

Delta Operations for Salmonids and Sturgeon (DOSS) Group
Conference call: 2/27/2018 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, Jason Julienne

DWR: Farida Islam, Kevin Reece, Dan Yamanaka Bryant Giorgi

NMFS: Jeff Stuart, Kristin McCleery

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

SWRCB: Chris Kwan

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/djfmfp)
3. Current Operations
4. Smelt working group update
5. Fish Monitoring: RSTs/trawls/seines
6. Fish Monitoring: Salvage
7. Hatchery Releases
8. DOSS Estimates of Fish Distribution
9. DOSS Estimates of Fish Entrainment Risk
10. DOSS advice
11. Next DOSS meeting

Agenda Item 2.

RPA Implementation Review

Delta RPA Actions affecting operations during February:

Action IV.1.2¹ (DCC gate operations):

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

Action IV.2.3² (OMR Management):

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

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

- Implementation of this action in WY 2018 is from 1/1/18 through 6/15/18, 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.
- Since the action went into effect on 1/1/18, no salvage-based triggers that would require OMR to be more positive than -5,000 cfs have been exceeded.

Action IV.3³ (Reduce likelihood of entrainment or salvage at the export facilities, including 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 [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 11/1/17, no salvage-based triggers that would require export reduction have been exceeded.

Agenda Item 3.

Current Operations (2/27/18)

SWP		CVP	
Exports (cfs)			
Clifton Court Forebay	2,900	Jones Pumping Plant	800 (1 unit)
Reservoir Releases (cfs)			
Feather - Oroville	2,250*	American - Nimbus	3,000**
		Sacramento - Keswick	3,250
		Stanislaus - Goodwin	1,700***
		Trinity - Lewiston	300
Reservoir Storage (in TAF)			
San Luis (SWP)	699	San Luis (CVP)	855
Oroville	1,459	Shasta	3,410
New Melones	1,928	Folsom	533
Delta Operations			
DCC	Closed	Sacramento River at Freeport (cfs)	11,200
Outflow Index (cfs)	~11,600	San Joaquin River at Vernalis (cfs)	2,804
E:I	16% (14-day avg.)	X2	76 km

* Oroville releases will decrease by ~200 cfs per day, targeting 1,750 cfs by Friday (3/2).

** Nimbus releases will decrease to 2,500 cfs by 3/1.

*** Goodwin releases will decrease to 900 cfs tomorrow (2/28), with further reductions possible later in the week.

Approximate OMRs as of 2/24/18:

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

	USGS gauges (cfs)	Index (cfs)
Daily	-800	-1,100
5-day	-600	-600
14-day	-1,700	-1,500

Approximate OMRs as of 2/26/18:

	Index (cfs)
Daily	-500
5-day	-600
14-day	-1,000

Factors controlling Delta exports:

- 2/20-2/27: D-1641 Delta outflow requirements and X2.
- Starting in early March, either OMR, outflow/X2 position, or the E/I ratio would likely be the controlling factor on any given day as current hydrology forecast are determined for the rest of the month.

Weather Forecast

The weather forecast for the Sacramento region predicts a series of winter storms bringing significant precipitation on Wednesday evening, continuing into the weekend.

Agenda Item 4.

Smelt Working Group Update

The Smelt Working Group met on Monday, 2/26/18 at 10 am. Anderson (USFWS) provided a summary on the DOSS call, and Chen (USFWS) distributed the following Smelt Working Group meeting summary via email:

The Smelt Working Group reviewed current Delta conditions, survey data, current water project operations, and forecasted weather. Current weather conditions are rainy and cool, with significant precipitation forecasted on Thursday. The 3-station average water temperature (Antioch, Rio Vista Bridge, and Mossdale) has remained below 12°C since 2/14, which is the temperature indicative of spawning identified in the Biological Opinion and a trigger for the start of Action 3. Current water exports have been kept to a minimum in an effort to increase and maintain Delta outflow. Based on Delta conditions, reductions in water exports, and the lack of recent detections of Delta smelt from surveys within the entrainment risk area, the Group concluded that the risk for Delta smelt and longfin smelt entrainment is low. In addition, no larval Delta smelt and no spawning adult Delta smelt have been detected, which indicates that the spawning season likely has not yet begun.

The Smelt Working Group does not believe that a recommendation under Action 1, Action 2 (adult pre-spawning Delta smelt), or Action 3 (larval Delta smelt) is necessary to protect Delta smelt at this time. The Group will continue to monitor Delta smelt survey and salvage data, Delta conditions, and particularly this Thursday's forecasted precipitation. The group will meet again next Monday, 3/5 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	Tisdale RST ^A	Knights Landing RST ^B	Butte Creek Fyke trap ^C	Butte Creek RST ^D	Beach Seines ^E	Sacramento Trawl ^E	Chippis Is. Midwater Trawl ^E	Mossdale Kodiak Trawl ^E
Sample Date	2/20-2/27	2/16-2/26	2/19-2/26	2/12-2/20	2/12-2/20	2/20-2/23	2/18, 2/20, 2/21, 2/22, 2/24	2/18, 2/20, 2/21, 2/22, 2/24	2/20, 2/21, 2/23
FR Chinook	7 juveniles					92	2		
SR Chinook	5 juveniles			2,999	2,541	19	1		
WR Chinook	5 smolts	1							
LFR Chinook									
Chinook (ad-clip)									
Steelhead (wild)									
Steelhead (ad-clip)	4 juveniles		2				14	8	
Green Sturgeon									
Flows (avg. cfs)	650	4,428	4,280	228	228				
W. Temp. (avg. °F)	48.5	49.8	48.1	42.8	42.8				
Turbidity (avg. NTU)	N/A	15.6	11.9	7.1	7.1				

^A Tisdale RST sampling period was from 2/16 at 11:00 am to 2/26 at 9:30 am.

^B Knights Landing RST sampling period was from 2/19 at 11:30 am to 2/26 at 10:30 am.

^C Butte Creek Fyke trap sampling period was from 2/12 at 8:30 am to 2/20 at 9:30 am.

^D Butte Creek RST sampling period was from 2/12 at 8:00 am to 2/20 at 8:30 am.

^E Data reported in the 2/18 to 2/24 DJFMP sampling summary. Data included 1 RBT, 3 RBTC, and 1 white sturgeon (WST) in EDSM Trawls.

Red Bluff Diversion Dam (RBDD)

The RBDD monitoring report came in after the DOSS call concluded. The data are provided for continuity of information. USFWS biweekly report (2/12/18-2/25/18) 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 (BY2017)	1,060*	459,380 (317,591-601,169)
Spring-run Chinook (BY2017)	4,306**	138,589 (99,077-178,101)

*Biweekly catch decreased by 103 fish from previous biweekly total of 1,163.

**Biweekly catch increased by 3,666 fish from previous biweekly total of 640.

Agenda Item 6.

Fish Monitoring: Salvage⁴

Fujimura (CDFW) provided a salvage summary.

For the period of 2/19-2/25, fish facilities continued to salvage juvenile Chinook salmon without adipose fins. Six winter-run sized Chinook salmon and 4 late fall-run Chinook salmon were salvaged. Four wild winter-run sized Chinook and 4 wild fall-run sized Chinook were also salvaged. The older juvenile salmon loss density reported on 2/20 was 2.25 fish/TAF, which is below the first trigger level of 2.5 fish/TAF (see weekly summary tables for details). The data sheet indicated that an observed clipped fish was a sutured fish. Stuart (NMFS) informed the DOSS group that several of the San Joaquin River Restoration Program experimental fish were implanted with acoustic tags, and may be the source of the observed fish with sutures.

Four wild steelhead and 1 hatchery steelhead were salvaged from the CVP last week (2/19 – 2/25/18). The 2/21 daily loss density was 1.0 fish/TAF (below RPA trigger levels). No steelhead were observed at the SWP facility during the same period.

Preliminary data for 2/26 indicated that no salmonid species or green sturgeon were reported at the SWP, however salvage of clipped spring-run sized juvenile Chinook salmon occurred at the CVP.

The Tracy Fish Collection Facility experienced a power outage yesterday evening that halted salvage operations for approximately 5.5 hours, but exports continued throughout that time.

Fujimura (CDFW) introduced the Spring Kodiak Trawl (SKT) interactive online mapping tool, <http://www.dfg.ca.gov/delta/data/skt/DisplayMaps.asp>, which allows you to select the species of interest, clipped or non-clipped status, as well as the year and survey number of the trawl. Please email Fujimura with any comments about the site.

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.

DOSS Weekly Salvage Update

Reporting Period: February 19-February 25, 2018

Prepared by Bob Fujimura on February 26, 2018 14:22

Preliminary Results -Subject to Revision

Criteria	19-Feb	20-Feb	21-Feb	22-Feb	23-Feb	24-Feb	25-Feb	Trend	
Loss Densities									
Wild older juvenile CS	0	2.25	0	0	0	0	0	↗	0.32
Wild steelhead	0	0	1.07	0	0	0	0	↘	0.15
Exports									
SWP daily export	392	0	809	1,226	2,106	1,761	1,235	↘	1,076
CVP daily export	1,744	1,728	1,727	1,731	1,730	1,730	1,730	↘	1,731
SWP reduced counts	0%	NA	0%	0%	0%	0%	0%	→	0%
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

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	4	4	↗	8	7
Spring Run	0	0	→	0	0
Late Fall Run	0	0	→	1	4
Fall Run	4	3	↗	4	3
Unclassified	0	0	→	0	0
Total	8	7		13	15
Hatchery					
Winter Run	6	26	↗	10	29
Spring Run	0	0	→	8	6
Late Fall Run	4	4	↘	47	160
Fall Run	0	0	→	0	0
Unclassified	0	0	→	1	NC
Total	10	30		66	195

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	4	3	↘	16	55
Hatchery	1	1	↘	30	20
Total	5	3		46	75

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

Generated by Bob Fujimura on February 26, 2018

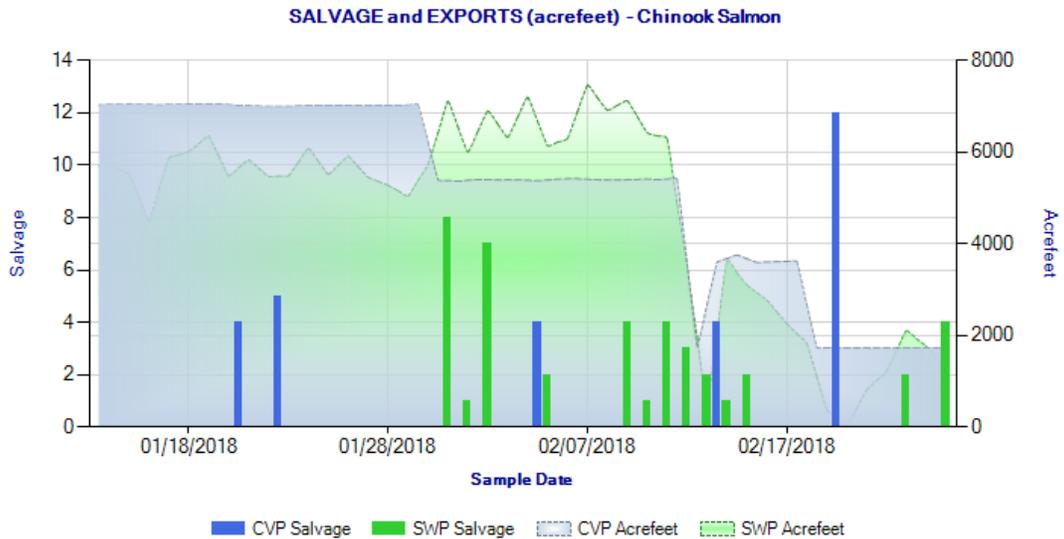


Figure 1. Daily salvage of Chinook Salmon (all races) and water exports from the state and federal fish salvage facilities during January 14 through February 25, 2018. Graph obtained from the DFG salvage monitoring web page: <http://www.dfg.ca.gov/delta/apps/salvage/SalvageExportCalendar.aspx>.

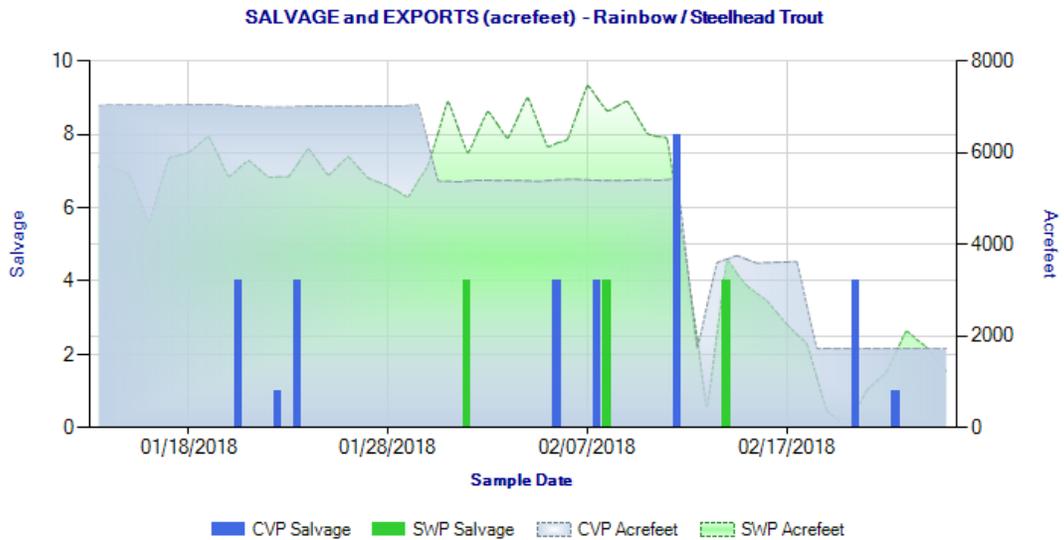


Figure 2. Daily salvage of Rainbow/Steelhead and water exports from the state and federal fish salvage facilities during January 14 through February 25, 2018. Graph obtained from the DFG salvage monitoring web page: <http://www.dfg.ca.gov/delta/apps/salvage/SalvageExportCalendar.aspx>.

CONFIRMED HATCHERY (ADIPOSE-FIN CLIPPED) CHINOOK SALMON LOSS AT THE SWP & CVP DELTA FISH FACILITIES as of 2/22/18

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	11.54	297,370	n/a	0.004	n/a	n/a	1/23/2018	1/31/2018
1/5/2018	LF	Coleman NFH	Battle Creek	Production	104.37	519,791	n/a	0.020	n/a	n/a	1/31/2018	2/15/2018
1/8/2018	LF	Coleman NFH	Battle Creek	Spring Surrogate	8.66	78,786	n/a	0.011	n/a	0.5%	1/31/2018	2/1/2018
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	3.88	84,922	n/a	0.005	n/a	0.5%	2/20/2018	2/20/2018
12/21/2017	S	SJRRP	San Joaquin River	Experimental	5.64	1450	n/a	0.389	n/a	n/a	1/11/2018	1/11/2018
1/19/2018	S	SJRRP	San Joaquin River	Experimental	0	210	n/a	0.000	n/a	n/a	*	*

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	26.29				
CVP					
TOTAL	26.29				

SWP and CVP adipose-fin clipped Chinook lost from 10/1/2017 through 2/22/2018.

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.

¹⁰Chinook outside of the length-at-date criteria (Delta model) are not reported.

** Information not yet available.

DWR-DES Revised 2/23/2018

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

Agenda Item 7.

Hatchery Releases

Stuart (NMFS) informed the DOSS group that the hatchery produced winter-run from the Livingston Stone National Fish Hatchery slated for the Sacramento River release are likely to be released this Thursday and/or Friday due to the forecast of rain events in the Central Valley region. Final details will be sent out later this week. The release group will be marked with an adipose fin clip and CWT. In addition, approximately 87,000 spring-run Chinook salmon will be released at Highway 140 on the San Joaquin River as part of the San Joaquin River Restoration Program. All fish will be marked with an adipose fin clip and CWT. Approximately 350 fish of the SJRRP will have JSAT tags.

Agenda Item 8.

DOSS Estimates of Fish Distribution

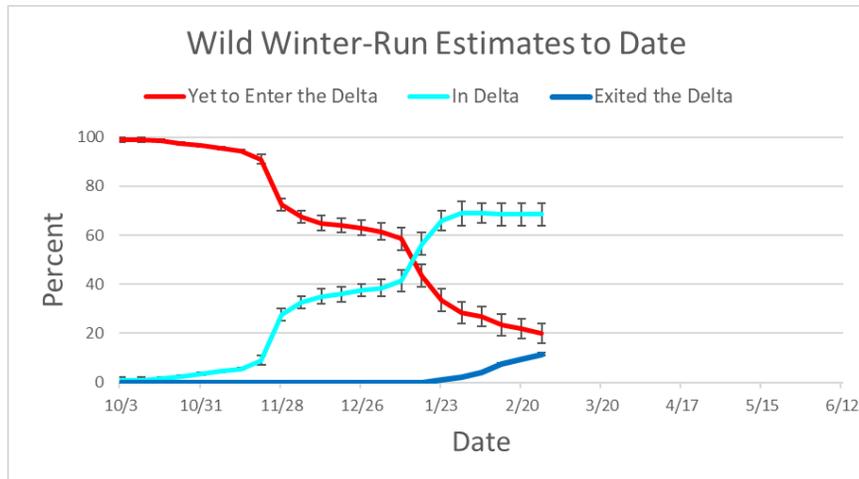
DOSS estimates of the current distribution of listed Chinook and steelhead, as a percentage of the population, are based on recent monitoring data and historical migration timing patterns.

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>	16-24% (Last week: 18-26%)	64-73% (Last week: 64-73%)	11-12% (Last week: 9-10%)
<i>Wild young-of-year spring-run Chinook salmon</i>	36-54% (Last week: 38-56%)	46-64% (Last week: 44-62%)	0% (Last week: 0%)

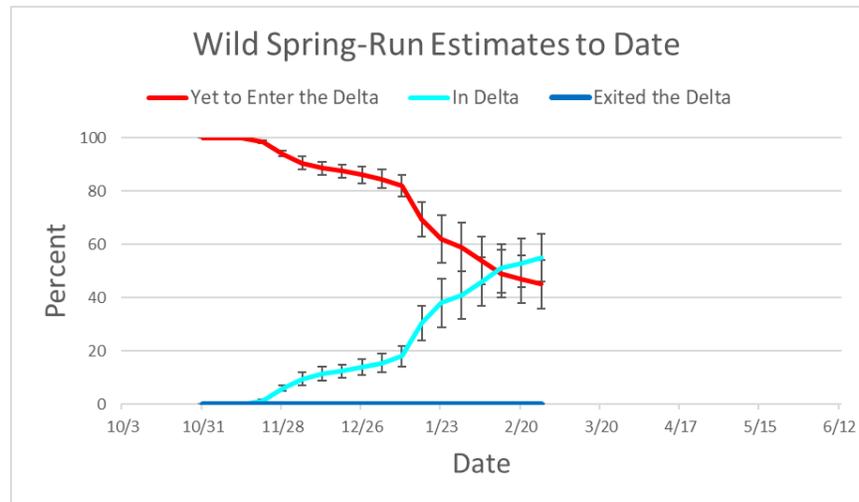
Rationale for changes in distribution

Wild winter-run Chinook: Few winter-run sized fish were observed at monitoring locations this past week: 5 at GCID and 1 at Tisdale. Since fish were observed and river conditions are similar to last week, DOSS estimated that an additional 2% of the winter-run population has moved through the Delta.

Wild spring-run Chinook: 5 spring-run sized fish were observed at GCID, ~5,500 at Butte Creek, 19 in the beach seines, and 1 at Sacramento Trawl this past week. Since more fish were observed and river conditions are similar to last week, DOSS estimated that an additional 2% of the spring-run population has moved into the Delta. There is also the potential that some of the fish classified as spring-run by the length-at-date criteria may actually be late emerging and slow growing winter-run Chinook salmon. Cooler river water temperatures this year may have delayed spawning and slowed the emergence and growth of winter-run fry in the upper Sacramento River, and thus these fish would fall into the size criteria for spring-run at this time of year. Likewise, some spring-run may fall into the fall-run length-at-date size criteria due to slow growth in cooler waters.



WY 2018 wild winter-run distribution estimates to date.



WY 2018 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: MEDIUM-HIGH** (higher than last week's risk estimate)
 - Increased flows and turbidities from recent storms are expected to stimulate fish movement.
 - Winter-run continue to be present in the Delta and are likely to continue rearing there for the next several weeks, elevating their exposure risk.
 - Approximately 64-73% of winter-run Chinook salmon population is downstream of Knights Landing at this time, a few winter-run have been seen in the lower Sacramento River section between Sacramento and DCC and several winter-run have been observed in the catch at Chipps Island over the past few weeks, indicating that most of the population is in the Delta and not upstream.
 - Approximately 46-64% of spring run population is in Delta
 - Surrogate spring-run Chinook salmon hatchery releases of late-fall run Chinook salmon are in the system. The last release occurred on 1/25/18. CWTs from captured clipped Chinook salmon are being read from fish collected during monitoring.
 - Wild Chinook salmon and steelhead as well as clipped Chinook salmon and steelhead have been observed in the Chipps Island trawls.
 - Wild and clipped Chinook salmon have been observed in beach seines from the North Delta and Liberty Island regions.
 - Wild and clipped Chinook salmon as well as clipped steelhead have been observed in the EDSM efforts.
 - Wild and clipped salmonids have been observed in salvage.
- **Routing Risk: MEDIUM**
 - River flows are not high enough to mute tidal influence at Georgiana Slough and Three Mile Slough allowing redirection of fish into these routes on flood tides.
 - Delta Cross Channel is closed.
- **Overall Entrainment Risk: MEDIUM-HIGH**
 - Increased movement of winter-run Chinook salmon into the Delta and within the Delta (rearing) increase overall risk of entrainment into the interior Delta.

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

- **Exposure Risk: MEDIUM-HIGH**
 - Clipped steelhead and wild steelhead have been observed in salvage.
 - Clipped and wild Chinook salmon have been observed in salvage.
 - Continuing to see Chinook salmon and steelhead in lower Sacramento River and western Delta monitoring efforts (Chippis Island and in the river confluence region).

- **OMR/Export Risk:**
 - OMR -2,500 cfs: LOW
 - OMR -3,500 cfs: LOW
 - OMR -5,000 cfs: MEDIUM
 - OMR -6,250 cfs⁵: MEDIUM -HIGH
 - OMR -7,500 cfs⁵: MEDIUM-HIGH (incrementally higher risk if Vernalis flows decrease)
 - OMR -9,000 cfs⁵: HIGH (Full export capacity, footprint of export effects extend into western Delta and lower San Joaquin River).

- **Overall Entrainment Risk:**
 - OMR -2,500 cfs: MEDIUM
 - OMR -3,500 cfs: MEDIUM
 - OMR -5,000 cfs: MEDIUM-HIGH
 - OMR -6,250 cfs⁵: MEDIUM-HIGH
 - OMR -7,500 cfs⁵: MEDIUM-HIGH
 - OMR -9,000 cfs⁵: HIGH

These assessments are based on current hydrology and fish distributions. Should more fish from the Sacramento or San Joaquin basins be detected at monitoring locations in the Delta, the risk of entrainment into the interior Delta or at the CVP/SWP facilities will increase.

Agenda Item 10.

DOSS Advice to WOMT and NMFS: None.

Agenda Item 11.

Next Meeting: The next DOSS conference call will be on **3/6/2018 at 9 am.**

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