

Delta Operations for Salmonids and Sturgeon (DOSS) Group
Conference call: 4/10/2018 at 9:00 am.

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: Bob Fujimura, Ken Kundargi

DWR: Farida Islam, Kevin Reece, Bryant Giorgi, Dan Yamanaka, Ming-Yen Tu

NMFS: Jeff Stuart, Kristin McCleery

Reclamation: Elissa Buttermore, Tom Patton, Don Portz, Towns Burgess, Mike Hendrick

SWRCB: Chris Carr, Chris Kwan

USFWS: Felipe Carrillo, Craig Anderson

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 update
5. Fish Monitoring: RSTs/trawls/seines
6. Fish Monitoring: Tracking of acoustic-tagged Chinook salmon
7. Fish Monitoring: Salvage
8. Hatchery Releases
9. DOSS Estimates of Fish Distribution
10. DOSS Estimates of Fish Entrainment Risk
11. DOSS advice
12. Next DOSS meeting

Agenda Item 2.

RPA Implementation Review

Delta RPA Actions affecting operations during April:

Action IV.1.2¹ (DCC gate operations):

- Gates will remain closed from February 1 to May 20.

Action IV.2.1 San Joaquin River to Export Ratio

- For the period between April 1 and May 31, the level of combined SWP and CVP exports will be determined by the San Joaquin River inflow as measured at

¹ 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

Vernalis. For the current water year type (determined on 4/9 to be below normal in the San Joaquin River basin) the ratio of San Joaquin River inflow to combined CVP and SWP exports is 3:1, 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.2.3² (OMR Management):

- Implementation of this action in WY 2018 is from 1/1/18 through 6/15/18, and requires that OMR flow be no more negative than -5,000 cfs during this period.
- Responses to exceedances of RPA action triggers will require that OMR flows become more positive to meet the mandatory OMR flows required by the action.
- OMR flows are reported weekly with the OMR index and the tidally filtered USGS gauges at the 5-day and 14-day running averages.
- Steelhead loss density on 4/2/18 was 9.89 fish/thousand acre-feet (TAF), combined loss of wild steelhead from the CVP and SWP was 129.4 fish, which exceeded the first loss trigger of 104.66 fish. The combined exports for 4/2/18 was 13.083 thousand acre feet. On 4/7/18, the combined wild steelhead loss was 213.28 fish, exceeding the second stage trigger of 179.64 fish (12 fish/TAF multiplied by 14.970 TAF exported) requiring OMR flows be no more negative than -2,500 cfs for 5 days. The first day of the action response was 4/9/18.
- The preliminary daily data for older juvenile Chinook salmon loss density indicated that the first trigger of 2.5 fish /TAF was exceeded on 4/3/18 (3.96 fish/TAF) requiring an OMR flow of no more negative than -3,500 cfs. This flow was already in effect for the steelhead loss density exceedance the previous day. Genetic analysis results on 4/5/18 showed that these fish were not genetically winter-run Chinook salmon.

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):

- Implementation of this action in WY 2018 is from 11/1/17 through 4/30/18.
- The third alert [March 1 through April 30: Knights Landing Catch Index (KLCI) or Sacramento Catch Index (SCI) >15] was not triggered during the past week.

Agenda Item 3.

Current Operations (4/10/18)

SWP		CVP	
Exports (cfs)			
Clifton Court Forebay	900 ^A	Jones Pumping Plant	3,500 ^B
Reservoir Releases (cfs)			
Feather - Oroville	9,250 ^C	American - Nimbus	16,000 ^D

² For details, see pages 74-79 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

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

		Sacramento - Keswick	3,250
		Stanislaus - Goodwin	1,400
		Trinity - Lewiston	300
Reservoir Storage (in TAF)			
San Luis (SWP)	929	San Luis (CVP)	905
Oroville	2,213	Shasta	4,031
New Melones	2,050	Folsom	781
Delta Operations			
DCC	Closed	Sacramento River at Freeport (cfs)	~78,500
Outflow Index (cfs)	~92,100	San Joaquin River at Vernalis (cfs)	~9,400
E:I	15% (14-day avg.)	X2	56 km (Martinez)

^A SWP exports will remain at 900 cfs through tomorrow (4/11), and will later increase to 1,500-1,800 cfs.

^B CVP exports will decrease to 1,800 cfs tomorrow (4/11), and to 950 cfs on Thursday (4/12).

^C Releases at Oroville Dam will decrease this week.

^D Releases at Nimbus Dam will decrease to 5,000 cfs on 4/18.

Approximate OMRs as of 4/7/18:

	USGS gauges (cfs)	Index (cfs)
Daily	-2,700	-3,400
5-day	-3,600	-3,500
14-day	-4,100	-4,100

Approximate OMRs as of 4/9/18:

	Index (cfs)
Daily	-2,600
5-day	-3,200
14-day	-3,900

***expected to be positive soon.**

Factors controlling Delta exports:

4/3: 1:1 San Joaquin inflow-to-export ratio per NMFS BiOp RPA Action IV.2.1

4/4-4/8: OMR -3,500 cfs OMR limit (steelhead loss trigger) per NMFS BiOp RPA Action IV.2.3

4/9: OMR flow -2,500 cfs (second stage steelhead loss trigger) OMR limit per NMFS BiOp RPA Action IV.2.3

4/10: San Joaquin inflow-to-export ratio changed to 3:1 per NMFS BiOp RPA Action IV.2.1

Weather Forecast

Small storm system through the Sacramento area is expected today through Thursday with moderate precipitation and cooler weather. Another small system is expected next week.

Agenda Item 4.

Smelt Working Group Update

The Smelt Working Group met on Monday, 4/9/18 at 10 am. Anderson (USFWS) provided the following Smelt Working Group summary from the meeting summary distributed via email by Chen (USFWS).

The Smelt Working Group reviewed current Delta conditions, survey data, current water project operations, and forecasted weather. Current weather is partly cloudy and warm with a minor storm event forecasted starting tomorrow through Thursday. The 3-station average water temperature (Antioch, Rio Vista Bridge, and Mossdale) has remained above 12°C since March 8, which is the temperature indicative of suitable spawning identified in the Biological Opinion and a trigger for the start of Action 3. The fish surveys from previous weeks have also detected spawning adult Delta smelt and Delta smelt larvae. River flows have been very high due to last week’s storm event, and OMR indices will be no less negative than -2,500 cfs starting today. Based on Delta conditions, water export levels, and the survey data, the Group concluded that the risk for Delta smelt entrainment is lower this week than it was for last week. The Group advised that entrainment risk would still be high for OMR flows of more negative than -5,000 cfs, medium for OMR flows of -3,500 to -5,000 cfs, and low at OMR flows of more positive than -3,500 cfs.

Action 3 (protections for larval and juvenile Delta smelt) was implemented on 3/26 and requires an OMR flow of no more negative than -5,000 cfs. The Smelt Working Group will continue to monitor Delta smelt survey and salvage data, Delta conditions, and this week’s forecasted precipitation. The Group will meet again next Monday, 4/16 at 10 am.

Agenda Item 5.

Fish Monitoring: The following table presents fish monitoring data summarized over the past week. Empty cells indicate zero catches at those locations with sample dates shown.

Location	GCID RST ^A	Tisdale RST ^B	Knights Landing RST ^C	Butte Creek Fyke trap ^D	Butte Creek RST ^E	Beach Seines ^F	Sacramento Trawl ^F	Chippis Island Midwater Trawl ^F	Mossdale Kodiak Trawl ^G
Sample Date	4/3-4/5	4/2-4/8	4/2-4/8	-	-	4/2, 4/5, 4/6	4/3-4/4, 4/6	4/1, 4/3-4/5, 4/7	4/2-4/7*
Chinook									254
FR Chinook	2 juveniles	3				169	2	3	
SR Chinook	10 juveniles	1				23	3	31	
WR Chinook	2 smolts							3	
LFR Chinook						8			
Chinook (ad-clip)	8 juvenile WR, 5					9	2	22	5

	smolt WR								
Steelhead (wild)	1					1		2	
Steelhead (ad-clip)						1		2	
Green Sturgeon									
Flows (avg. cfs)	916	11,304	10,255						
W. Temp. (avg. °F)	60.8	58	61.3						
Turbidity (avg. NTU)	8.6	31.8	12.4						

^A The GCID trap cone had a log jammed in it on 4/4 and 4/5. On 4/5, the RST was removed from the bypass channel for the upcoming high flows. No catch on 4/5.

^B Tisdale RST sampling period was from 4/2 at 8:30 am to 4/6 at 9:30 am.

^C Knights Landing RST sampling period was from 4/2 at 11:15 am to 4/8 at 12:00 pm. On 4/5-4/7, backwatering effect from increased flow out of the Feather River has seemingly muted Sacramento River flows at Knights Landing. Cones were fished overnight, however low rev numbers indicate little to no cone rotation occurred.

^D Butte Creek Fyke trap was pulled from the water on 3/20 at 9:30 am.

^E Butte Creek RST cone was raised 3/21 at 8:30 am.

^F Data reported in the 4/1 to 4/7 DJFMP sampling summary. Not included in the table above is 1 CHNE (the code used for spray-dyed Chinook, usually represent fish used for a gear efficiency trial) reported at Mossdale beach seine.

^G Mossdale Trawl sampling is being conducted by CDFW (Region 4) from 4/1-6/30.

* 4/3-4/7 Mossdale catch data was received after the DOSS call and included 5 hatchery and 254 wild Chinook salmon.

Agenda Item 6.

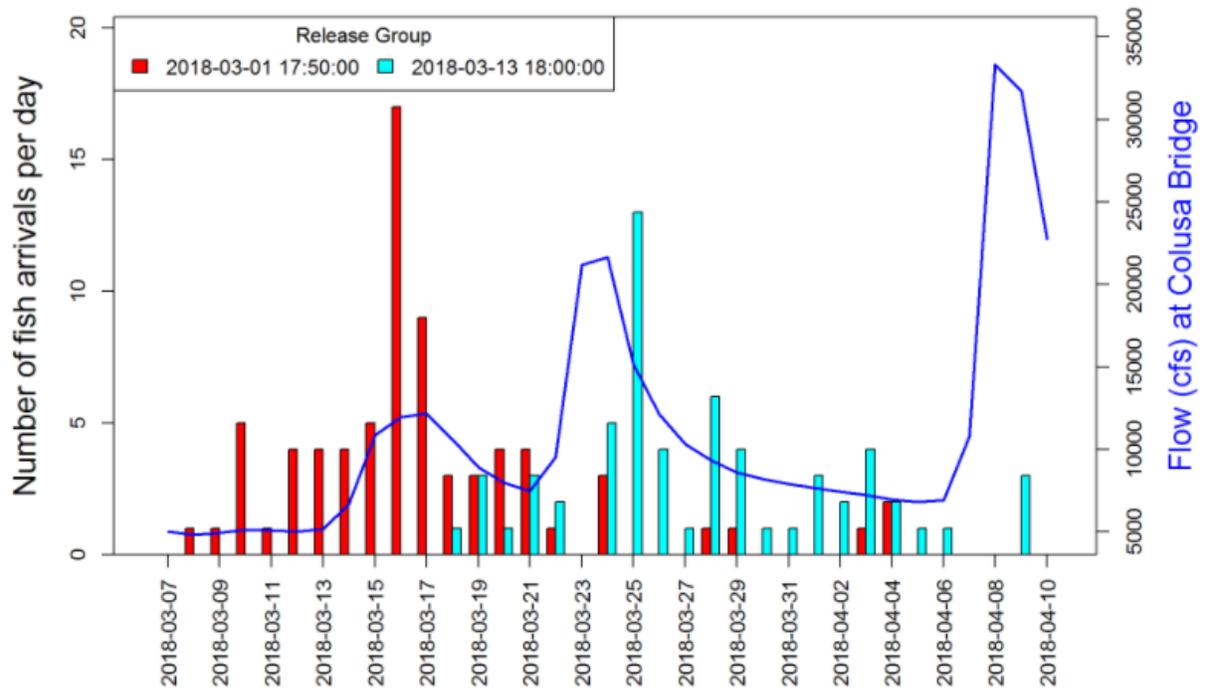
Fish Monitoring: Tracking of acoustic-tagged hatchery winter-run Chinook salmon

The Livingston Stone National Fish Hatchery released acoustic-tagged (JSATS) winter-run Chinook salmon from brood year 2017. The following table provides the detection frequency at Tower Bridge and Sacramento I-80/50 Bridge from 3/8 to 4/10.

	First Release Group	Second Release Group
Date of release	3/1/2018	3/13/2018
# acoustically tagged (JSATS)	361	239
Detections at Tower Bridge	72 (20%)	55 (23%)
Detections at the Sacramento I-80/50 Bridge	68 (19%)	48 (20%)
Minimum Survival to Tower Bridge	20.6%	25.9%
95% Confidence Interval	16.7% to 25.1%	20.7% to 31.9%

<https://calfishtrack.github.io/real-time/pageLSWR.html>

Detections at Tower Bridge (downtown Sacramento) versus Sacramento River flows at Colusa Bridge



Preliminary Spring Kodiak Trawl Chinook Salmon and Steelhead Catch Survey 4, 2018

Survey Conducted 4/2/2018 – 4/5/2018

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										
405	0										
411	0										
418	0										
501	1			1							
504	0										
519	0										
602	0										
606	2		1		1						
609	0										
610	1				1						
508	2				2						
513	0										
520	6			2	4						
801	0										
804	2			1	1						
704	1				1						
706	3			2	1						
707	3			3							
711	1									1	
712	0										
713	2				2						
715	0										
716	0										
719*											
724	1			1							
809	1									1	
812	1				1						
815	0										
902	0										
906	2			1	1						
910	6		2	2	2						
912	8		1		7						
914	4				4						
915	0										
919	0										
920	0										
921	1		1								
922	0										
923	0										
Totals:	48	0	5	13	28	0	0	0	0	2	0
Range of FL			36-73	81-100	75-117					224-430	

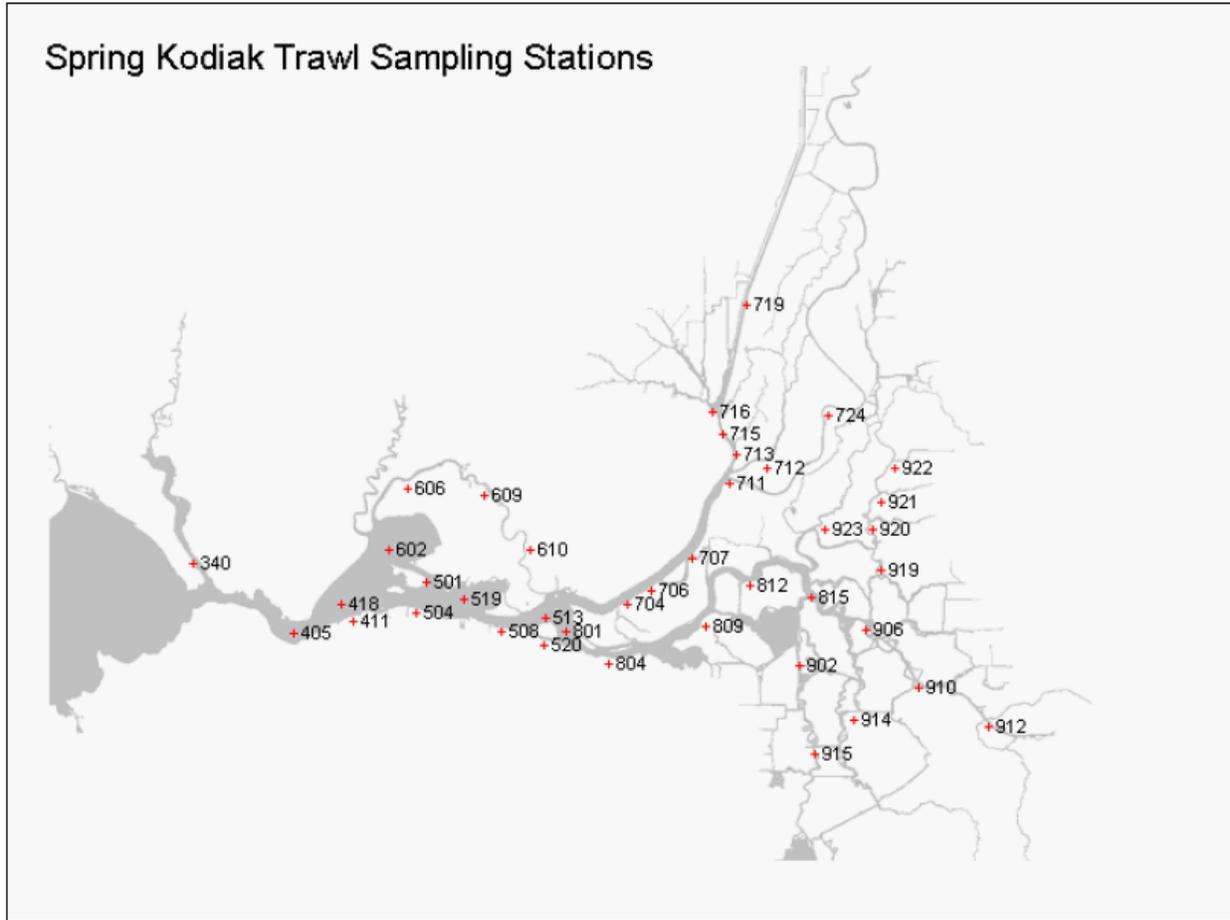
Suisun Bay & West

Confluence

Sac River System

South & Central Delta

*Station not sampled



Agenda Item 7.

Fish Monitoring: Salvage⁴

Fujimura (CDFW) provided a salvage summary for the period of April 2-April 8, 2018.

The number of juvenile Chinook salmon salvaged last week decreased compared to the previous week: 8 winter-run size, 2,335 spring-run size, and 615 fall-run size unclipped juvenile Chinook salmon were salvaged; 136 spring-run size juvenile clipped (hatchery) Chinook salmon were salvaged.

The number of wild steelhead salvaged last week increased compared to the previous week. 242 wild steelhead and 110 hatchery steelhead were salvaged.

Wild steelhead and older juvenile Chinook salmon were salvaged most days last week and resulted in daily loss densities between 0.56 to 1.23 fish/TAF for older juvenile Chinook salmon and 3.58 to 14.25 for wild steelhead.

No sturgeon were salvage last week.

⁴ Salvage data reported in this section represent the total estimated and expanded salvage based on the number of fish observed at the fish collection facility. For example, if one steelhead is observed in the typical ½-hour sampling period within a 2-hour operation period, the single steelhead is expanded to a salvage of four.

Preliminary results for yesterday (4/9) indicate wild Chinook salmon and wild and hatchery steelhead were salvaged at both state and federal fish facilities. Most of the Chinook salmon were in the spring-run size range.

DOSS Weekly Salvage Update

Reporting Period: April 2-April 8, 2018
 Prepared by Bob Fujimura on April 9, 2018 19:30
 Preliminary Results -Subject to Revision

Criteria	2-Apr	3-Apr	4-Apr	5-Apr	6-Apr	7-Apr	8-Apr	Trend	
Loss Densities									
Wild older juvenile CS	0.68	0	0	1.23	0	0	0.56	↘	0.35
Wild steelhead	9.89	7.83	5.80	5.18	3.58	14.25	7.57	↗	7.73
Exports									
SWP daily export	6,092	7,316	8,974	9,037	9,146	9,584	8,784	↘	8,419
CVP daily export	6,991	7,005	5,403	5,378	5,380	5,386	6,811	↘	6,051
SWP reduced counts	0%	0%	8%	0%	0%	0%	0%	↗	1%
CVP reduced counts	0%	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 brief fish salvage facility interruption 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	8	35	↘	120	327
Spring Run	2,335	5,002	↘	5,397	9,413
Late Fall Run	4	3	↘	5	7
Fall Run	615	974	↘	1,498	1,884
Unclassified	0	0	↘	4	NC
Total	2,962	6,015		7,024	11,632
Hatchery					
Winter Run	0	0	↘	40	148
Spring Run	136	350	↘	966	1,596
Late Fall Run	0	0	↘	70	232
Fall Run	0	0	↘	0	0
Unclassified	0	0	↘	1	NC
Total	136	350		1,077	1,975

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
 Selective correction of wild older juvenile salmon from results from the rapid DNA analysis project have been made on wild winter-run sized salmon.

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	242	783	↘	727	1,950
Hatchery	110	374	↘	653	2,201
Total	352	1,157		1,380	4,151

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

Generated by Bob Fujimura on April 9, 2018

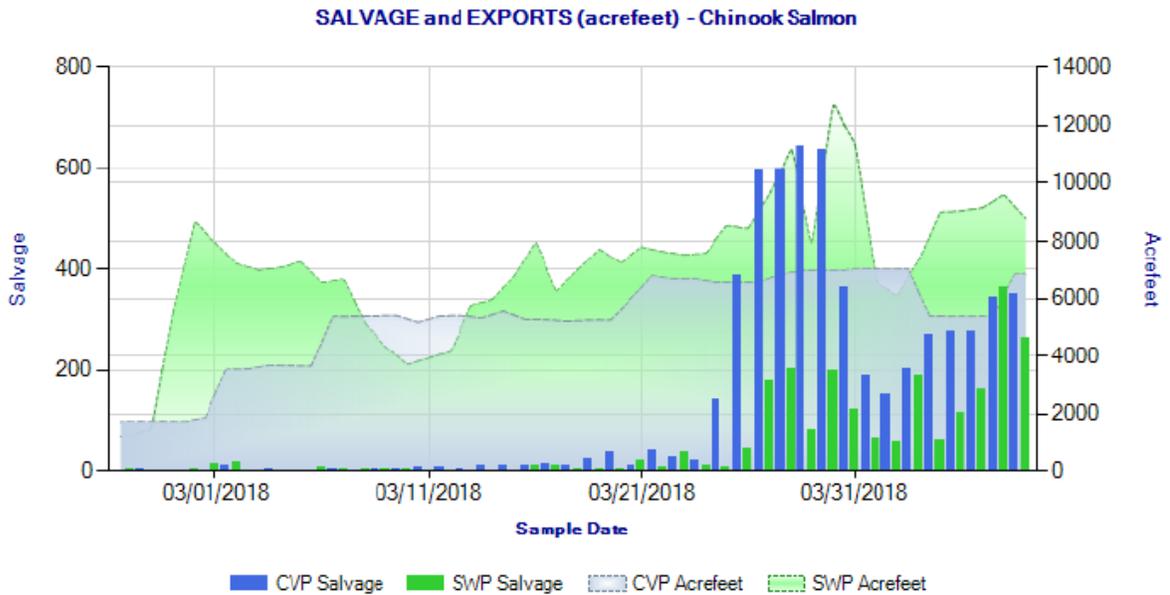


Figure 1. Daily salvage of Chinook Salmon (all races) and water exports from the state and federal fish salvage facilities during February 25 through April 8, 2018. Graph obtained from the DFG salvage monitoring web page: <http://www.dfg.ca.gov/delta/apps/salvage/SalvageExportCalendar.aspx>.

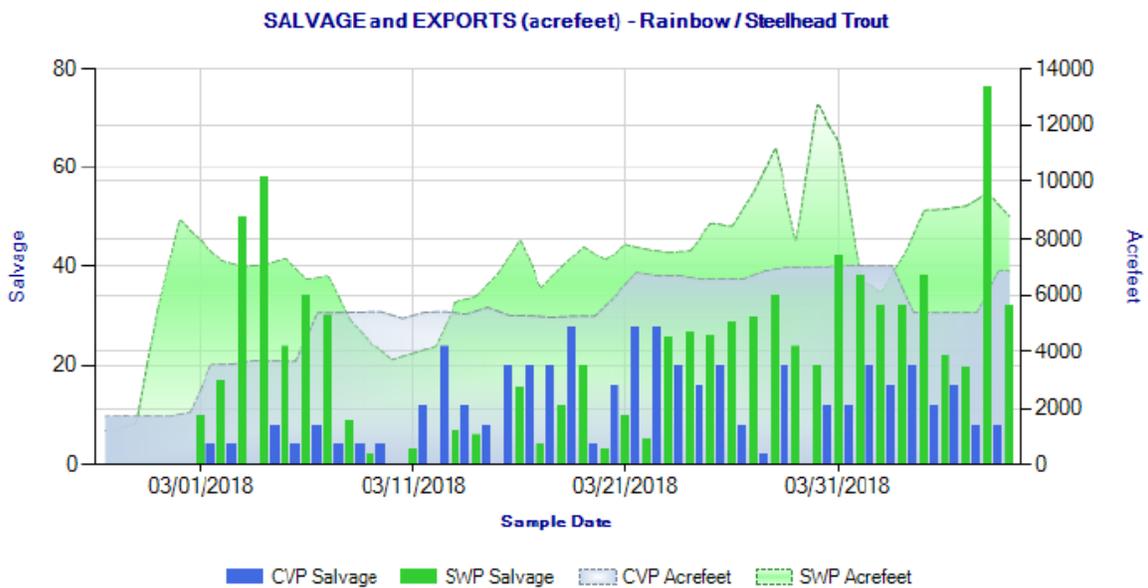


Figure 2. Daily salvage of Rainbow/Steelhead and water exports from the state and federal fish salvage facilities during February 25 through April 8, 2018. Graph obtained from the DFG salvage monitoring web page: <http://www.dfg.ca.gov/delta/apps/salvage/SalvageExportCalendar.aspx>.

CONFIRMED HATCHERY (ADIPOSE-FIN CLIPPED) CHINOOK SALMON LOSS AT THE SWP & CVP DELTA FISH FACILITIES as of 4/5/18

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 Trigger	Date of First Loss ⁴	Date of Last Loss ⁴
12/21/2017	LF	Coleman NFH	Battle Creek	Production	31.35	297,370	n/a	0.011	n/a	n/a	1/23/2018	3/16/2018
1/5/2018	LF	Coleman NFH	Battle Creek	Production	130.62	519,791	n/a	0.025	n/a	n/a	1/31/2018	3/28/2018
1/8/2018	LF	Coleman NFH	Battle Creek	Spring Surrogate	12.99	78,786	n/a	0.016	n/a	0.5%	1/31/2018	3/26/2018
1/19/2018	LF	Coleman NFH	Battle Creek	Spring Surrogate	0	71,645	n/a	0.000	n/a	0.5%	*	*
1/25/2018	LF	Coleman NFH	Battle Creek	Spring Surrogate	25.68	84,922	n/a	0.030	n/a	0.5%	*	3/8/2018
3/1/2018, 3/13/2018	W	Livingstone NFH	Sacramento River	Production	19.93	216,746	n/a	0.009	n/a	0.5%	3/22/2018	3/26/2018
12/21/2017	S	SJRRP	San Joaquin River	Experimental	13.16	1450	n/a	0.908	n/a	n/a	1/11/2018	3/13/2018
1/19/2018	S	SJRRP	San Joaquin River	Experimental	149.55	31184	n/a	0.480	n/a	n/a	3/14/2018	4/3/2018
1/26/2018	S	SJRRP	San Joaquin River	Experimental	236.34	49549	n/a	0.477	n/a	n/a	3/11/2018	4/4/2018
3/2/2018	S	SJRRP	San Joaquin River	Experimental	736.58	87115	n/a	0.846	n/a	n/a	3/30/2018	4/4/2018

UNCONFIRMED HATCHERY (ADIPOSE-FIN CLIPPED) CHINOOK SALMON LOSS AT THE SWP & CVP DELTA FISH FACILITIES, 2017/2018

Facility	Unknown CWT Loss ⁵	Unread CWT Loss ⁶	Unknown Hatchery Loss ⁷	Acoustic Tag Loss ⁸	Number of Unassigned CWTs ⁹
SWP	270.34				
CVP	16.02				
TOTAL	286.36				

SWP and CVP adipose-fin clipped Chinook lost from 10/1/2017 through 4/05/2018.

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.

⁵Adipose-fin clipped Chinook was observed during fish count, but tag code could not be determined (e.g., damaged tag, lost tag, no tag, or Chinook released).

⁶Adipose-fin clipped Chinook was collected during fish count and has not been processed yet.

⁷CWT has been read, but hatchery release information not yet available.

⁸Adipose-fin clipped Chinook released due to presence of sutures.

⁹CWT cannot currently be assigned to a salvage record with certainty since the CWT was lost and then found. CWT may be assigned to a salvage record if new information is available.

* Information not yet available.

DWR-DES Revised 4/6/2018

Preliminary data from DFW, DWR, FWS, and Reclamation; subject to revision.

Agenda Item 8.

Hatchery Releases

The USFWS scheduled a release of approximately 3,959,982 brood year 2017 fall-run Chinook salmon from the Coleman National Fish Hatchery into Battle Creek on 4/6. This release included 25% marked (adipose fin clip and CWT) fish.

The USFWS scheduled a release of approximately 25,248 brood year 2017 winter-run Chinook salmon captive broodstock progeny into the North Fork Battle Creek, at Wildcat Road Bridge, on 4/6. The release was 100% marked (adipose fin clip, left pelvic-fin clip, and CWT) fish.

The USFWS scheduled a release of approximately 100,000 brood year 2017 steelhead from the Mokelumne River Hatchery into the Mokelumne River at New Hope Landing on 4/9 and 4/10. The release is 100% marked (adipose fin clip) fish.

Agenda Item 9.

DOSS Estimates of Fish Distribution

DOSS estimates of the current distribution of listed Chinook and steelhead, 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>Wild young-of-year winter-run Chinook salmon</i>	<1% (Last week: <1%)	5-20% (Last week: 15-30%)	80-95% (Last week: 70-85%)
<i>Wild young-of-year spring-run Chinook salmon</i>	5% (Last week: 5-10%)	70-75% (Last week: 80-85%)	20-25% (Last week: 10%)
<i>Hatchery winter-run Chinook salmon</i>	25% (Last week: 60-75%)	50% (Last week: 20-30%)	25% (Last week: 5-10%)

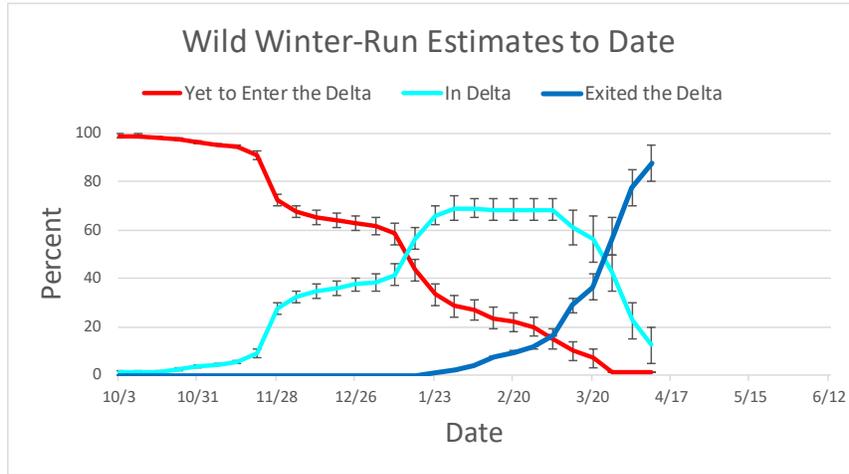
Rationale for changes in distribution

Wild winter-run Chinook: 2 winter-run sized fish were observed at GCID and 3 at Chipps Island this past week. Since several more fish were observed at Chipps Island trawl and only a couple at other monitoring locations during this past week, DOSS estimated that an additional 10% of the winter-run population has exited past Chipps Island.

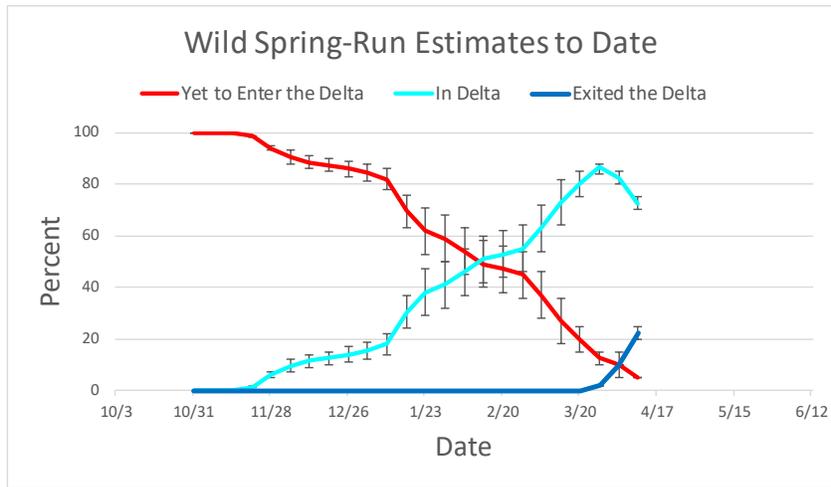
Wild spring-run Chinook: 10 spring-run sized fish were observed at GCID, 1 at Tisdale, 23 in the beach seines, 3 at Sacramento Trawl, and 31 at Chipps Island Trawl this past week. Since more fish were observed at locations within the Delta and at Chipps Island trawl, DOSS estimated that an additional 10% of the spring-run population has moved into the Delta from upstream locations and an additional 10-15% of the population has exited the Delta past Chipps.

Hatchery winter-run Chinook: Based on real-time monitoring of the acoustically-tagged hatchery winter-run at Tower Bridge and the I-80/50 Bridge and due to high river flows this past week, DOSS estimated that the majority of the release groups have entered the Delta and based on the size of clipped Chinook salmon recovered in the Chipps Island trawl, DOSS estimates that 25%

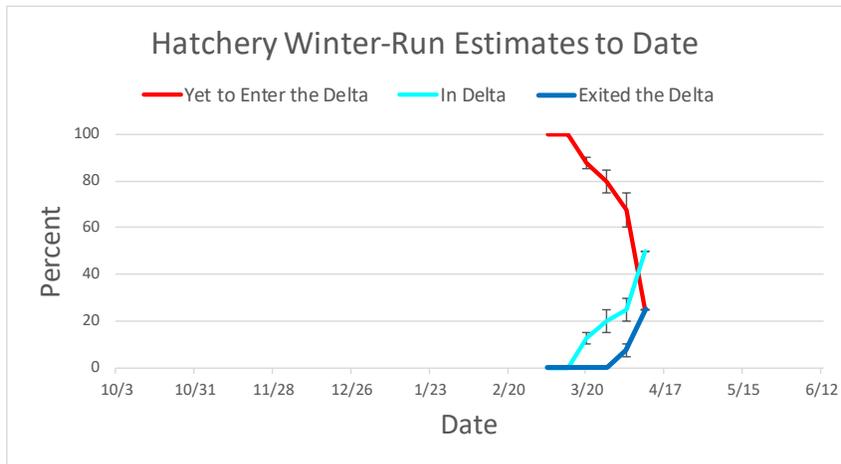
of the hatchery produced winter-run have exited past Chippis Island. This estimate assumes a high in-river survival rate but does not account for predation or other sources of mortality.



WY 2018 wild winter-run distribution estimates to date.



WY 2018 wild spring-run distribution estimates to date.



WY 2018 hatchery winter-run distribution estimates to date.

Agenda Item 10.

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 99% of the winter-run Chinook salmon population has moved downstream into the Delta or have already exited past Chipps Island.
 - Hatchery production winter-run releases have occurred and the pulse of acoustically-tagged fish has been detected moving through the Sacramento area receiver arrays.
 - Hatchery winter-run Chinook salmon have been salvaged at the Project's fish salvage facilities.
 - Wild winter-run Chinook salmon have been observed at the salvage facilities (DNA verified).
 - Spring Kodiak Trawl data also indicate winter-run are in the central and western Delta.
 - Increased flows and turbidities from recent storms are expected to have stimulated fish movement.
 - Winter-run continue to be present in the Delta and are likely to continue rearing there for the next several weeks, until leaving the Delta, elevating their exposure risk.
 - Fewer winter-run have been seen recently in the lower Sacramento River section between Sacramento and the DCC and more winter-run have been observed in the

- catch at Chipps Island over the past few weeks, indicating that most of the population has moved out of the Delta past Chipps Island.
- Approximately 70-75% of spring run population is in Delta, with an additional 20-25% of the population having exited the Delta.
 - Surrogate spring-run Chinook salmon hatchery releases of late-fall run Chinook salmon that are captured during DJFMP monitoring or in salvage are in the Delta. The last release occurred on 1/25/18. CWTs from ad-clipped Chinook salmon are being read from fish collected during monitoring.
 - Wild and hatchery Chinook salmon and steelhead have been observed in the Chipps Island trawls.
 - Wild and hatchery Chinook salmon have been observed in beach seines from the North Delta and Liberty Island regions.
 - Wild and hatchery Chinook salmon as well as hatchery steelhead have been observed in the EDSM efforts.
 - Wild and hatchery salmonids and steelhead have been observed in salvage.
- **Routing Risk: LOW-MEDIUM**
 - Sacramento River inflows are currently ~79,000 cfs and are high enough to mute tidal effects at Georgiana Slough and Three Mile Slough.
 - Delta Cross Channel is closed.
 - **Overall Entrainment Risk: MEDIUM**
 - Fish are present in the Delta but high river inflows and predicted positive OMR and Qwest reduce the risk of entrainment into the central and southern Delta.

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

- **Exposure Risk: HIGH**
 - Clipped steelhead and wild steelhead have been observed in salvage.
 - Clipped and wild Chinook salmon have been seen in salvage.
 - Continuing to see Chinook salmon and steelhead in lower Sacramento River and western Delta monitoring efforts (Chipps Island and in the river confluence region)
 - SKT trawl has captured clipped and unclipped Chinook salmon in the San Joaquin River and southern Delta.
 - Greater proportions of the WRCS and SRCS populations are estimated to have moved into the Delta or out of the Delta than remain upstream
- **OMR/Export Risk:**
 - OMR -2,500 cfs: LOW (higher San Joaquin River flows reduce this risk)
 - OMR -3,500 cfs: MEDIUM
 - OMR -5,000 cfs: MEDIUM-HIGH
 - OMR -6,250 cfs⁵: HIGH

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

- OMR -7,500 cfs⁵: HIGH (incrementally higher risk if Vernalis flows decrease)
 - OMR -9,000 cfs⁵: HIGH (full export capacity, footprint of export effects extend into the western Delta and lower San Joaquin River). Different DOSS members ranked the risk as either a medium or high risk.
- **Overall Entrainment Risk:**
 - OMR -2,500 cfs: MEDIUM (high San Joaquin River flows)
 - OMR -3,500 cfs: MEDIUM-HIGH (but lower than -5,000 cfs OMR risk)
 - OMR -5,000 cfs: MEDIUM-HIGH
 - OMR -6,250 cfs⁵: HIGH
 - OMR -7,500 cfs⁵: HIGH
 - OMR -9,000 cfs⁵: HIGH

These assessments are based on current hydrology and fish distributions.

Agenda Item 11.

DOSS Advice to WOMT and NMFS:

None.

Agenda Item 12.

Next Meeting: The next DOSS conference call will be on **4/17/2018 at 9 am.**