Delta Operations for Salmonids and Sturgeon (DOSS) Group
Conference call: 4/9/2019 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.

CDFW: Ken Kundargi, Duane Linander, Jason Julienne, Kyle Griffith
DWR: Bryant Giorgi, Chris Cook, Kevin Reece, Dan Yamanaka
NMFS: Kristin Begun
Reclamation: Tom Patton, Elissa Buttermore, Towns Burgess
SWRCB: Craig Williams, Michael Macon, 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/djfmp)
3. Current Operations
4. Smelt Working Group
5. Fish Monitoring: RSTs/trawls/seines
6. Fish Monitoring: Salvage
7. Hatchery Releases
8. Hatchery Winter-Run Monitoring and Take
9. Rapid Genetic Analyses
10. DOSS Estimates of Fish Distribution
11. DOSS Feedback on Entrainment Risk
12. DOSS advice
13. Next DOSS meeting

Agenda Item 2.
RPA Implementation Review

Delta RPA Actions affecting operations during April:

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

[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.

either the Deer Creek gage at Vina (DCV), or the Mill Creek gage at Los Molinos (MLM). The First Alert was triggered every day this past week. See table below for details.

	Mill Creek (MLM)		Deer Creek (DCV)	
Date	mean daily flow (cfs)	change in mean daily flow	mean daily flow (cfs)	change in mean daily flow
4/2/2019	696	35%	1,131	24%
4/3/2019	804	16%	1,341	19%
4/4/2019	724	-10%	1,215	-9%
4/5/2019	696	-4%	1,174	-3%
4/6/2019	727	4%	1,203	2%
4/7/2019	667	-8%	1,148	-5%
4/8/2019	786	18%	1,243	8%

- 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.

	Wilkins Slough (WLK)	Knights Landing (KL)
Date	Mean Daily Flow (cfs)	Daily water temperature (°F)
4/2/2019	25,079	55.3
4/3/2019	25,013	55.5
4/4/2019	25,625	55.0
4/5/2019	25,769	54.7
4/6/2019	26,109	54.6
4/7/2019	26,435	53.6
4/8/2019	26,484	53.6

Action IV.1.2[2] (DCC gate operations):

- DCC gates will remain closed through 5/20/19, per operations described in RPA IV.1.2 starting 12/1/18.

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

- 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 (Above Normal 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.

[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

- 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[3] (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.
- On 4/4, the SWP salvaged 3 unclipped older juvenile Chinook salmon, which makes the total confirmed loss of 39.10, and a daily loss density of 4.61 fish per taf. Loss of greater than 2.5 fish per taf requires an average OMR flow of -3,500 cfs for 5 consecutive days, beginning on 4/5. However, since the OMR is currently positive, no change in exports is required.

Action IV.3[3] (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 (4/9/19)

SWP		CVP	
Exports (cfs)			
Clifton Court Forebay	1,500	Jones Pumping Plant	1,800 (2 units)*
Reservoir Releases (cfs)			
Feather - Oroville	15,000**	American - Nimbus	10,000
		Sacramento - Keswick	30,000***
		Stanislaus – Goodwin	4,500
		Trinity - Lewiston	300
Reservoir Storage (in TAF)			
San Luis (SWP)	1,028	San Luis (CVP)	966 (full)
Oroville	1,993	Shasta	4,144
New Melones	1,974	Folsom	787
Delta Operations			
DCC	Closed	Sacramento River at Freeport (cfs)	72,300
Outflow Index (cfs)	114,000	San Joaquin River at Vernalis (cfs)	12,900
E:I	4% (14-day avg.)	X2	<56 km

[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

* CVP exports are scheduled to increase to 2,000 cfs tomorrow, 4/10.
** Oroville releases are scheduled to decrease to 10,000 cfs tomorrow, 4/10.
*** Keswick releases are scheduled to increase to 40,000 cfs later today, 4/9.

Factors controlling Delta exports:

- 4/2/19-4/9/19: 4:1 San Joaquin I:E ratio per NMFS BiOp RPA Action IV.2.1

Approximate OMR as of 4/6/19:

	USGS gauges (cfs)	Index (cfs)
Daily	3,500	3,300
5-day	3,500	3,500
14-day	Data not available	1,300

Approximate OMR as of 4/8/19:

	Index (cfs)
Daily	2,900
5-day	3,300
14-day	1,900

Weather Forecast

Dry conditions expected in the Sacramento valley this week with continuing showers in the mountains today and Thursday. Flood advisory for Shasta County continues as runoff from Monday's rain event heads downstream. Dry and warmer weather expected this weekend in the valley and Delta area.

Agenda Item 4.

Smelt Working Group

The Smelt Working Group met on Monday, 4/8/19, at 10 am. The following meeting summary is preliminary and is subject to change. The following meeting summary provided by Chen (USFWS) is preliminary and is subject to change.

> 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 potential trigger for the start of Action 3. River flows and reservoir releases are expected to remain elevated this week, and OMR flow rates are expected to be in the positive territory. The SWG determined that the risk of entrainment for Delta Smelt would be very low for fish that are currently outside of the South Delta. Fish, particularly larvae, in the South and Central Delta, however, could still be at risk of entrainment based on the current rate of water exports.
>
> 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, 4/15, 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]	Chipps Is. Midwater Trawl[D]	Mossdale Kodiak Trawl[E]
Sample Date	-	3/29-4/5	4/1-4/7	4/1-4/3	3/31-4/2, 4/4-4/5	3/31-4/2, 4/4-4/5	4/2-4/7
Chinook							3
FR Chinook		36	70	363	16	7	
SR Chinook		176	268	30	92	98	
WR Chinook					18	22	
LFR Chinook				3			
Chinook (ad-clip)		3 FR 18 SR	16 FR 70 SR	19*	39	54	2
Steelhead (wild)					2		
Steelhead (ad-clip)					2	3	
Green Sturgeon							
Flows (avg. cfs)		36,484	25,659				
W. Temp. (avg. °F)		55.1	54.8				
Turbidity (avg. NTU)		57.8	37.34				

[A] The GCID trap was raised on 2/22 due to predicted high flows.

[B] Tisdale RST sampling period was from 3/29 at 9:00 am to 4/5 at 9:30 am. The river right cone was damaged and did not fish from 3/29 to 4/1. Cones were sampling at 50% effort from 4/1 to 4/5.

[C] Knights Landing RST sampling period was from 4/1 at 9:15 am to 4/7 at 10:45 am.

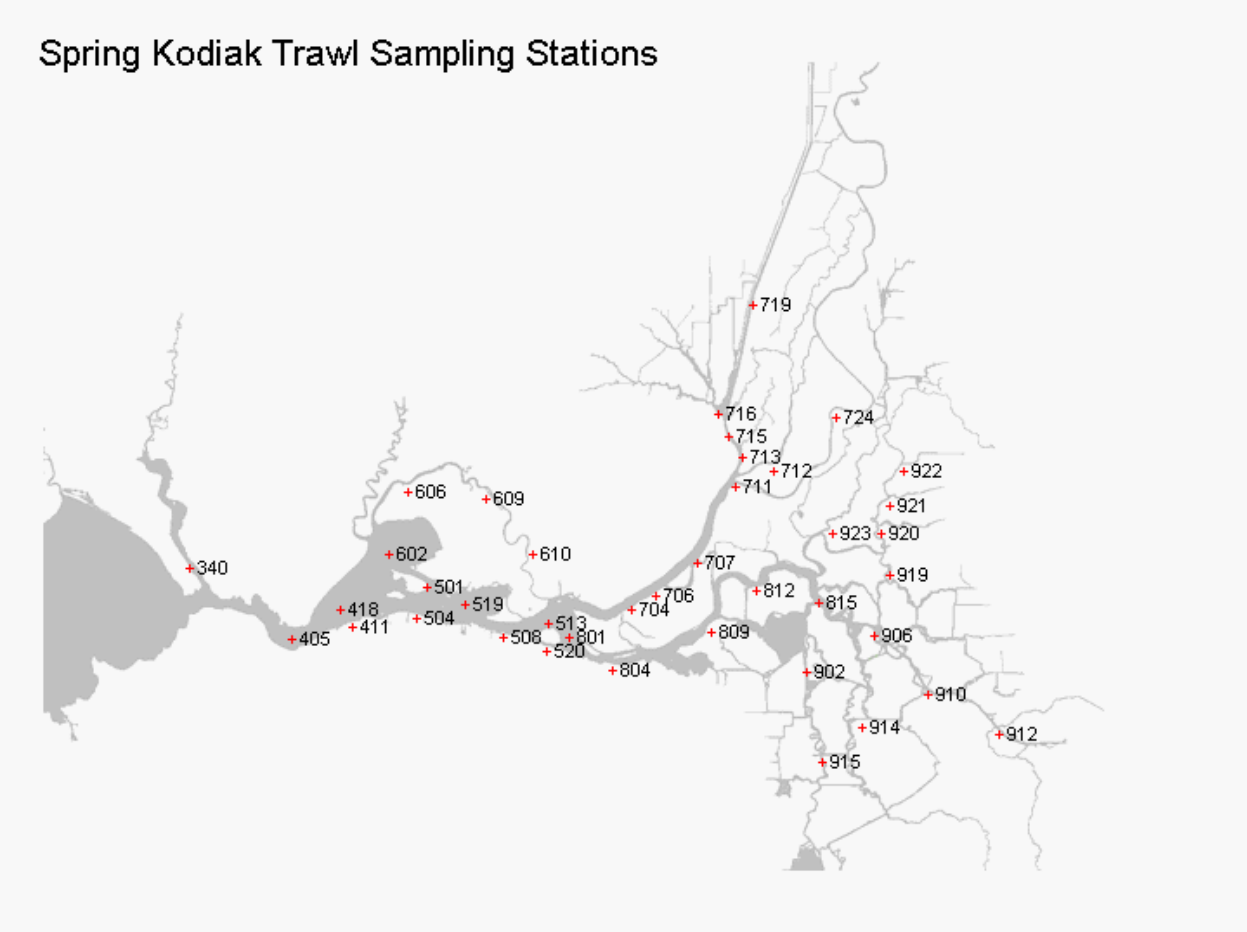
[D] Data reported in the 3/31 to 4/6 DJFMP sampling summary. *Three of the 19 ad-clipped fish at the beach seines were left pelvic fin and ad-clipped, indicating they were Battle Creek winter-run from LSNFH.

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

Preliminary Spring Kodiak Trawl Chinook Salmon and Steelhead Catch, Survey 3, 2019

Survey Conducted 3/18/2019 – 3/21/2019

Station	# of Fish	Fall Run Chinook		Spring Run Chinook		Winter Run Chinook		Late Fall Run Chinook		Steelhead		
		Clipped	Not Clipped	Clipped	Not Clipped	Clipped	Not Clipped	Clipped	Not Clipped	Clipped	Not Clipped	
340	0											Suisun Bay & West
405	0											
411	0											
418	0											
501	2									2		
504	0											
519	0											
602	1				1							
606	1		1									
609	0											
610	0											
508	1				1							Confluence
513	1									1		
520	0											
801	3		2							1		
804	0											
704	4		2		2							Sac River System
706	0											
707	2				2							
711	0											
712	0											
713	1			1								
715	1						1					
716	0											
719	1		1									
724	0											
809	3									3		South & Central Delta
812	1					1						
815	0											
902	0											
906	0											
910	1				1							
912	1			1								
914	0											
915	0											
919	3		3									
920	0											
921	0											
922	0											
923	0											
Totals:	27	0	9	2	7	1	1	0	0	7	0	
Range of FL (mm):			38-64	79-92	67-107	108	136			184-260		



Red Bluff Diversion Dam (RBDD)

USFWS biweekly report (3/12/19-3/25/19) 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)	5,967	1,161,380 (687,973-1,634,787)
Spring-run Chinook (BY2018)	532,113	1,367,440 (-2,642,929-5,377,808)

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

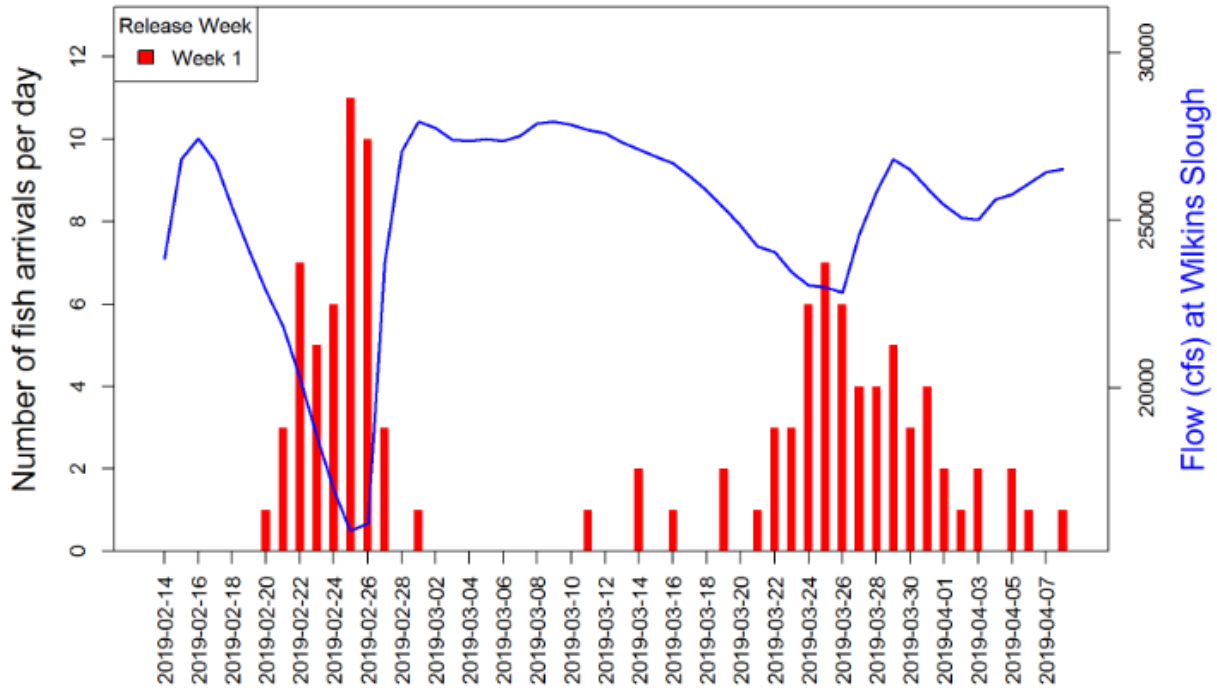
The Livingston Stone National Fish Hatchery released acoustic-tagged (JSATS) winter-run Chinook salmon from brood year 2018. The following table provides the detection frequencies downstream of the release site. Detections through 4/8/19 below.

Date of release	**2/14/19**
# acoustically tagged (JSATS)	**649 fish**
Butte City Bridge	193 (30%)
Tower Bridge	108 (17%)
Minimum survival to Tower Bridge	24%
I-80/50 Bridge	122 (18%)
Georgiana Slough	21 (3%)

Detections at Benicia Bridge	145 (22%)
Minimum survival to Benicia Bridge	23%

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

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

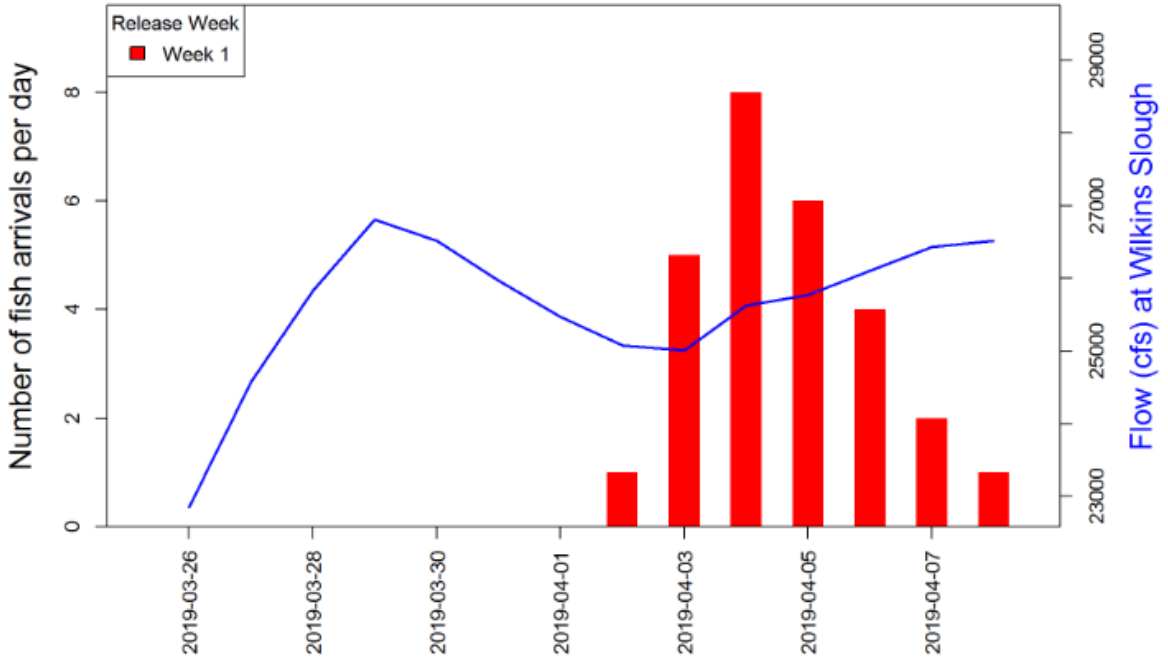


Tracking of acoustic-tagged winter-run Chinook salmon released at Battle Creek
The Livingston Stone National Fish Hatchery released acoustic-tagged (JSATS) winter-run Chinook salmon from brood year 2018. The following table provides the detection frequencies downstream of the release site. Detections through 4/8/19 below.

Date of release	**3/26/19**
# acoustically tagged (JSATS)	**500 fish**
Butte City Bridge	26 (5%)
Tower Bridge	27 (5%)
Minimum survival to Tower Bridge	10%
I-80/50 Bridge	32 (6%)
Georgiana Slough	12 (2%)
Detections at Benicia Bridge	5 (1%)
Minimum survival to Benicia Bridge	1%

https://calfishtrack.github.io/real-time/pageBCJSWR_2019.html

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



Lower American River

RST catch through 4/1/19 on the American River at Watt Avenue. From 1/10 to 4/1, 14,301 unmarked fall-run, 52 spring-run, 18 winter-run, and 175 steelhead have been observed.

Feather River

Cook (DWR) provided Feather River RST data for the 3/26 to 4/2 period for two RST sites on the Feather River. At the Eye Side Channel, 79 fall-run Chinook salmon and 7 steelhead were observed. At Herringer, 102 fall-run Chinook salmon were observed and no other species of concern. The traps were pulled on 4/2 due to high flows and are not currently sampling.

Agenda Item 6.

Fish Monitoring: Salvage

Griffiths (CDFW) provided a salvage summary for the period of 4/1-4/7.

Chinook salmon

Unclipped (wild origin) Chinook: Weekly salvage of wild origin Chinook salmon included 8 winter-run, 41 spring-run, and 13 fall-run sized fish (estimated from subsample). Total WY19 salvage of wild-origin Chinook salmon is 3,945 fish.

Clipped (hatchery origin) Chinook: Weekly salvage of ad-clipped Chinook salmon included 148 spring-run and 4 fall-run sized fish. Total WY19 salvage of ad-clipped Chinook is 1,502 fish.

On 4/5, clipped spring-run sized Chinook salmon were salvaged at the federal facility in which CWTs were not detected. The battery in the detector was changed, but it is also possible these fish lost their markings. These fish were released.

Steelhead
Unclipped steelhead: 21 fish salvaged for a season total to date of 326.
Clipped steelhead: 23 fish salvaged for a season total to date of 1,755.

DOSS Weekly Salvage Update

Reporting Period: April 1-April 7, 2019

Prepared by Kyle Griffiths on April 8, 2019 15:19

Preliminary Results -Subject to Revision

Criteria	1-Apr	2-Apr	3-Apr	4-Apr	5-Apr	6-Apr	7-Apr	Trend	
Loss Densities									
Wild older juvenile CS	0	0	0	4.09	0	0	0	↗	0.58
Wild steelhead	0	0	4.81	1.02	2.06	2.93	0	↘	1.55
Exports									
SWP daily export	6,668	5,224	7,379	6,871	4,815	3,801	3,405	↘	5,452
CVP daily export	1,656	1,622	1,624	1,618	3,590	3,592	3,593	↘	2,471
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;

		Weekly Total			Season Total	
Category		**Salvage**	**Loss**	**Trend**	**Salvage**	**Loss**
Wild						
	Winter Run	8	35	↘	176	504
	Spring Run	41	131	↗	92	306
	Late Fall Run	0	0	→	3	13
	Fall Run	13	27	↗	3,670	3,990
	Unclassified	0	0	→	4	NC
	Total	**62**	**193**		**3,945**	**4,812**
Hatchery						
	Winter Run	0	0	↘	131	561
	Spring Run	148	420	↘	1,009	3,597
	Late Fall Run	0	0	→	354	776
	Fall Run	4	3	↗	4	3
	Unclassified	0	0	→	4	NC
	Total	**152**	**423**		**1,502**	**4,936**

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

	Weekly Total			Season Total	
Category	**Salvage**	**Loss**	**Trend**	**Salvage**	**Loss**
Wild	21	91	↘	326	1,087
Hatchery	23	100	↘	1,755	5,417
Total	**44**	**191**		**2,081**	**6,504**

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

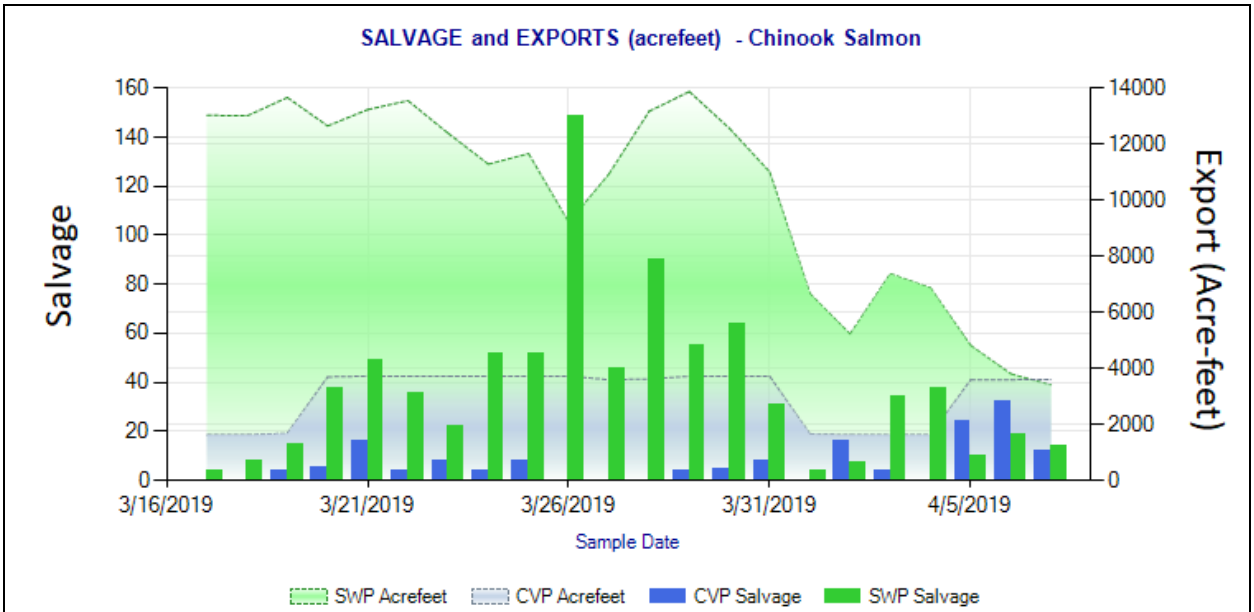


Fig 1. Chinook Salmon Salvage (values = number of fish salvaged) and export (acre-feet) at state/federal salvage facilities. All CS races/origins combined. Dates: 3/17 - 4/7/2019.

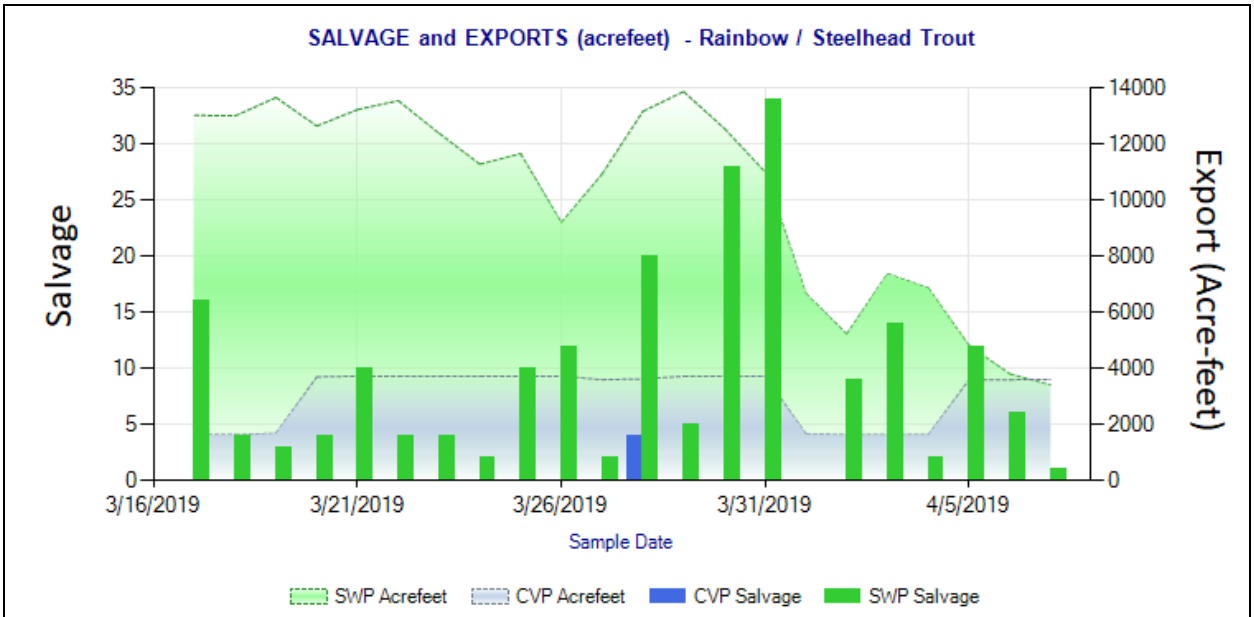


Figure 2. Salvage of clipped & unclipped **Steelhead** for state & federal salvage facilities. Dates: 3/17 - 4/7/2019.

CONFIRMED HATCHERY (ADIPOSE-FIN CLIPPED) CHINOOK SALMON LOSS AT THE SWP & CVP DELTA FISH FACILITIES as of 3/16/19

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 3/16/2019.

[1]Number released with the adipose-fin clipped and a coded-wire tag (CWT).

[2]% Loss of Number Released = (Confirmed Loss/Number Released)*100.

[3]% Loss of Total Entering Delta= (Confirmed Loss/Total Entering Delta)*100.

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

Agenda Item 7.

Hatchery Releases

On 4/5/19, the California Department of Fish and Wildlife (CDFW) released approximately 667,134 brood year 2018 spring-run Chinook salmon from Feather River Hatchery into the Feather River at Boyd's Pump and Gridley boat ramp. This release included 100% marked (adipose fin clip) and coded wire tag (CWT) fish.

On 4/5/19, CDFW released approximately 2,530 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 consisted of marked (adipose fin clip, lower caudal clip, and CWT juveniles that were released in Reach 1 of the SJRRP Restoration Area.

On 4/8/19, the U.S. Fish and Wildlife Service (USFWS) released approximately 3.3 million brood year 2018 fall-run Chinook salmon from the Coleman National Fish Hatchery into Battle Creek. This release included 25% marked (adipose fin clip and CWT) and 75% unmarked fish.

Agenda Item 8.

Hatchery Winter-Run Monitoring and Take Discussion

The group discussed reporting of salvaged Battle Creek hatchery winter-run and whether it is necessary to process fish to retrieve their CWT, or if they can be positively identified by their clipped left pelvic and adipose fins. Salvaged fish would preferably be released back into the river, but collecting the CWT would determine the origin with 100% certainty. Reece (DWR) suggested confirming with NMFS via email that the preference is to release fish alive after visually confirming their origin by their unique fin clips.

Agenda Item 9.

Rapid Genetic Analyses

Buttermore (Reclamation) asked the group for input on whether to cease rapid genetic testing for the remainder of April. The group agreed that considering the current hydrology and controlling I:E ratio it is not be necessary to keep staff on-call 24 hours a day for rapid testing for the remainder of the month. However, if conditions change, the group will reassess.

Agenda Item 10.

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)
Young-of-year (YOY) winter-run Chinook salmon	0-1% (Last week: 0-1%)	14-20% (Last week: 19-25%)	80-85% (Last week: 75-80%)
Young-of-year (YOY) spring-run Chinook salmon	5% (Last week: 5%)	50-55% (Last week: 60-65%)	40-45% (Last week: 30-35%)
Hatchery winter-run Chinook salmon	0-1% (Last week: 0-1%)	4-15% (Last week: 9-20%)	85-95% (Last week: 80-90%)

Rationale for distribution

Wild winter-run Chinook:

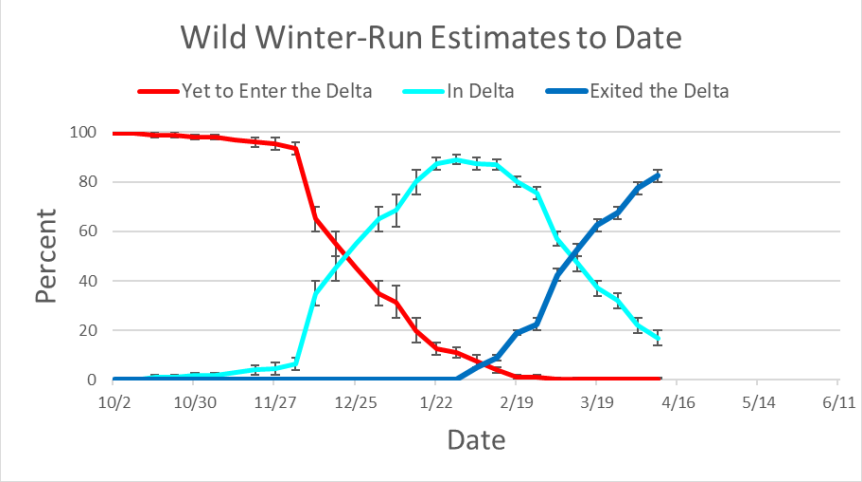
18 wild winter-run Chinook salmon were observed at Sacramento trawl and 22 at Chipps Island trawl. Since fish were observed at monitoring locations, outflow remains high, and due to seasonal timing, DOSS estimates that an additional 5 percent of wild winter-run Chinook salmon population has exited the Delta past Chipps Island and few fish remain upstream of Knights Landing.

Wild spring-run Chinook:

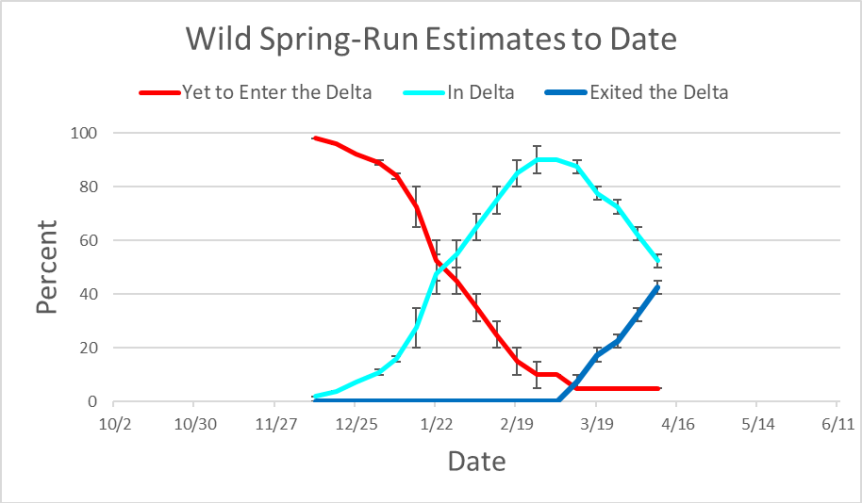
176 wild spring-run Chinook salmon were observed at Tisdale, 268 at Knights Landing, 30 at the beach seines, 92 at Sacramento trawl, and 98 at Chipps Island trawl. Many of these fish are assumed to be unmarked hatchery fall-run Chinook recently released upstream. Since more fish were observed at monitoring locations, outflow remains high, and due to seasonal timing, DOSS estimates that an additional 10 percent of the population has exited the Delta past Chipps Island and 5 percent remain upstream of Knights Landing.

Hatchery winter-run Chinook:

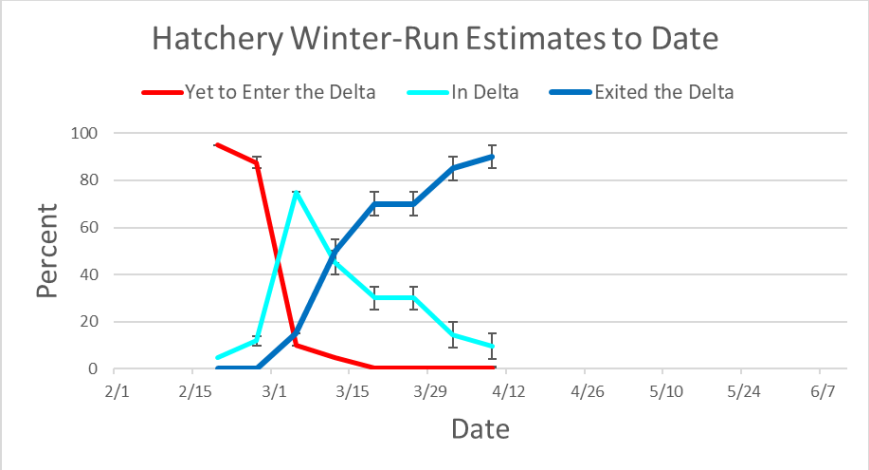
193 acoustically-tagged (AT) hatchery winter-run have been detected at Butte City Bridge, 108 at Tower Bridge, 122 at I80-50, and 145 at Benicia Bridge. Since a few more fish were detected by receivers this past week at Sacramento and Benicia Bridge locations, DOSS estimates that an additional 5 percent 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.

<u>Agenda Item 11.</u>

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:** MEDIUM
    - Approximately 14-20% of winter run juveniles estimated to be in the Delta.
    - Approximately 50-55% 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 (~114,000 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.
    - Fremont Weir is currently spilling this week, so some fish are expected to bypass export facilities.
    - CWT fish salvaged this past week were all from the San Joaquin side. Lack of salvage of CWT winter-run fish from Sacramento River indicates that the interior Delta routing risk is low due to the current hydrology.
- **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.
    - Due to high flows some salmonids may use the Fremont weir route and bypass interior Delta entrainment routes this week.

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.
    - Exports are expected to remain steady of the week with the exception of a couple of maintenance days.
    - Flows at San Joaquin River are expected to remain high over the next week keeping exports steady and the risk of entrainment, especially for steelhead remains unchanged.
    - OMR is expected to be positive over the next week.

    - Exposure risk is medium for San Joaquin steelhead and low for Sacramento listed fish.

- **OMR/Export Risk:**
    - OMR -2,500 cfs: LOW
    - OMR -3,500 cfs: LOW
    - OMR -5,000 cfs: MEDIUM
    - OMR -6,250 cfs[4]: MEDIUM-HIGH
    - OMR -7,500 cfs[4]: HIGH
    - OMR -9,000 cfs[4]: HIGH

- **Overall Entrainment Risk:**
    - OMR -2,500 cfs: LOW-MEDIUM
    - OMR -3,500 cfs: LOW-MEDIUM
    - OMR -5,000 cfs: MEDIUM
    - OMR -6,250 cfs[4]: MEDIUM-HIGH
    - OMR -7,500 cfs[4]: HIGH
    - OMR -9,000 cfs[4]: HIGH

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

Agenda Item 12.
DOSS Advice to WOMT and NMFS: None

Agenda Item 13.
Next Meeting: The next DOSS conference call will be on **4/16/19 at 9am**.

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