

**Delta Operations for Salmonids and Sturgeon (DOSS) Group**  
**Conference call: 5/21/2019 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, Ken Kundargi, Jason Julienne, Lauren Damon, Geir Aasen

**DWR:** Chris Cook, Bryant Giorgi, Farida Islam, Dan Yamanaka

**NMFS:** Kristin Begun

**Reclamation:** Tom Patton, Elissa Buttermore

**SWRCB:** Craig Williams, Chris Carr

**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. Next DOSS meeting

**Agenda Item 2.**

**RPA Implementation Review**

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

**Action IV.1.2<sup>1</sup> (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 typically will be opened on weekends (starting at 10 am Friday) and closed on weekdays (starting at 10 am on Monday) through mid-June, however gates will be closed through Memorial Day weekend and likely through the end of May.

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

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<sup>1</sup> 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.2.3<sup>3</sup> (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 (5/21/19)**

SWP		CVP	
<b>Exports (cfs)</b>			
Clifton Court Forebay	2,200	Jones Pumping Plant	1,000*
<b>Reservoir Releases (cfs)</b>			
Feather - Oroville	9,000	American - Nimbus	10,000
		Sacramento - Keswick	8,000
		Stanislaus – Goodwin	2,000
		Trinity - Lewiston	3,700**
<b>Reservoir Storage (in TAF)</b>			
San Luis (SWP)	743	San Luis (CVP)	754
Oroville	3,395	Shasta	4,395
New Melones	2,002	Folsom	929
<b>Delta Operations</b>			
DCC	Closed	Sacramento River at Freeport (cfs)	42,400
Outflow Index (cfs)	72,300	San Joaquin River at Vernalis (cfs)	12,900
E:I	6% (14-day avg.)	X2	~57 km

\* CVP exports scheduled to increase to 1,600 cfs on Thursday, 5/23 (just after the DOSS call the change was revised to 2,700 cfs).

\*\* Trinity releases are ramping down for ROD pulse flow schedule.

**Factors controlling Delta exports:**

- 5/7/19-5-14-19: 4:1 San Joaquin I:E ratio per NMFS BiOp RPA Action IV.2.1

Approximate OMR as of 5/18/19:

	USGS gauges (cfs)	Index (cfs)
Daily	2,200	2,100
5-day	1,900	1,800
14-day	1,900	1,700

Approximate OMR as of 5/20/19:

	Index (cfs)
Daily	2,500
5-day	2,000
14-day	1,800

#### Weather Forecast

More rain showers expected in the Sacramento Valley today with heavy snow in the mountains (6-12 inches with snow levels as low as 5,500 feet). Below average temperatures continue this week with dry conditions Wednesday to Saturday. Slight chance of showers on Sunday.

#### **Agenda Item 4.**

##### **Smelt Working Group**

The Smelt Working Group met on Monday, 5/20/19, at 10 am.

The Smelt Working Group (SWG) reviewed current Delta conditions, survey data, expected exports, and forecasted weather. River flows are on the rise this week with past weekend's storm, and OMR flow rates are expected to be more positive than +2,500 cfs with NMFS BiOp Action IV.2.1 San Joaquin River Inflow to Export (I:E) Ratio as the controlling factor. The SWG determined that the current overall risk of entrainment for Delta Smelt is very low, and that adults and larvae even in the South Delta would have a low 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 Tuesday, 5/28 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 <sup>A</sup>	Tisdale RST <sup>B</sup>	Knights Landing RST <sup>C</sup>	Beach Seines <sup>D</sup>	Sacramento Trawl <sup>D</sup>	Chippis Is. Midwater Trawl <sup>D</sup>	Mossdale Kodiak Trawl <sup>E</sup>
Sample Date	5/14-5/15	5/13-5/19	5/13-5/20	5/13, 5/15-5/17	5/12-5/14, 5/16-5/17	5/12-5/14, 5/16-5/17	5/13-5/18
Chinook							362
FR Chinook	216 juveniles	13	4	29	84	342	
SR Chinook	16 juveniles 6 smolts	1		1		8	
WR Chinook							
LFR Chinook							
Chinook (ad-clip)	26 FR	2 FR 1 SR	1 FR	2	9	99	
Steelhead (wild)	4					1	
Steelhead (ad-clip)				1			
Green Sturgeon	4						
Flows (avg. cfs)	1,123	10,877	10,332				
W. Temp. (avg. °F)	61.95	57.5	62.2				
Turbidity (avg. NTU)	25.70	24.3	21.62				

<sup>A</sup> Juvenile green sturgeon collected at GCID had fork lengths of 28mm and 27mm.

<sup>B</sup> Tisdale RST sampling period was from 5/13 at 10:00 am to 5/19 at 10:45 am.

<sup>C</sup> Knights Landing RST sampling period was from 5/13 at 11:00 am to 5/20 at 10:30 am.

<sup>D</sup> Data reported in the 5/12 to 5/18 DJFMP sampling summary.

<sup>E</sup> 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. Detections through 5/20/19 below.

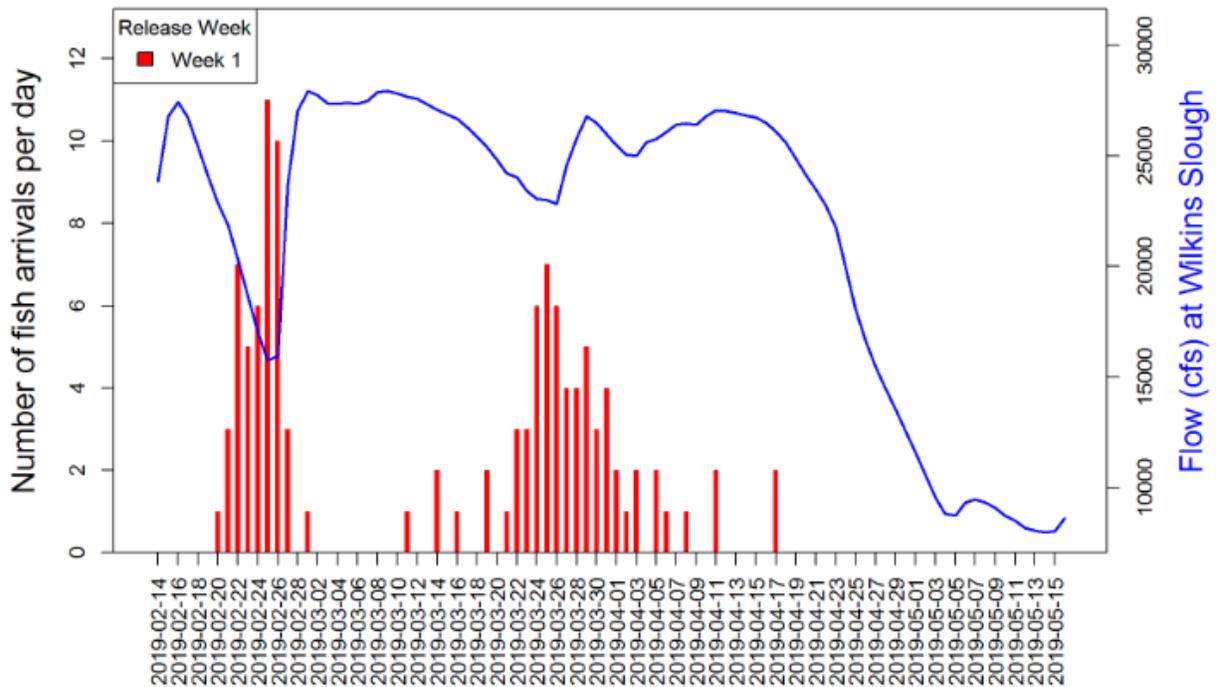
<b>Date of release</b>	<b>2/14/19</b>
<b># acoustically tagged (JSATS)</b>	<b>650 fish</b>
Butte City Bridge	195 (30%)
Tower Bridge	112 (17%)
Minimum survival to Tower Bridge	44%*
I-80/50 Bridge	127 (19.5%)
Georgiana Slough	20 (3%)
Detections at Benicia Bridge	163 (25%)

<b>Date of release</b>	<b>2/14/19</b>
Minimum survival to Benicia Bridge	26%

\* Minimum survival estimate assumes some fish may have taken Yolo Bypass route.

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

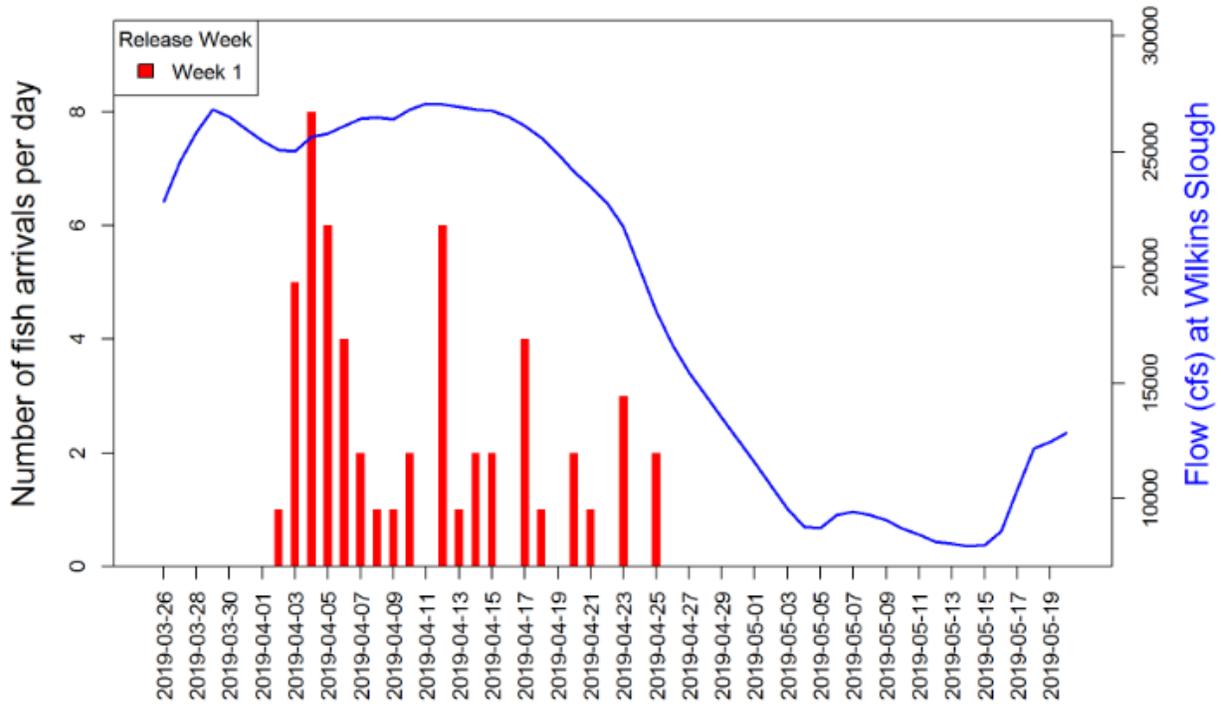
The Livingston Stone National Fish Hatchery released acoustic-tagged (JSATS) winter-run Chinook salmon from brood year 2018. The following table provides the detection frequencies downstream of the release site. Detections through 5/20/19 below.

<b>Date of release</b>	<b>3/26/19</b>
<b># acoustically tagged (JSATS)</b>	<b>500 fish</b>
Butte City Bridge	31 (6%)
Tower Bridge	54 (11%)
Minimum survival to Tower Bridge	23%*
I-80/50 Bridge	81 (16%)
Georgiana Slough	22 (4%)
Detections at Benicia Bridge	70 (14%)
Minimum survival to Benicia Bridge	14%

\* Minimum survival estimate assumes some fish may have taken Yolo Bypass route.

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**

Cook (DWR) provided Feather River RST data for two RST sites on the Feather River. At the Eye Side Channel from 5/14 to 5/16, 17 fall-run Chinook salmon, 1 late-fall-run Chinook salmon, and 1 wild steelhead were observed. Flows were an average 3,500 cfs, water temperature 53°F, and turbidity 2.6 NTU. At the Herringer site from 5/14 to 5/17, 9 fall-run Chinook salmon and 2 ad-clipped spring-run Chinook salmon were observed. Flows were an average 7,750 cfs, water temperature 55°F, and turbidity 3.2 NTU.

**Agenda Item 6.**

**Fish Monitoring: Salvage**

Damon (CDFW) provided a salvage summary for the period of 5/13-5/19.

Chinook salmon

Unclipped (wild origin) Chinook: Weekly salvage of wild origin Chinook salmon included 386 spring-run and 1,404 fall-run sized fish (estimated from subsample). Total WY19 salvage of wild-origin Chinook salmon is 7,727 fish.

Clipped (hatchery origin) Chinook: No ad-clipped fish were observed this week in salvage. Total WY19 salvage of ad-clipped Chinook is 1,699 fish.

Steelhead

Unclipped steelhead: 8 fish salvaged for a season total to date of 414.

Clipped steelhead: 0 fish salvaged for a season total to date of 1,831.

Operations:

No reduced counts were reported for the state and federal facilities.

The state facility shut down for annual maintenance on 5/13. Export and salvage resumed at 0800 hours on 5/18.

The federal facility announced a planned maintenance procedure for 4-8 hours on 5/16 but canceled due to weather. The maintenance was rescheduled for 5/22, weather permitting.

## DOSS Weekly Salvage Update

Reporting Period: May 13-May 19, 2019

Prepared by Bob Fujimura on May 20, 2019 15:37

Preliminary Results -Subject to Revision

Criteria	13-May	14-May	15-May	16-May	17-May	18-May	19-May	Trend	
<b>Loss Densities</b>									
Wild older juvenile CS	0	0	0	0	0	0	0	→	0.00
Wild steelhead	0.70	0	0	0	0.53	0	0	↘	0.17
<b>Exports</b>									
SWP daily export	0	0	0	0	0	2,807	3,118	↘	846
CVP daily export	3,912	3,927	5,201	5,192	5,176	1,963	1,961	↗	3,905
SWP reduced counts	0	0	0	0	0	0	0		
CVP reduced counts	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;

Category	Weekly Total			Season Total	
	Salvage	Loss	Trend	Salvage	Loss
<b>Wild</b>					
Winter Run	0	0	→	184	537
Spring Run	386	373	↘	1,680	4,648
Late Fall Run	0	0	→	3	13
Fall Run	1,404	1,036	↘	5,856	6,934
Unclassified	0	0	→	4	NC
<b>Total</b>	<b>1,790</b>	<b>1,409</b>		<b>7,727</b>	<b>12,132</b>
<b>Hatchery</b>					
Winter Run	0	0	→	87	366
Spring Run	0	0	→	1,250	4,399
Late Fall Run	0	0	→	354	776
Fall Run	0	0	→	4	3
Unclassified	0	0	→	4	NC
<b>Total</b>	<b>0</b>	<b>0</b>		<b>1,699</b>	<b>5,543</b>

Trend = weekly loss per race; Salvage = estimated number of fish collected by the CVP and SWP fish protective facilities per unit of time

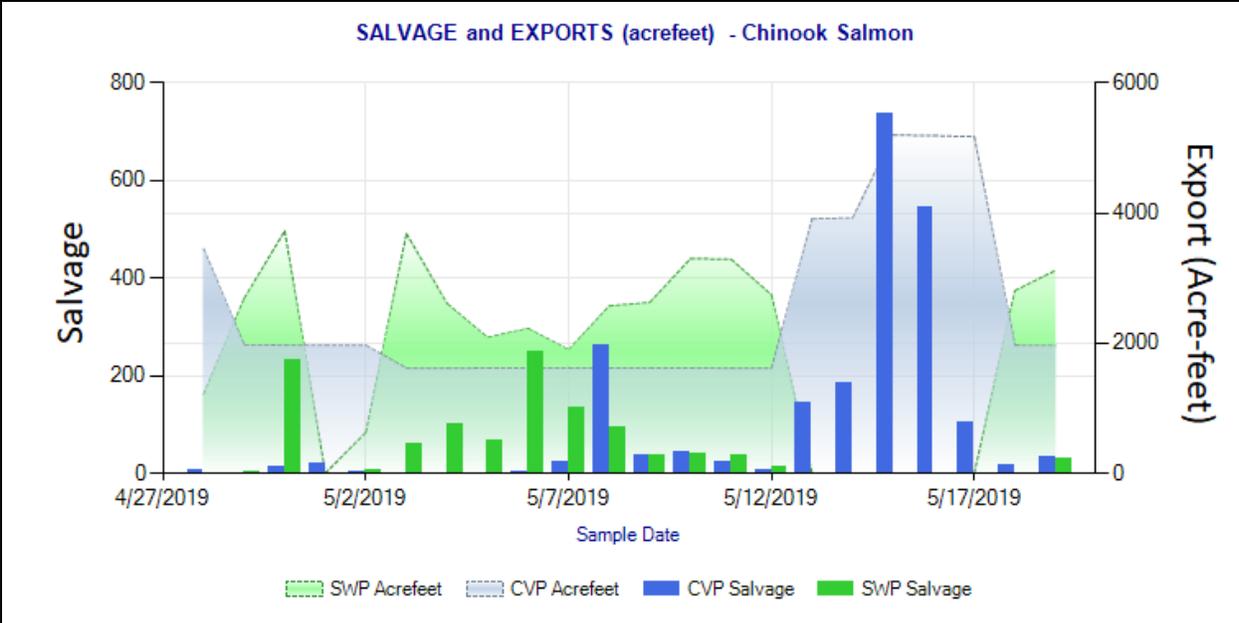
NC = cannot be calculated; hatchery salmon salvage and loss estimates have been corrected using CWT readings when available

## Steelhead Weekly/Season Salvage and Loss

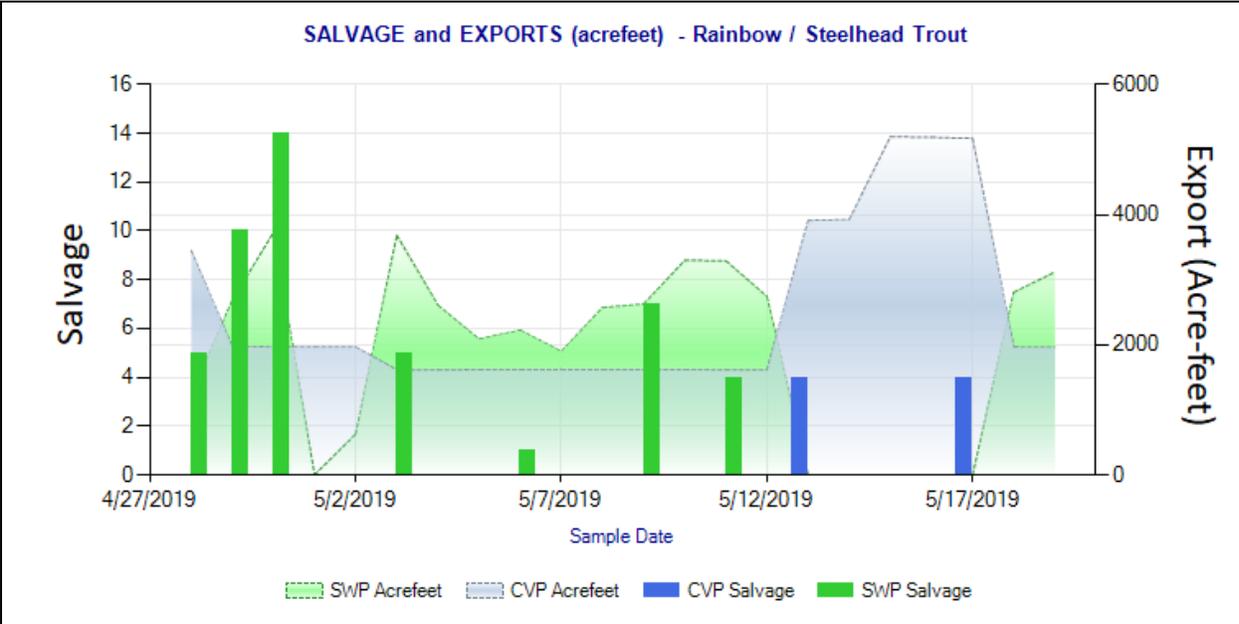
Combined salvage and loss for both CVP and SWP fish facilities

Category	Weekly Total			Season Total	
	Salvage	Loss	Trend	Salvage	Loss
Wild	8	5	↘	414	1,373
Hatchery	0	0	↘	1,831	5,732
<b>Total</b>	<b>8</b>	<b>5</b>		<b>2,245</b>	<b>7,105</b>

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



**Fig 1. Chinook Salmon Salvage** (values = number of fish salvaged) and export (acre-feet) at state/federal salvage facilities. All CS races/origins combined. Dates: 4/28 - 5/19/2019.



**Figure 2. Salvage of clipped & unclipped Steelhead** for state & federal salvage facilities. Dates: 4/28 – 5/19/2019.

CONFIRMED HATCHERY (ADIPOSE-FIN CLIPPED) CHINOOK SALMON LOSS AT THE SWP & CVP DELTA FISH FACILITIES as of 5/20/19

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 Stage Trigg	Date of First Loss <sup>4</sup>	Date of Last Loss <sup>4</sup>
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 5/20/2019.

<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.

**Agenda Item 7.**  
**Hatchery Releases**

On 5/17/19, the California Department of Fish and Wildlife (CDFW) released approximately 400,000 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 four groups of 100% Coded Wire Tagged (CWT) and adipose fin clipped fish.

On 5/19/19 and 5/20/19, CDFW released approximately 1.3 million brood year 2018 Chinook from Feather River Hatchery into the San Pablo Bay at the Mare Island Net Pens. This release included 25% marked (adipose fin clip) and CWT fish.

On 5/21/19, CDFW will release approximately 120,000 brood year 2018 fall-run Chinook salmon from Mokelumne River Hatchery into the Monterey Trout and Salmon Acclimation Net Pens in Santa Cruz Harbor. This release will be 100% 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.

<b>Location</b>	<b>Yet to Enter Delta (Upstream of Knights Landing)</b>	<b>In the Delta</b>	<b>Exited the Delta (Past Chipps Island)</b>
<i>Young-of-year (YOY) winter-run Chinook salmon</i>	0-1% (Last week: 0-1%)	0-1% (Last week: 0-2%)	98-100% (Last week: 98-100%)
<i>Young-of-year (YOY) spring-run Chinook salmon</i>	0-5% (Last week: 5%)	5% (Last week: 5-10%)	90-95% (Last week: 85-90%)
<i>Hatchery winter-run Chinook salmon</i>	0-1% (Last week: 0-1%)	0-1% (Last week: 0-1%)	98-100% (Last week: 98-100%)

**Rationale for distribution**

Wild winter-run Chinook:

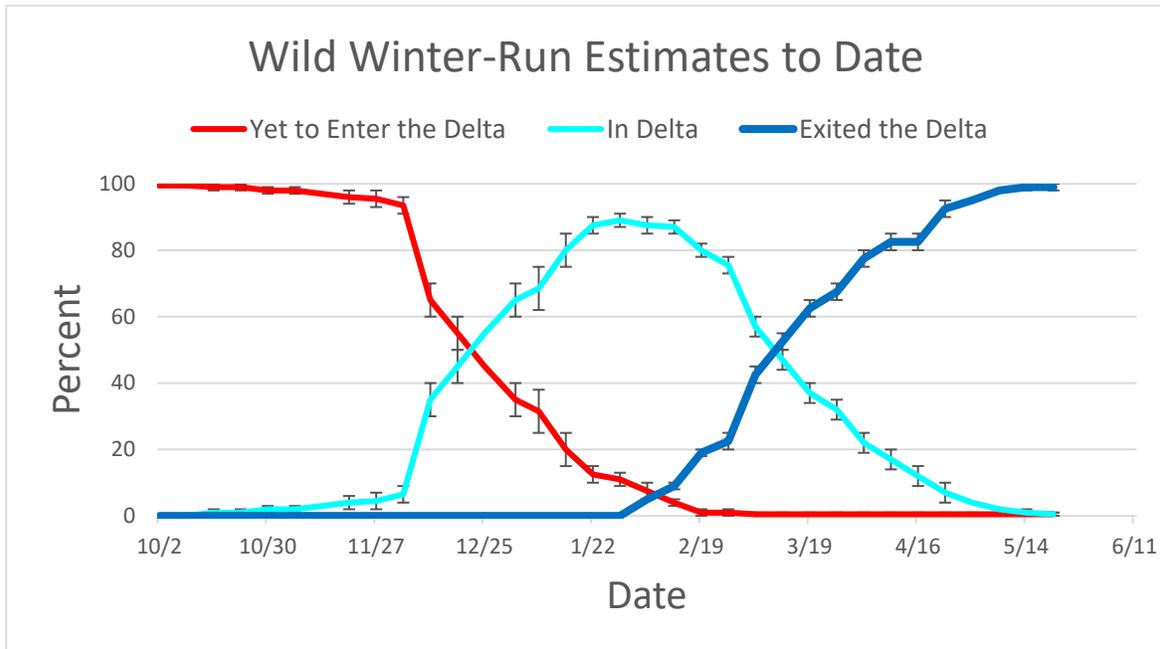
No wild winter-run Chinook salmon were observed at monitoring locations this week. Since none were observed, and due to life history and seasonal timing, DOSS estimates that 98-100 percent of wild winter-run Chinook salmon population has exited the Delta past Chipps Island, with few fish remain upstream of Knights Landing.

Wild spring-run Chinook:

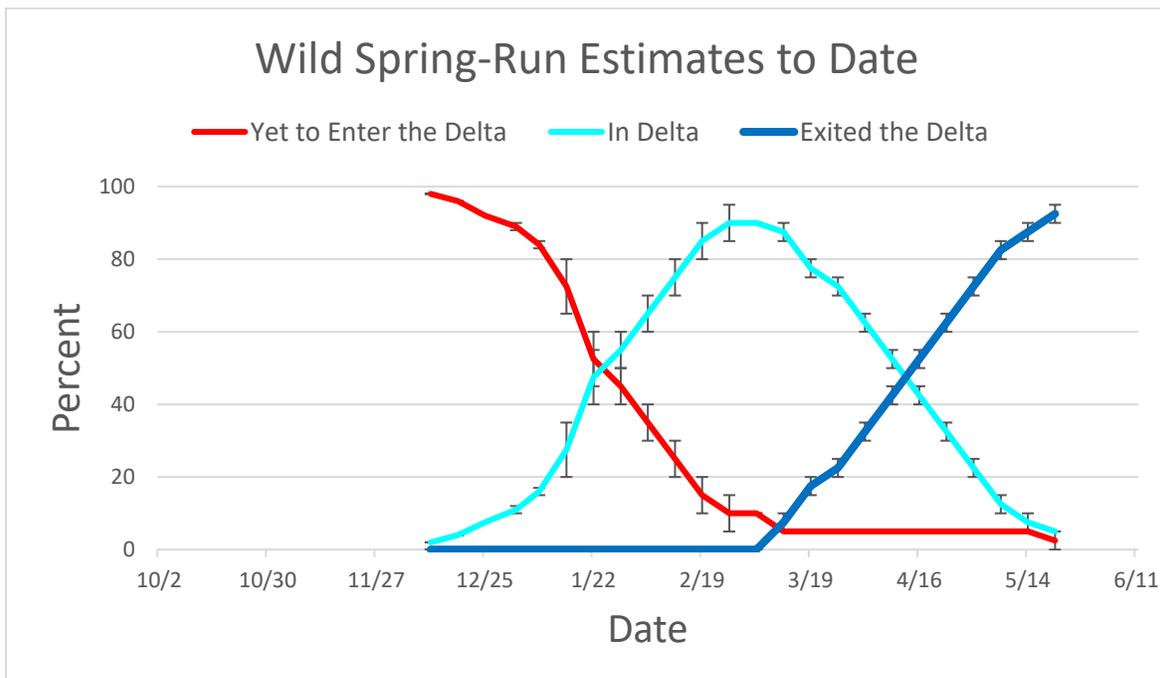
22 wild spring-run Chinook salmon were observed at GCID, 1 at Tisdale, 1 at the beach seines, and 8 at Chipps Island trawl. Since fish were observed at monitoring locations, and due to life history and seasonal timing, DOSS estimates that an additional 5 percent of the population has exited the Delta past Chipps Island and 0-5 percent remain upstream of Knights Landing.

Hatchery winter-run Chinook:

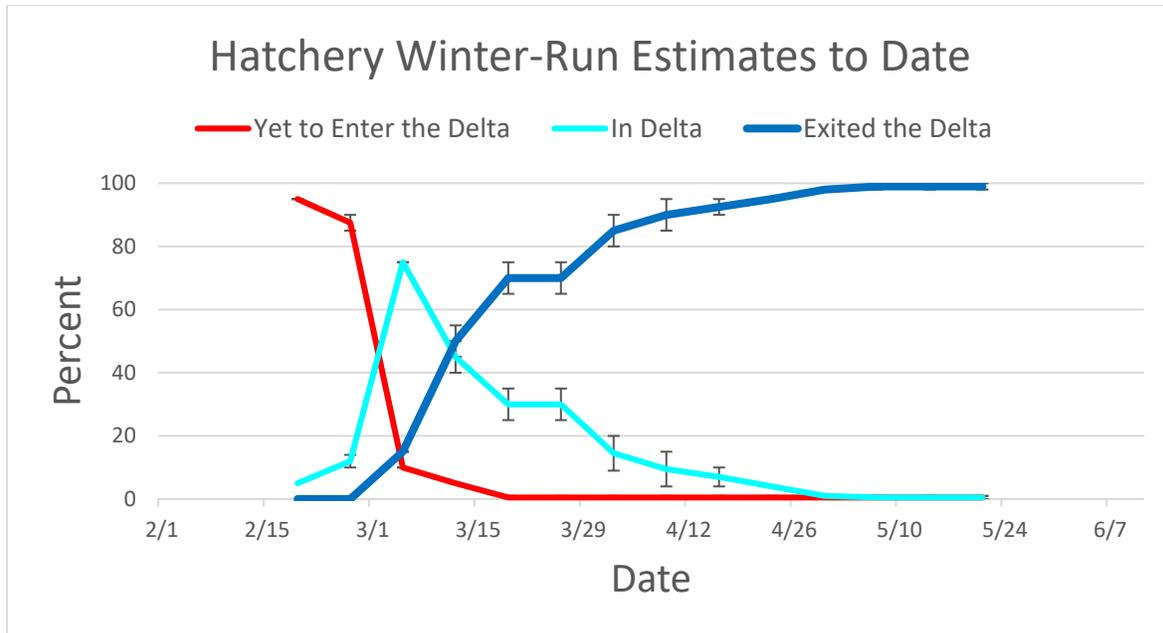
195 acoustically-tagged (AT) hatchery winter-run have been detected at Butte City Bridge, 112 at Tower Bridge, 127 at I80-50, and 163 at Benicia Bridge. No additional fish were detected at receivers in the past week. Since no fish were detected, DOSS estimates the majority of the group has migrated through the Delta past Chipps 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-MEDIUM**
  - Approximately 0-1% of winter run juveniles estimated to be in the Delta.
  - Approximately 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 (~42,400 cfs) which result in a muting of tidal effects around Georgiana Slough and Threemile Slough. Flows are expected to remain above 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-MEDIUM**
  - 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 medium for San Joaquin steelhead and low for Sacramento listed fish.
  - 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 cfs<sup>2</sup>: MEDIUM-HIGH
  - OMR -7,500 cfs<sup>2</sup>: HIGH
  - OMR -9,000 cfs<sup>2</sup>: HIGH
- **Overall Entrainment Risk:**
  - OMR -2,500 cfs: LOW-MEDIUM

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

- OMR -3,500 cfs: LOW-MEDIUM
- OMR -5,000 cfs: MEDIUM
- OMR -6,250 cfs<sup>4</sup>: MEDIUM-HIGH
- OMR -7,500 cfs<sup>4</sup>: HIGH
- OMR -9,000 cfs<sup>4</sup>: 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.**

**Next Meeting:** The next DOSS conference call will be on **5/28/19 at 9am.**