

Delta Operations for Salmonids and Sturgeon (DOSS) Group
Conference call: 1/5/16 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.

DWR: Aaron Miller, Kevin Reece, Mike Ford, Rhiannon Mulligan

Reclamation: Peggy Manza

NMFS: Barb Byrne, Jeff Stuart, Meiling Roddam

CDFW: Bob Fujimura, Ken Kundargi

USFWS: Craig Anderson, Leigh Bartoo

SWRCB: Chris Carr, 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

Agenda Item 2.

RPA Implementation Review

Delta RPA Actions that may affect operations during January:

Action IV.1.2¹ (DCC gate operations):

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

Action IV.2.3² (OMR Management based on salvage triggers)

- Older juvenile loss density of 2.70 fish /TAF on 1/2/16 exceeded the first stage action trigger of 2.5 fish / TAF.
- Required action response is at least 5 days of OMR no more negative than -3,500 cfs.
- Day 1 of the action response was Sunday, 1/3/16.

¹ 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

² 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

Agenda Item 3.

Current Operations (1/5/16)

SWP		CVP	
Exports (cfs)			
Clifton Court Forebay	3,000	Jones Pumping Plant	800
Reservoir Releases (cfs)			
Feather - Oroville	950	American - Nimbus	500
		Sacramento - Keswick	3,250
		Stanislaus - Goodwin	200
		Trinity - Lewiston	300
Reservoir Storage (in TAF)			
San Luis (SWP)	380	San Luis (CVP)	81
Oroville	1,025	Shasta	1,440
New Melones	315	Folsom	245
Delta Operations			
DCC	Closed	Sacramento River at Freeport (cfs)	7,391
Outflow Index (cfs)	~ 4,200	San Joaquin River at Vernalis (cfs)	781
E:I	~19% (14-day avg.)	X2	>81 km

Delta outflow requirements in D-1641 controlled exports over the weekend; outflow (per D-1641) and OMR (per the NMFS BiOp) are both controlling today; OMR likely to be controlling exports by the end of the week.

River forecasts indicate Bend Bridge peaking at ~25,000 cfs today, and Verona peaking at around 23,000 cfs on Friday.

OMR as of 12/28/15:

	USGS gauges*	Index
5-day	-4,696	-5,404
14-day	-2,774	-3,052

*Miller (DWR) reported that there have been some equipment issues with the USGS gauges, thus the most recent OMR numbers he reported were for 12/28/15.

Expected daily (1/5/16) OMR index reported by Miller (DWR): -3,362 cfs.

Agenda Item 4.

Smelt Working Group

The SWG met on Monday, 1/4/16. Bartoo (USFWS) reported that the Working Group did not recommend a change in scheduled exports for the protection of Delta Smelt at the January 4 meeting. Previous SWG meeting notes are available at: http://www.fws.gov/sfbaydelta/cvp-swp/smelt_working_group.cfm.

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	Jersey Pt./ Prisoners Pt. Trawls	Sacramento Trawl	Beach Seines	Knights Landing RST ^A	Tisdale RST ^B	GCID RST	Mossdale Kodiak Trawl
Sample Date	12/27-1/2	12/27-1/2	12/27-1/2	12/27-1/2	12/28-1/3	12/28-1/4	12/29-1/3	12/27-1/2
Total Catch	29	26	1	312	72	73	408	0
FR Chinook		1		309	60	67	370	
WR Chinook				1	1		6	
SR Chinook					8	3	1	
LFR Chinook	3						9	
Ad-Clipped Chinook	26		1		3	2	22	
Chinook Adult				1 (374 mm)				
Steelhead (wild)								
Steelhead (ad-clip)						1		
Green Sturgeon								
Delta Smelt		25						
Splittail				1				
Longfin Smelt								
Flows (avg. cfs)					5,355	5,349	830	
W. Temp. (avg. °F)					44	44	47	
Turbidity (avg. NTU)					14.5	12	12.5	

^A Sampling period was from 12/28 at 9:00 am to 12/31 at 3:00 pm, and from 1/2 at 9:30 am to 1/3 at 9:45 am. From 1/2 at 9:30 am to 1/3 at 9:45 am, only one trap was fishing due to an equipment malfunction.

^B Sampling period was from 12/28 at 8:15 am to 1/4 at 8:30 am.

An ad-clipped steelhead was caught in the Tisdale RST on 12/31, before the first steelhead hatchery release of the year (Coleman National Fish Hatchery's release of steelhead at Bend Bridge from January 4-12, 2016). The Tisdale RST datasheet did not list a size for the clipped

steelhead, but it is likely that this is a steelhead from a previous year's release that didn't leave the system.

It is important to remember that the raw catch data that is reported in the table above and discussed during DOSS doesn't account for any variation in effort and may give misleading trends if sampling effort not also considered.

Reece (DWR) reported to DOSS that the genetic analysis results from the last week showed that the 18 unclipped Chinook observed at the fish facilities were classified as 13 fall-run Chinook, 4 late-fall-run Chinook, and 1 spring-run Chinook. A detailed accounting was sent to DOSS after the call, and is attached to these notes.

Red Bluff Diversion Dam (RBDD) Monitoring

USFWS biweekly report (12/17/15-12/31/15) for preliminary estimates of passage by brood-year and run for unmarked juvenile Chinook salmon captured by rotary screw traps at RBDD included:

Run and Species	Biweekly Total	Brood Year Total
Winter-run Chinook (BY2015)	6,123	318,161

The current season-to-date total of 318, 161 compares to a seasonal total of 411,309 last year, and seasonal totals of 848,980-4,401,776 for brood years 2009-2013.

Fish Salvage³:

Fujimura (CDFW) reported that non-ad clipped and clipped juvenile Chinook salmon continue to be salvaged at the SWP only last week. No other listed fish species has been salvaged this water year.

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

³Salvage 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: December 28-January 3, 2016
 Prepared by Bob Fujimura on January 4, 2016 19:00
 Preliminary Results -Subject to Revision

Criteria	28-Dec	29-Dec	30-Dec	31-Dec	1-Jan	2-Jan	3-Jan	Trend	
Loss Densities									
Wild older juvenile CS	2.62	0	0	0	1.96	2.70	0	↘	1.04
Wild steelhead	0	0	0	0	0	0	0		0.00
Exports									
SWP daily export	7,782	7,823	7,497	5,964	4,222	2,989	2,964	→	5,606
CVP daily export	5,457	5,440	5,439	5,416	5,099	3,799	2,120	↘	4,681
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 loss density exceeded NMFS first phase trigger of 2.50 fish/TAF

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
Wild					
Winter Run	2	9	↘	2	9
Spring Run	0	0	→	0	0
Late Fall Run	14	63	↘	44	166
Fall Run	0	0	↘	4	18
Unclassified	0	0	→	0	0
Total	16	71		50	192
Hatchery					
Winter Run	24	106	↘	24	106
Spring Run	0	0	→	0	0
Late Fall Run	31	136	↘	41	181
Fall Run	1	4	↘	1	4
Unclassified	0	0	→	0	0
Total	56	246		66	291

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	→	0	0
Hatchery	0	0	→	0	0
Total	0	0		0	0

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 12/28/15-1/3/16.

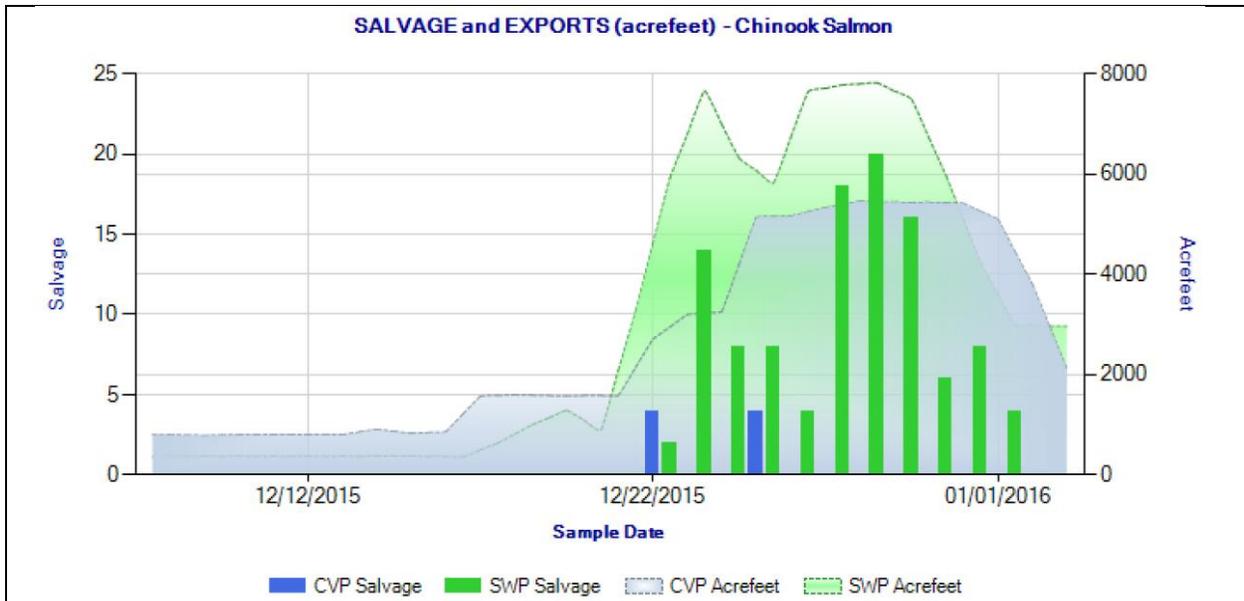


Figure 2. Daily salvage of Chinook salmon (all races) and water exports from the state and federal fish salvage facilities during December 8, 2015 through January 3, 2016.

DOSS Estimates of Fish Distribution

DOSS estimates of the current distribution of listed Chinook, as a percentage of the population, are based on recent monitoring data and historical migration timing patterns. As monitoring information is received, listed species distribution will be updated and included in the following table.

Location	Yet to Enter Delta (Upstream of Knights Landing)	In the Delta	Exited the Delta (Past Chipps Island)
<i>Young-of-year (YOY) winter-run Chinook salmon</i>	70% - 75% (Last week: 80% - 85%)	25% - 30% (Last week: 15% - 20%)	0% (Last week: same)
<i>Young-of-year (YOY) spring-run Chinook salmon</i>	85% (Last week: 95% - 99%)	15% (Last week: 1% - 5%)	0% (Last week: same)

DOSS Feedback on Entrainment Risk

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

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

Influencing factors considered include:

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

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

Interior Delta Entrainment Risk: Based on current information, DOSS estimates that the

- **Exposure Risk** for listed fish in the Sacramento River over the next week is HIGH because increased migration in the vicinity of Georgiana Slough is expected for two reasons:
 - Flow and turbidity increases, which may cue salmonid movement, are expected in response to forecasted rains; and
 - The release of over 500,000 hatchery steelhead at Bend Bridge (on the mainstem Sacramento River upstream of Red Bluff) may cause a “pied piper” effect that stimulates movement of wild salmonids.
- **Routing Risk** for fish in the Sacramento River over the next week is LOW because of the hydrodynamics in the vicinity of Georgiana Slough (i.e., increased river flows are expected to mute the tidal effects at Georgiana Slough).
- **Overall Entrainment Risk** for fish in the Sacramento River into the Interior Delta is LOW to MEDIUM considering a HIGH exposure risk combined with a LOW routing risk (see table below).

Interior Delta Entrainment Risk for listed species			
	Routing Risk		
Exposure Risk	Low	Medium	High
Low			
Medium			
High	X		

CVP/SWP Facilities Entrainment Risk: Based on current information, DOSS estimates that the

- **Exposure Risk** for fish in the Interior Delta over the next week is LOW to MEDIUM because few fish are expected to be entrained into the Interior Delta from the Sacramento River (see above), but there are some fish expected to have previously migrated into and be rearing within the Interior Delta.
- **OMR/Export Risk** for fish in the Interior Delta over the next week is LOW to MEDIUM because OMR no more negative than -3,500 cfs is expected through at least Thursday and

risks associated with potential OMR levels of -5,000 cfs at the end of the week may be partially offset by increased river flows due to forecasted rains.

- **Overall Entrainment Risk** for fish in the Interior Delta into the CVP/SWP Facilities is LOW to MEDIUM considering a LOW to MEDIUM exposure risk combined with a LOW to MEDIUM OMR/Export risk (see table below).

CVP/SWP Facilities Entrainment Risk for listed species			
Exposure Risk	OMR/Export Risk		
	Low	Medium	High
Low	X	X	
Medium	X	X	
High			

Agenda Item 6.

DOSS Advice to WOMT and NMFS: None

Agenda Item 7.

Next Meeting: The next DOSS conference call will be on 1/12/16 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>

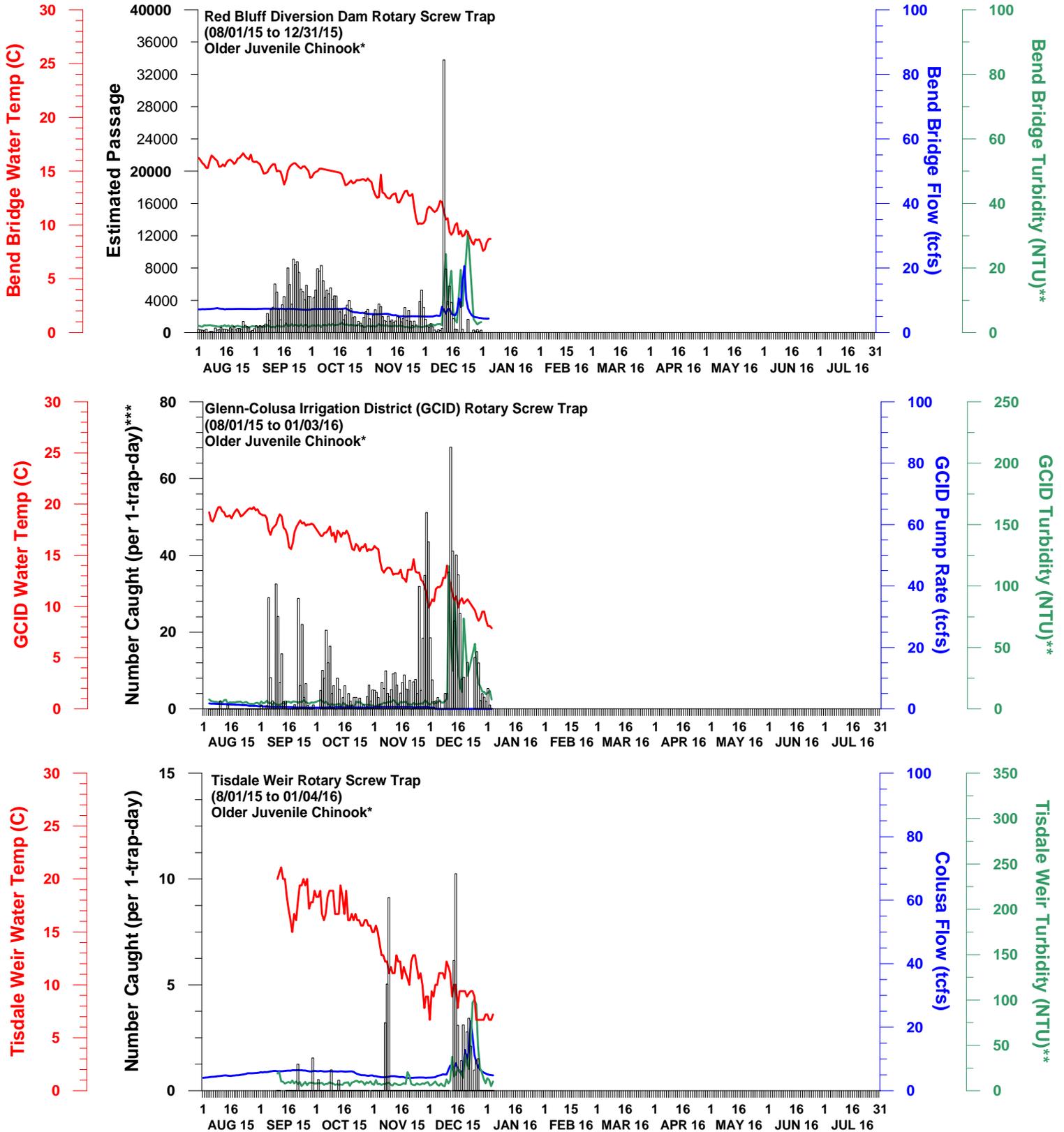
Attachment 1:

Comparison of run assignments based on the Delta length-at-date model vs. genetics. This detailed data summary was not available during the DOSS call, but was shared with DOSS later on Tuesday morning, so is included here for convenience.

Preliminary Data, subject to revision.

ID	FACILITY	DATE	TIME	SPCODE	LGT	ADCLIP	DELTA MODEL RACE	Genetic Assignment	PosProb1	Genetic ID Group	PosProb2	Next Best	CATCH	SALVAGE	LOSS
C150090CVP	2	12/22/2015	10:00	1	160	N	LF	Non-winter	1.000	Spring	0.565	Late Fall	1	4.0	3.52
C150083SWP	1	12/23/2015	14:00	1	146	N	LF	Non-winter	1.000	Fall	0.924		1	2.0	9.16
C150007SWP	1	12/24/2015	13:00	1	169	N	LF	Non-winter	1.000	Fall	0.416	Late Fall	1	4.0	17.15
C150009SWP	1	12/24/2015	13:00	1	176	N	LF	Non-Winter	1.000	Late Fall	0.556	Fall	1	4.0	17.15
C150008SWP	1	12/24/2015	13:00	1	180	N	LF	Non-winter	1.000	Fall	0.910		1	4.0	17.15
C150010SWP	1	12/24/2015	16:00	1	162	N	LF	Non-Winter	1.000	Late Fall	0.752	Fall	1	2.0	9.16
C150011SWP	1	12/25/2015	02:00	1	160	N	LF	Non-winter	1.000	Fall	0.540	Late Fall	1	2.0	8.57
C150082CVP	2	12/25/2015	08:00	1	170	N	LF	Non-winter	1.000	Fall	0.871		1	4.0	3.19
C150012SWP	1	12/26/2015	09:00	1	150	N	LF	Non-winter	1.000	Fall	0.998		1	4.0	17.95
C150013SWP	1	12/26/2015	09:00	1	198	N	F	Non-Winter	1.000	Late Fall	0.566	Fall	1	4.0	17.95
C150015SWP	1	12/28/2015	07:30	1	140	N	W	Non-winter	1.000	Fall	0.904		1	1.0	4.33
C150016SWP	1	12/28/2015	07:30	1	147	N	W	Non-winter	1.000	Fall	0.860		1	1.0	4.33
C150019SWP	1	12/28/2015	07:30	1	153	N	LF	Non-winter	1.000	Fall	0.988		1	1.0	4.33
C150017SWP	1	12/28/2015	07:30	1	155	N	LF	Non-winter	1.000	Fall	0.991		1	1.0	4.33
C150018SWP	1	12/28/2015	07:30	1	165	N	LF	Non-winter	1.000	Fall	0.856		1	1.0	4.33
C150014SWP	1	12/28/2015	07:30	1	192	N	LF	Non-winter	1.000	Fall	0.642	Late Fall	1	1.0	4.33
C150086SWP	1	12/28/2015	07:30	1	151	N	LF	Non-winter	1.000	Fall	0.966		1	1.0	4.33
C150085SWP	1	12/28/2015	07:30	1	183	N	LF	Non-Winter	1.000	Late Fall	0.761	Fall	1	1.0	4.33

NUMBER OF UNMARKED OLDER JUVENILE CHINOOK MEASURED IN THE SACRAMENTO RIVER

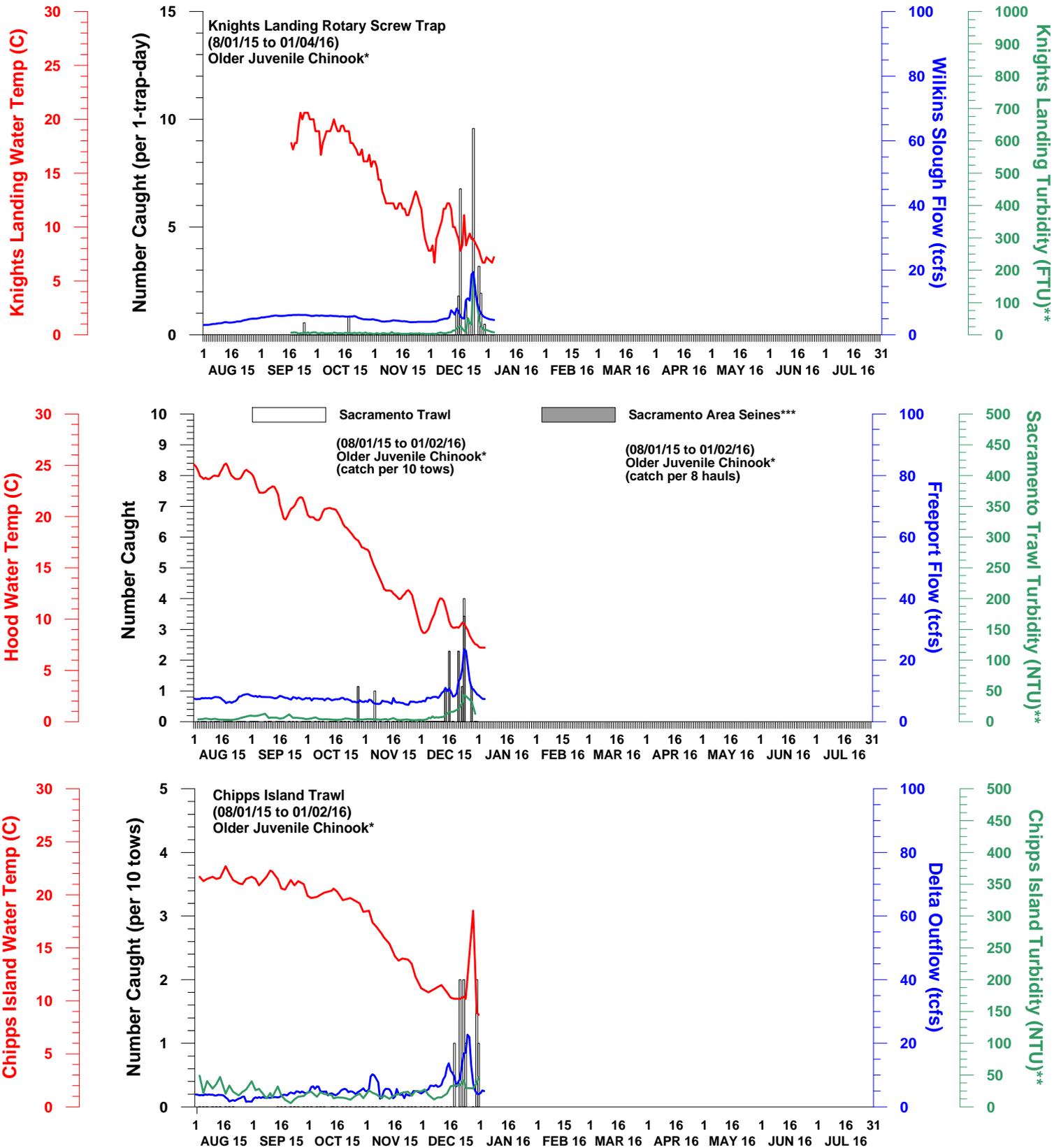


DWR-DES 5 January 2016
Preliminary data from DFW, FWS, GCID, and CDEC; subject to revision.

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

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

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



DWR-DES 05 January 2016

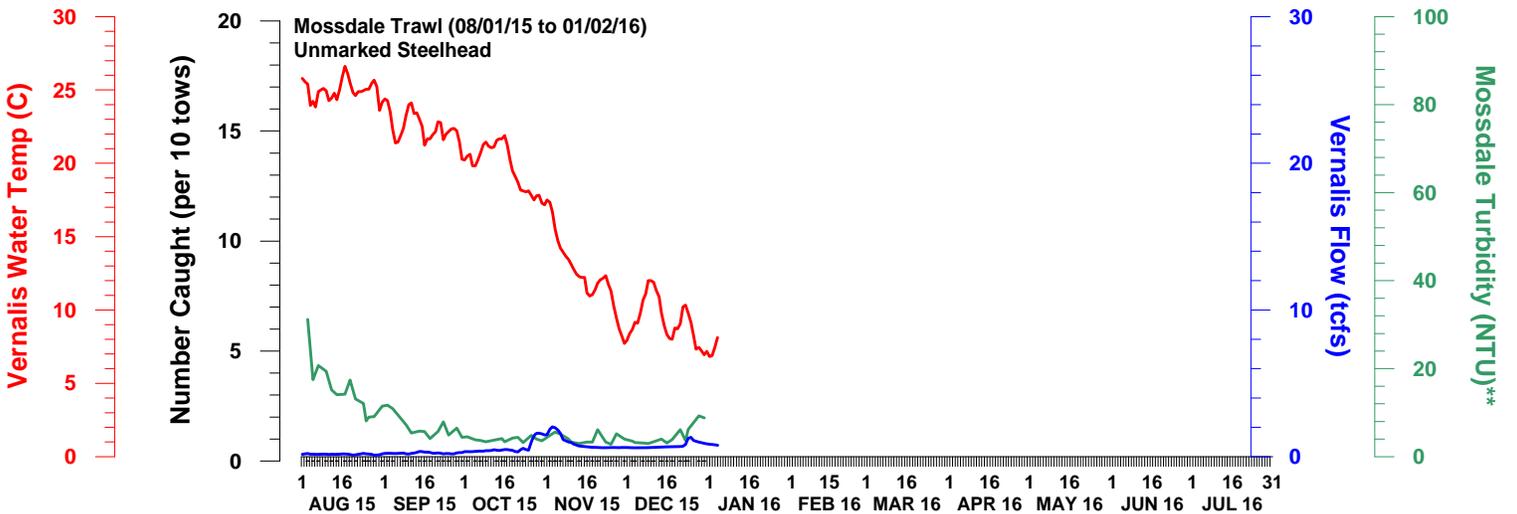
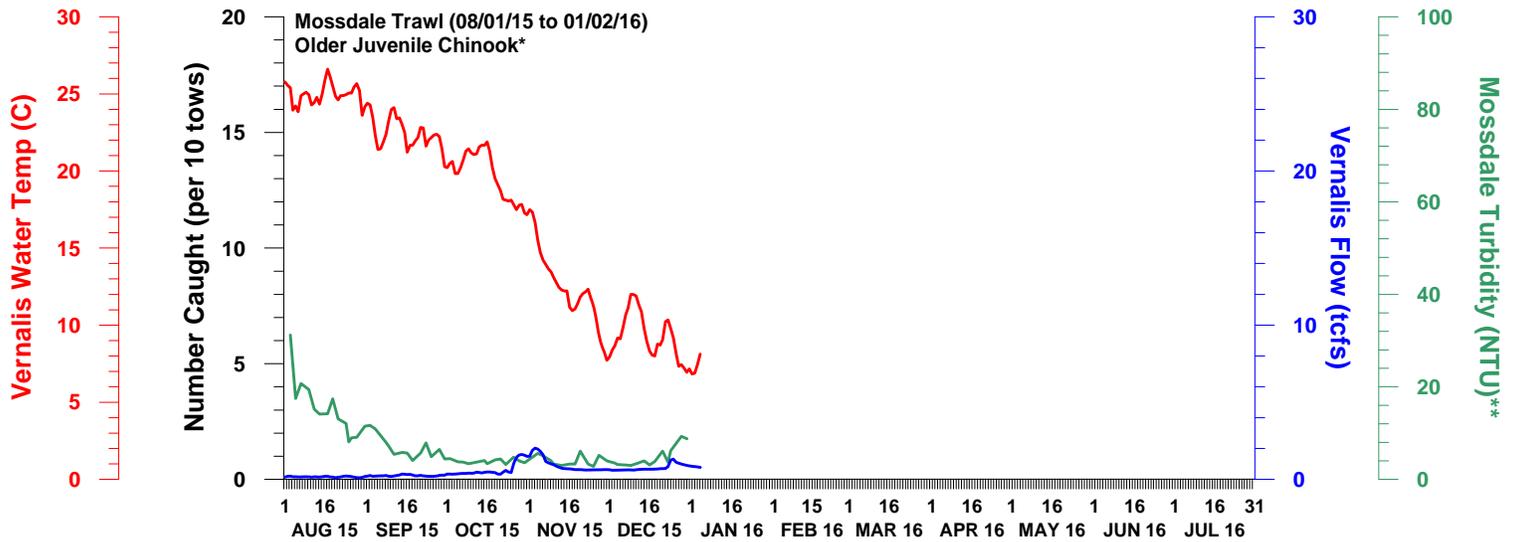
Preliminary data from DFW, FWS, and CDEC; subject to revision.

*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

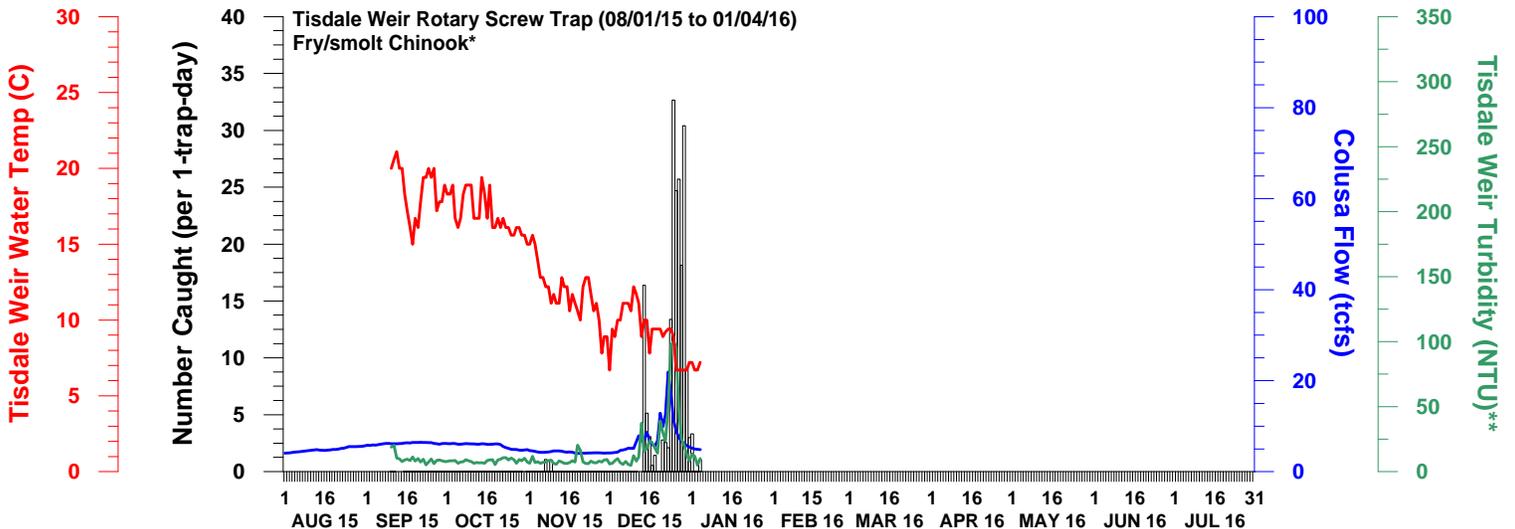
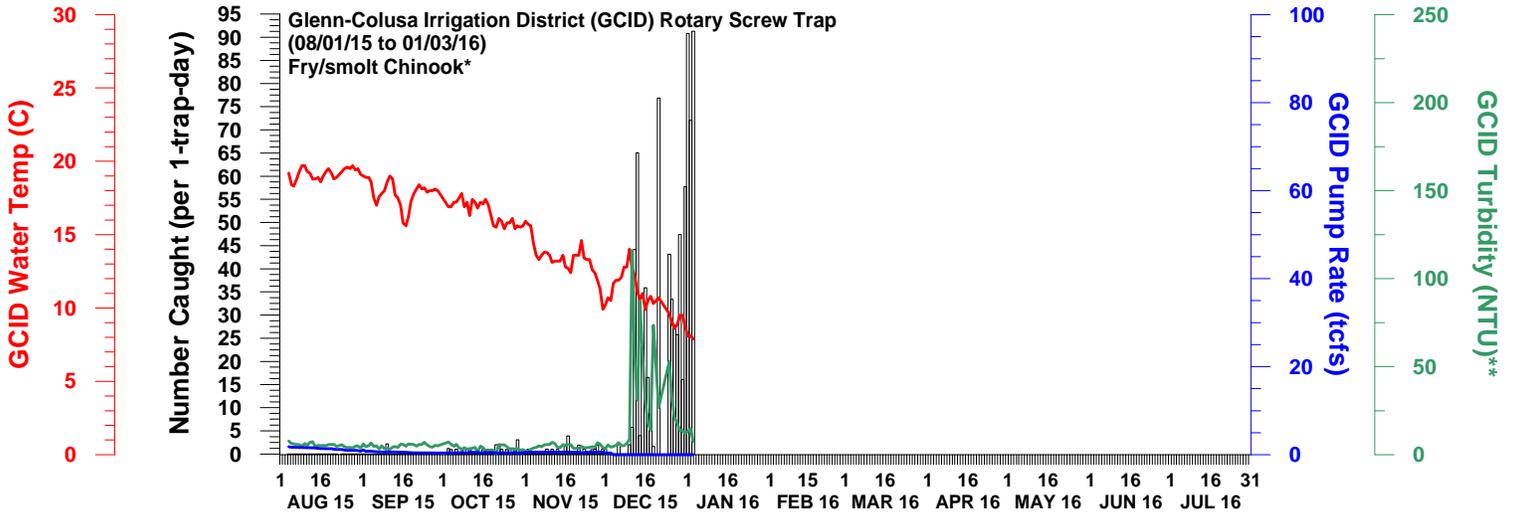
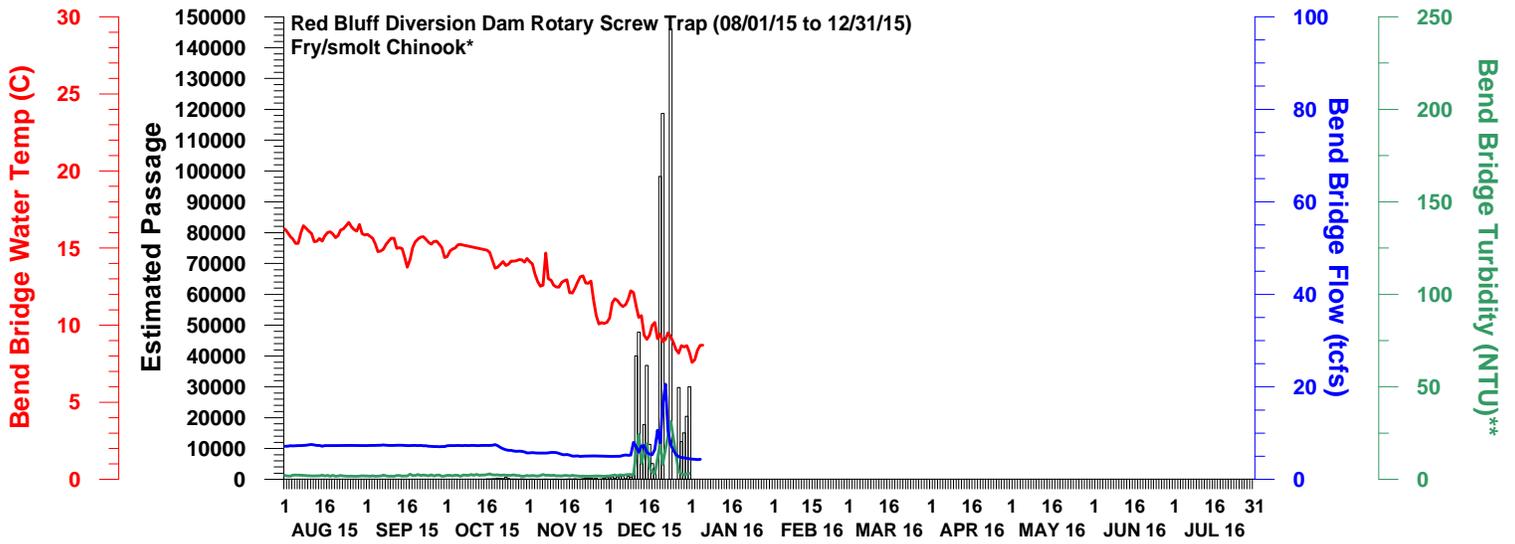


DWR-DES 05 January 2016
Preliminary data from FWS and CDEC; subject to revision.

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

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

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



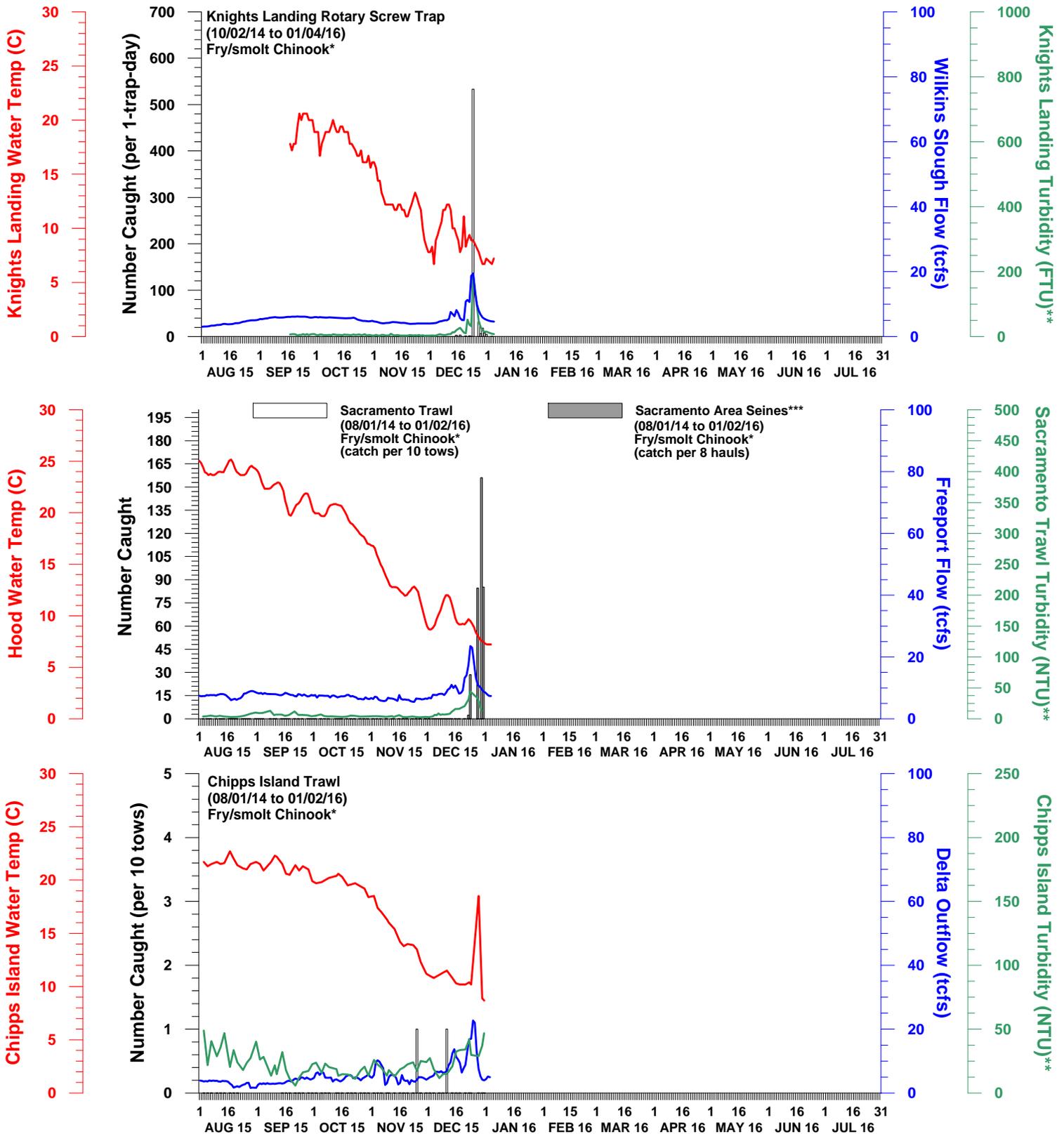
DWR-DES 05 January 2016

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

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

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

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



DWR-DES 05 January 2016

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

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***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.

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).

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)¹, 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.

¹ Formerly known as the California Department of Fish and Game (DFG).

OBSERVED CHINOOK SALVAGE AT THE SWP & CVP DELTA FISH FACILITIES 08/01/2015 THROUGH 6/21/2016

