

Delta Operations for Salmonids and Sturgeon (DOSS) Group
Conference call: 2/19/2019 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: http://www.westcoast.fisheries.noaa.gov/central_valley/water_operations/doss.html.

CDFW: Duane Linander, Ken Kundargi, Jason Julienne, Kyle Griffiths

DWR: Bryant Giorgi, Dan Yamanaka

NMFS: Kristin Begun

Reclamation: Tom Patton, Elissa Buttermore

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: www.baydeltalive.com/djfmj)
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 February:

Action IV.1.1 (Alerts that indicate the Delta Cross Channel (DCC) gate operations may be triggered soon)¹:

- Starting on 10/1, the First Alert is triggered if either the first component (>95 cfs flow threshold) or second component (>50% change in mean daily flow) has been exceeded at either the Deer Creek gage at Vina (DCV), or the Mill Creek gage at Los Molinos

¹ For details, see pages 60-61 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. Note that in October 2014, NMFS approved a modification of the first component of the first alert to a 95 cfs mean daily flow threshold in either Mill Creek or Deer Creek in lieu of operating the Mill and Deer Creek rotary screw traps.

(MLM). The First Alert was triggered every day this past week. See table below for details.

Date	Mill Creek (MLM)		Deer Creek (DCV)	
	mean daily flow (cfs)	change in mean daily flow	mean daily flow (cfs)	change in mean daily flow
2/12/2019	290	-6%	318	-8%
2/13/2019	2,600	797%	1,620	410%
2/14/2019	5,126	97%	5,407	234%
2/15/2019	1,709	-67%	2,229	-59%
2/16/2019	1,000	-41%	1,343	-40%
2/17/2019	730	-27%	976	-27%
2/18/2019	570	-22%	778	-20%

- Second Alert (triggered only if both Knights Landing water temperatures are <56.3°F and Wilkins Slough flows are >7,500 cfs). The Second Alert was triggered every day this past week. See table below for details.

Date	Wilkins Slough (WLK)	Knights Landing (KL)
	Mean Daily Flow (cfs)	Daily water temperature (°F)
2/12/2019	15,948	47.4
2/13/2019	15,604	47.2
2/14/2019	23,854	47.4
2/15/2019	26,816	44.0
2/16/2019	27,444	44.6
2/17/2019	26,751	45.1
2/18/2019	25,384	46.1

Action IV.1.2² (DCC gate operations):

- DCC gates will remain closed per operations described in RPA IV.1.2 starting 12/1/18.

Action IV.2.3³ (OMR Management):

- Implementation of this action in WY 2019 began on 1/1/19, 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.
- No salvage-based triggers that would require OMR to be more positive than -5,000 cfs were exceeded this week.

² 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

Action IV.3³ (Reduce likelihood of entrainment or salvage at the export facilities, including an alert that indicates that export operations may need to be altered):

- The Third Alert [November 1-February 28 Knights Landing Catch Index (KLCI) or Sacramento Catch Index (SCI) >10] was not triggered this past week.
- Since the action went into effect on 11/1/18, no salvage-based triggers that would require export reduction have been exceeded.

Agenda Item 3.

Current Operations (2/19/19)

SWP		CVP	
Exports (cfs)			
Clifton Court Forebay	7,200	Jones Pumping Plant	4,100
Reservoir Releases (cfs)			
Feather - Oroville	1,750	American - Nimbus	13,000
		Sacramento - Keswick	3,250
		Stanislaus – Goodwin	1,500
		Trinity - Lewiston	300
Reservoir Storage (in TAF)			
San Luis (SWP)	1,017	San Luis (CVP)	881
Oroville	1,862	Shasta	3,368
New Melones	1,993	Folsom	630
Delta Operations			
DCC	Closed	Sacramento River at Freeport (cfs)	75,200
Outflow Index (cfs)	~161,000	San Joaquin River at Vernalis (cfs)	11,600
E:I	12% (14-day avg.)	X2	<56 km

Factors controlling Delta exports:

- 2/12/19: -3,500 cfs OMR limit per NMFS BiOp RPA Action IV.2.3
- 2/13/19-2/19/19: -5,000 cfs OMR limit per NMFS BiOp RPA Action IV.2.3

Approximate OMR as of 2/16/19:

	USGS gauges (cfs)	Index (cfs)
Daily	-3,600	-4,800
5-day	-4,600	-4,700
14-day	-4,000	-4,400

³ For details, see pages 79-80 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

Approximate OMR as of 2/18/19:

	Index (cfs)
Daily	-4,700
5-day	-4,900
14-day	-4,400

Weather Forecast

The forecast for the Sacramento area predicts cooler temperatures with a chance of light precipitation on Wednesday and Thursday, with another potential for light precipitation over the weekend.

Agenda Item 4.

Smelt Working Group

The Smelt Working Group did not meet on Monday due to the holiday. The group will meet today, 2/19/19, at 10 am.

The following preliminary summary was provided after the DOSS call:

The Smelt Working Group (SWG) reviewed current Delta conditions, survey data, expected exports, and forecasted weather. 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 trigger for the start of Action 3. Even with increased rivers flows as a result of last week's storm, the SWG expressed concern over the higher turbidity levels around the OMR corridor, determining that the risk for Delta Smelt entrainment is higher this week than it was last week. The SWG advised that the risk of entrainment for Delta Smelt would be low for OMR flows of between -1,250 to -2,000 cfs, medium for flows between -2,000 to -3,500 cfs, and high for flows between -3,500 to -5,000 cfs.

The Service notified Reclamation on 2/6 that Action 3 had been implemented for the protection of larval and juvenile Delta Smelt, which 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, 2/25/19 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 ^D
Sample Date	2/12-2/13	2/8-2/15	2/11-2/18	2/11-2/14	2/10-2/12, 2/15-2/16	2/10-2/12, 2/15	2/11, 2/13, 2/15
FR Chinook	3 juveniles	12	115	440	240		16
SR Chinook	2 juveniles	1	4	13	2		
WR Chinook	1 smolt			1	5	1	1
LFR Chinook	1 smolt						
Chinook (ad-clip)				1		1	2
Steelhead (wild)		3			3		
Steelhead (ad-clip)	3	1	2	15	27	10	
Green Sturgeon							
Flows (avg. cfs)	1,542.5	23,397	23,229				
W. Temp. (avg. °F)	49.80	56	46.0				
Turbidity (avg. NTU)	160.4	90.4	122.07				

^A On 2/13 a tree was jammed in the RST cone on arrival. The RST was removed from the bypass channel due to predicted high flows and heavy debris.

^B Tisdale RST sampling period was from 2/8 at 9:30 am to 2/15 at 9:30 am. RST trap fishing effort at 50%.

^C Knights Landing RST sampling period was from 2/11 at 10:15 am to 2/18 at 11:45 am. RST trap fishing effort reduced to 50% on 2/13 through 2/18.

^D Data reported in the 2/10 to 2/16 DJFMP sampling summary. DatCall data received after the DOSS call due to the Monday holiday.

Enhanced Delta Smelt Monitoring (EDSM):

Eight fall-run Chinook salmon, 1 winter-run Chinook, 1 ad-clipped Chinook, 2 wild steelhead, and 5 clipped steelhead were observed in the EDSM this past week.

Red Bluff Diversion Dam (RBDD)

USFWS biweekly report (1/29/19-2/11/19) 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 (90% CI)
Winter-run Chinook (BY2018)	923	1,143,714 (734,744-1,552,683)
Spring-run Chinook (BY2018)	2,338	48,791 (-6,353-103,935)

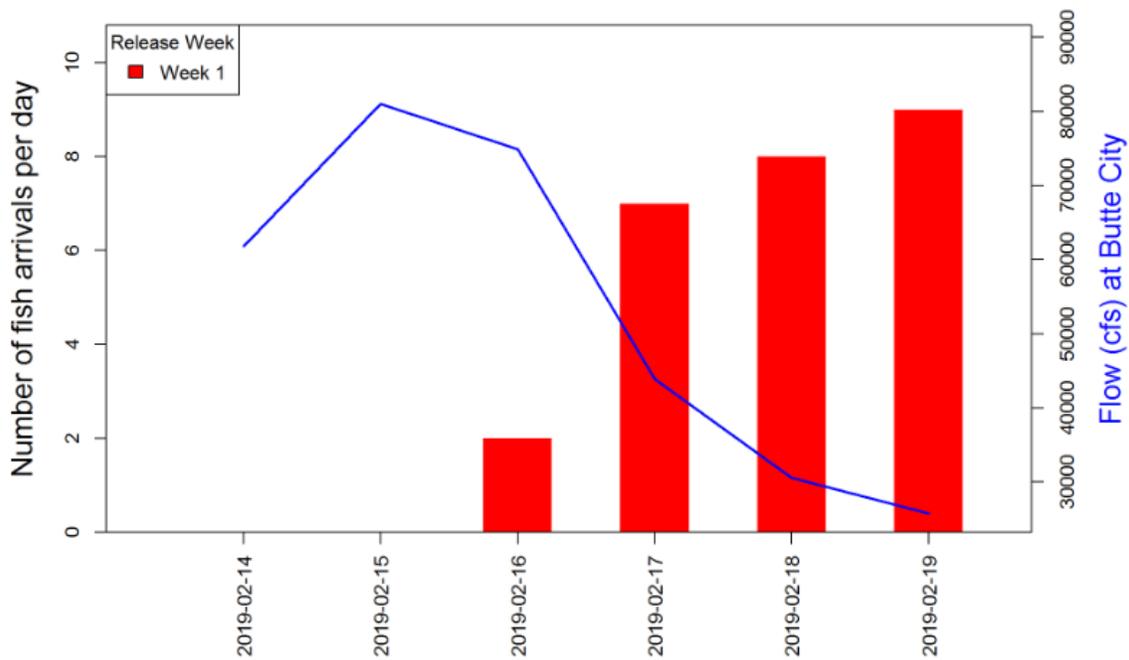
Tracking of acoustic-tagged hatchery winter-run Chinook salmon

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.

Date of release	2/14/19
# acoustically tagged (JSATS)	649
Butte City	26 (4%)
Detections at Tower Bridge	0 (0%)
Detections at Benicia Bridge	0 (0%)

https://calfishtrack.github.io/real-time/pageLSWR_2019.html

Detections at Butte City Bridge versus Sacramento River flows at Butte City



Stanislaus River weir

Monitoring at the weir near Riverbank (upstream passage of adult salmonids) occurred from 9/5/18 to 2/4/19. Weir sampling has concluded for the season due to high river flows. The cumulative net upstream passage through 2/4/19 was 4,779 Chinook salmon (26% ad-clipped, indicating a verifiable hatchery origin; hatcheries ad-clip 25% of their production fall-run Chinook salmon), and 25 steelhead (data provided by FISHBIO). Sixteen of the steelhead passing the weir were greater than 16 inches, 6 of which were ad-clipped.

Acoustic-tagged green sturgeon

CDFW has acoustic-tagged 40 juvenile sturgeon (35 green sturgeon and 5 white sturgeon) captured between 7/24/18 and 12/27/18 near Sherman Lake on the Sacramento River (western Delta). Fork lengths of these fish range between 39 cm and 94 cm. 31

individuals were detected (near the Sherman Lake tagging location) between 8/14/18 and 1/3/19.

Agenda Item 6.

Fish Monitoring: Salvage

Griffiths (CDFW) provided a salvage summary for the period of 2/11-2/17.

Chinook salmon

Unclipped (wild origin) winter-run-sized Chinook: Weekly salvage of wild origin Chinook salmon was 462 individuals (estimated from subsample). Total WY19 salvage of wild-origin Chinook salmon is 1,806 fish. No loss density triggers were exceeded during this period.

Clipped (hatchery origin) winter-run-sized Chinook: Ad-clipped Chinook salmon were identified by CWT as originating from the San Joaquin River Restoration Program Salmon Conservation and Research Facility (SCARF), as well as from the Coleman National Fish Hatchery spring surrogate release group #3. Weekly salvage of clipped (hatchery origin) Chinook was 45 individuals, for a WY19 total of 448.

Steelhead

Unclipped steelhead: 55 fish salvaged for a season total to date of 134.

Clipped steelhead: 426 fish salvaged for a season total to date of 924.

Sturgeon

No sturgeon were salvaged this week.

Operations

The state facility reduced count duration below 25% of salvage time because of high fish numbers on 2/13. The federal facility reported 60 minutes of unscreened exports due to maintenance of the secondary screen on the 2/13.

DOSS Weekly Salvage Update

Reporting Period: February 11-February 17, 2019
 Prepared by Kyle Griffiths on February 19, 2019 15:46
 Preliminary Results -Subject to Revision

Criteria	11-Feb	12-Feb	13-Feb	14-Feb	15-Feb	16-Feb	17-Feb	Trend	
Loss Densities									
Wild older juvenile CS	0	1.39	1.03	1.01	1.11	1.04	1.23	↗	0.97
Wild steelhead	1.65	1.61	2.78	0.43	2.95	1.03	0	↗	1.49
Exports									
SWP daily export	5,134	5,414	8,951	7,837	9,227	8,679	10,468	↗	7,959
CVP daily export	7,000	7,022	8,555	8,648	8,389	8,186	8,183	↗	7,998
SWP reduced counts	0	0	8%	0	0	0	0		
CVP reduced counts	0	0	4%	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
Wild					
Winter Run	36	112	↗	94	204
Spring Run	0	0	↗	0	0
Late Fall Run	0	0	↗	3	13
Fall Run	426	451	↗	1,709	1,400
Unclassified	0	0	↗	0	0
Total	462	563		1,806	1,617
Hatchery					
Winter Run	12	51	↗	16	54
Spring Run	25	33	↗	86	104
Late Fall Run	4	3	↗	338	705
Fall Run	0	0	↗	4	3
Unclassified	4	NC		4	NC
Total	45	87		448	866

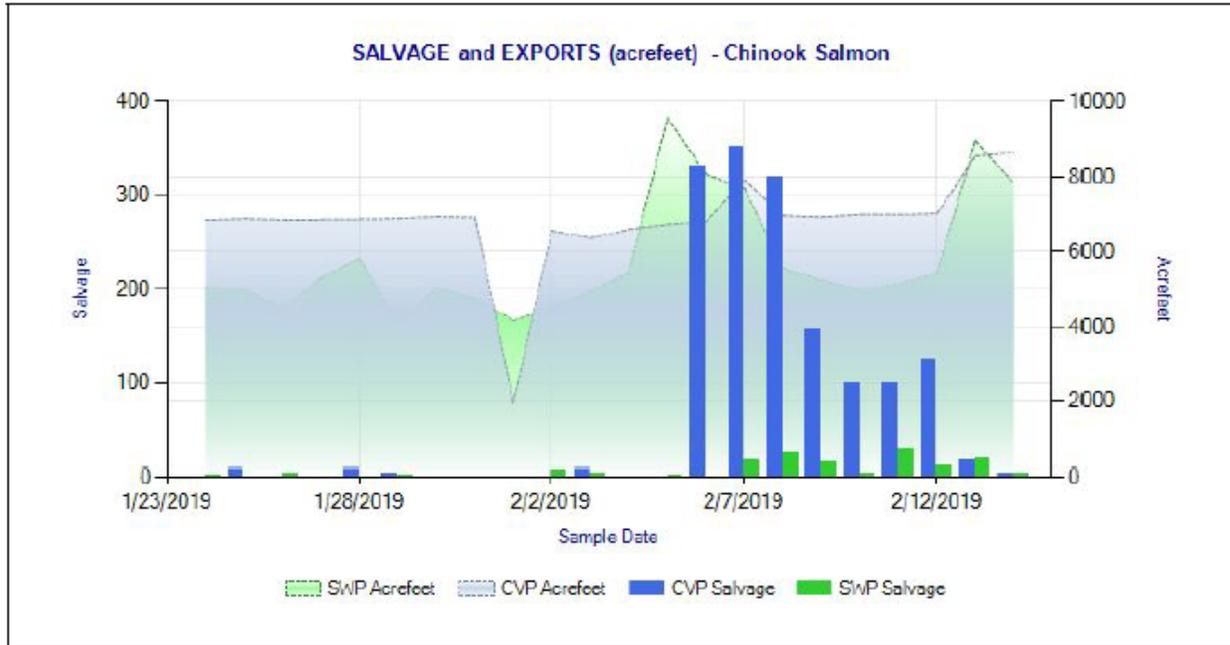
Trend = weekly loss per race; Salvage = estimated number of fish collected by the CVP and SWP fish protective facilities per unit of time
 NC = cannot be calculated; hatchery salmon salvage and loss estimates have been corrected using CWT readings when available

Steelhead Weekly/Season Salvage and Loss

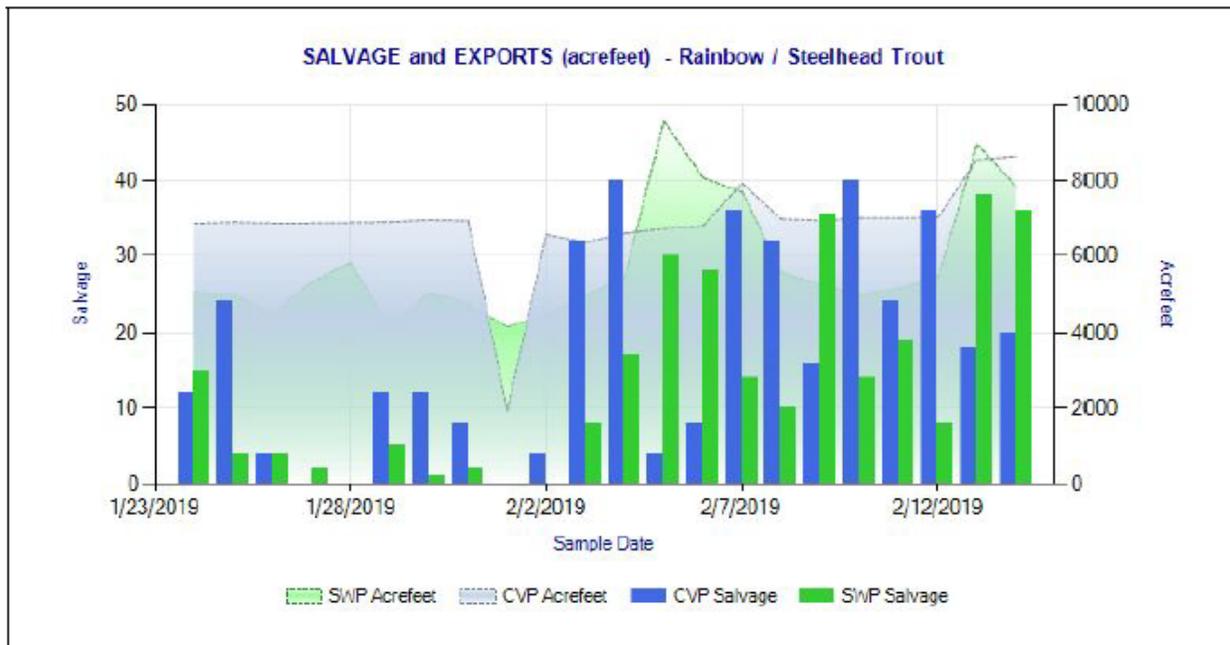
Combined salvage and loss for both CVP and SWP fish facilities

Category	Weekly Total			Season Total	
	Salvage	Loss	Trend	Salvage	Loss
Wild	55	165	↗	134	358
Hatchery	426	1,239	↗	924	2,269
Total	481	1,404		1,058	2,627

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



Chinook Salmon salvage (all races & origins combined) 1/24-2/14/2019.



Steelhead Salmon salvage (all races & origins combined) 1/24-2/14/2019.

CONFIRMED HATCHERY (ADIPOSE-FIN CLIPPED) CHINOOK SALMON LOSS AT THE SWP & CVP DELTA FISH FACILITIES as of 2/12/19

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	49.68	61,277	n/a	0.081	n/a	0.5%	12/27/2018	1/21/2019
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	419.77	73,952	n/a	0.568	n/a	0.5%	1/16/2019	2/10/2019

SWP and CVP adipose-fin clipped Chinook lost from 10/1/2018 through 2/12/2019.

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

Revised: On 2/14/2019, the U.S. Fish and Wildlife Service (USFWS) released approximately 225,017 brood year 2018 winter-run Chinook salmon from the Livingston Stone National Fish Hatchery into the Sacramento River at Caldwell Park Boat Ramp in Redding, California. These fish were approximately 85 mm fork length and were 100% coded-wire tagged and marked with an adipose-fin clip. Approximately 650 fish were acoustic-tagged.

On 2/6/19-2/19/19, the California Department of Fish and Wildlife (CDFW) released approximately 465,000 brood year 2018 steelhead from the Feather River Fish Hatchery into the Feather River at Boyd’s pump. This release included 100% marked (adipose fin clip) 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 Chipps Island)
<i>Young-of-year (YOY) winter-run Chinook salmon</i>	0-2% (Last week: 3-5%)	78-82% (Last week: 85-89%)	18-20% (Last week: 8-10%)
<i>Young-of-year (YOY) spring-run Chinook salmon</i>	10-20% (Last week: 20-30%)	80-90% (Last week: 70-80%)	0% (Last week: 0%)
<i>Hatchery winter-run Chinook salmon</i>	95%	5%	0%

Rationale for distribution

Wild winter-run Chinook:

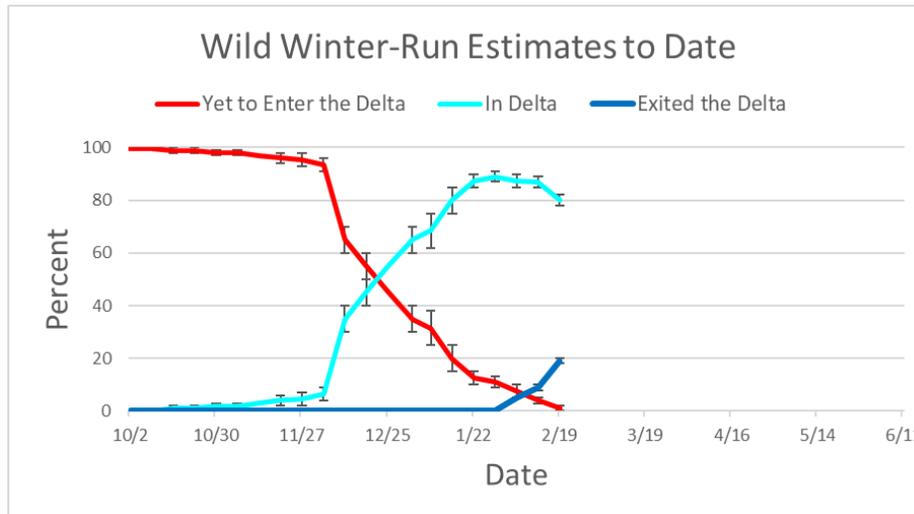
One wild winter-run Chinook salmon was observed at the GCID RST, 1 at the beach seines, 5 at Sacramento trawl, 1 at Chipps Island trawl, and 1 at Mossdale (according to baydeltalive.com since DatCall data were received after the DOSS call). Since some fish were observed at monitoring locations, outflows were high this past week, and due to seasonal timing, DOSS estimates that approximately 10 percent of wild winter-run Chinook salmon population has exited the Delta past Chipps Island this past week.

Wild spring-run Chinook:

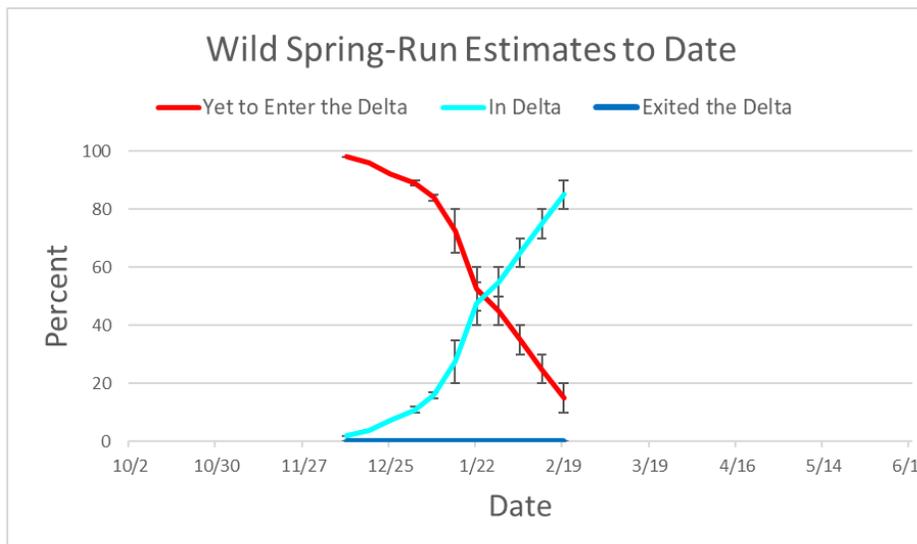
Two wild spring-run Chinook salmon were observed GCID, 1 at Tisdale, 4 at Knights Landing, 13 at the beach seines, and 2 at Sacramento trawl (according to baydeltalive.com since DatCall data were received after the DOSS call). Since outflows were high this past week and several more fish were observed at monitoring locations, DOSS estimates that an additional 10 percent of the population has entered the Delta this past week. Since no spring-run were observed at Chipps Island trawl, no wild spring-run Chinook salmon are estimated to have exited the Delta.

Hatchery winter-run Chinook:

Based on real-time monitoring of the acoustically-tagged (AT) hatchery winter-run, 4 percent of the release group has reached Butte City. DOSS estimated that 5 percent of the release group has entered the Delta based on observation of AT fish, and assuming not all fish passed the receivers since weirs were overtopping this week.



WY 2019 wild winter-run distribution estimates to date.



WY 2019 wild spring-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: HIGH**
 - Approximately 80% of winter run juveniles estimated to be in the Delta.
 - Approximately 80-90% 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 (~75,000 cfs) which increases the 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.
 - With Fremont Weir overflowing this week, some fish are expected to bypass export facilities.
- **Overall Entrainment Risk: MEDIUM**
 - Flows at San Joaquin River are expected to remain high over the next week increasing exports and the risk of entrainment, especially for steelhead. Inflows from the Sacramento and San Joaquin rivers are expected to remain high over the next week which balances exports to remain in the Medium entrainment risk.

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

- **Exposure Risk: MEDIUM**
 - Listed Chinook salmon and steelhead have been salvaged and observed in monitoring sites in the Delta.

- Exports are going up but are not substantial increases in light of extra river inflow.
- **OMR/Export Risk:**
 - OMR -2,500 cfs: LOW
 - OMR -3,500 cfs: LOW
 - OMR -5,000 cfs: MEDIUM
 - OMR -6,250 cfs⁴: MEDIUM-HIGH
 - OMR -7,500 cfs⁴: HIGH
 - OMR -9,000 cfs⁴: HIGH
- **Overall Entrainment Risk:**
 - OMR -2,500 cfs: LOW-MEDIUM
 - OMR -3,500 cfs: LOW-MEDIUM
 - OMR -5,000 cfs: MEDIUM
 - OMR -6,250 cfs⁴: MEDIUM-HIGH
 - OMR -7,500 cfs⁴: HIGH
 - OMR -9,000 cfs⁴: 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 **2/26/19 at 9am.**

⁴By request of management, DOSS also assessed risks at an OMR flow more negative than -5,000 cfs.