Delta Operations for Salmonids and Sturgeon (DOSS) Group
Conference call: 04/28/2015 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.

DWR: Farida Islam, Aaron Miller, Bryant Giorgi, Dan Yamanaka, Mike Ford
Reclamation: Peggy Manza, Michele Palmer
NMFS: Barb Byrne, Jeff Stuart, Garwin Yip, Meiling Roddam
USFWS: Craig Anderson
CDFW: Bob Fujimura, Duane Linander

Agenda Items
1. Agenda review and introductions
2. RPA Implementation review
3. Current Operations
4. Smelt Working Group
5. Fish Monitoring
6. DOSS Advice

Agenda Item 2.

RPA Implementation Review

Delta RPA Actions affecting operations during April:

Action IV.1.2 (DCC gate operations):

- Default DCC gate closure.

Action IV.2.3 (OMR Flow Management)

- The OMR limit of no more negative than -5,000 cfs is in effect, but not controlling Delta exports.

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 (04/28/2015)

SWP		CVP	
Exports (cfs)			
Clifton Court Forebay	750	Jones Pumping Plant	800
Reservoir Releases (cfs)			
Feather - Oroville	1,500	American - Nimbus	500*
		Sacramento - Keswick	7,000
		Stanislaus - Goodwin	150
		Trinity – Lewiston	600**
Reservoir Storage (in TAF)			
San Luis (SWP)	900	San Luis (CVP)	380
Oroville	1,793	Shasta	2,683
New Melones	495	Folsom	575
Delta Operations			
DCC	Closed	Sacramento River at Freeport (cfs)	6,549
Outflow Index (cfs)	~6,700 (4,327 for 7-day NDOI; 6,800 for 3-day NDOI to 4/28/15)	San Joaquin River at Vernalis (cfs)	488
E:I	19% (3-day avg.) 18% (14-day avg.)	X2	>81 km

*Will be increased to 1,000 cfs on 4/29 to help meet Delta needs (outflow; salinity management)
**For the spring pulse flow on the Trinity River

At this time, exports are limited to 1,500 cfs by two separate regulatory requirements: 4/6/15 SWRCB Revised Order on the TUCP -- limits combined exports to no more than 1,500 cfs when outflow is <7,100 cfs. (Note: The exception[1] allowing intermediate pumping when outflow is greater than 5,500 cfs may be exercised this week, if approved by the Executive Director of the SWRCB.)
NMFS RPA Action IV.2.1 -- The Critical year 1:1 ratio (of San Joaquin inflow at Vernalis to combined CVP/SWP exports) is in effect and limits combined exports to 100% of Vernalis flow, or 1,500 cfs, whichever is greater.

OMR values as of 4/25:

	USGS gauges (cfs)	Index (cfs)
5-day avg.	-1,650	-1,800
14-day avg.	-1,710	-1,800

[1] See section iii on page 39 of the 4/6/15 SWRCB Revised Order, available at: http://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/docs/tucp/2015/tucp_order040615.pdf

Agenda Item 4.

Smelt Working Group (SWG)

The Working Group met on 4/27/15, and 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) need to be modified for the protection of Delta Smelt adults and larvae.

The Working Group is following guidance for entrainment protections from both Action 2 (adult Delta Smelt) and Action 3 (juvenile Delta Smelt).

The Working Group also agreed that given their present distribution, existing constraining conditions were sufficient to protect longfin smelt from entrainment in the southern Delta.

The Working Group will continue to monitor Delta Smelt survey and salvage data and Delta conditions and will meet again Monday, May 4, 2015 at 10 am.

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	Chipps Is. Midwater Trawl	Sacramento Trawl	Beach Seines	Lower American River RST	Knights Landing RST[A]	Tisdale RST[B]	GCID RST[C]	Mossdale Kodiak Trawl
Sample Date	4/19-4/25	4/19-4/25	4/19-4/25	4/20-4/24	4/20-4/27	4/20-4/24	4/21-4/24	4/20-4/26
Total Catch	**398**	**11**	**63**	**301**	**3**	**4**	**73**	**2**
FR Chinook	106 (66mm-84mm)	4 (69mm-82mm)	1 (75mm)	274			11	
WR Chinook							1	
SR Chinook	204 (83mm-106mm)	5 (83mm-108mm)	9 (86mm-103mm)	27	3 (90mm-110mm)	4 (88mm-112mm)	60	
LFR Chinook								
Ad-Clipped Chinook	85 (67mm-104mm)	1 (73mm)	1 (101mm)					
Delta Smelt								
Splittail	2		52					
Longfin Smelt								

Steelhead (ad-clip)								
Steelhead (wild)	1 (296mm)	1 (234mm)		1 (fry)			1	2 (231mm, 250mm)
Green Sturgeon								
Flows (avg. cfs)					3,861	3,960	782	
W. Temp. (avg. °F)					69	68	59	
Turbidity (avg. NTU)					13	14	6.61	

[A] Sampling period was from 4/20 at 9:30am to 4/27 at 10:30am.
[B] Sampling period was from 4/20 at 8:30am to 4/24 at 10:00am.
[C] RST trap pulled on 4/24

Acoustic Tag Updates and Next Steps

- Byrne (NMFS) passed along, and supported, a suggestion from Josh Israel (Reclamation) that in late May or early June, DOSS meet with Arnold Ammann and some folks at the Biotelemetry Lab at UC Davis to compile thoughts on what DOSS and managers want in terms of acoustic tag data summaries in the future.
- A DOSS member mentioned that the Biotelemetry Lab at UC Davis may be providing some reporting on real-time sturgeon movement.
- There have been no recent updates on the acoustic-tagged spring-run or winter-run Chinook.

Fish Salvage[2]:

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

[2]Salvage data reported in this section represent the total estimated and expanded salvage based on the number of fish observed at the fish collection facility. For example, if one steelhead is observed in the typical ½-hour sampling period within a 2-hour operation period, the single steelhead is expanded to a salvage of four.

DOSS Weekly Salvage Update
Reporting Period: April 20-26, 2015
Prepared by Bob Fujimura on April 27, 2015 19:30
Preliminary Results -Subject to Revision

Criteria	20-Apr	21-Apr	22-Apr	23-Apr	24-Apr	25-Apr	26-Apr	Trend	
Loss Densities									
Wild older juvenile CS	0	0	0	0	0	0	0	→	0.00
Wild steelhead	0	**1.52**	0	0	0	0	0	↘	0.22
Exports									
SWP daily export	976	882	1,011	916	916	916	1,378	→	999
CVP daily export	1,969	1,967	1,967	1,789	1,603	1,602	1,594	↘	1,784
SWP reduced counts	0%	0%	0%	0%	0%	0%	0%	→	0%
CVP reduced counts	0%	0%	0%	0%	0%	0%	0%	→	0%

Loss Density = fish lost/TAF; water export = AF; Trend = compared to previous week; wild = adipose fin present
Loss = estimated number of fish lost at the CVP and SWP Delta export facilities based on estimated salvage (see below)
Reduced counts = percentage of time that routine salvage sample time were less than 30 min per 2 hours of salvage and export operations
Yellow highlighted dates indicate TFCF salvage outage occurred

Chinook Salmon Weekly/Season Salvage and Loss
Combined salvage and loss for both CVP and SWP fish facilities
Race determined by size at date of capture; hatchery = adipose fin missing;

	Weekly Total			Season Total	
Category	Salvage	Loss	Trend	Salvage	Loss
Wild					
Winter Run	0	0	→	53	106
Spring Run	16	30	↗	41	59
Late Fall Run	0	0	→	6	26
Fall Run	0	0	→	16	26
Unclassified	0	0	→	24	NC
Total	**16**	**30**		**140**	**217**
Hatchery					
Winter Run	0	0	→	62	214
Spring Run	4	3	↗	4	3
Late Fall Run	0	0	→	136	340
Fall Run	0	0	→	41	180
Unclassified	0	0	→	12	NC
Total	**4**	**3**		**255**	**737**

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

	Weekly Total			Season Total	
Category	Salvage	Loss	Trend	Salvage	Loss
Wild	1	4	↘	35	137
Hatchery	4	3	↘	523	1,841
Total	**5**	**7**		**558**	**1,978**

State Water Project loss = salvage x 4.33; Central Valley Project loss = salvage x 0.68

Figure 1. DOSS weekly salvage update for the reporting period 4/20/15-4/26/15.

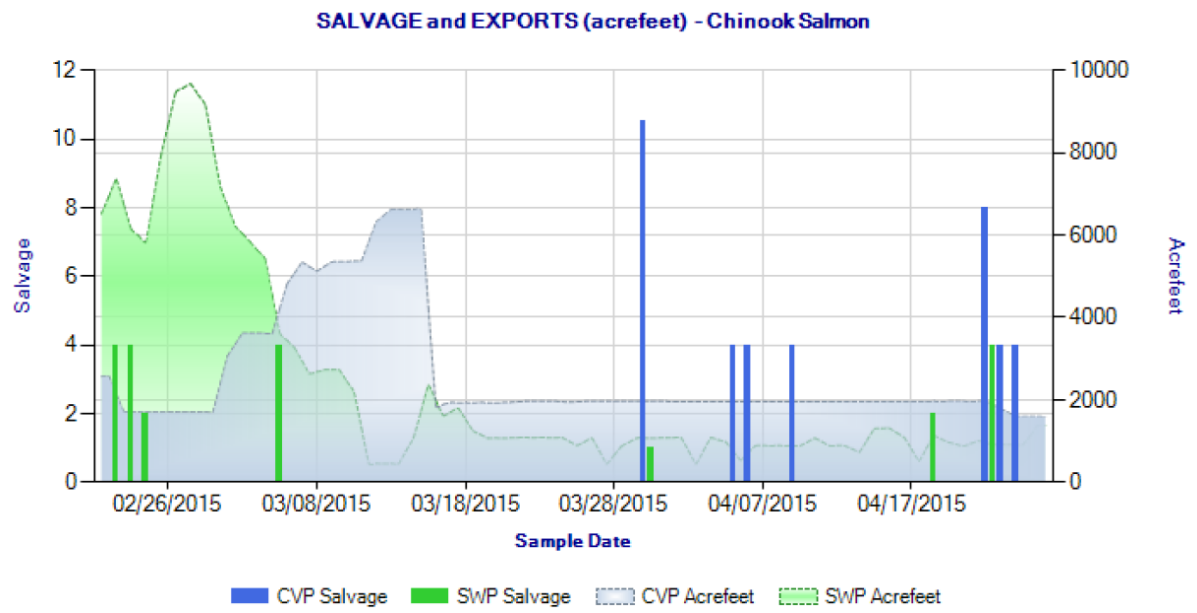


Figure 2. Daily salvage of Chinook salmon (all races) and water exports from the state and federal fish salvage facilities during 02/22/15 through 04/26/15.

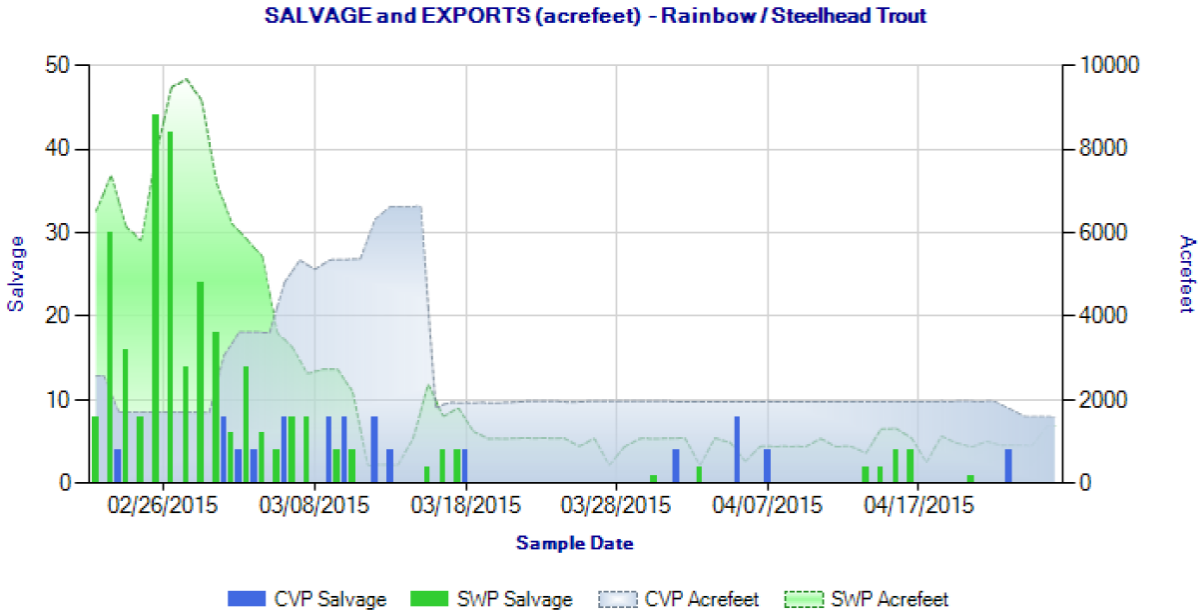


Figure 3. Daily salvage of steelhead and water exports from the state and federal fish salvage facilities during 02/22/15 through 04/26/15.

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[1]	Total Entering Delta	% Loss of Number Released[2]	% Loss of Total Entering Delta[3]	First Concern Level	Second Concern Level	Date of First Loss[4]	Date of Last Loss[4]
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	188500	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	n/a	n/a	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[6]	Unread CWT Loss[6]	Unknown Hatchery Loss[7]	Acoustic Tag Loss[8]	Number of Unassigned CWTs[9]
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 4/26/2015.
[1]Number released with the adipose-fin clipped and a coded-wire tag (CWT).
[2]% Loss of Number Released = (Confirmed Loss/Number Released)*100.
[3]% Loss of Total Entering Delta= (Confirmed Loss/Total Entering Delta)*100.
[4]Date of first and last loss accounts for all CWT loss even those from special studies where salvage and loss=0.
[5]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).
[6]Adipose-fin clipped Chinook was collected during fish count and has not been processed yet.
[7]CWT has been read, but hatchery release information not yet available.
[8]Adipose-fin clipped Chinook released due to presence of sutures.
[9]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.
[10]Chinook outside of the length-at-date criteria (Delta model) are not reported.
** Information not yet available.

DWR-DES Revised 4/27/2015
Preliminary data from DFW, 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.

Location	Yet to Enter Delta (Upstream of Knights Landing)	In the Delta	Exited the Delta (Past Chipps Island)
Young-of-year (YOY) winter-run Chinook salmon (naturally produced)	>95% out of Delta; Generally done migrating with the exception of a few stragglers. (Last week: few stragglers upstream, 10% in the Delta, 90% exited the Delta)		
YOY winter-run Chinook salmon (hatchery-produced)	>95% out of Delta; Generally done migrating with the exception of a few stragglers. (Last week: few stragglers upstream, 10% in the Delta, 90% exited the Delta)		
YOY spring-run Chinook salmon[A]	Few stragglers only to 5% (last week: same)	20% - 30% (last week: 40%)	70% - 80% (last week: 60%)
Yearling spring-run Chinook salmon[B]	>95% out of Delta; Generally done migrating with the exception of a few stragglers. (last week: same)		
Hatchery steelhead[C]	>95% out of Delta; Generally done migrating with the exception of a few stragglers. (Last week: <5% upstream, <5% in the Delta, >95% exited the Delta)		
Sacramento River steelhead (naturally-produced)	Limited catch data		
San Joaquin River steelhead[D]	<5% (last week: 5%)	10% - 15% (last week: 25%)	80% - 85% (last week: 70%)

[A] 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.

[B] 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.

[C] 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.

[D] 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 exiting a neap tide.

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

Entrainment risk if mid-step exports implemented
DOSS discussed the entrainment risk for the mid-step export implementation. DWR reported that while the TUCP's "intermediate pumping" provision[3] allows for combined exports of up to 3,500 cfs, the amount of additional exports is limited to the amount by which Delta outflow exceeds 5,500 cfs. So for example, a 3-day NDOI of 6,000 cfs is 500 cfs more than 5,500 cfs, and implementation of the intermediate pumping provision could not exceed a combined export level of 1,500 cfs + 500 cfs=2,000 cfs. DWR estimated that the mid-step would result in an estimated change in OMR from approximately -1,800 cfs to a maximum of -2,800 cfs for a few days, including taking into account that the HORB is in and all 8 culverts are open.

Based on the current entrainment risks outlined above, the mid-step would shift entrainment risk from medium risk of entrainment to medium to high risk of entrainment. Entrainment risk for San Joaquin River steelhead is reduced by the HORB, although the culverts conceivably allow passage into Old River. DOSS suggested that, to the extent feasible, the projects primarily pump through the CVP based on the lower pre-screen loss. DOSS acknowledges the incremental increase in risk but, given the duration of the mid-step, did not identify any major red flags in the implementation of the mid-step.

Agenda Item 6.

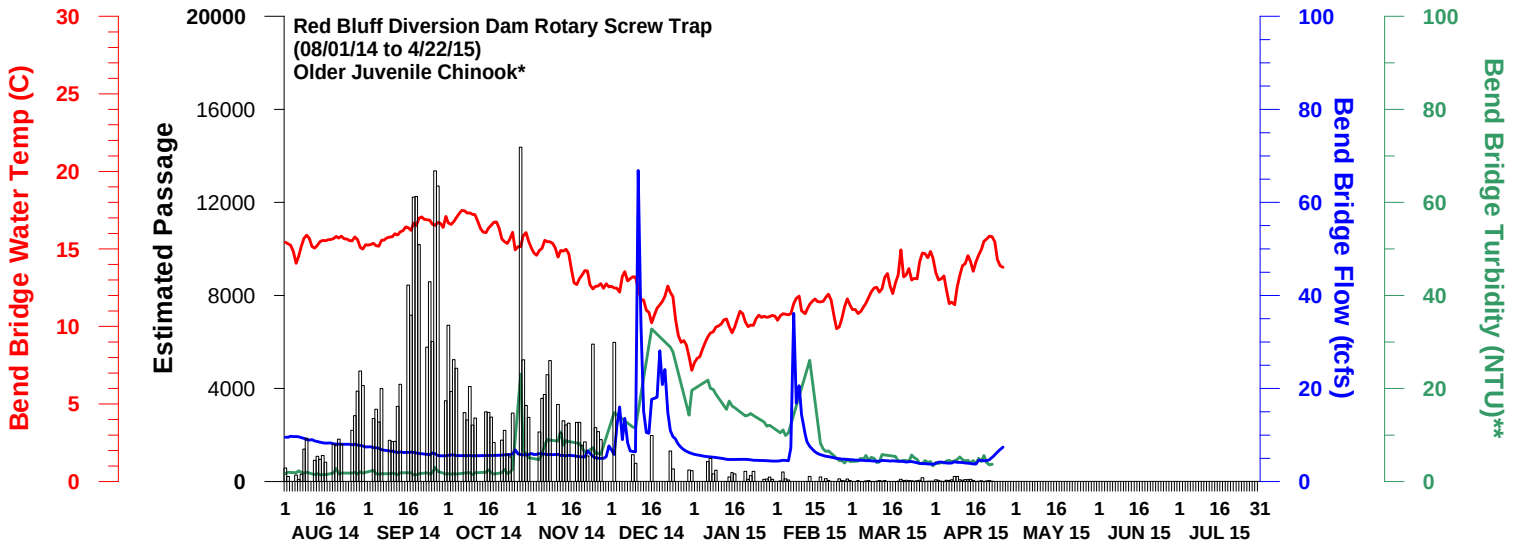
DOSS Advice to WOMT and NMFS: None.

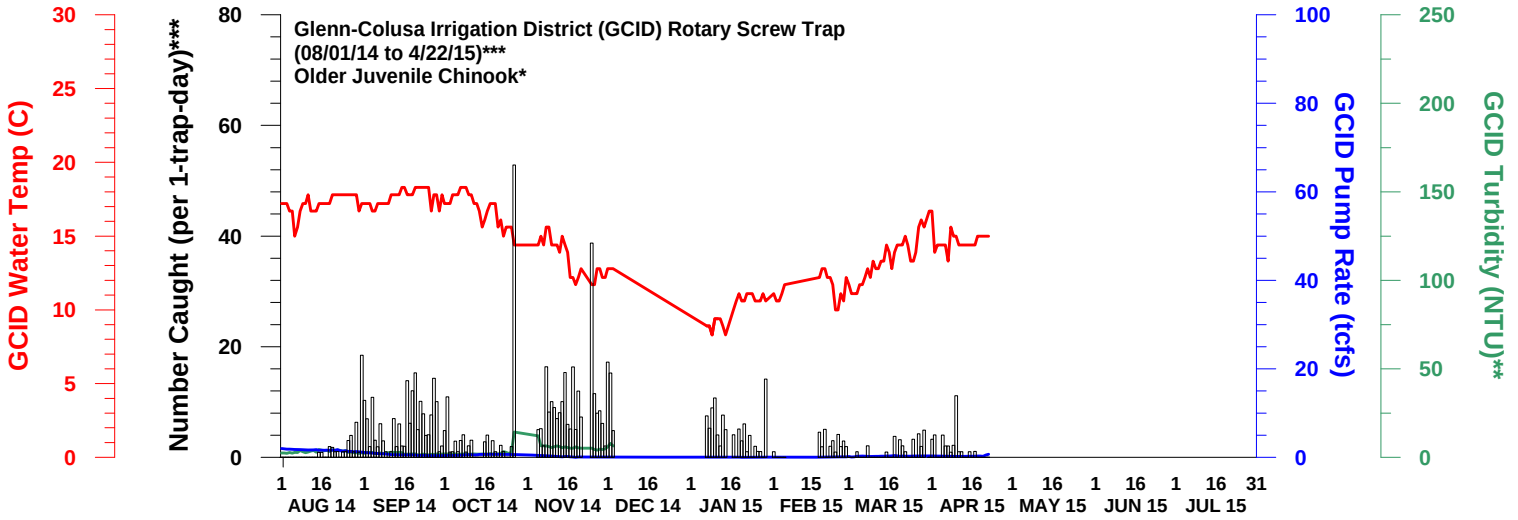
Next Meeting: The next DOSS conference call will be on 05/05/15 at 9am.

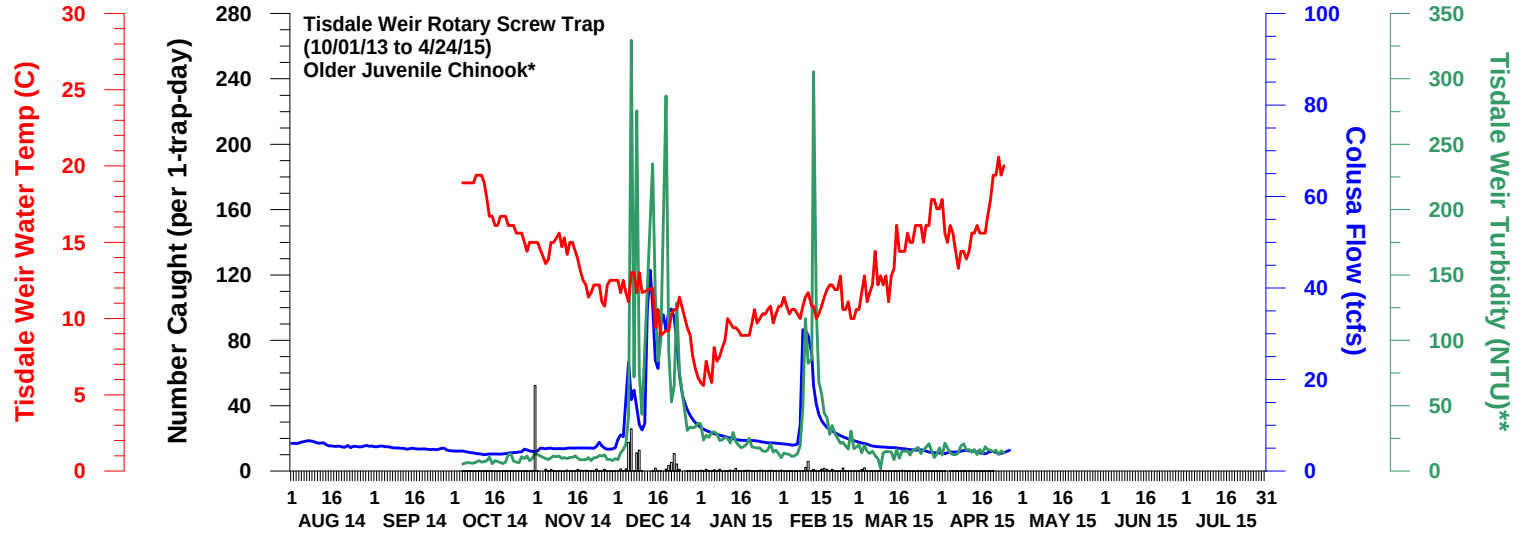
The following graphs were provided by DWR for Chinook salmon and steelhead observed at monitoring locations in the Sacramento and San Joaquin rivers and Delta. For additional graphs, please visit the DWR website at:
http://www.water.ca.gov/swp/operationscontrol/calfed/calfedmonitoring.cfm

[3] See section iii on page 39 of the 4/6/15 SWRCB Revised Order, available at:
http://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/docs/tucp/2015/tucp_order040615.pdf

NUMBER OF UNMARKED OLDER JUVENILE CHINOOK MEASURED IN THE SACRAMENTO RIVER



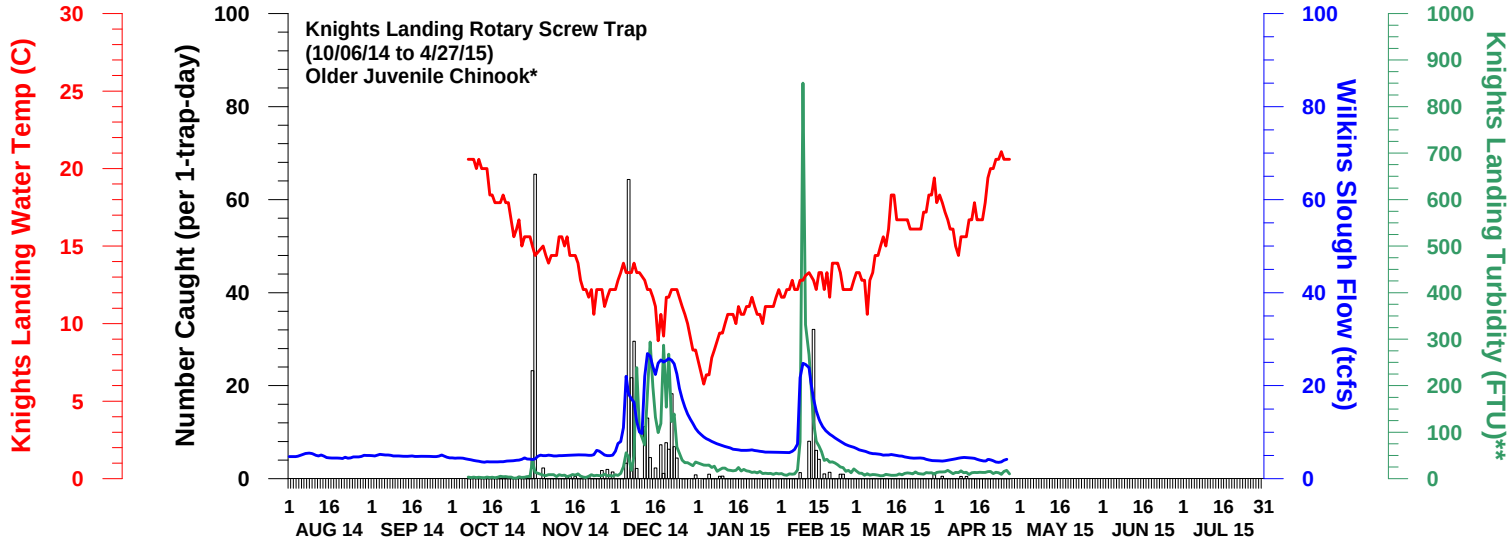


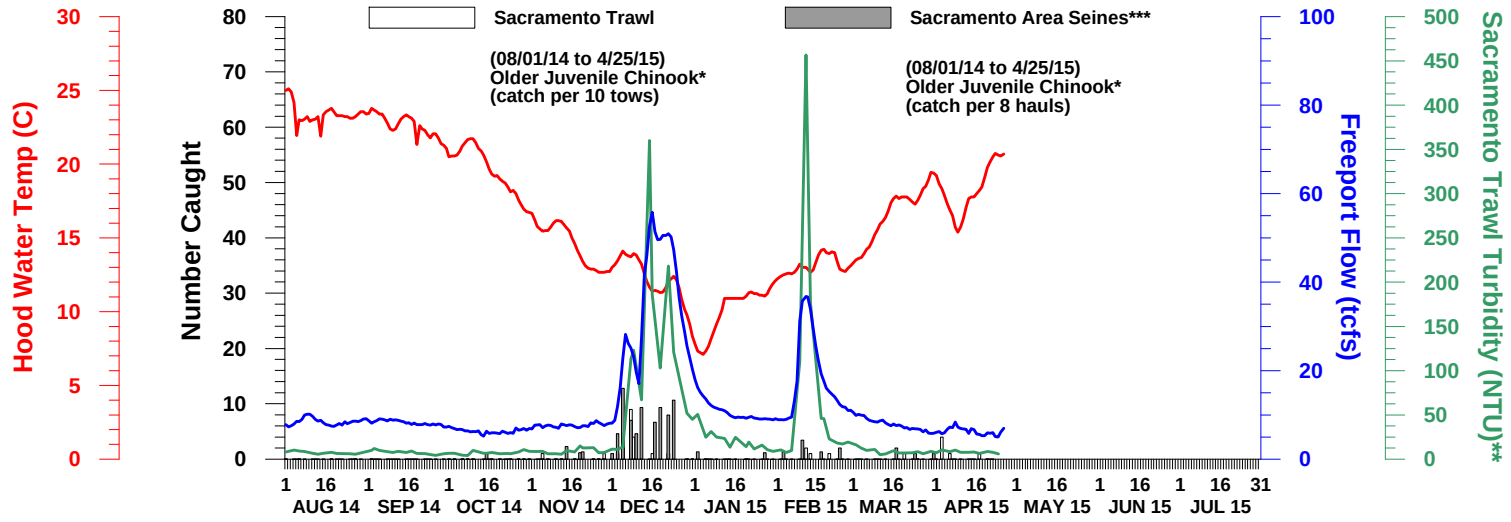


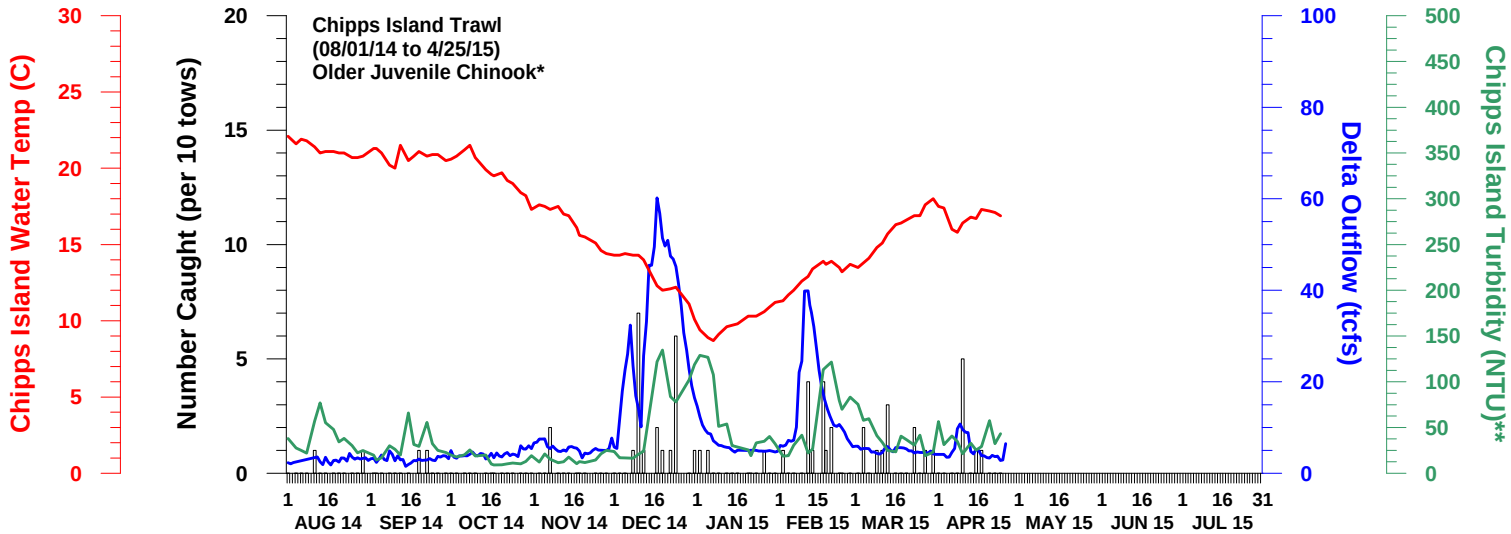
DWR-DES 27 APR 2015
Preliminary data from DFW, FWS, GCID, and CDEC; subject to revision.

*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 12/2/14-1/6/15 and 2/5/15-2/16/15 due to forecasted increase in flow and subsequent elevation change.

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

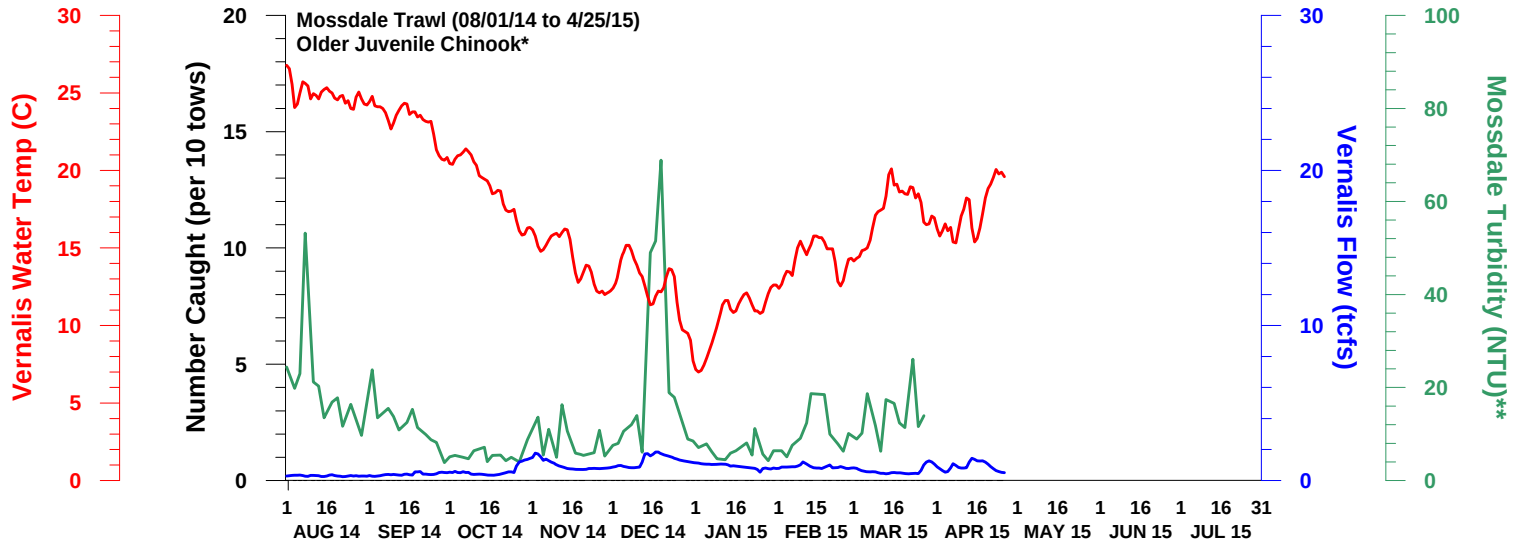


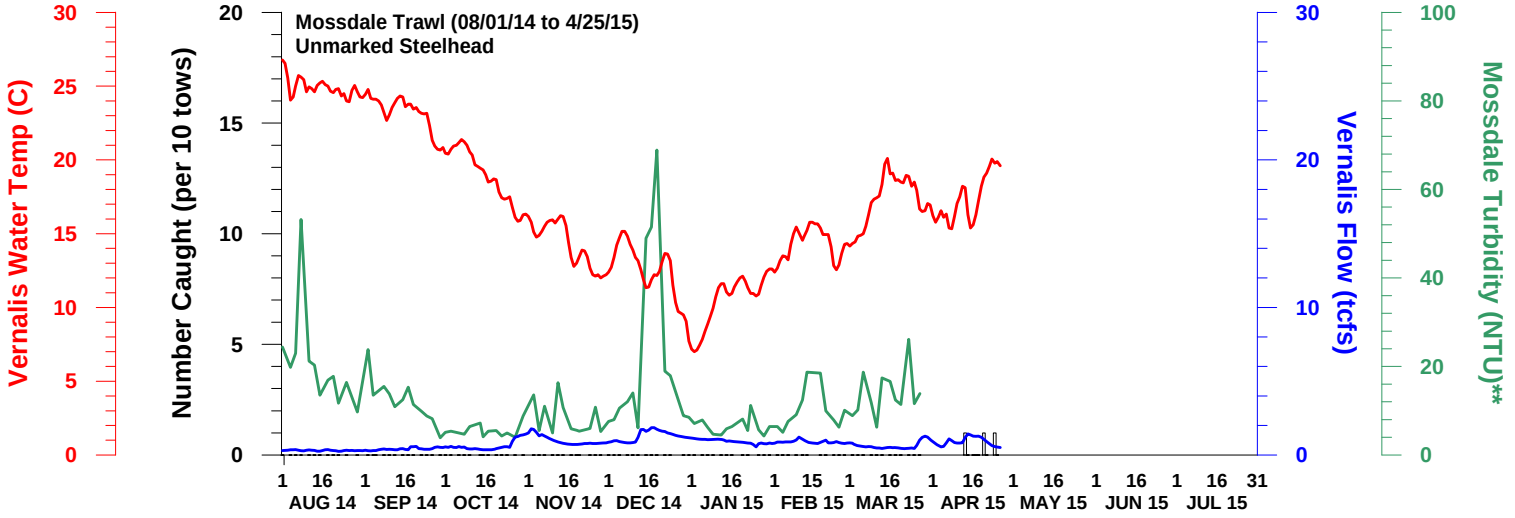




DWR-DES 27 APR 2015
Preliminary data from DFW, FWS, and CDEC; subject to revision.
*Older juvenile Chinook defined as all Chinook greater than or equal to the minimum winter run length-at-date criteria and less than the maximum size included in the length-at-date criteria (Frank Fisher Model) for which 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

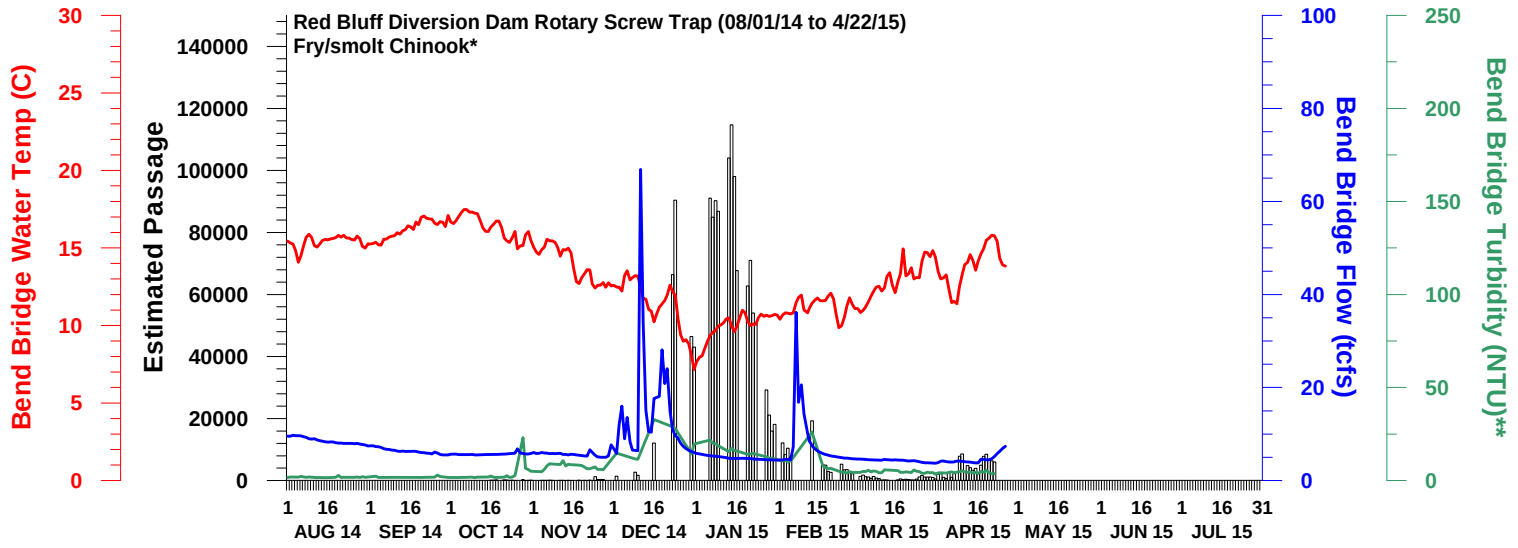


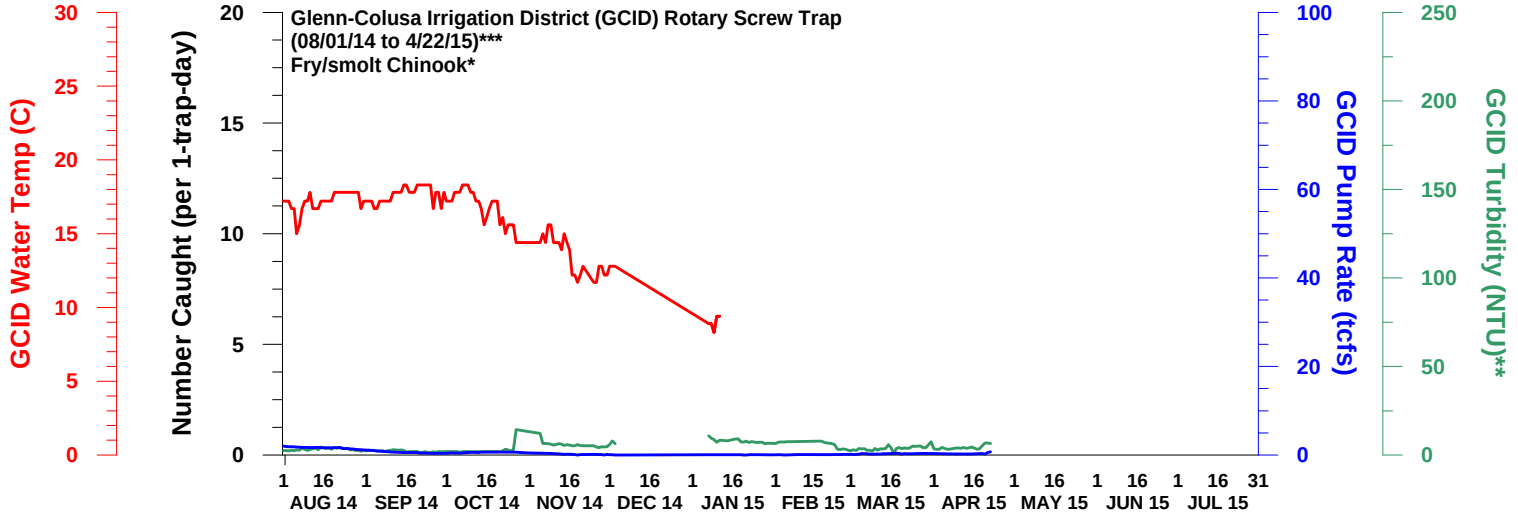


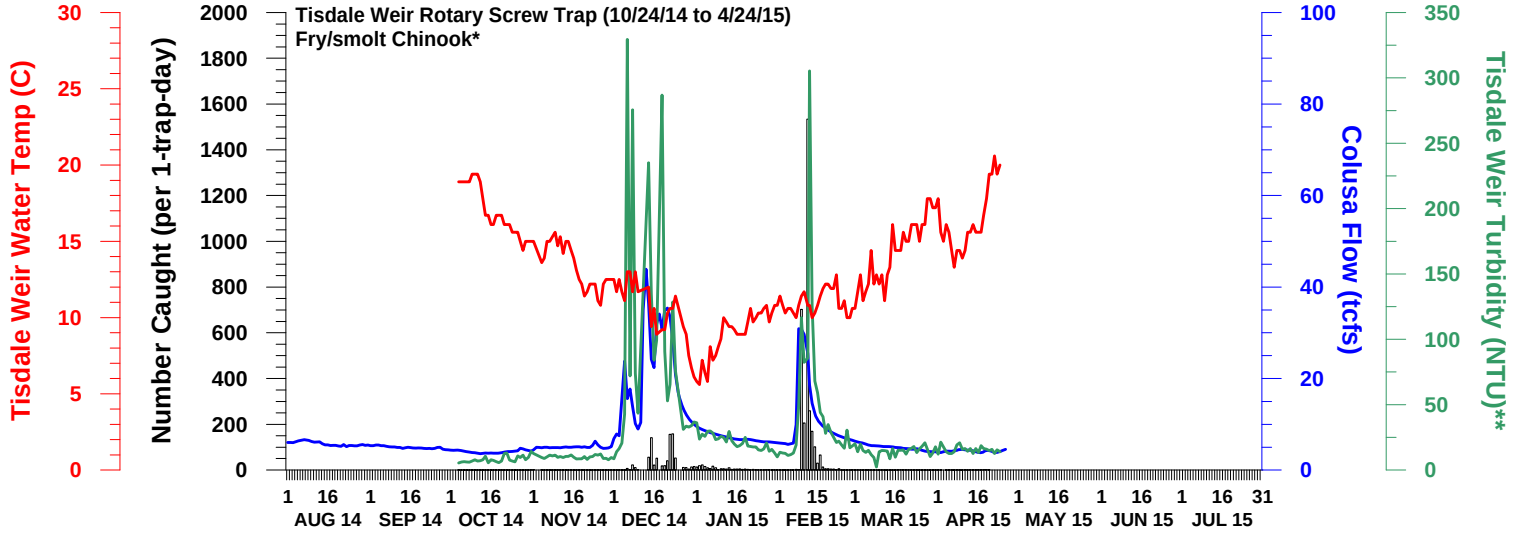
DWR-DES 27 APR 2015
Preliminary data from FWS and CDEC; subject to revision.

*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



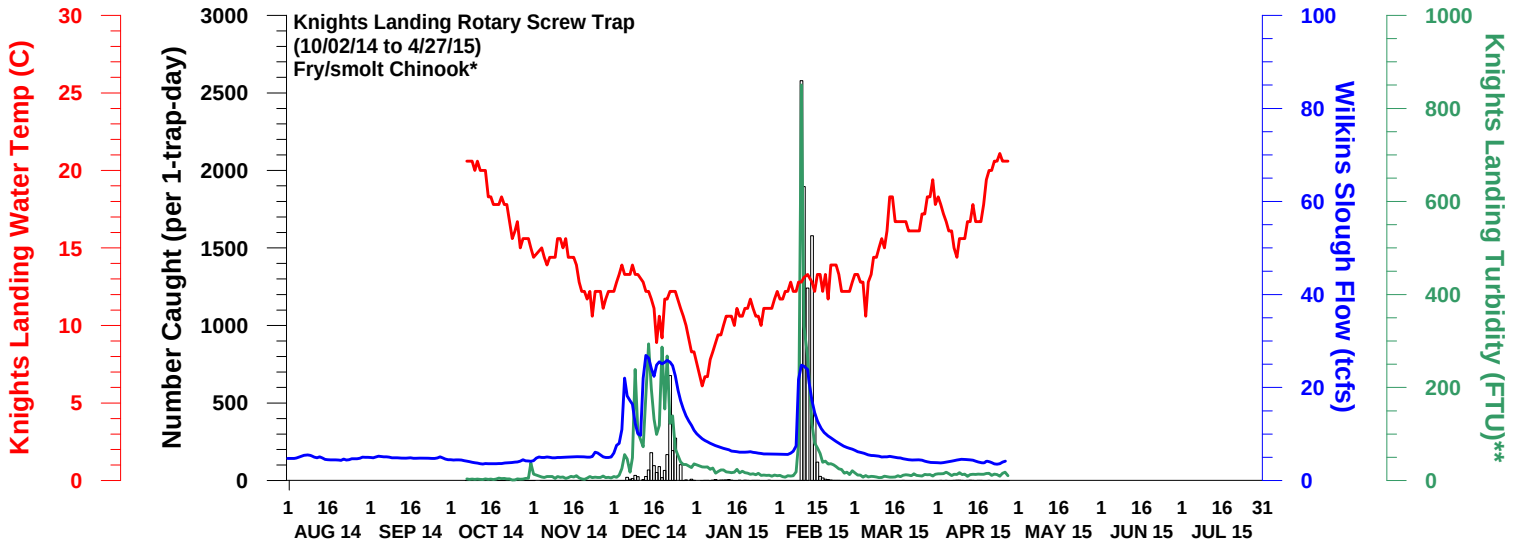


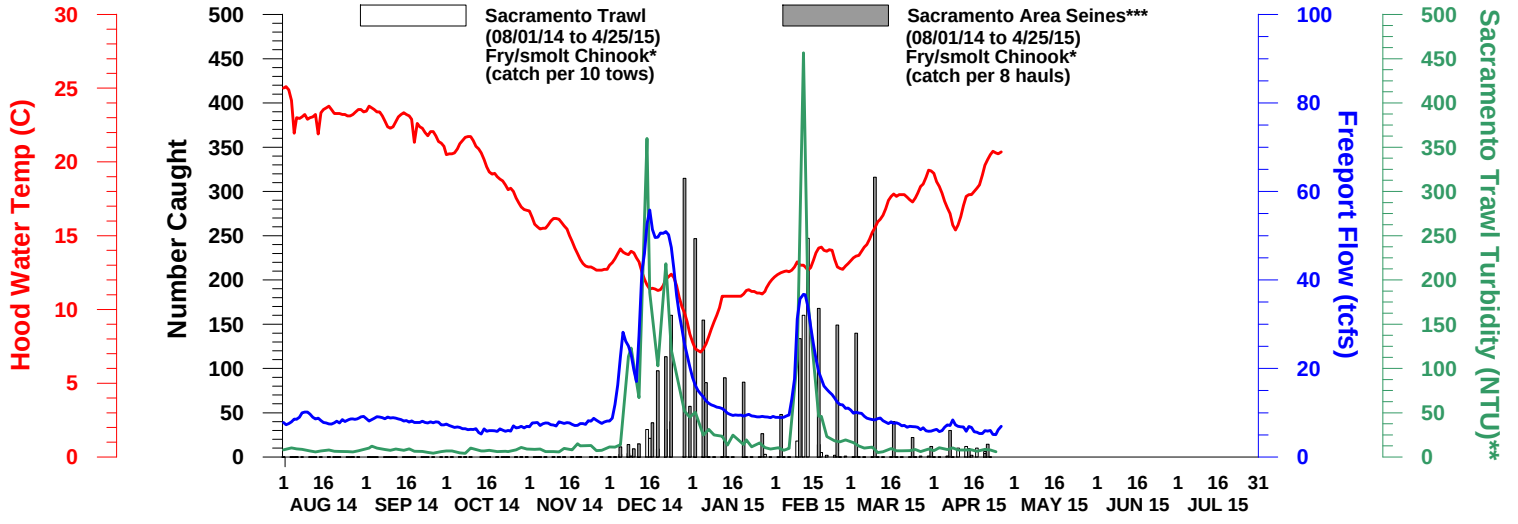


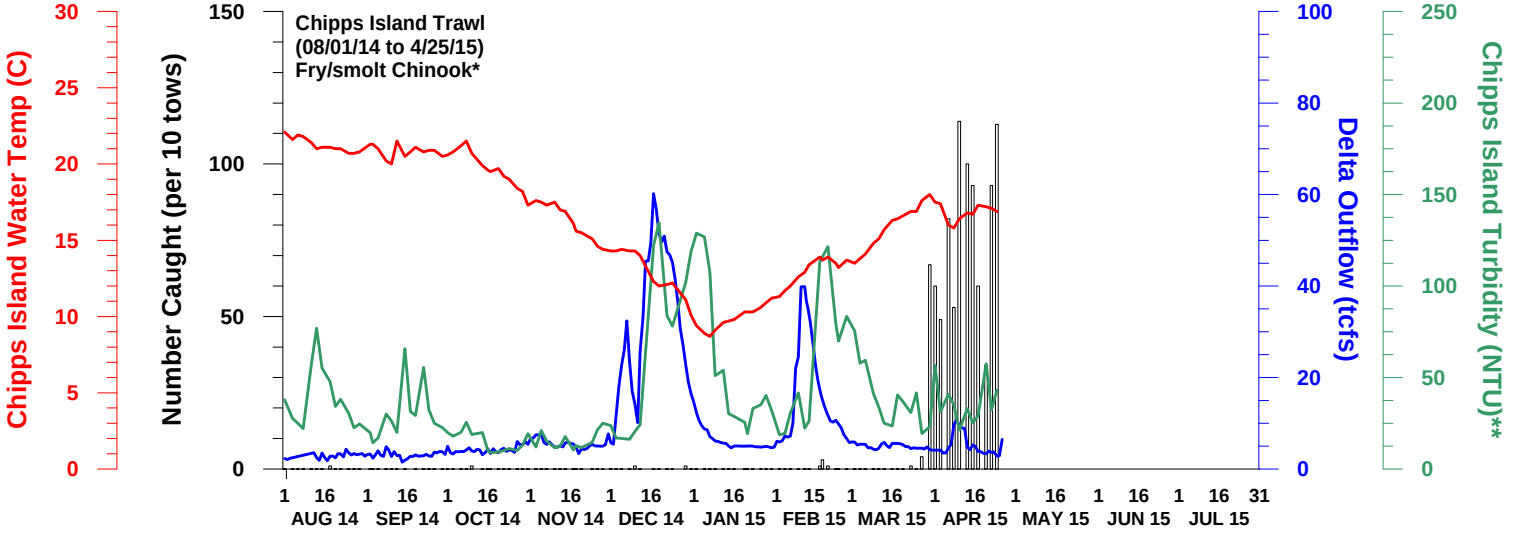
DWR-DES 27 APR 2015
Preliminary data from DFW, FWS, GCID, and CDEC; subject to revision.

*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.

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



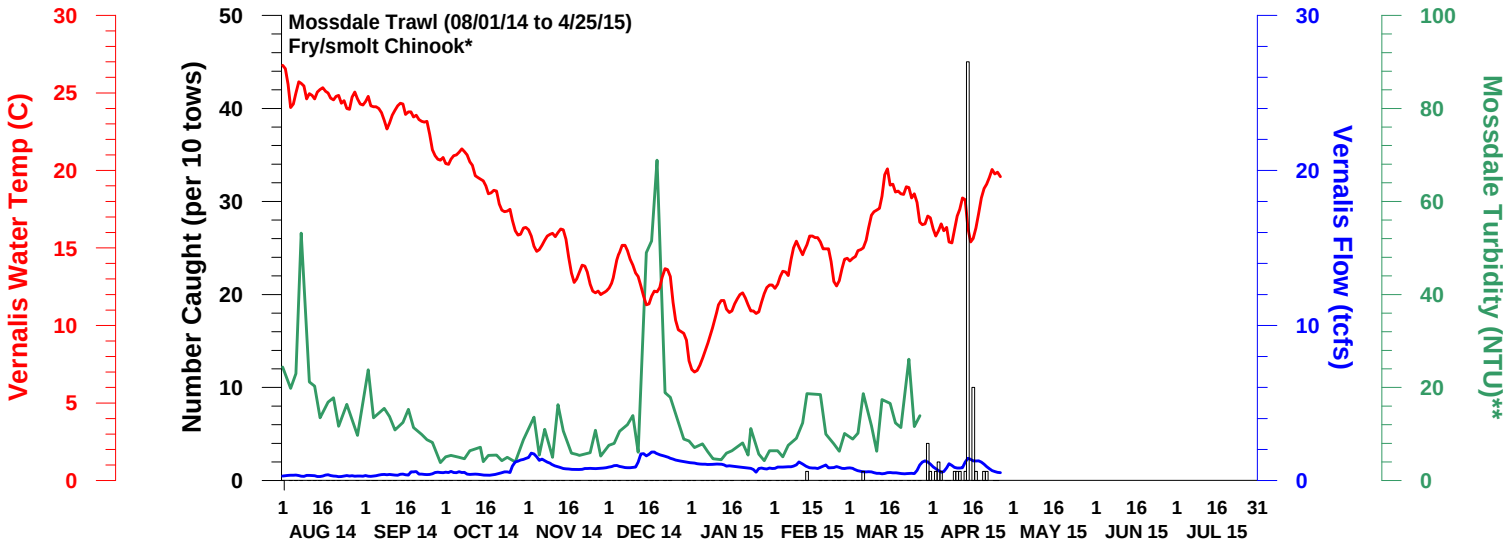




DWR-DES 27 APR 2015
Preliminary data from DFW, FWS, and CDEC; subject to revision.

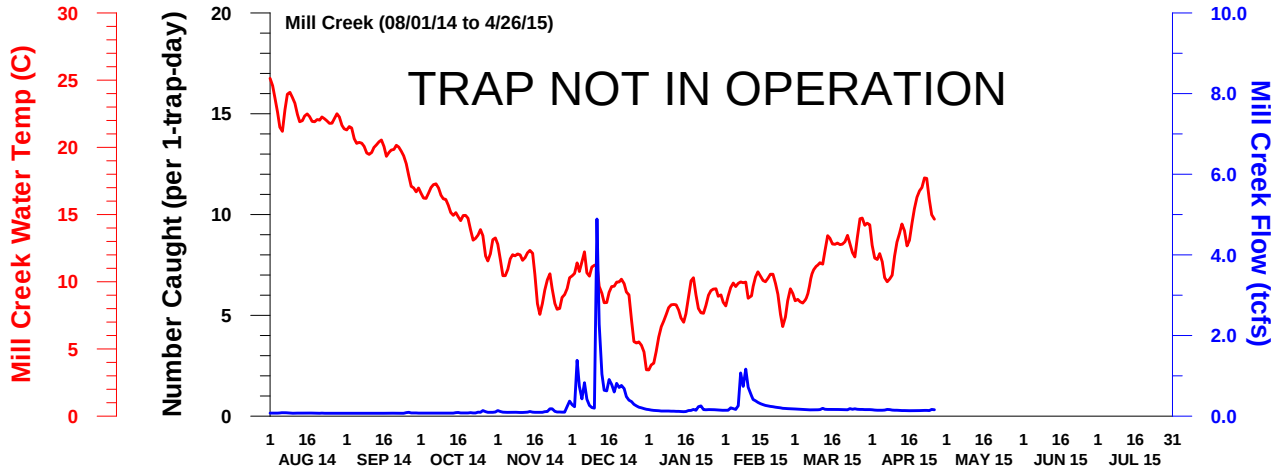
*Fry/smolt Chinook defined as all Chinook less than the minimum winter run length-at-date criteria (Frank Fisher model).
**Turbidity is a discrete measurement and is not measured continuously. Therefore, data are interpolated on days when turbidity was not measured unless data are missing for more than 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.

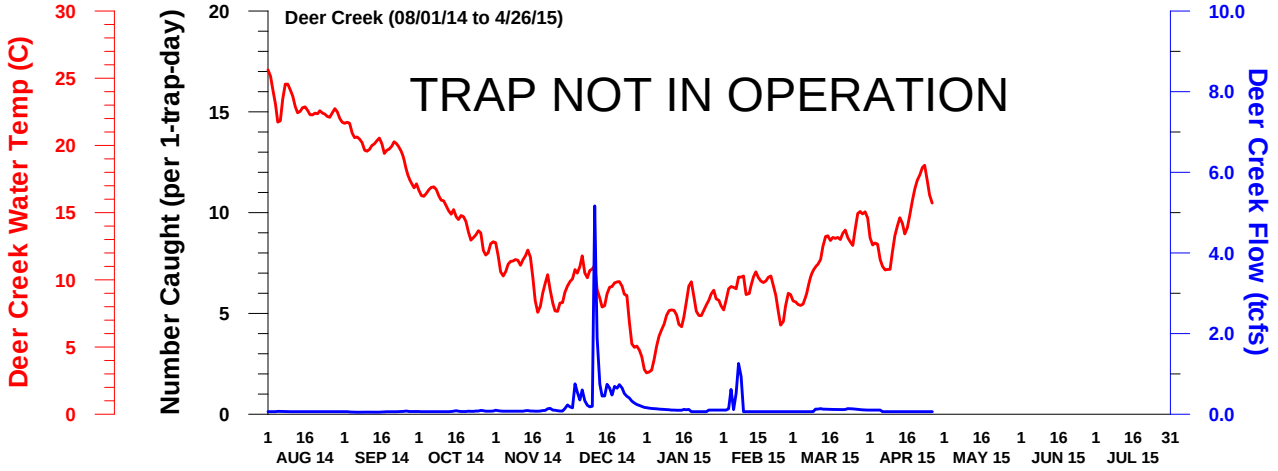
NUMBER OF UNMARKED FRY/SMOLT CHINOOK MEASURED IN THE SAN JOAQUIN RIVER



DWR-DES 27 APR 2015
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





DWR-DES 27 APR 2015
Preliminary data from CDEC; subject to revision.

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.

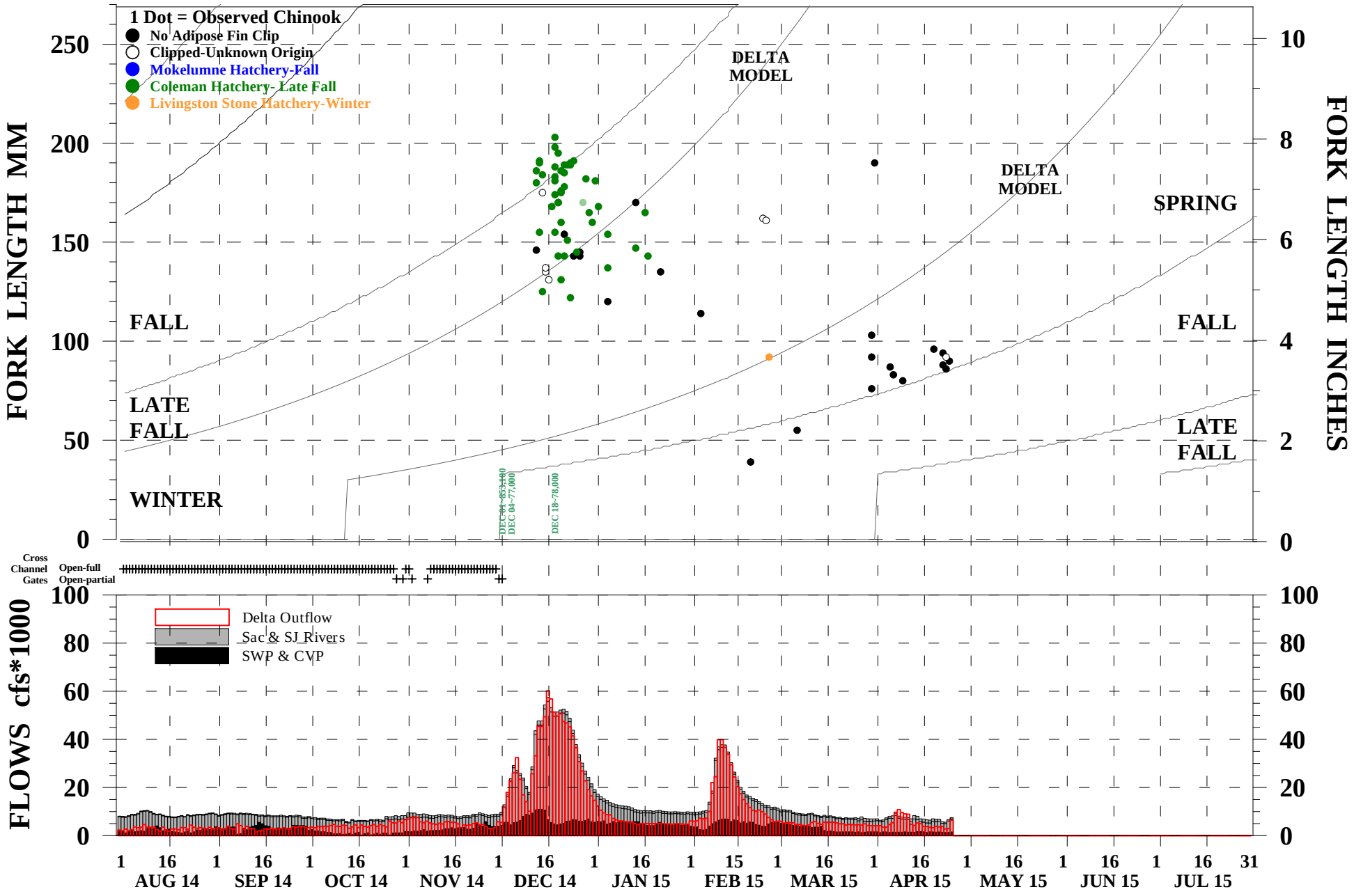
Sacramento River Trawl, Sacramento Area Beach Seine, and Chipps Island Trawl data were obtained directly from FWS, Stockton Fish and Wildlife Office (http://www.fws.gov/stockton/jfmp/).

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.

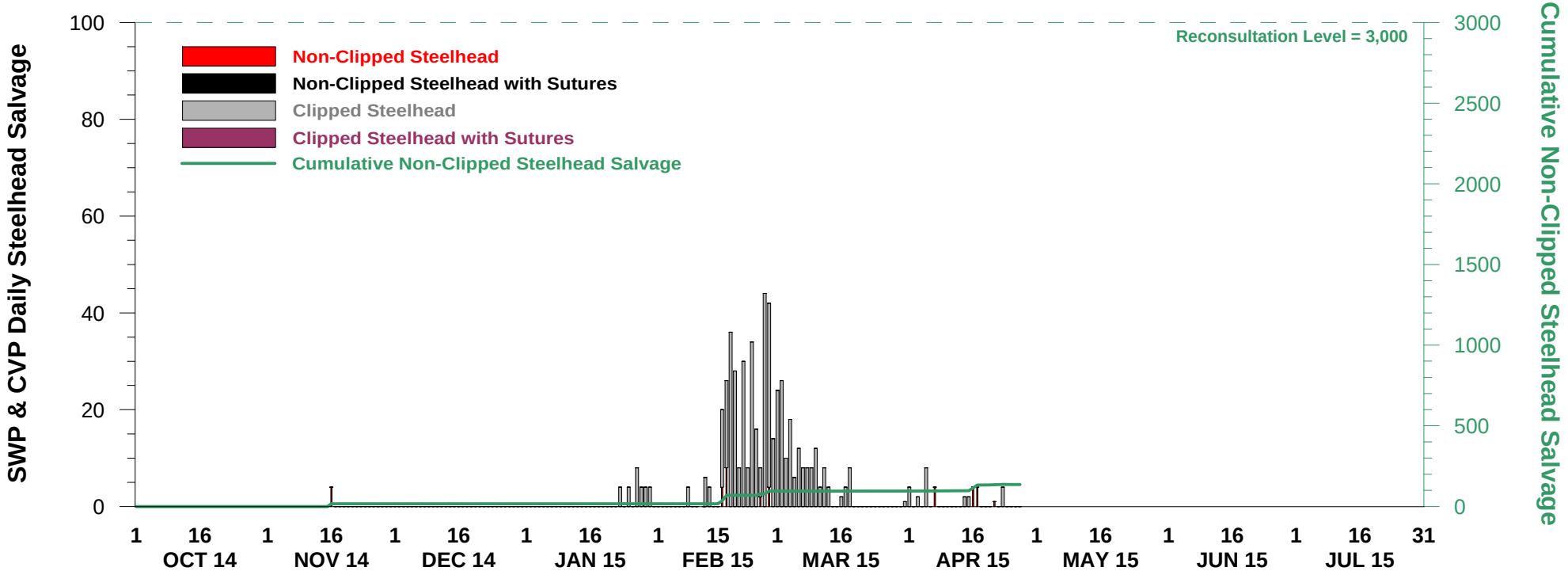
[1] Formerly known as the California Department of Fish and Game (DFG).

OBSERVED CHINOOK SALVAGE AT THE SWP & CVP
DELTA FISH FACILITIES 08/01/2014 THROUGH 4/26/2015



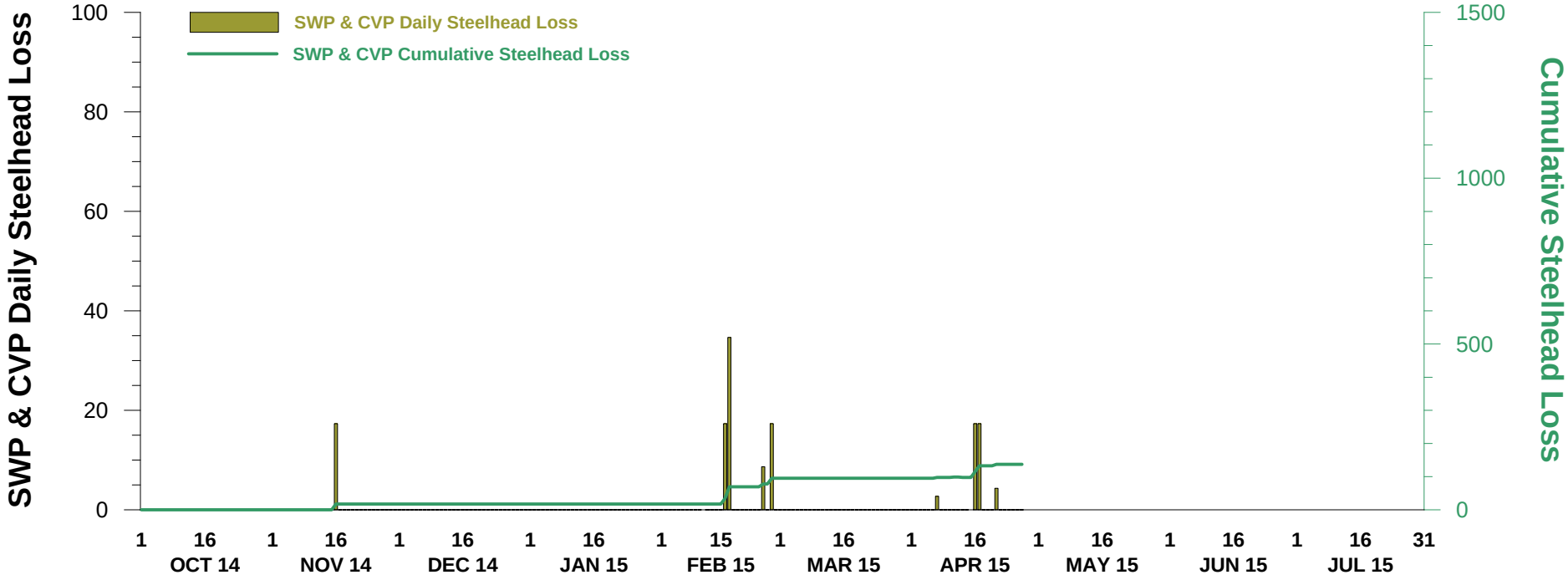
DWR-DES 27 APR 2015
Preliminary data from DFW, DWR, FWS, Reclamation, and CDEC; subject to revision.
*Chinook not measured for length and Chinook outside of the length-at-date criteria (Delta model) are not reported.

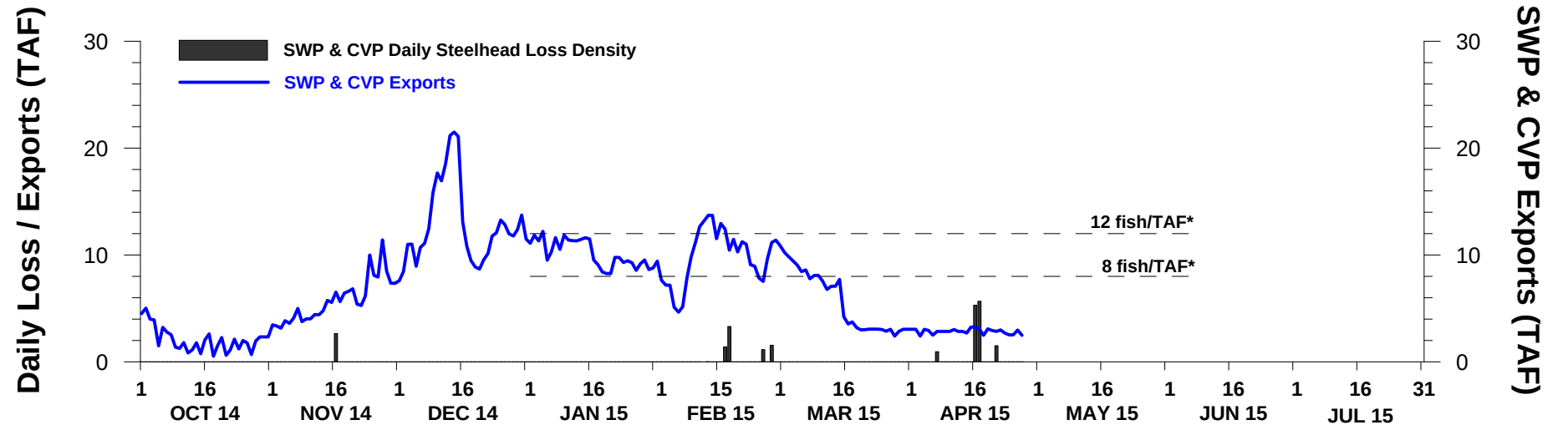
STEELHEAD SALVAGE AT THE DELTA
FISH FACILITIES 01 OCT 2014 THROUGH 26 APR 2015



DWR-DES 27 APRIL 2015
Preliminary data from DFW; subject to revision.

NON-CLIPPED STEELHEAD LOSS AT THE DELTA FISH FACILITIES 01 OCT 2014 THROUGH 26 APR 2015





DWR-DES 27 APRIL 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.