland

**Agenda Items**

1. Agenda review and introductions
2. RPA Implementation review
3. Current Operations
4. Smelt Working Group
5. Fish Monitoring
6. DOSS Advice
7. Next DOSS meeting
8. Monitoring Data Discussion

**Agenda Item 2.**

***RPA Implementation Review***

**Delta RPA Actions affecting operations during May:**

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

- DCC gates were opened Friday, 5/22 and are closing today, 5/26.
- DCC gates will open again Friday, 5/29, and will close Monday, 6/1
- Both of the above openings are allowed during the May 21-June 15 period of both the NMFS BiOp and D-1641 DCC operations.

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

- The OMR limit of no more negative than -5,000 cfs is in effect.
- Note on temperature offramp: IV.2.3 implementation ends on 6/15, or when the temperature offramp is satisfied, whichever is sooner. The temperature offramp is satisfied when mean daily water temperature at Mossdale exceeds 72°F for seven consecutive days in June. Yesterday's Mossdale water temperature (as reported at MSD station on CDEC) was ~71°F. The soonest possible offramp is June 8, when daily water temperatures for the first seven days in June are known.

**Action IV.2.1 (I:E ratio)**

- Currently, the Critical year 1:1 ratio (of San Joaquin inflow at Vernalis to combined CVP/SWP exports) is in effect. This action restricts combined exports to 100% of Vernalis flow, or 1,500 cfs, whichever is greater.

**Agenda Item 3.**

**Current Operations (5/26/2015)**

SWP		CVP	
<b>Exports (cfs)</b>			
Clifton Court Forebay	800 <sup>A</sup>	Jones Pumping Plant	0 <sup>A</sup>
<b>Reservoir Releases (cfs)</b>			
Feather - Oroville	1,700 <sup>B</sup>	American - Nimbus	1,500
		Sacramento - Keswick	7,500
		Stanislaus - Goodwin	150
		Trinity – Lewiston	1,800 <sup>C</sup>
<b>Reservoir Storage (in TAF)</b>			
San Luis (SWP)	804	San Luis (CVP)	324
Oroville	1,588	Shasta	2,454
New Melones	460	Folsom	547
<b>Delta Operations</b>			
DCC	Closed <sup>D</sup>	Sacramento River at Freeport (cfs)	7,922
Outflow Index (cfs)	5,207 (5,646 7-day NDOI)	San Joaquin River at Vernalis (cfs)	435
E:I	8% (3-day avg.) 8% (14-day avg.)	X2	> 81 km

<sup>A</sup> The SWP is pumping for the CVP from 5/19 to ~5/27, due to a maintenance outage at the CVP. For 5/26 and 5/27, the SWP will pump 800 cfs, where 400 cfs will be for the SWP and 400 cfs will be for the CVP. Jones pumping plant is expected to come back online on 5/28.

<sup>B</sup> Will be reduced by the end of 5/26 to 1,500 cfs.

<sup>C</sup> Will be decreased to 450 cfs by the end of June.

<sup>D</sup> Closed on 5/26.

Salinity management is currently controlling exports.

Current Daily OMR Index is approximately -1,300.

OMR values as of 5/22/15:

	USGS gauges (cfs)	Index (cfs)
5-day avg.	-1,310	-1,320
14-day avg.	-1,350	-1,230

**Head of Old River Barrier (HORB)**

- The removal operation of the head of Old River barrier will start on 5/27/15
- Breach is anticipated by 6/4/15

- Completion of the in-water work is scheduled for 6/10/15

**Agenda Item 4.**

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

No report; because of the Memorial Day holiday on Monday, the Working Group is meeting at 10am today (after the DOSS call).

**Agenda Item 5.**

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

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

Location	Chippis Is. Midwater Trawl <sup>A</sup>	Mokelumne RSTs <sup>B</sup>	Sacramento Trawl <sup>A</sup>	Beach Seines <sup>A</sup>	Knights Landing RST <sup>C</sup>	Tisdale RST <sup>D</sup>	GCID RST	Mossdale Kodiak Trawl <sup>E</sup>
Sample Date		5/13-5/19			5/18-5/25	5/18-5/24	5/19-5/25	5/18-5/24
Total Catch		4,751			1	0	133	4
FR Chinook		4,747					132	
WR Chinook								
SR Chinook							1	
LFR Chinook								
Ad-Clipped Chinook								
Delta Smelt								
Splittail								
Longfin Smelt								
Steelhead (ad-clip)								
Steelhead (wild)		4			1 (360mm)			4 (231mm-268mm)
Green Sturgeon								
Flows (avg. cfs)					4,830	5,800	961	
W. Temp. (avg. °F)					69	67	61	
Turbidity (avg. NTU)					11	15	4.9	

<sup>A</sup> DAT data received after DOSS call due to holiday on Monday, 5/25.

<sup>B</sup> Data from Mokelumne River Fisheries Monitoring Program of the East Bay M.U.D.; Traps are located at river mile 54 and 38.

<sup>C</sup> Sampling period was from 5/18 at 12:00pm to 5/25 at 10:15am.

<sup>D</sup> Sampling period was from 5/18 at 9:00am to 5/24 at 8:30am.

<sup>E</sup> It was noted that no Chinook have been caught since 4/21/15, and the seasonal Chinook catch is the lowest in at least 10 years.

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

USFWS biweekly report (5/7-20/15) for preliminary estimates of passage by brood-year and run for unmarked juvenile Chinook salmon 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 (BY2014)	40	411,256
Spring-run Chinook (BY2014)	2,287	121,820
Fall-run Chinook (BY2014)	147,362	3,699,706
Late-fall-run Chinook (BY2015)	859	2,614
Rainbow Trout (BY2015)	1,459	7,942

### **Fish Salvage<sup>1</sup>:**

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

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<sup>1</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 18-24, 2015  
 Prepared by Bob Fujimura on May 25, 2015 14:30  
 Preliminary Results -Subject to Revision

Criteria	18-May	19-May	20-May	21-May	22-May	23-May	24-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	364	983	1,092	1,274	1,274	1,547	1,547	↗	1,154
CVP daily export	1,237	351	0	0	0	0	0	↘	227
SWP reduced counts	0%	0%	0%	0%	0%	0%	0%	→	0%
CVP reduced counts	0%	0%	NS	NS	NS	NS	NS		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  
 NS = not sampled

**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	→	53	106
Spring Run	4	4	↗	50	70
Late Fall Run	0	0	→	6	26
Fall Run	0	0	→	16	26
Unclassified	0	0	→	24	NC
<b>Total</b>	<b>4</b>	<b>4</b>		<b>149</b>	<b>229</b>
<b>Hatchery</b>					
Winter Run	0	0	→	62	214
Spring Run	0	0	→	8	7
Late Fall Run	0	0	→	136	340
Fall Run	0	0	→	41	180
Unclassified	0	0	→	12	NC
<b>Total</b>	<b>0</b>	<b>0</b>		<b>259</b>	<b>741</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	→	43	157
Hatchery	0	0	→	523	1,841
<b>Total</b>	<b>0</b>	<b>0</b>		<b>566</b>	<b>1,998</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 5/18/15-5/24/15.

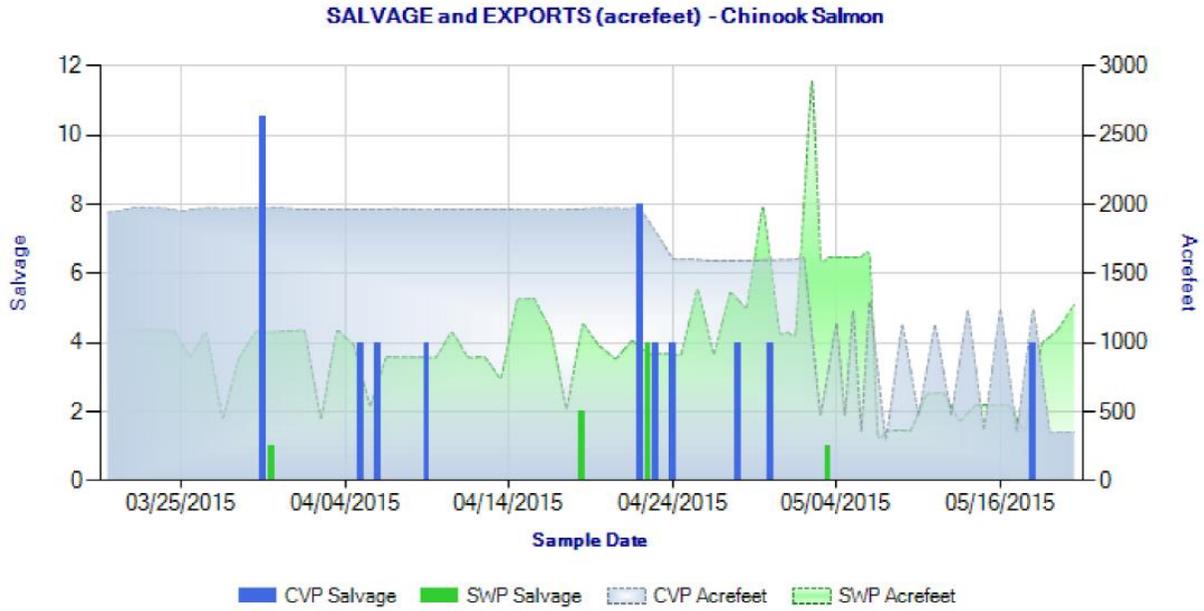


Figure 2. Daily salvage of Chinook salmon (all races) and water exports from the state and federal fish salvage facilities during 3/21/15 through 5/21/15.

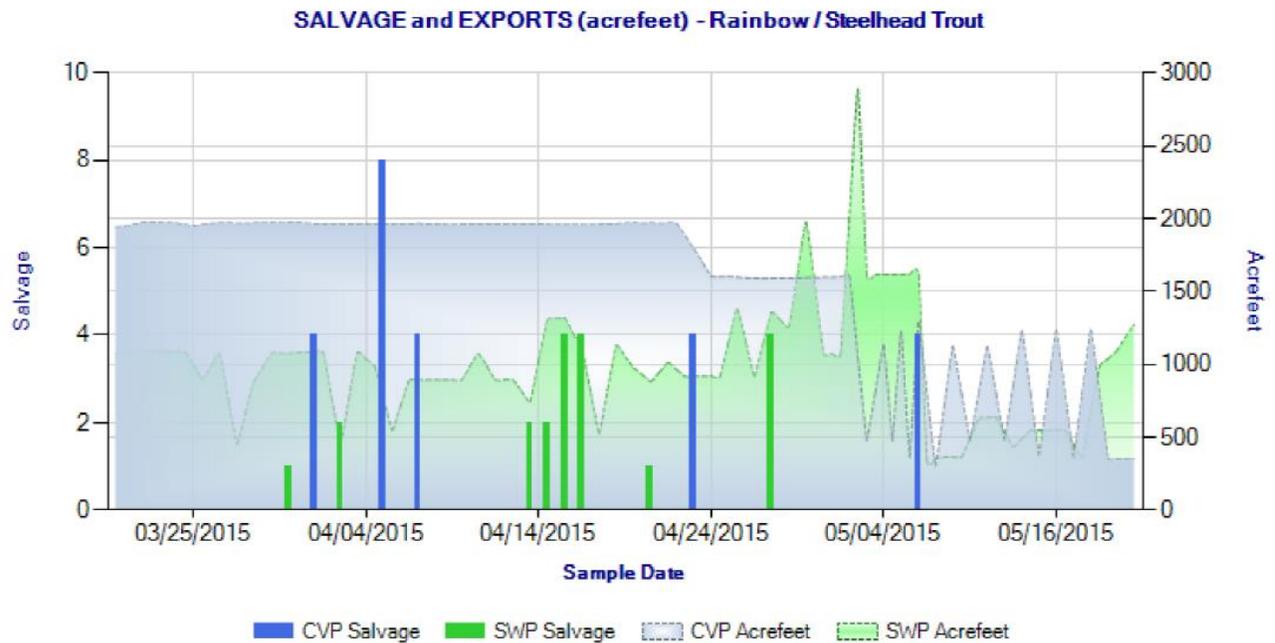


Figure 3. Daily salvage of steelhead and water exports from the state and federal fish salvage facilities during 3/21/15 through 5/21/15.

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

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

Release Date	CWT Race	Hatchery	Release Site	Release Type	Confirmed Loss	Number Released <sup>1</sup>	Total Entering Delta	% Loss of Number Released <sup>2</sup>	% Loss of Total Entering Delta <sup>3</sup>	First Concern Level	Second Concern Level	Date of First Loss <sup>4</sup>	Date of Last Loss <sup>4</sup>
12/1/2014	LF	Coleman NFH	Battle Creek	Production	574.59	853,100	n/a	0.067	n/a	n/a	n/a	12/12/2014	1/16/2015
12/4/2014	LF	Coleman NFH	Battle Creek	Spring Surrogate	34.98	77,000	n/a	0.045	n/a	0.5%	1.0%	12/25/2014	12/29/2014
12/18/2014	LF	Coleman NFH	Battle Creek	Spring Surrogate	45.42	78,000	n/a	0.058	n/a	0.5%	1.0%	1/1/2015	1/17/2015
2/5/2015	LF	Coleman NFH	Battle Creek	Spring Surrogate	0.00	83,100	n/a	0.000	n/a	0.5%	1.0%	*	*
2/4 - 2/6/2015	W	Livingstone NFH	Sacramento River	Production	8.40	612,056	188,500	0.001	0.00004	0.5%	1.0%	2/25/2015	2/25/2015
3/25-3/31/2015	F	Coleman NFH	Rio Vista net pens	Production	3.72	942,800	n/a	n/a	n/a	0.5%	1.0%	2/23/2015	2/23/2015
4/2-4/3/2015	F	Coleman NFH	Rio Vista net pens	Production	0.00	109,500	n/a	0.000	n/a	0.5%	1.0%	*	*
4/10-4/19/2015	F	Coleman NFH	Rio Vista net pens	Production	0.00	1,517,900	n/a	0.000	n/a	0.5%	1.0%	*	*
4/18-4/19/2015	F	Coleman NFH	Rio Vista net pens	Production	0.00	207,350	n/a	0.000	n/a	0.5%	1.0%	*	*

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

Facility	Unknown CWT Loss <sup>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	18.01	0.00	0.00	17.00	0
CVP	26.62	0.00	0.00	0.00	0
TOTAL	44.63	0.00	0.00	17.00	0

SWP and CVP adipose-fin clipped Chinook lost from 10/1/2014 through 5/17/2015.

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

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

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

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

<sup>5</sup>Adipose-fin clipped Chinook was observed during fish count, but tag code could not be determined (e.g., damaged tag, lost tag, 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 5/18/2015

Preliminary data from DF-W, DWR, FWS, and Reclamation; subject to revision.

## DOSS Estimates of Fish Distribution

DOSS estimates of the current distribution of listed Chinook and steelhead, as a percentage of the population, are based on recent monitoring data and historical migration timing patterns. The table below reflects current distribution. Note that the latest Chipps Island, Sacramento Trawl, and Beach Seine data were not available by the time of the 5/26/15 DOSS call, due to the Monday holiday. The Mossdale Trawl data were received and quickly reviewed during the DOSS call.

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 (naturally produced)</i>		>99% out of Delta; Generally done migrating with the exception of a few stragglers. (Last week: same)	
<i>YOY winter-run Chinook salmon (hatchery-produced)</i>		>99% out of Delta; Generally done migrating with the exception of a few stragglers. (Last week: same)	
<i>YOY spring-run Chinook salmon<sup>A</sup></i>		>99% out of Delta; Generally done migrating with the exception of a few stragglers. (Last week: few stragglers upstream, 5% in the Delta, 95% exited the Delta)	
<i>Yearling spring-run Chinook salmon<sup>B</sup></i>		>99% out of Delta; Generally done migrating with the exception of a few stragglers. (last week: same)	
<i>Hatchery steelhead<sup>C</sup></i>		>99% out of Delta; Generally done migrating with the exception of a few stragglers. (Last week: same)	
<i>Sacramento River steelhead (naturally-produced)</i>		Limited catch data	
<i>San Joaquin River steelhead<sup>D</sup></i>		>95% out of Delta; Generally done migrating with the exception of a few stragglers. (Last week: few stragglers upstream, 5% in the Delta, 95% exited the Delta)	

<sup>A</sup> Chipp Island Trawl data of spring-run is difficult to interpret now that the 75% unmarked fall-run productions are likely masking the wild spring-run Chinook catch.

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

<sup>C</sup> Difficult to assess now that all hatchery releases are in the system (CNFH, Feather River Fish Hatchery, and Mokelumne Fish Hatchery released as usual; Nimbus Hatchery released their steelhead in the spring of 2014 because of expected unsuitable hatchery water temperatures during the summer of 2014). Percentages are intended to capture distribution of steelhead that migrate out; not those that may residualize.

<sup>D</sup> Have observed a few juvenile steelhead in monitoring data. Distribution estimates are also based on 10 years of historical data from Mossdale Trawls (on the San Joaquin River) and RST data from Caswell Park (on the Stanislaus River), as well as on recent flow and water temperature conditions.

## DOSS Feedback on Entrainment Risk

Entrainment risk of fish from the Sacramento River into the Interior Delta (same as last week except for tidal conditions):

DOSS noted that generally, there is an increased risk of entrainment into the interior Delta during spring tides, compared to during neap tides, at any OMR level. During a spring tide, tidal conditions extend further upstream and may, for example, create conditions at Georgiana Slough (e.g., reverse flows) that are associated with routing into Georgiana Slough, a route to the interior Delta. Currently, the Delta is experiencing a neap tide.

DOSS notes that a DCC opening may increase the risk of entrainment into the interior Delta for fish in the vicinity of the DCC. Occasional DCC gate openings from 5/21 to 6/15 are allowed per both D-1641 and the NMFS BiOp's RPA Action IV.1.2, and so this opening doesn't represent any change in risk to migrating salmonids relative to typical operations.

Entrainment risk of fish in the Interior Delta into the CVP/SWP facilities (same as last week): DOSS assessed the current risk of entrainment for listed salmonids. For listed salmonids in the Delta, the current risk of entrainment for each OMR flow range was characterized as follows:

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

DOSS notes that, once the CVP pumping plant resumes operations on Thursday, 5/28, the risk of facility loss may be reduced relative to the risk during the period of SWP pumping only, since the CVP is more efficient at salvaging fish.

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

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

#### **Agenda Item 7.**

**Next Meeting:** The next DOSS conference call will be on 6/9/15 at 9am.

#### **Agenda Item 8.**

##### ***Monitoring Data Discussion***

##### **General discussion points raised**

- How do we know if monitoring is adequate?
- Retrospective data analysis may be useful. The DOSS annual report may be an opportunity for this.

##### **Topic: Spatial Distribution**

1. Was monitoring in the rivers and Delta adequate to accurately estimate spatial distribution to assess DCC gates and other Delta operations?
2. Were there changes made for drought monitoring that benefited this evaluation?
3. Is there other information that would be useful for determining spatial distribution?
4. Is weekly review of the spatial distribution of salmonids useful?

### **Summary of DOSS Discussion**

- Use of monitoring information retrospectively to evaluate if monitoring is adequate is an important step that could be done better.
- Not all rotary screw trap information is used, use RST data from the San Joaquin Rivers and American and Feather rivers more regularly
- Understand production of fall-run Chinook on the American River by continuing carcass surveys. Reclamation stopped funding, but CDFW found some funding
- Large knowledge gaps in understanding spatial distribution of fish within the Delta before they reach Chipps Island
- Jersey Point and Prisoner Point Trawls were considered useful data for within-Delta presence/absence, but not for comparisons since data is very limited to a couple year of lower production due to drought.
- Increase the number of acoustic receivers- greater spatial coverage is important
  - Additional locations for real-time receivers could include:
    - Georgiana Slough—to see how many fish that are routed through there make it to Middle River
    - Tisdale/Sutter Bypass—to see if fish use other migration routes; receivers in the bypasses would not necessarily have to be real-time receivers
    - Knight’s Landing—which may also be useful to provide context for RST data
    - Acoustic telemetry and RST could be used in tandem to estimate trap efficiency possibly. This is done on the Mossdale Trawl by CDFW to look at steelhead emigration.
- Increase real-time reporting of RST data from San Joaquin tributaries
- CDFW’s Spring Kodiak Trawls for Delta Smelt catch juvenile salmonids, too. Reporting of incidental salmonid catch from Kodiak trawls would be useful for next year’s DOSS calls.

### **Topic: Temporal Distribution**

5. Was monitoring in the rivers and Delta adequate to accurately estimate temporal entrance and exit in the Delta?
6. Were there changes made for drought monitoring that benefited this estimation?
7. Is there other information that would be useful for determining temporal distribution?

### **Summary of DOSS Discussion**

- Mostly use Knight’s Landing and Sacramento Trawl data for this currently
- More frequent monitoring efforts (*e.g.* daily versus weekly or 3x/week sampling) may help to capture short-term peak migration events, but may be logistically more difficult (staff time, costs) and will likely result in higher take. The benefit of a daily effort is that it informs the cumulative presence, which has independent utility perhaps for comparing population level effects

### **Topic: Identification (to Chinook run, hatchery origin, basin origin?)**

8. Was monitoring adequate to accurately identify salmonids in the river, delta, and salvage?
9. Was the timing of monitoring adequate to identify salmonids?
10. Were there changes made for drought monitoring that benefited this estimation?
11. Are there populations that we cannot differentiate, but should be differentiated?

### **Summary of DOSS Discussion**

- Need a more structured, multiyear program for genetic sampling
- If it is not logistically possible to do routine genetic sampling, maybe initiate genetic sampling only when approaching a take limit
  - In particular, it would be useful data for specific locations such as Knight's Landing, Tisdale, and GCID.
  - Could also be part of a long-term dataset, in which to compare different water year types
- Would be nice to look at growth differences between wild and hatchery winter-run Chinook, but we are not there yet
- Potential use of PIT (Passive Integrated Transponder) tags to determine steelhead origin (or maybe even other Chinook runs and origins)
- Another approach of spot recognition and individual recognition was mentioned and papers by Merz et al. 2012, Merz et al. 2014, and Bergman et al. 2014 were shared with DOSS.

### **Topic: Juvenile Production/Abundance Of Different Life Stages**

12. Is information on production of fish important for Delta drought operations?
13. Was monitoring adequate to accurately estimate the number of salmonid in the river, Delta, and salvage?
14. Were there changes made for drought monitoring that benefited this estimation?
15. Is information on life history diversity of fish important for Delta drought operations?

### **Summary of DOSS Discussion**

- Good to understand life history structure, diversity, and changes within a population, but may not necessarily need the information (other than JPE to calculate JPE-based trigger) to implement the current RPA actions
- Important to evaluate current and historical life history diversity (especially for winter-run Chinook) and determine possible drivers of life history change through time.
- This seems important to understanding how many fish enter and exit the Delta, and the influence of operations on them.
- Production information helps to contextualize any information about adults from carcass surveys.

### **Topic: Salvage/Loss**

16. Was monitoring in salvage adequate to accurately estimate loss?
17. Were there changes made for drought monitoring that benefited this estimation?
18. Is there other information that would be useful for determining salvage estimation?

### **Summary of DOSS Discussion**

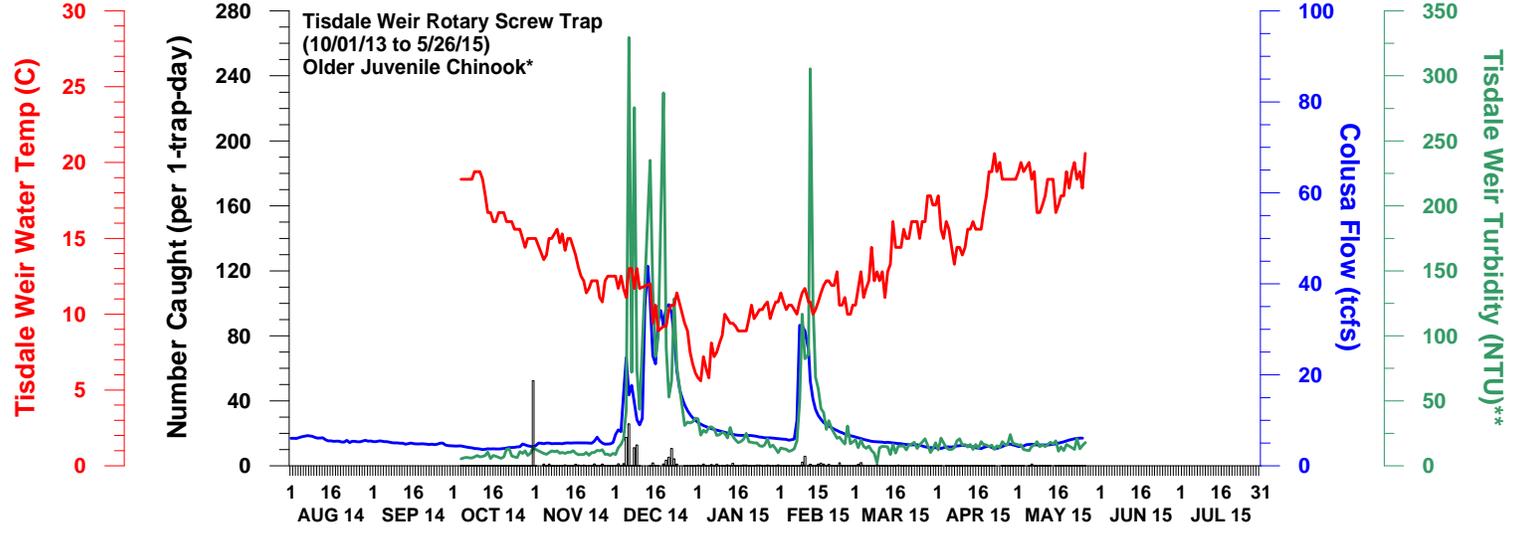
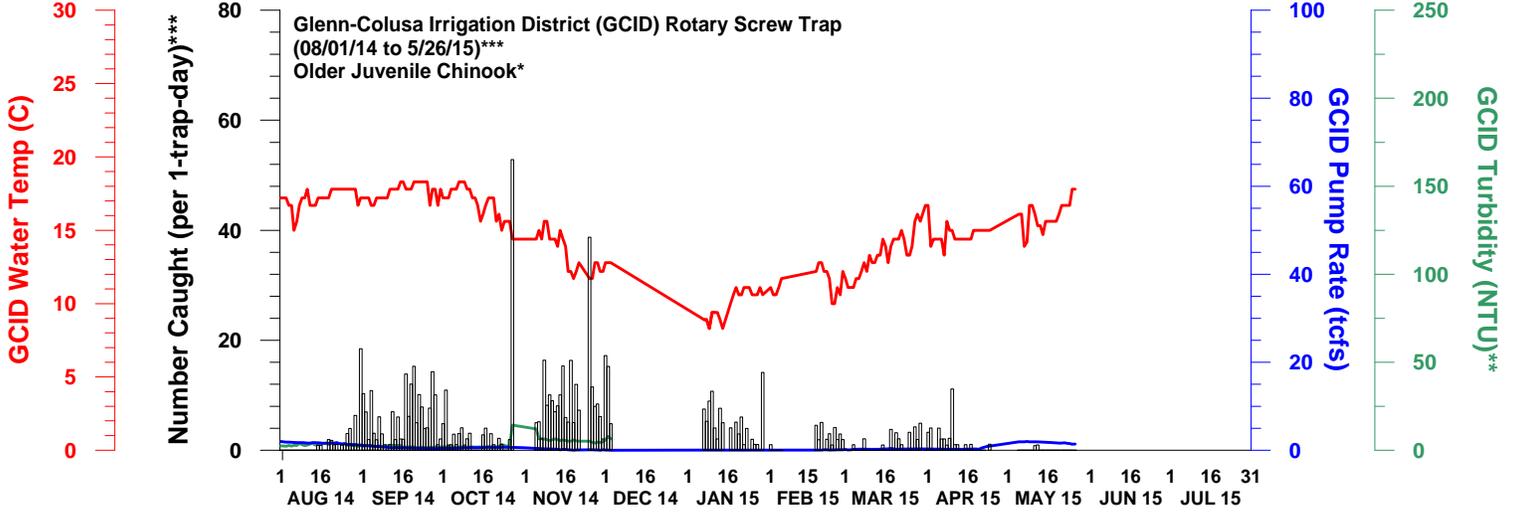
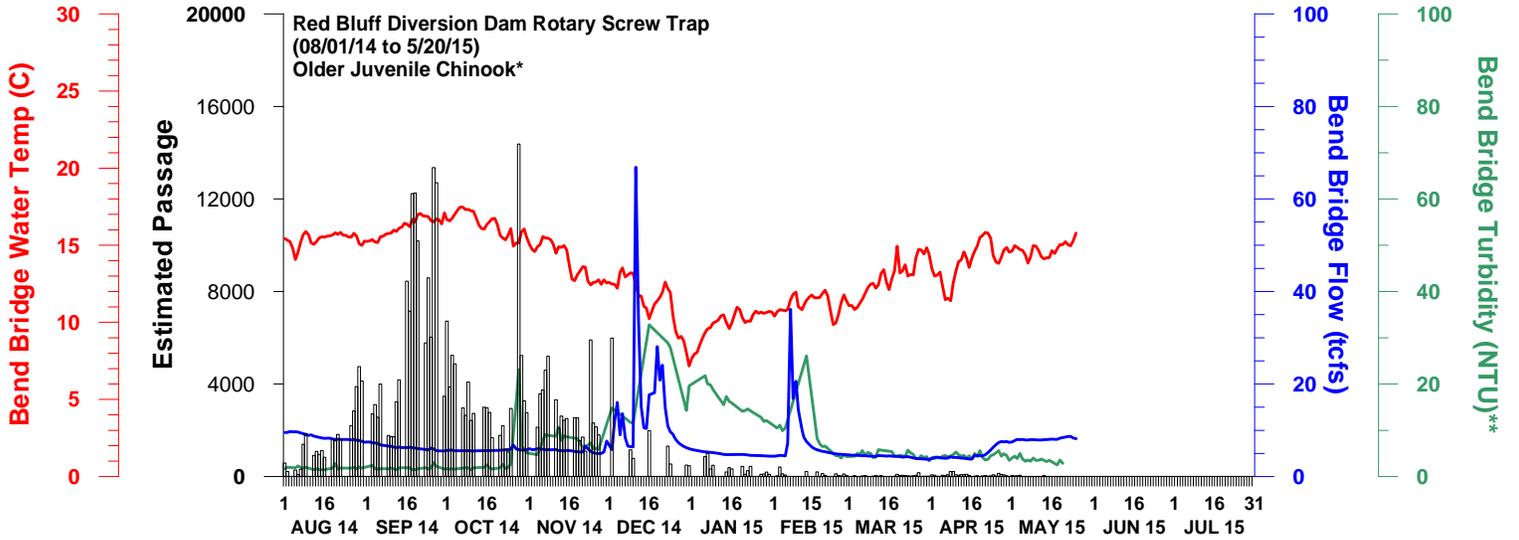
- Salvage data are an important piece of information
- Potential to install real-time acoustic receivers inside the facilities
- When fish are rare, it might be worth increasing the salvage count frequency (*e.g.* Green Sturgeon rarely observed in counts, but may still be observed in the facilities). However, the objective for increasing counts should be clearly identified.

- Potential for automatic identification of fish in facilities using, for example, DIDSON technology or other combination of camera and software.

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

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

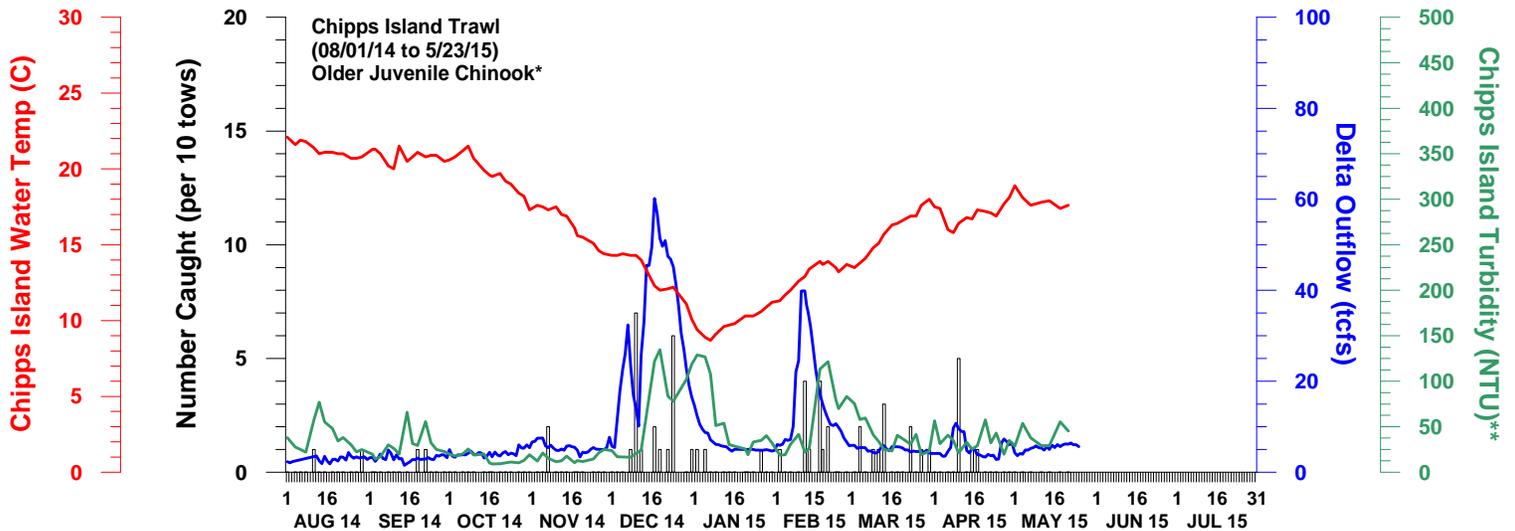
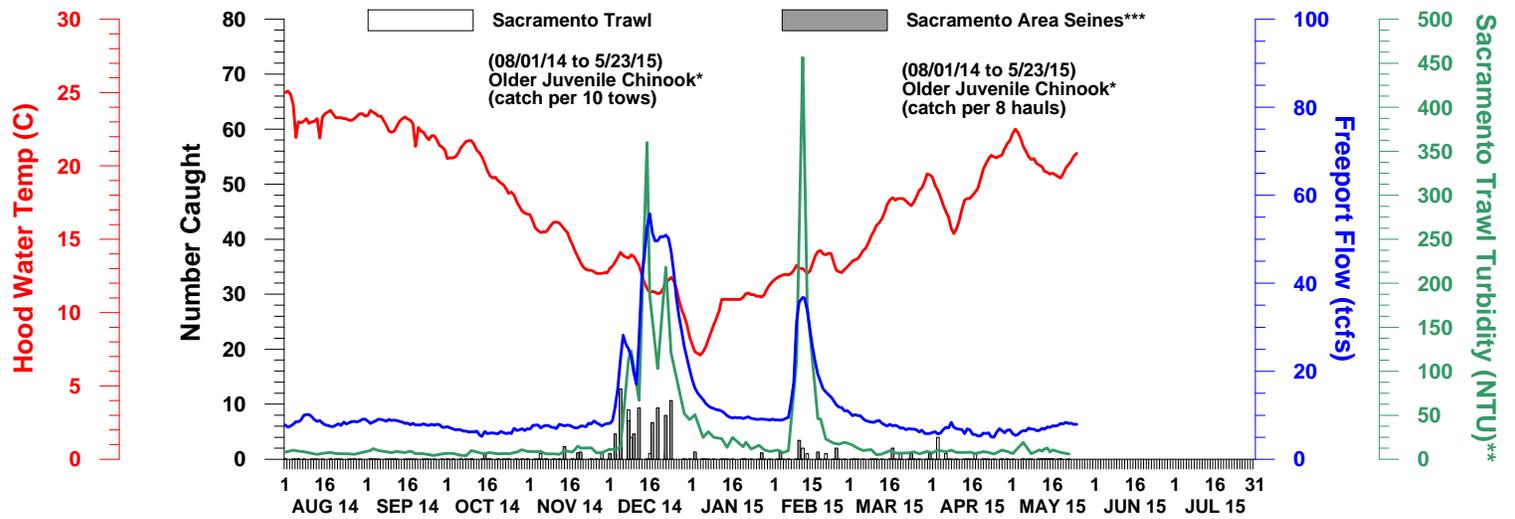
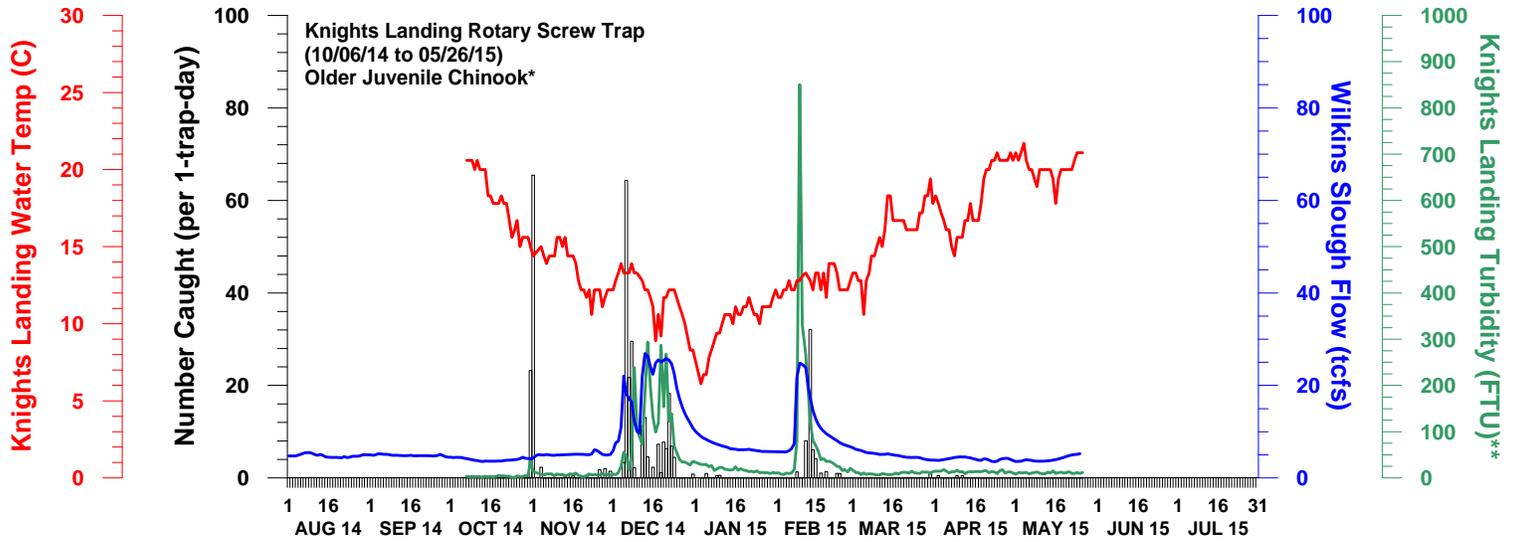
# NUMBER OF UNMARKED OLDER JUVENILE CHINOOK MEASURED IN THE SACRAMENTO RIVER



DWR-DES 27 MAY 2015  
 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.  
 \*\*Turbidity is a discrete measurement and is not measured continuously. Therefore, data are interpolated on days when turbidity was not measured unless data are missing for more than five days.  
 \*\*\*Trap was pulled on 10/28/14 due to extremely turbid conditions, heavy debris, and high number of listed winter run Chinook and has resumed since 11/5/14. Trap was not in operation on 12/3/14-1/6/15, 2/5/15-2/16/15, and 4/25/15-5/4/15 due to various reasons.

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



DWR-DES 27 MAY 2015

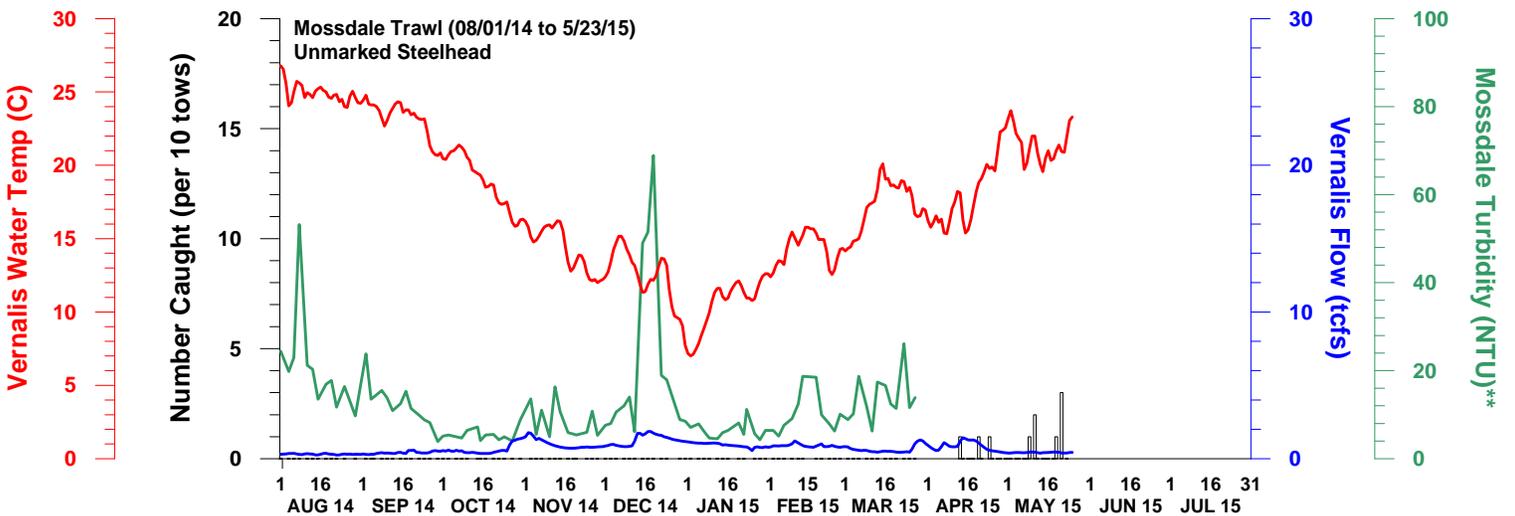
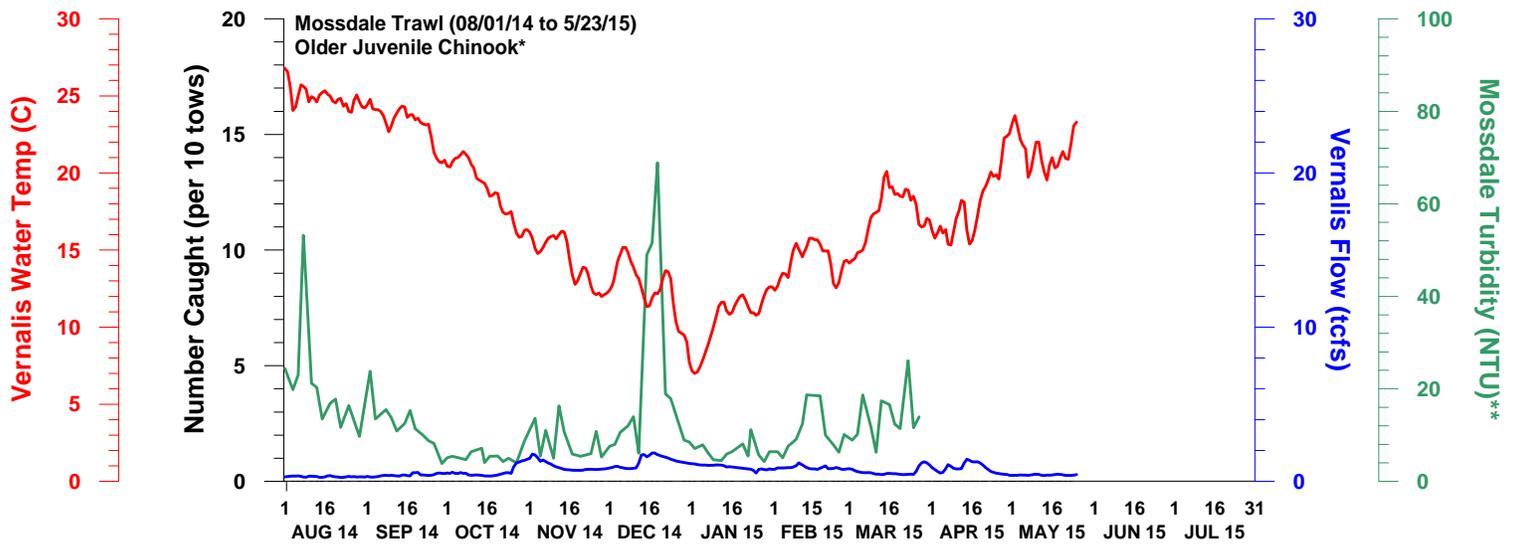
Preliminary data from DFW, FWS, and CDEC; subject to revision.

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

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

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

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

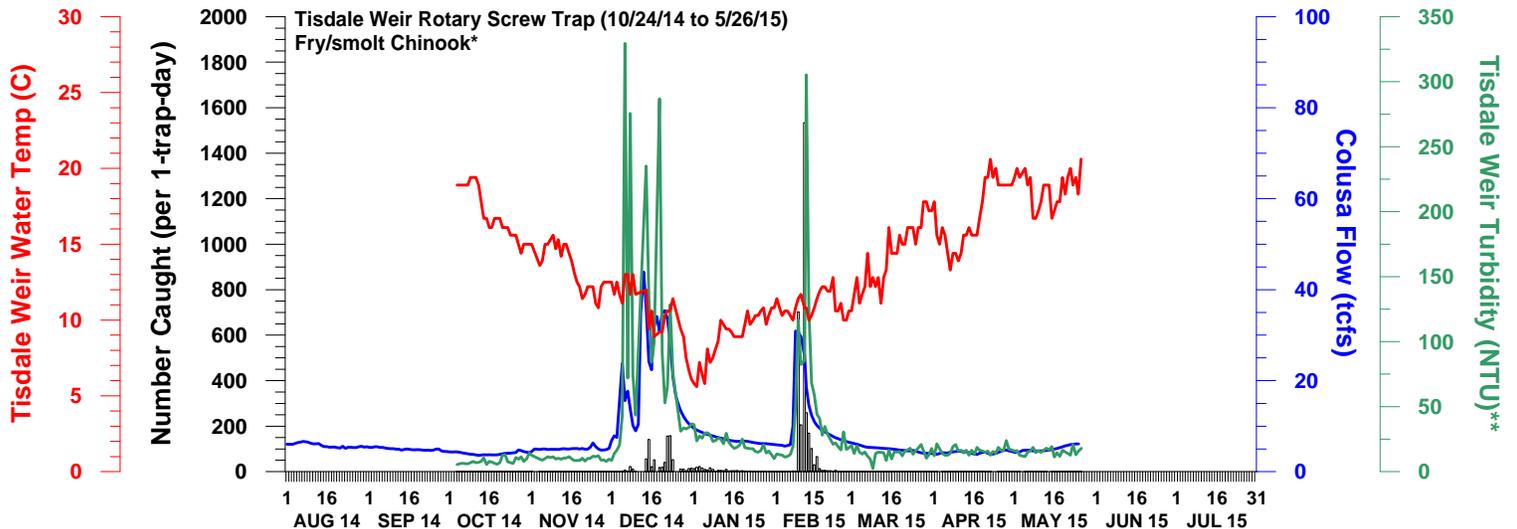
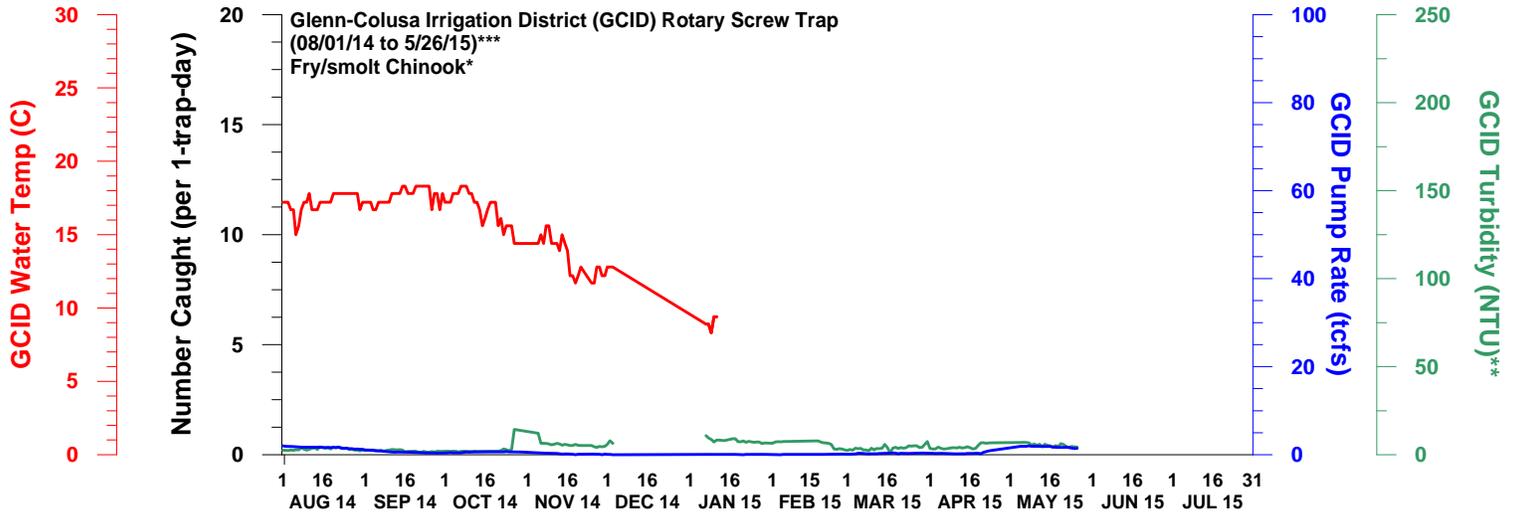
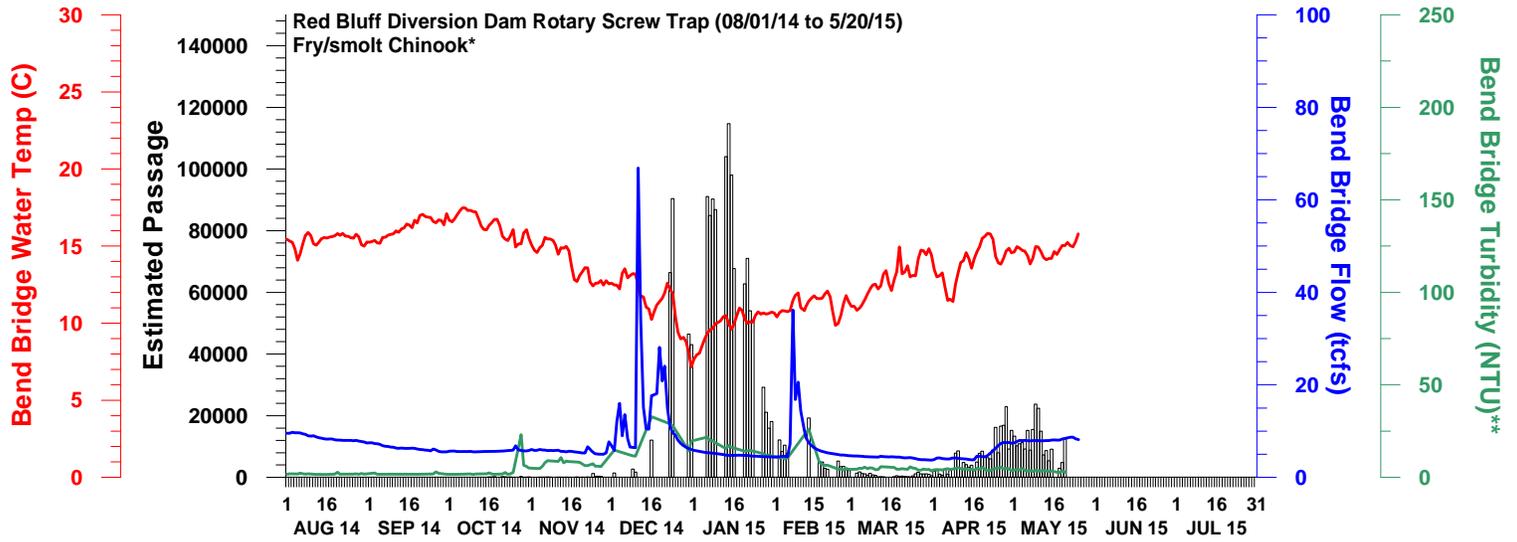


DWR-DES 27 MAY 2015  
Preliminary data from FWS and CDEC; subject to revision.

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

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

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



DWR-DES 27 MAY 2015

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

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

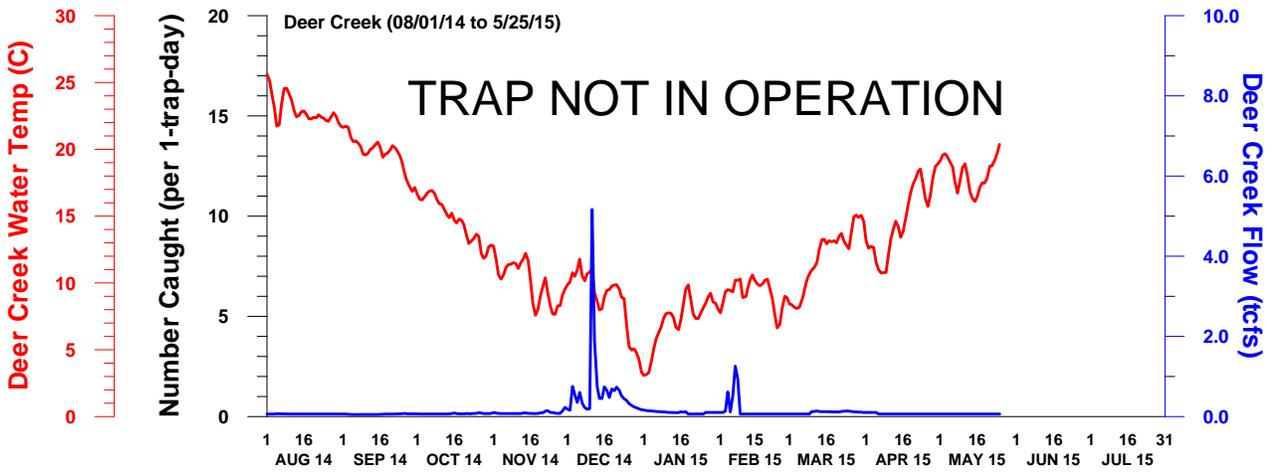
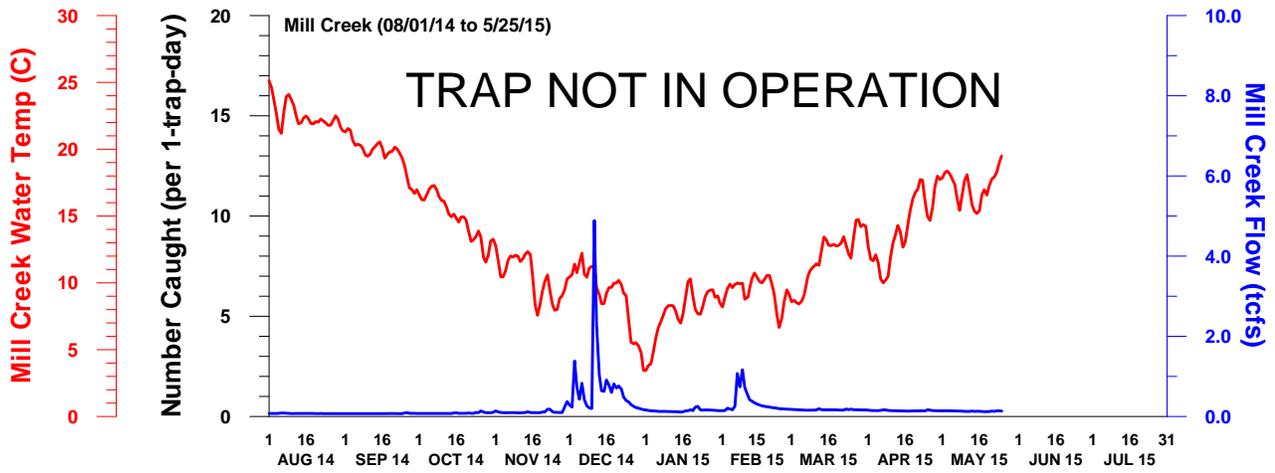
\*\*Turbidity is a discrete measurement and is not measured continuously. Therefore, data are interpolated on days when turbidity was not measured unless data are missing for more than five days.

\*\*\*Trap was pulled on 10/28/14 due to extremely turbid conditions, heavy debris, and high number of listed winter run Chinook and has resumed since 11/5/14. Traps were not in operation on 12/3/14 - 1/6/15, 2/5/15 - 2/16/15, and 4/25/15 - 5/4/15 due to various reasons.





# 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/>).

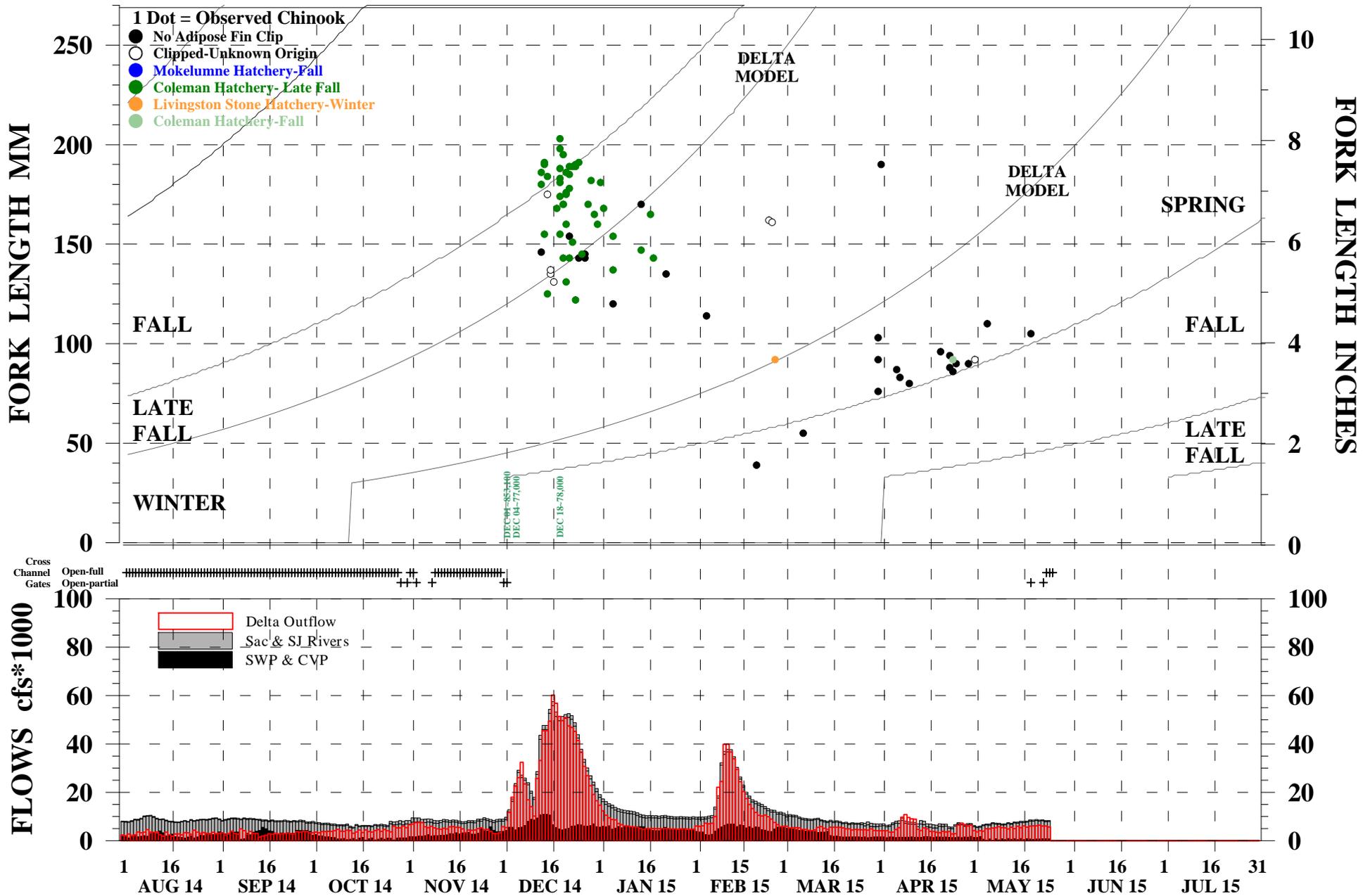
Mossdale Trawl data were either obtained directly from FWS, Stockton Fish and Wildlife Office or from DFW (Region 4).

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).

# OBSERVED CHINOOK SALVAGE AT THE SWP & CVP DELTA FISH FACILITIES 08/01/2014 THROUGH 5/25/2015

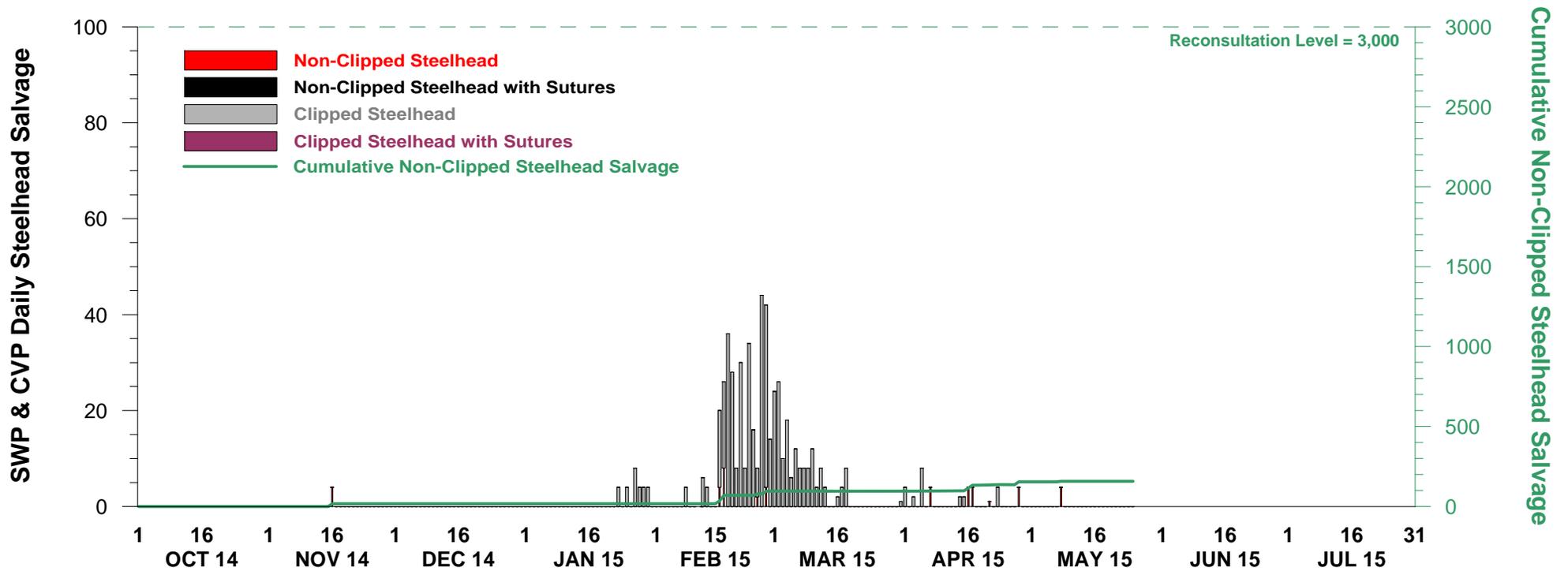


DWR-DES 26 MAY 2015

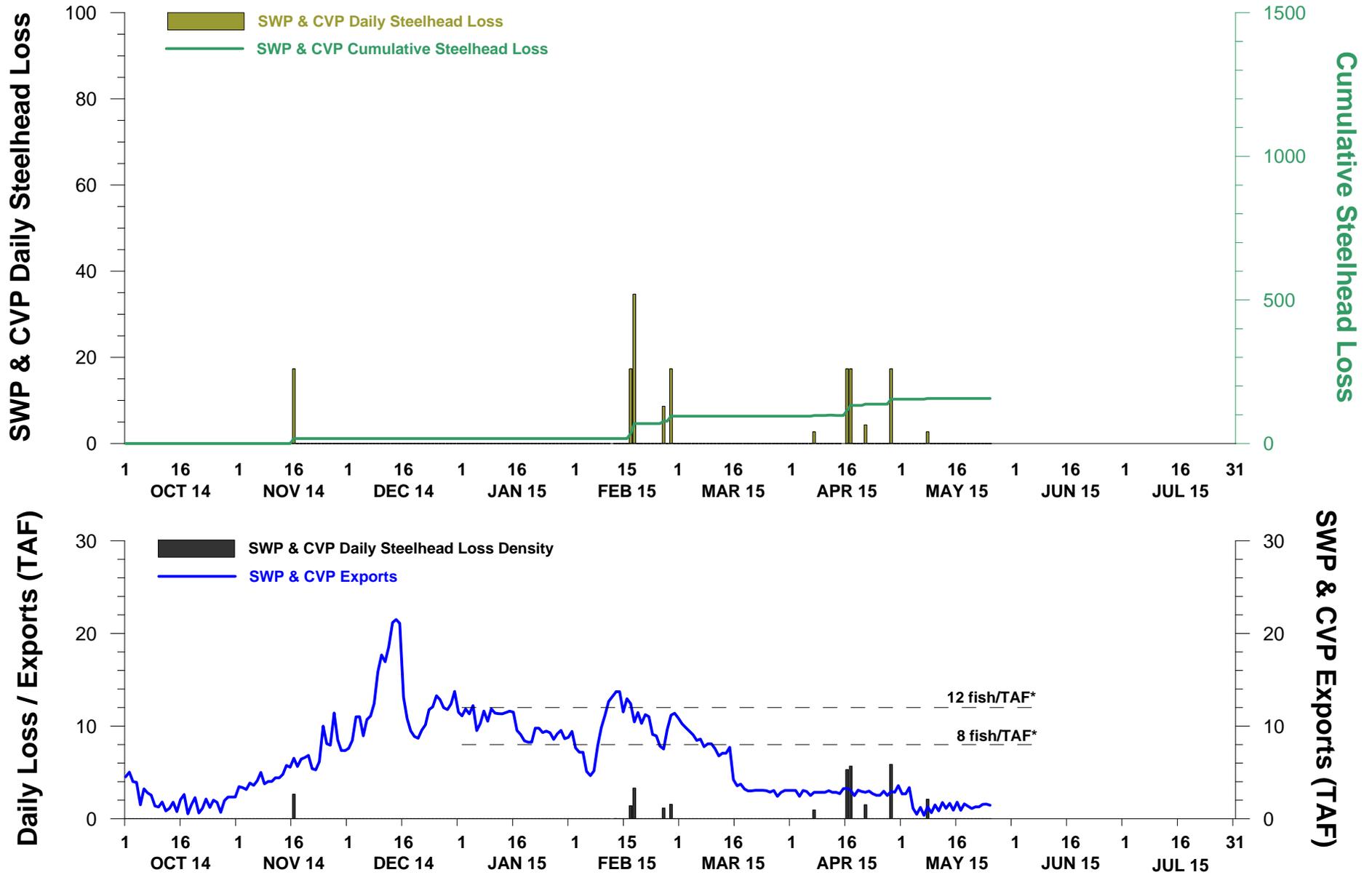
Preliminary data from DFW, DWR, FWS, Reclamation, and CDEC; subject to revision.

\*Chinook not measured for length and Chinook outside of the length-at-date criteria (Delta model) are not reported.

# STEELHEAD SALVAGE AT THE DELTA FISH FACILITIES 01 OCT 2014 THROUGH 25 MAY 2015



# NON-CLIPPED STEELHEAD LOSS AT THE DELTA FISH FACILITIES 01 OCT 2014 THROUGH 25 MAY 2015



DWR-DES 26 MAY 2015

Preliminary data from DFW; subject to revision.

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