

Delta Operations for Salmonids and Sturgeon (DOSS) Group
Conference call: 6/4/2019 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 the [NMFS Water Ops page: www.westcoast.fisheries.noaa.gov/central_valley/water_operations/doss.html](http://www.westcoast.fisheries.noaa.gov/central_valley/water_operations/doss.html).

CDFW: Duane Linander, Geir Aasen, Kyle Griffith, Jason Julienne

DWR: Chris Cook, Bryant Giorgi, Dan Yamanaka, Kevin Reece, Mike Ford

NMFS: Kristin Begun

Reclamation: Tom Patton, Mike Hendrick, Mike Beaks, Towns Burgess

SWRCB: Craig Williams

USFWS: Craig Anderson, Felipe Carrillo

Agenda Items

1. Agenda review and introductions
2. RPA Implementation review (For the DOSS Dashboard, click on the "Triggers & Indices" tab at: [Bay Delta Live](#))
3. Current Operations
4. Smelt Working Group
5. Fish Monitoring: RSTs/trawls/seines
6. Fish Monitoring: Salvage
7. Hatchery Releases
8. DOSS Estimates of Fish Distribution
9. DOSS Feedback on Entrainment Risk
10. DOSS advice
11. DOSS Report WY 2019 Preliminary Discussion
12. Next DOSS meeting

Agenda Item 2.

RPA Implementation Review

Delta RPA Actions affecting operations during May/June:

Action IV.1.2¹ (DCC gate operations):

- DCC gates will remain closed from 5/21/19 through 6/15/19, per operations described in RPA IV.1.2.
- Gates will likely remain closed on weekends due to continued high flows.

Action IV.2.1 San Joaquin River Inflow to Export (I:E) Ratio

¹ For details, see pages 62-66 in Enclosure 2 of the [2011 Amendments to the 2009 RPA: 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)

- For the period of 4/1 through 5/31, the level of combined SWP and CVP exports is determined by the San Joaquin River inflow as measured at Vernalis. For the current water year type (Wet in the San Joaquin River basin) the ratio of San Joaquin River inflow to combined CVP and SWP exports is 4:1, based on a 14-day running average.
- An exception procedure provides for minimum health and safety needs, identified as 1,500 cfs combined exports in the 2009 RPA with 2011 amendments.

Action IV.2.3³ (OMR Management):

- Implementation of this action in WY 2019 is from 1/1/19 to 6/15/19, and requires that Old and Middle River (OMR) flow be no more negative than -5,000 cfs. OMR flows are reported weekly with the OMR index and the tidally filtered USGS gauges at the 5-day and 14- day running averages.
- Responses to exceedances of RPA action triggers require that OMR flows become more positive to meet the mandatory OMR flow limits required by the action.
- No salvage-based triggers that would require OMR to be more positive than -5,000 cfs were exceeded this week.

Agenda Item 3.

Current Operations (6/4/19)

SWP		CVP	
Exports (cfs)			
Clifton Court Forebay	6,680	Jones Pumping Plant	4,400 (5 units)
Reservoir Releases (cfs)			
Feather - Oroville	10,500	American - Nimbus	11,000
		Sacramento - Keswick	13,000
		Stanislaus – Goodwin	1,450*
		Trinity - Lewiston	2,100**
Reservoir Storage (in TAF)			
San Luis (SWP)	714	San Luis (CVP)	750 (increasing)
Oroville	3,452	Shasta	4,477
New Melones	2,068	Folsom	954
Delta Operations			
DCC	Closed	Sacramento River at Freeport (cfs)	42,086
Outflow Index (cfs)	46,969	San Joaquin River at Vernalis (cfs)	15,786
E:I	18% (14-day avg.)	X2	59 km

* Goodwin releases will increase and decrease following Appendix 2E scheduled pulse flow.

** Trinity releases are continuing the ROD pulse flow schedule.

Factors controlling Delta exports:

- 5/28/19 - 5-31-19: 4:1 San Joaquin I:E ratio per NMFS BiOp RPA Action IV.2.1
- 6/1/19 - 6/3/19: physical capacity (federal side), USACE Permits (state side)

Approximate OMR as of 6/1/19:

	USGS gauges (cfs)	Index (cfs)
Daily	-4,400	-4,300
5-day	700	1,000
14-day	2,300	2,000

Approximate OMR as of 6/3/19:

	Index (cfs)
Daily	-3,400
5-day	-1,400
14-day	1,200

Weather Forecast

Above normal temperatures in the Sacramento Valley through Wednesday in the mid to upper 90s, then cooling into the weekend. Winds will increase Saturday and Sunday night. Warm temperatures will return late in the weekend and early next week.

Agenda Item 4.

Smelt Working Group

The Smelt Working Group met on Monday, 6/3/19, at 10 am.

The Smelt Working Group (SWG) reviewed current Delta conditions, survey data, expected exports, and forecasted weather. River flows have remained high, and the water projects are both exporting at their full permitted capacity, resulting in OMR flow rates of around -3,500 cfs. The SWG determined that based on the available survey data, most of the fish appear to be outside the entrainment risk area, and the overall risk of entrainment for fish in the system is low. However, due to the low fish population, fish could have went undetected by the field surveys in the South Delta and the Lower San Joaquin River, and fish that could be present in these areas could still be at risk of entrainment.

On 1/31, the 3-station average daily water temperature at Mossdale, the Rio Vista Bridge, and Antioch exceeded 12°C, which is the temperature indicative of Delta Smelt spawning as identified in the Biological Opinion and a potential trigger for the start of Action 3. The Service determined on 2/6 that Action 3 had been implemented for the protection of larval and juvenile Delta Smelt. The implementation of Action 3 requires OMR flow rates to be no more negative than -5,000 cfs on a 14-day running average. The SWG will continue to monitor Delta Smelt survey and salvage data and Delta conditions, and the group plans to meet again next Monday, 6/10 at 10 am.

Agenda Item 5.

Fish Monitoring: The following table presents fish monitoring data summarized over the past week. Unless otherwise noted, reported sizes are fork length. Empty cells indicate zero catches at those locations with sample dates shown.

Location	GCID RST ^A	Tisdale RST ^B	Knights Landing RST ^C	Beach Seines ^D	Sacramento Trawl ^D	Chippis Is. Midwater Trawl ^D	Mossdale Kodiak Trawl ^E
Sample Date	5/27-5/31, 6/1-6/3	5/22-5/30	5/27-6/2	5/28-5/31	5/26, 5/28-5/31	5/26, 5/28-5/31	5/23-6/1
Chinook							86
FR Chinook	42 juveniles 4 smolts	18	1	22	51	194	
SR Chinook	2 smolts						
WR Chinook							
LFR Chinook							
Chinook (ad-clip)	4 FR				5*	44	1
Steelhead (wild)			1	1	1		
Steelhead (ad-clip)							
Green Sturgeon	1						
Flows (avg. cfs)	1,790	13,906	14,741				
W. Temp. (avg. °F)	62.79	60.6	66.2				
Turbidity (avg. NTU)	34.94	24.3	26.68				

^A GCID cone was raised on 5/26 due to predicted high flows and heavy debris, and was lowered on the afternoon of 5/27, raised on 5/31 and lowered on 6/1 at 9 am. The juvenile green sturgeon observed on 6/3 had a fork length of 29mm.

^B Tisdale RST sampling period was from 5/22 at 9:30 am to 5/30 at 9:00 am. On 5/28, cone was raised due to snapped cable caused by extreme debris; repairs were made.

^C Knights Landing RST sampling period was from 5/27 at 11:30 am to 6/2 at 8:45 am.

^D Data reported in the 5/26 to 6/1 DJFMP sampling summary. *One tagged Chinook was acoustic-tagged.

^E Mossdale trawls sampled by CDFW (Region 4) instead of the DJFMP between 4/1 and 6/30.

Tracking of acoustic-tagged winter-run Chinook salmon released at Caldwell Park

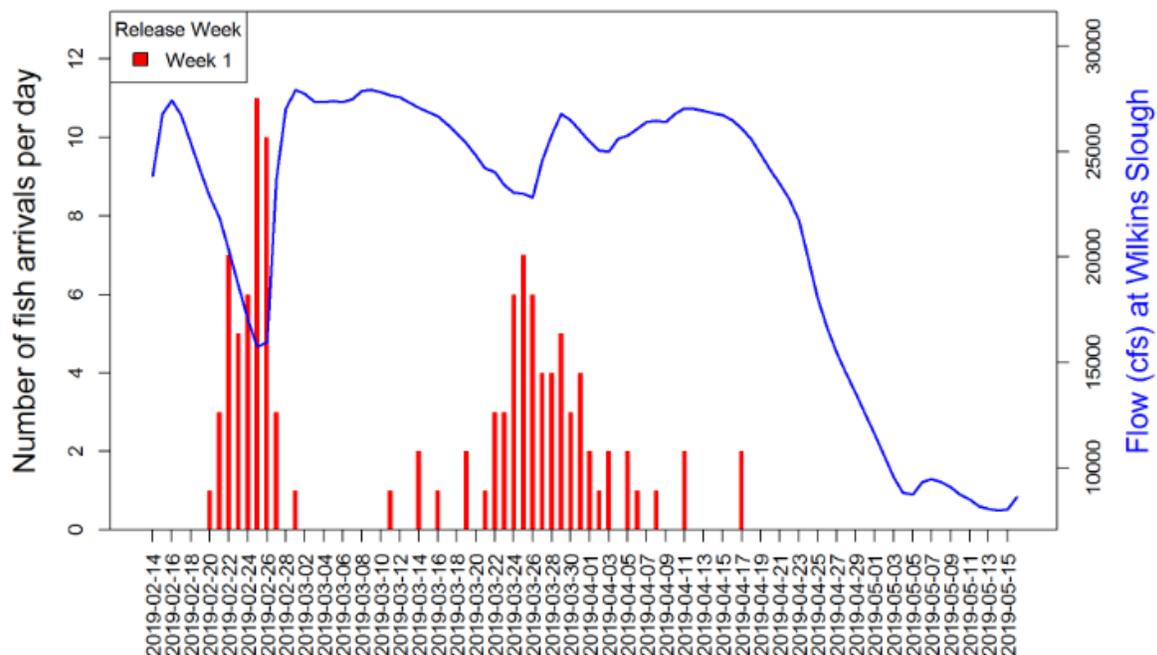
The Livingston Stone National Fish Hatchery released acoustic-tagged (JSATS) winter-run Chinook salmon from brood year 2018. The following table provides the detection frequencies downstream of the release site. This project is complete and tags are no longer active. Detections through 5/23/19 below.

Date of release	2/14/19
# acoustically tagged (JSATS)	650 fish
Butte City Bridge	195 (30%)
Tower Bridge	112 (17%)
Minimum survival to Tower Bridge	25%*
I-80/50 Bridge	127 (19.5%)
Georgiana Slough	21 (3%)
Detections at Benicia Bridge	163 (25%)
Minimum survival to Benicia Bridge	26%

*If Yolo Bypass Weirs were overtopping during migration, fish may have taken that route, and therefore this is a minimum estimate of survival.

[Winter-Run Acoustic Tagging Project: https://calfishtrack.github.io/real-time/pageLSWR_2019.html](https://calfishtrack.github.io/real-time/pageLSWR_2019.html)

Detections at Tower Bridge (downtown Sacramento) versus Sacramento River flows at Wilkins Slough



Tracking of acoustic-tagged winter-run Chinook salmon released at Battle Creek

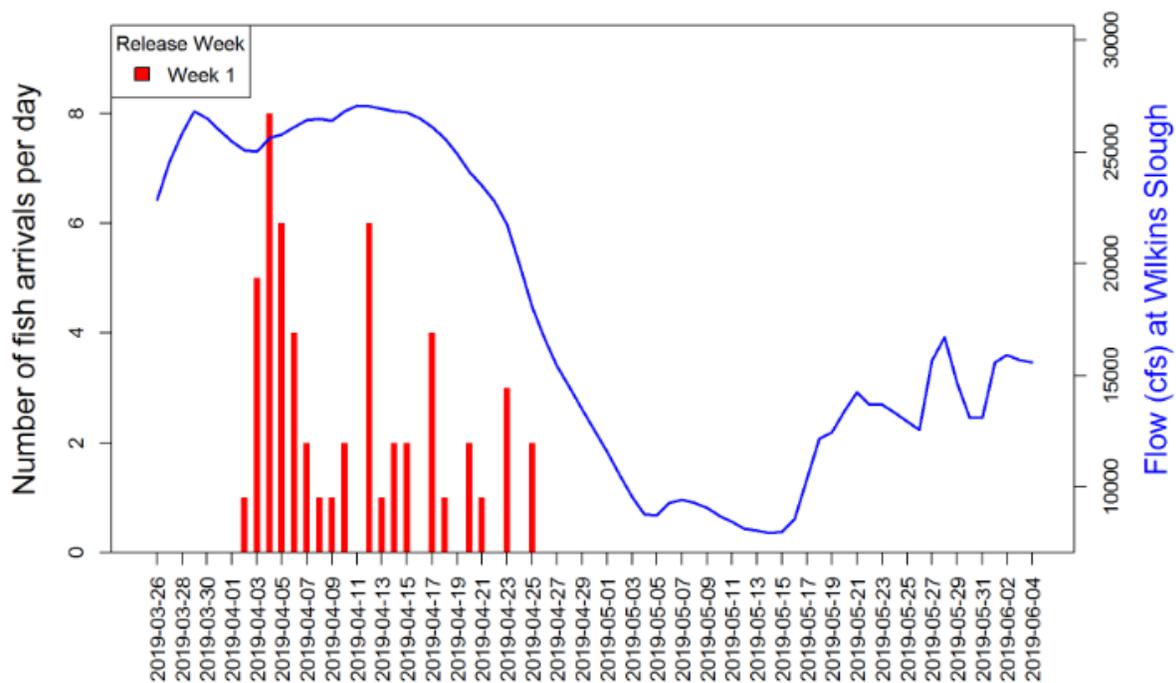
The Livingston Stone National Fish Hatchery released acoustic-tagged (JSATS) winter-run Chinook salmon from brood year 2018. The following table provides the detection frequencies downstream of the release site. Detections through 6/2/19 below.

Date of release	3/26/19
# acoustically tagged (JSATS)	500 fish
Butte City Bridge	31 (6%)
Tower Bridge	54 (11%)
Minimum survival to Tower Bridge	23%*
I-80/50 Bridge	82 (16%)
Georgiana Slough	22 (4%)
Detections at Benicia Bridge	70 (14%)
Minimum survival to Benicia Bridge	14%

*If Yolo Bypass Weirs were overtopping during migration, fish may have taken that route, and therefore this is a minimum estimate of survival.

[Battle Creek Winter-Run Acoustic Tagging Project: https://calfishtrack.github.io/real-time/pageBCJSWR_2019.html](https://calfishtrack.github.io/real-time/pageBCJSWR_2019.html)

Detections at Tower Bridge (downtown Sacramento) versus Sacramento River flows at Wilkins Slough



Feather River RST Data

Cook (DWR) provided Feather River RST data for two RST sites on the Feather River. At the Eye Side Channel from 5/28 to 5/31, 16 fall-run Chinook salmon were observed. Flows were an average 2,625 cfs, water temperature 56°F, and turbidity 2.2 NTU. At the Herringer site from 5/28 to 5/31, 5 fall-run Chinook salmon were observed. Flows were an average 6,500 cfs, water temperature 61°F, and turbidity 3.3 NTU.

Agenda Item 6.

Fish Monitoring: Salvage

Griffiths (CDFW) provided a salvage summary for the period of 5/27-6/2.

Chinook salmon

Unclipped (wild origin) Chinook: Weekly salvage of wild origin Chinook salmon included 73 spring-run and 725 fall-run sized fish (estimated from subsample). Total WY19 salvage of wild-origin Chinook salmon is 10,973 fish.

Clipped (hatchery origin) Chinook: 4 ad-clipped spring-run sized Chinook salmon were observed this week in salvage. Total WY19 salvage of ad-clipped Chinook is 1,703 fish.

Steelhead

Unclipped steelhead: 18 fish salvaged for a season total to date of 432.

Clipped steelhead: 9 fish salvaged for a season total to date of 1,840.

Operations:

The federal facility reported an interruption in salvage between 2400 hours (midnight) on 5/31 and 0400 hours 6/1, affecting two counts, for a reduction of 8% in coverage. The outage occurred because of a large elevation differential across the louvers, which can be caused by high debris loads.

DOSS Weekly Salvage Update

Reporting Period: May 27 - June 2, 2019
 Prepared by Kyle Griffiths on June 3, 2019 15:48
 Preliminary Results - Subject to Revision

Criteria	27-May	28-May	29-May	30-May	31-May	1-Jun	2-Jun	Trend	
Loss Densities									
Wild older juvenile CS	0	0	0	0	0	0	0	→	0.00
Wild steelhead	0.45	1.68	2.94	0	2.10	0	0	↗	1.02
Exports									
SWP daily export	748	3,546	5,204	4,581	6,632	12,025	12,986	↗	6,532
CVP daily export	5,329	1,605	1,609	1,609	1,614	8,551	8,509	→	4,118
SWP reduced counts	0	0	0	0	0	0	0		
CVP reduced counts	0	0	0	0	0	8%	0		

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

Chinook Salmon Weekly/Season Salvage and Loss

Combined salvage and loss for both CVP and SWP fish facilities
 Race determined by size at date of capture; hatchery = adipose fin missing;

Category	Weekly Total			Season Total	
	Salvage	Loss	Trend	Salvage	Loss
Wild					
Winter Run	0	0	→	184	537
Spring Run	73	183	↗	2,159	6,089
Late Fall Run	0	0	→	3	13
Fall Run	725	1,672	↗	8,623	11,832
Unclassified	0	0	→	4	NC
Total	798	1,854		10,973	18,471
Hatchery					
Winter Run	0	0	→	87	366
Spring Run	4	3	↗	1,254	4,402
Late Fall Run	0	0	→	354	776
Fall Run	0	0	→	4	3
Unclassified	0	0	→	4	NC
Total	4	3		1,703	5,546

Trend = weekly loss per race; Salvage = estimated number of fish collected by the CVP and SWP fish protective facilities per unit of time
 NC = cannot be calculated; hatchery salmon salvage and loss estimates have been corrected using CWT readings when available

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	18	49	↗	432	1,422
Hatchery	9	24	↗	1,840	5,756
Total	27	73		2,272	7,178

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

CONFIRMED HATCHERY (ADIPOSE-FIN CLIPPED) CHINOOK SALMON LOSS AT THE SWP & CVP DELTA FISH FACILITIES as of 6/4/19

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 Stage Trigg	Date of First Loss ⁴	Date of Last Loss ⁴
12/3/2018	LF	Coleman NFH	Battle Creek	Spring Surrogate	67.33	61,277	n/a	0.110	n/a	0.5%	12/27/2018	2/16/2019
12/14/2018	LF	Coleman NFH	Battle Creek	Spring Surrogate	24.57	66,266	n/a	0.037	n/a	0.5%	12/27/2018	2/10/2019
1/4/2019	LF	Coleman NFH	Battle Creek	Spring Surrogate	457.26	73,952	n/a	0.618	n/a	0.5%	1/16/2019	2/20/2019

SWP and CVP adipose-fin clipped Chinook lost from 10/1/2018 through 6/4/2019.

¹Number 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.

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

Agenda Item 7.
Hatchery Releases

On May 23 and 24, 2019, the California Department of Fish and Wildlife (CDFW) released approximately 450,000 brood year 2018 fall-run Chinook salmon from Mokelumne River Hatchery into the San Joaquin River at the Sherman Island Net Pen site. This release included 25% Coded Wire Tagged (CWT) fish.

On May 25, 2019, CDFW released approximately 240,000 brood year 2018 fall-run Chinook salmon from Mokelumne River Hatchery into the Coastside Fishing Club Net Pens in Pillar Point Harbor. This release was the second of three weekly releases totaling 720,000 included 100% CWT fish.

On May 26, 2019, CDFW released approximately 450,000 brood year 2018 fall-run Chinook salmon from Mokelumne River Hatchery into San Francisco Bay at Fort Baker. This release included 25% CWT fish.

On May 28 and 29, 2019, CDFW released approximately 1,334,272 brood year 2018 fall-run Chinook salmon from Feather River Hatchery into the San Pablo Bay at the Conoco 66 and Mare Island net pens. This release included 25% marked (adipose fin clip) and CWT fish.

On May 30 and 31, 2019, CDFW released approximately 450,000 brood year 2018 fall-run Chinook salmon from Mokelumne River Hatchery into the San Joaquin River at the Sherman Island Net Pen site. This release included 25% CWT fish.

On June 1, 2019, CDFW released approximately 240,000 brood year 2018 fall-run Chinook salmon from Mokelumne River Hatchery into the Coastside Fishing Club Net Pens in Pillar Point Harbor. This release was the last of three weekly releases totaling 720,000 and included 100% CWT fish.

On June 3 and 4, 2019, CDFW will release approximately 1,158,000 brood year 2018 fall-run Chinook salmon from Nimbus Fish Hatchery into the San Pablo Bay at the Mare Island Net Pen site. This release will include 25% marked (adipose fin clip) and CWT fish.

On June 6 and 7, 2019, CDFW will release approximately 883,727 brood year 2018 fall-run Chinook salmon from Feather River Hatchery into the San Pablo Bay at the Mare Island Net Pen site. This release will include 25% marked (adipose fin clip) and CWT fish.

On June 8 and 9, 2019, CDFW will release approximately 1,003,460 brood year 2018 fall-run Chinook salmon from the Feather River Hatchery into the San Francisco Bay at Fort Baker. This release will include 25% marked (adipose fin clip) and CWT fish.

Agenda Item 8.
DOSS Estimates of Fish Distribution

DOSS estimates of the current distribution of listed Chinook salmon as a percentage of the population, are based on recent monitoring data and historical migration timing patterns.

Location	Yet to Enter Delta (Upstream of Knights Landing)	In the Delta	Exited the Delta (Past Chippis Island)
<i>Young-of-year (YOY) winter-run Chinook salmon</i>	0% (Last week: 0-1%)	0-1% (Last week: 0-1%)	99-100% (Last week: 98-100%)
<i>Young-of-year (YOY) spring-run Chinook salmon</i>	0-2% (Last week: 0-5%)	2-5% (Last week: 5%)	93-98% (Last week: 90-95%)
<i>Hatchery winter-run Chinook salmon</i>	0% (Last week: 0-1%)	0-1% (Last week: 0-1%)	99-100% (Last week: 98-100%)

Rationale for distribution

Wild winter-run Chinook:

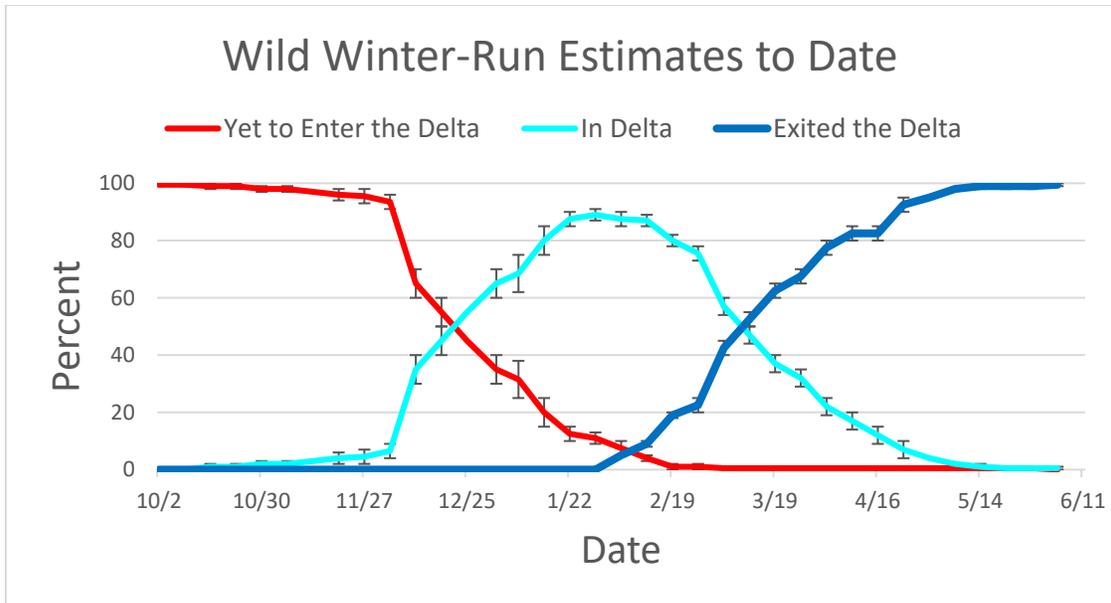
No wild winter-run Chinook salmon were observed at monitoring locations this week. Since none have been observed upstream of the Delta in several weeks, and due to life history and seasonal timing, DOSS estimates that none remain upstream and 99-100 percent of wild winter-run Chinook salmon population has exited the Delta past Chippis Island.

Wild spring-run Chinook:

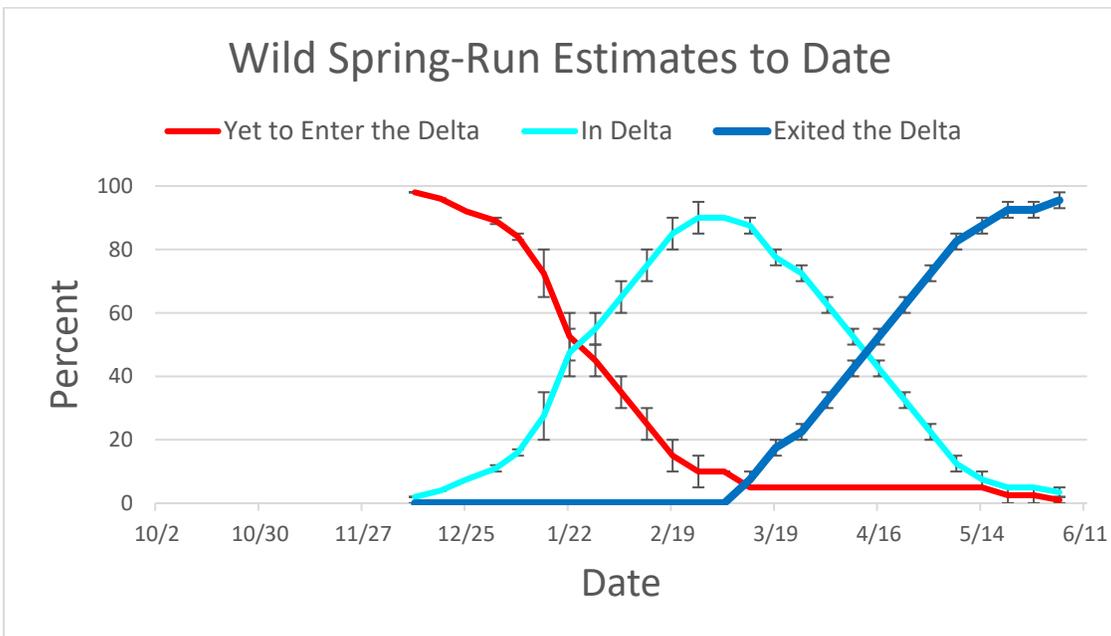
Two wild spring-run Chinook salmon smolts were observed at GCID this week, and at no other monitoring locations. Since 2 fish were observed, and due to life history and seasonal timing, DOSS estimates that 93-98 percent of the population has exited the Delta past Chippis Island, 2-5 percent are in the Delta, and 0-2 percent remain upstream of Knights Landing.

Hatchery winter-run Chinook:

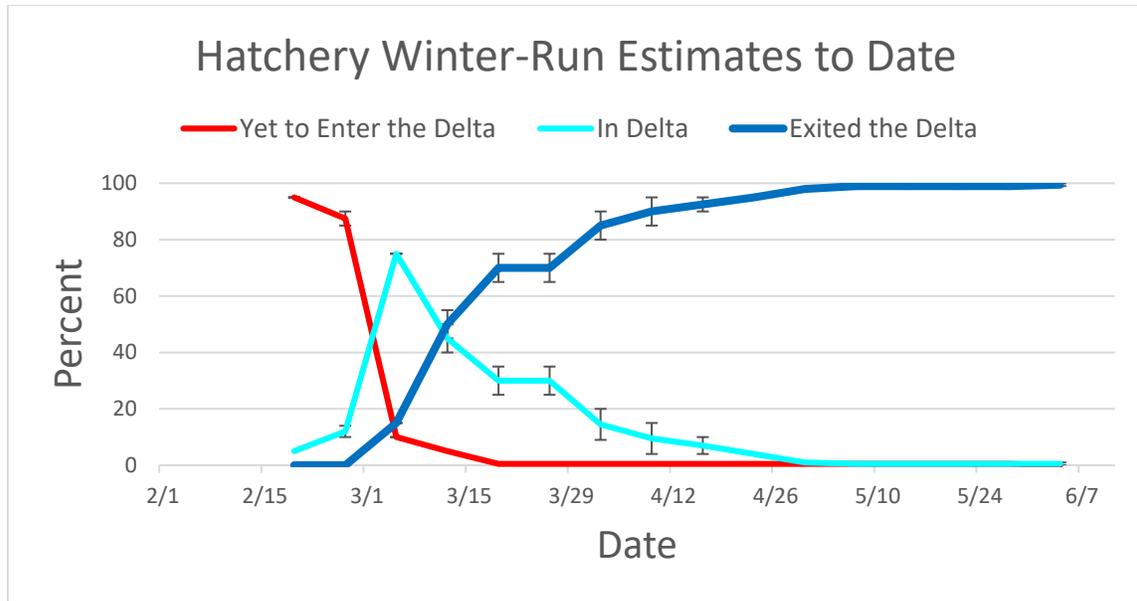
No additional acoustic tagged fish were detected at receivers in the past week. Since none were detected, DOSS estimates 99-100 percent of the group has migrated through the Delta past Chippis Island. This estimate assumes a high in-river survival rate and does not account for predation or other sources of mortality.



WY 2019 wild winter-run distribution estimates to date.



WY 2019 wild spring-run distribution estimates to date.



WY 2019 hatchery winter-run distribution estimates to date.

Agenda Item 9.

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; 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 into the 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 over the next week:

- **Exposure Risk: LOW**
 - Approximately 0-1% of winter run juveniles estimated to be in the Delta.
 - Approximately 2-5% of spring run juveniles estimated to be in the Delta.
 - Central Valley steelhead are in the system, including the Delta.
- **Routing Risk: LOW**
 - DCC is closed.
 - Flows are elevated on the Sacramento River (42,086 cfs) which result in a muting of tidal effects around Georgiana Slough and Threemile Slough. Flows are expected to remain around 30,000 cfs for the duration of the week.
 - Some fish observed in salvage are assumed to be of Sacramento River origin, and may have chosen interior routes. These fish could also be of San Joaquin River origin.
- **Overall Entrainment Risk: LOW**
 - Inflows from the Sacramento River are expected to remain high over the next week which balances exports to remain in the Low to Medium entrainment risk.

CVP/SWP Facilities Entrainment Risk for listed salmonids in the Interior Delta over the next week:

- **Exposure Risk: LOW**
 - Listed Chinook salmon and steelhead have been salvaged and observed in monitoring sites in the Delta.
 - Flows at San Joaquin River are decreasing, but so are exports based on inflows at Vernalis. The risk of entrainment, especially for steelhead remains unchanged.
 - OMR is expected to remain positive over the next week.
 - Exposure risk is low for San Joaquin steelhead and low for Sacramento listed fish based on historical salvage data and positive OMRs.
 - Unmarked Chinook salmon observed in salvage may have originated from San Joaquin River.
- **OMR/Export Risk:**
 - OMR -2,500 cfs: LOW
 - OMR -3,500 cfs: LOW
 - OMR -5,000 cfs: MEDIUM
 - OMR -6,250 cfs²: MEDIUM-HIGH
 - OMR -7,500 cfs²: HIGH
 - OMR -9,000 cfs²: HIGH
- **Overall Entrainment Risk:**
 - OMR -2,500 cfs: LOW
 - OMR -3,500 cfs: LOW
 - OMR -5,000 cfs: MEDIUM

²By request of management, DOSS also assessed risks at an OMR flow more negative than -5,000 cfs.

- OMR -6,250 cfs²: MEDIUM-HIGH
- OMR -7,500 cfs²: HIGH
- OMR -9,000 cfs²: HIGH

These assessments are based on anticipated and current hydrology and fish distributions for the next week.

Agenda Item 10.

DOSS Advice to WOMT and NMFS: None

Agenda Item 11.

Discussion of Assignments for the DOSS WY 2019 Annual Report

Begun (NMFS) announced that she will be sending out a draft Table of Contents (TOC) for the water year 2019 DOSS Annual Report this week with section assignments. She requested that the DOSS team members look over the draft TOC and section assignments and make any changes or updates to assignments as needed, and will also send out a draft timeline for the report for review. DOSS members will have a short discussion next meeting (6/11/19) regarding the annual report assignments and timeline.

Agenda Item 12.

Next Meeting: The next DOSS conference call will be on **6/11/19 at 9am.**