

Delta Operations for Salmonids and Sturgeon (DOSS) Group
Conference call: 2/5/2019 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 Kyle Griffiths

DWR: Bryant Giorgi, Farida Islam, Dan Yamanaka, Reza Shahcheraghi, Ming-Yen Tu

NMFS: Jeff Stuart, 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: www.baydeltalive.com/djtmp)
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 January/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
1/29/19	248	-5%	293	-7%
1/30/19	242	-2%	282	-4%
1/31/19	237	-2%	268	-5%
2/1/19	238	0%	262	-2%
2/2/19	1,283	439%	1,211	363%
2/3/19	1,199	-7%	1,231	2%
2/4/19	1,927	61%	1,876	52%

- 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)
1/29/19	12,513	50.8
1/30/19	11,791	51.7
1/31/19	11,267	52.5
2/1/19	10,874	53.2
2/2/19	10,762	53.5
2/3/19	19,677	53.2
2/4/19	25,635	51.9

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.
- Until the official JPE letter is issued, the threshold for the minimum fish density threshold trigger described in Action IV.2.3 will be 2.5 fish /TAF (first trigger) and 5.1 fish/TAF (second trigger).

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 (2/5/19)

SWP		CVP	
Exports (cfs)			
Clifton Court Forebay	4,300	Jones Pumping Plant	3,500*
Reservoir Releases (cfs)			
Feather - Oroville	1,750	American - Nimbus	1,750**
		Sacramento - Keswick	3,250
		Stanislaus – Goodwin	925***
		Trinity - Lewiston	300
Reservoir Storage (in TAF)			
San Luis (SWP)	949	San Luis (CVP)	824
Oroville	1,488	Shasta	3,004
New Melones	1,891	Folsom	576
Delta Operations			
DCC	Closed	Sacramento River at Freeport (cfs)	36,400
Outflow Index (cfs)	~30,000	San Joaquin River at Vernalis (cfs)	4,800
E:I	14% (14-day avg.)	X2	>68 km

* CVP exports have been at 3,500 cfs since Saturday (2/2) and are scheduled to increase to 4,000 cfs on Thursday (2/7) with the expected increase in flow in the San Joaquin River.

** Nimbus releases will increase to 4,000 cfs by Thursday (2/7).

*** Goodwin releases are scheduled to decrease every day, down to 200 cfs on 2/15.

Factors controlling Delta exports:

- 1/29/19-2/5/19: -5,000 cfs OMR limit per NMFS BiOp RPA Action IV.2.3

Approximate OMR as of 2/2/19:

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

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 2/4/19:

	Index (cfs)
Daily	-4,800
5-day	-4,300
14-day	-4,700

Weather Forecast

The forecast this week predicts colder temperatures and scattered showers this morning southeast of Chico, with low snow levels down to the foothills and northern Sacramento valley floor. More precipitation is expected on 2/9 and 2/10.

Agenda Item 4.

Smelt Working Group

The Smelt Working Group met on Monday, 2/4/19, at 10 am. The meeting notes were provided after the DOSS call and are summarized below.

The Smelt Working Group (SWG) reviewed current Delta conditions, survey data, expected exports, and forecasted weather. The triggers for implementing D-1641 X2's standard were not met last week, and OMR flows have been held to just below -5,000 cfs. 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. The SWG agreed that with early spawning under way, management should focus on the turbidity bridge in the South and Central Delta as the primary indicator of entrainment risk for both adults and their offspring. 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 SWG believes that a recommendation under Action 3 for the protection of larval fish is warranted at this time, while also adding that protection of adults should still be a priority. The SWG will continue to monitor Delta Smelt survey and salvage data and Delta conditions, particularly the turbidity bridge around the South and Central Delta. The SWG plans to meet again on Monday, 2/11/19 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	Chippys Is. Midwater Trawl ^D	Mossdale Kodiak Trawl ^D
Sample Date	1/28-2/1	1/28-2/3	1/27-2/4	1/28-1/29, 1/31-2/1	1/27-2/1	1/27-1/29, 1/31-2/1	1/28, 1/30, 12/1

FR Chinook	45 juveniles 1 smolt	56	125	142	36		
SR Chinook	4 juveniles	16	4	5	2		
WR Chinook	8 juveniles 3 smolts		1	7	1	2	
LFR Chinook						1	
Chinook (ad-clip)						1	
Steelhead (wild)						2	
Steelhead (ad-clip)	15		3		6	9	
Green Sturgeon							
Flows (avg. cfs)	1,007	13,769	14,859				
W. Temp. (avg. °F)	53.76	59	52.1				
Turbidity (avg. NTU)	19.75	36.5	86.89				

^A On 1/29 during the night check a large tree was caught on the debris deflector; the RST cone was raised. On 2/1 the GCID RST was raised due to predicted high flows.

^B Tisdale RST sampling period was from 1/28 at 9:30 am to 2/3 at 10:00 am. RST trap fishing effort at 100%.

^C Knights Landing RST sampling period was from 1/24 at 11:00 am to 2/4 at 10:15 am. RST trap fishing effort at 50%.

^D Data reported in the 1/27 to 2/2 DJFMP sampling summary.

Enhanced Delta Smelt Monitoring (EDSM):

Seventeen fall-run Chinook salmon and 3 clipped steelhead were observed in the EDSM this past week.

Red Bluff Diversion Dam (RBDD)

USFWS biweekly report (1/15/19-1/28/19) 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)	2,744	1,142,791 (734,399-1,551,183)
Spring-run Chinook (BY2018)	15,617	46,453 (-7,058-99,964)

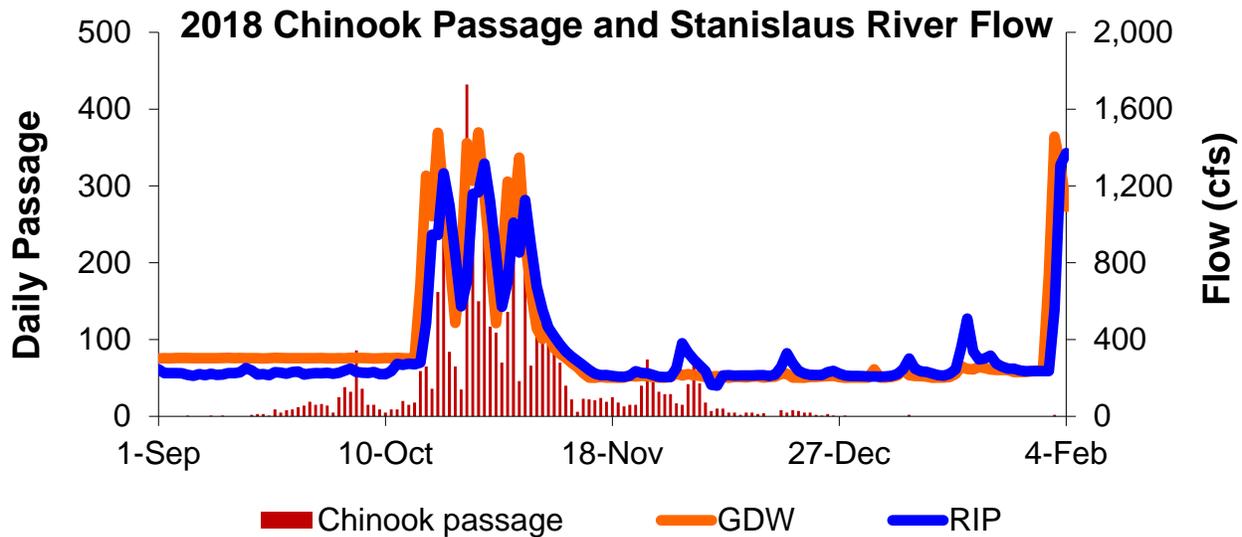
CDFW carcass surveys

- **San Joaquin River tributaries:** Chinook salmon carcass surveys, with incidental redd counts, began the week of 10/1/18 on the Merced River, Tuolumne River, and Stanislaus River. CDFW has completed the ninth week of surveys. No data were collected this week.

- **American River:** Chinook salmon carcass surveys began on Monday, 10/15/18. The survey area is from Nimbus Dam to Watt Avenue. The Nimbus Basin was closed to all fishing on 3/1/2018. Chinook salmon spawning is currently monitored in this area. The weir was pulled out during the week of 12/10 and is no longer part of the survey. Carcass surveys for the 2018-2019 season concluded on 1/9/2019 with a total of 12,581 carcasses observed with peak carcass observation occurring during the week of 12/3/2018. It is estimated that peak emergence will be during the beginning of March.

Stanislaus River weir

Monitoring at the weir near Riverbank (for upstream passage of adult salmonids) began on 9/5/18. Data for the week of 1/28/19-2/2/19; 2 adult fall-run Chinook salmon (*Oncorhynchus tshawytscha*) and 1 wild steelhead (*O. mykiss*) was observed passing upstream of the weir. The cumulative net upstream passage through 2/4/19 is 4,779 Chinook salmon (26% were 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 in their 2/5/19 Stanislaus Weir Update). Sixteen of the steelhead passing the weir were greater than 16 inches. Of these 16 fish, -6 were ad-clipped indicating a hatchery origin, and 10 were unclipped indicating a natural origin.



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 have been detected (near the Sherman Lake tagging location) between 8/14/18 and 1/3/19. No new updates have been reported in the last week.

Agenda Item 6.

Fish Monitoring: Salvage

Griffiths (CDFW) provided a salvage summary for the period of 1/28-2/3.

Unclipped (wild origin) winter-run-sized Chinook salmon were observed at the state facility on 2/2 and 2/3 and at the federal facility on 1/28, 1/29, and 2/3. Weekly salvage of wild origin Chinook salmon was 24 individuals (estimated from subsample). Total WY19 salvage of wild-origin fish is 75. No loss density triggers were reached during this period.

Clipped (hatchery origin) winter-run-sized Chinook salmon were observed at the state facility on 1/29, 2/2, and 2/3. No clipped Chinook salmon were observed at the federal facility. Clipped Chinook were identified as late-fall run Chinook salmon from Coleman National Fish Hatchery production release (11/29) and spring-run surrogate release groups (1/4) based on coded wire tag data. No seasonal triggers have been met.

9 individual clipped (hatchery origin) Chinook salmon were observed, for a WY19 total of 346. Clipped steelhead were observed at the federal facility 1/29, 1/30, 1/31, 2/2, and 2/3 and at the state facility 1/29, 2/3.

Unclipped steelhead were salvaged on 1/29, and 1/30 at the state facility. This week had the largest single day total salvage for any day/facility combination (32 at the federal facility on 2/3).

No sturgeon were salvaged this week.

The federal facility reduced salvage on 1/29 and 1/30 to remove sand from the secondary channel. The state facility reduced salvage on 2/3 because of high fish salvage rates.

DOSS Weekly Salvage Update

Reporting Period: January 28-February 3, 2019
 Prepared by Kyle Griffiths on February 4, 2019 15:40
 Preliminary Results -Subject to Revision

Criteria	28-Jan	29-Jan	30-Jan	31-Jan	1-Feb	2-Feb	3-Feb	Trend	
Loss Densities									
Wild older juvenile CS	0.45	0.26	0	0	0	0.81	1.25	↗	0.40
Wild steelhead	0	1.58	0.36	0	0	0	0	↘	0.28
Exports									
SWP daily export	5,820	4,086	5,026	4,743	4,162	4,478	4,951	→	4,752
CVP daily export	6,882	6,901	6,949	6,929	1,942	6,564	6,369	↘	6,077
SWP reduced counts	0	0	0	0	0	0	30%		
CVP reduced counts	8%	8%	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
Wild					
Winter Run	24	32	↗	44	75
Spring Run	0	0	→	0	0
Late Fall					
Run	0	0	↘	3	13
Fall Run	0	0	↘	28	34
Unclassified	0	0	→	0	0
Total	24	32		75	122
Hatchery					
Winter Run	0	0	→	0	0
Spring Run	0	0	→	32	21
Late Fall					
Run	9	39	↘	316	639
Fall Run	0	0	→	0	0
Unclassified	0	0	→	0	0
Total	9	39		348	660

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	5	22	↘	44	85
Hatchery	79	94	↘	208	375
Total	84	116		252	460

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

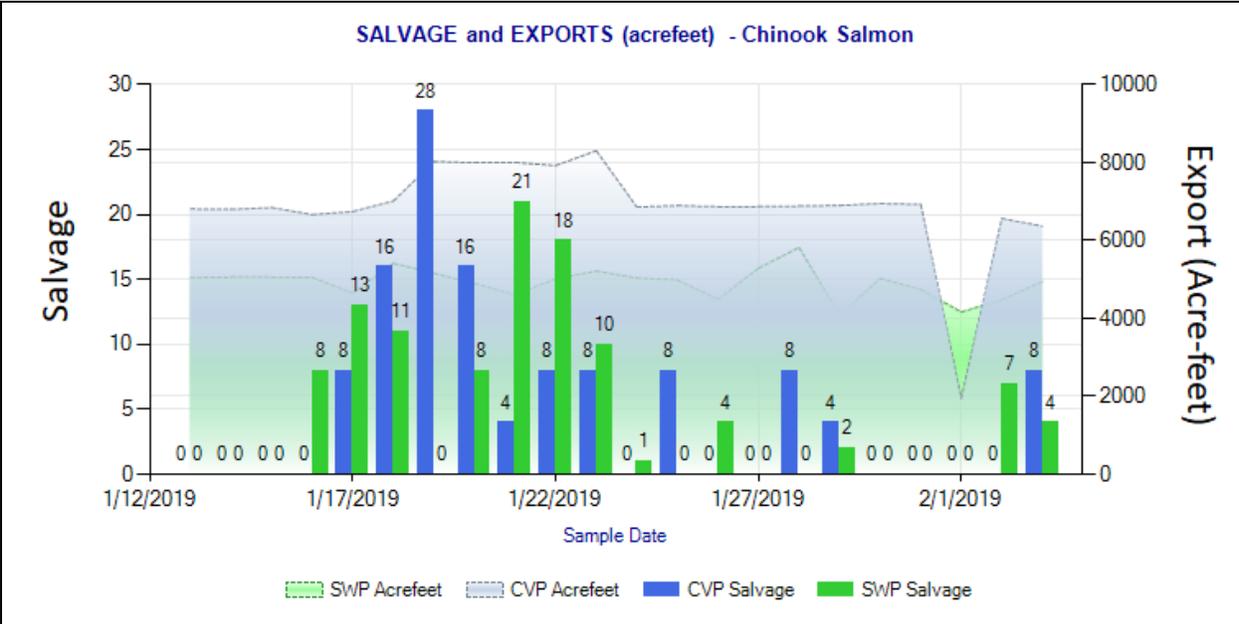


Fig 1. Salvage (values = number of fish salvaged) and export (acre-feet) at state/federal salvage facilities 1/13/2019 – 2/3/2019. All CS races/origins combined.

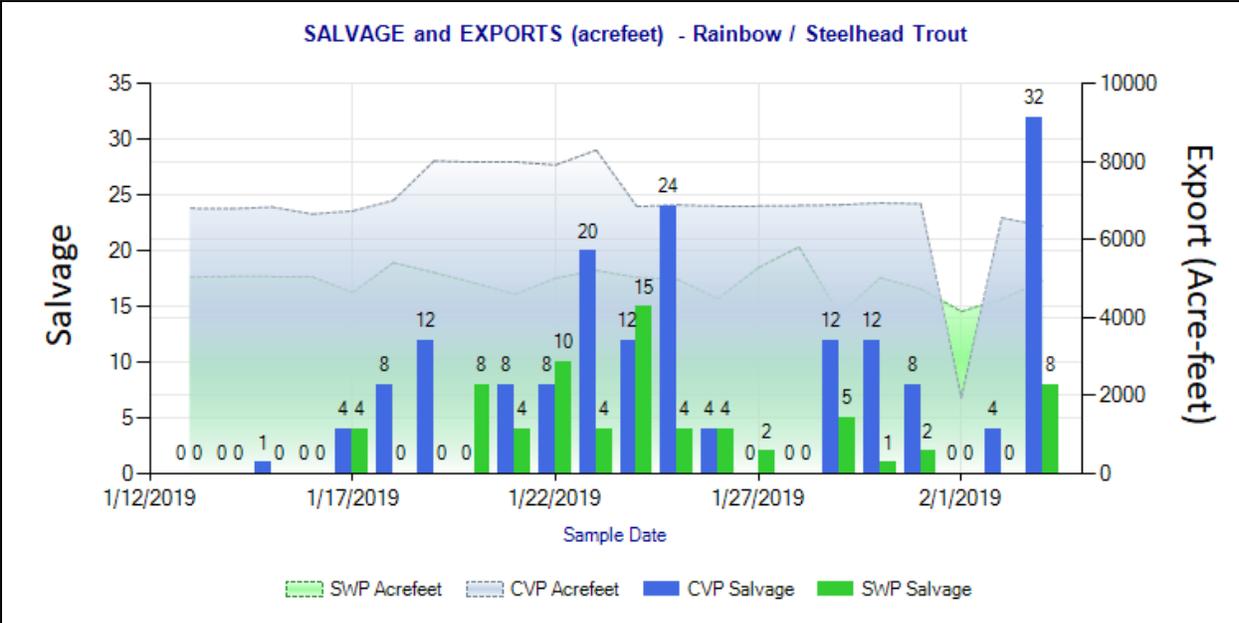


Figure 2. Salvage of Steelhead for state & federal salvage facilities 1/13/2019 - 2/3/2019

CONFIRMED HATCHERY (ADIPOSE-FIN CLIPPED) CHINOOK SALMON LOSS AT THE SWP & CVP DELTA FISH FACILITIES as of 2/3/19

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	15.88	66,266	n/a	0.024	n/a	0.5%	12/27/2018	1/20/2019
1/4/2019	LF	Coleman NFH	Battle Creek	Spring Surrogate	364.32	73,952	n/a	0.493	n/a	0.5%	1/16/2019	2/2/2019

SWP and CVP adipose-fin clipped Chinook lost from 10/1/2018 through 2/3/2019.

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 1/31/2019, the California Department of Fish and Wildlife (CDFW) will release approximately 50,000 brood year 2018 spring-run Chinook salmon from the San Joaquin River Restoration Program’s (SJRRP) Salmon Conservation and Rearing Facility (SCARF) into the San Joaquin River. This release will consist of marked (adipose fin clip and CWT) juveniles, released at the Fremont Ford Bridge (Highway 140). The average fork length is 76 mm.

On 1/29/2019 and continuing through May 2019, CDFW plans to conduct rotary screw trap (RST) efficiency releases using brood year 2018 spring-run Chinook salmon originating from the SJRRP’s SCARF. Releases will occur weekly, upstream of four RST locations (Owl Hollow, Sycamore Island, SR-99, and San Mateo Road) within Reaches 1 and 2 of the SJRRP Restoration Area. Releases will consist of 600 marked (adipose fin clip, CWT, photonic tag) juveniles per trap location, for a season total of up to 40,000 juveniles.

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>	5-10% (Last week: 9-13%)	85-90% (Last week: 87-91%)	5% (Last week: 0%)
<i>Young-of-year (YOY) spring-run Chinook salmon</i>	30-40% (Last week: 40-50%)	60-70% (Last week: 50-60%)	0% (Last week: 0%)

Rationale for distribution

Wild winter-run Chinook:

Eleven wild winter-run Chinook salmon were observed at the GCID RST, 1 at Knights Landing, 7 at the beach seines, 1 at Sacramento trawl, and 2 at Chipps Island. Since Sacramento River flows were higher this past week and fish were observed at monitoring locations, DOSS estimates that approximately 5 percent of wild winter-run Chinook salmon population has migrated through the Delta this past week, with 5 percent exiting at Chipps Island trawl since wild winter-run Chinook salmon were observed in the Chipps Island trawl over the past week.

Wild spring-run Chinook:

Four wild spring-run Chinook salmon were observed GCID, 16 at Tisdale, 4 at Knights Landing, 5 at the beach seines, and 2 at Sacramento trawl. Since Sacramento River flows were higher this past week and 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.

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 85-90% of winter run juveniles estimated to be in the Delta.
 - Approximately 60-70% 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 (~30,000 cfs) which increases the muting of tidal effects around Georgiana Slough and Threemile Slough. Flows are expected to remain elevated through the week.
- **Overall Entrainment Risk: MEDIUM**

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

- **Exposure Risk: MEDIUM**
 - Listed Chinook salmon 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 will be -5,000 cfs or more positive.
- **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

DOSS wants to provide WOMT and NMFS a heads up that there is a risk of exceeding the spring-run surrogate first stage trigger for release group #3 this next week. Adding approximately 1 fish at SWP in normal salvage could exceed the trigger.

Agenda Item 11.

Next Meeting: The next DOSS conference call will be on **2/12/19 at 9am.**

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