

Salmon Monitoring Team Weekly Meeting
Conference call: 3/24/20 at 9:00 a.m.

Objective: Provide information to the Water Operations Management Team (WOMT), Reclamation and California Department of Water Resources on measures to reduce adverse effects from Delta operations of the Central Valley Project (CVP) and the State Water Project (SWP) on salmonids and green sturgeon. Salmon Monitoring Team notes will be posted to Reclamation's web page <https://www.usbr.gov/mp/bdo/salmon-monitoring-team.html>.

CDFW: Geir Aasen, Adam Chorazyczewski, Kristal Davis-Fadtke, Kyle Griffiths, Jason Julienne, Ken Kundargi, Duane Linander, Paige Uttley, Jonathan Williams

DWR: Chris Cook, Brittany Davis, Bryant Giorgi, En-Ching Hsu, Farida Islam, Tracy Pettit, Kevin Reece, Harry Spanglet, Ian Uecker

Kearns & West: Matt Marvin

NMFS: Kristin Begun, Jeff Stuart, Garwin Yip

Reclamation: Towns Burgess, Elissa Buttermore, Suzanne Manugian, Tom Patton

SWRCB: Chris Carr, Craig Williams, Alessia Siclari

USFWS: Katherine Sun

Agenda Items:

1. Introductions
2. Relevant Actions and Triggers
3. Current Operations, Outlook, and Weather Forecast
4. Review of Environmental Data
5. Fish Abundance and Distribution
 - a. Hatchery Releases
 - b. Fish Monitoring: RSTs/trawls/seines
 - c. Historical Fish Monitoring Data
 - d. Fish Monitoring: Salvage
 - e. Migration Status: Estimates of Fish Distribution
6. Fish Exposure and Behavioral Cues
 - a. Current Conditions (DSM2, Entrainment Models)
 - b. Sensitivity to Operational Actions
7. Other Topics
8. Additional Considerations for WOMT
9. Next SaMT Meeting

Agenda Item 2.

Relevant Actions and Triggers Review

DCC Gate Operations

- DCC gates are closed per operations described in NMFS' 2009 Biological Opinion (BiOp) RPA Action IV.1.2 and Reclamation's Proposed Action 4.10.5.3 and are expected to remain closed until 5/20/20.

OMR Management

- Implementation of this action in water year (WY) 2020 began on 1/1/20 and requires that Old and Middle River (OMR) flow be no more negative than -5,000 cfs (NMFS' 2009 BiOp RPA Action IV.2.3

and 2019 ROC Proposed Action). OMR flows are reported weekly with the OMR index and the tidally filtered USGS gauges at the daily, 5-day and 14-day running averages.

- The official [Juvenile Production Estimate \(JPE\) letter](#) from NMFS was signed and issued to Reclamation on 2/3/20. The JPE for natural-origin brood year (BY) 2019 Sacramento River winter-run Chinook salmon is 854,941 fish surviving to enter the Delta. The Interim Incidental Take Permit (ITP) issued by the California Department of Fish and Wildlife (CDFW) for the operations of the SWP references the 2009 NMFS biological opinion RPA actions for its compliance. NMFS' RPA action IV.2.3 uses the length-at-date (LAD) for run assignment of older juveniles (i.e., larger than the minimum LAD for winter-run Chinook salmon), the first stage trigger will be exceeded if more fish are lost in salvage than calculated by multiplying 8 fish/thousand acre feet (TAF) times the volume of water exported in TAF. The second stage is triggered if the number of older juvenile Chinook salmon lost is greater than the number calculated by multiplying 12 fish/TAF by the volume of water exported in TAF.
 - If a trigger is exceeded, all older juvenile Chinook salmon will have a tissue sample processed through the rapid genetic analysis protocol to determine the genetic run assignment.
 - When applying the rapid genetic analysis protocol, the first stage trigger is exceeded if genetically verified combined daily loss density of older-juvenile-sized winter-run Chinook salmon exceeds 4.27 fish per TAF of water exported, and the second stage trigger is exceeded if the genetically verified daily loss density of older-juvenile-sized winter-run Chinook salmon exceeds 8.55 fish per TAF of water exported.
- Refer to weekly operations and fish outlook document for more triggers relevant to the CDFW ITP and the 2019 ROC Proposed Actions (see Agenda Item 3).

Agenda Item 3.

Weekly Ops and Fish Outlook Document Reclamation and DWR have been developing an operations and fish monitoring outlook every week to distribute to SaMT, Smelt Monitoring Team, and WOMT. The document summarizes: current and projected CVP and SWP operations, fish life stage presence, and status of various metrics towards Delta Performance Thresholds. SaMT reviewed this document and members provided the following feedback.

Weekly Fish and Water Operations Outlook 3/24/2020 – 3/31/2020

Summary: Light precipitation amounts in Central Valley today through Wednesday. Dry and warmer for the rest of the week. X2 requirements currently in effect are at Collinsville (81 km) through [(1) daily X2, (2) 14 day-averaged X2 or, (3) Delta Outflow {3 day averaged} $\geq 7,1000$ cfs]. The maximum E/I ratio of 0.35 (in D-1641), Collinsville X2 compliance or, OMR $\geq -5,000$ cfs are all factors that could potentially control project operations. Salmonid salvage density criteria per the interim ITP extension are in effect for SWP operations. Reservoir releases are being held or decreased to conserve storage, no increases to reservoir releases will occur this week.

Tributary/Division	Projected Intended Operations and Ranges for week	Related Environmental and Fish Conditions
Clear Creek	Whiskeytown Release: 275 cfs	<ul style="list-style-type: none"> • Fall-run Chinook Salmon emergence underway. • Spring-run Chinook immigration March – June. • Late-fall run chinook are spawning. • Steelhead spawning. <p><i>(updated 3/17/20)</i></p>
Sacramento River	Shasta Storage: 3.56 MAF Shasta Release: 4,500 cfs (a decrease in releases to 4,000 cfs is possible)	<ul style="list-style-type: none"> • End of winter-run Chinook juvenile migration. • Winter-run Chinook adults migrating in and holding. • Spring-run Chinook juveniles rearing and emigrating. • Fall-run Chinook fry in gravel with continued emergence, juveniles rearing and emigrating. • Late-fall Chinook are spawning (Dec-Mar), eggs and fry in gravel. • Steelhead spawning commencing. • Green Sturgeon adults present. <p><i>(updated 3/17/20)</i></p>
Feather River	Oroville Storage: 2.26 MAF Oroville Release to Feather: 1,050 cfs to 1,750 cfs	<ul style="list-style-type: none"> • Fall-run Chinook salmon eggs still in gravel, hatching, and emergence is ongoing. Peak emergence of fall-run was expected to have occurred in mid-March but is more likely to occur through mid-April. • Steelhead spawning is minimal. Steelhead eggs are in gravel, hatching and emergence is ongoing. • Spring-run and Fall-run juvenile Chinook salmon continue to emigrate out of the Lower Feather River. <p><i>(updated 3/23/20)</i></p>
American River	Folsom Storage: .46 MAF Nimbus Release to American: 1,500 cfs (a decrease to 1,000 cfs is possible)	<ul style="list-style-type: none"> • Fall-run Chinook salmon eggs still in gravel, hatching and emergence is ongoing. Peak emergence of fall-run estimated to have occurred mid-March. Preliminary carcass survey results indicate emergence will occur through mid-April. • Steelhead spawning is occurring. Steelhead eggs are in the gravel, hatching and emergence is ongoing.
		<ul style="list-style-type: none"> • Spring-run and winter-run Chinook salmon juveniles present (non-natal rearing). • Fall-run Chinook salmon that have emerged are currently rearing and emigrating out of the lower American River. • Fall-run Chinook salmon and steelhead redds at potential risk of dewatering due to reductions in releases. • Fall-run Chinook salmon and steelhead juveniles at risk of stranding due to reductions in releases.

Tributary/Division	Projected Intended Operations and Ranges for week	Related Environmental and Fish Conditions
		(updated 3/23/20)
Stanislaus River	New Melones Storage: 1.89 MAF Goodwin Release to Stanislaus: 200 cfs	<ul style="list-style-type: none"> • Majority of fall-run Chinook salmon have emerged. Preliminary carcass survey data estimated peak emergence to have occurred mid-February. • Steelhead are spawning based on historical timing and eggs are currently in the gravel. No empirical data on steelhead spawning is available. Historical data indicates steelhead may be emerging now. • Steelhead redds at potential risk of dewatering based on releases in the Stanislaus River: for 3 weeks had been approximately 2,000 cfs, now reduced to 200 cfs. (updated 3/23/20)
Delta	Freeport: 9,000 to 12,000 cfs Vernalis: 1,000 to 1,700 cfs Delta Outflow index: 7,000 to 10,000 cfs Barker Slough PP: 20-42cfs (per ITP Condition 5.3) Exports JPP: 1,800 to 3,600 cfs CC: 500 to 2,000 cfs Expected OMR Index Values: -3,000 to -4,700 cfs Maximum Allowable OMR: -5,000 cfs X2 position: 78 to >81 km QWEST: 0 cfs to -2,000 cfs DCC: Closed	<ul style="list-style-type: none"> • 53-58% Winter-run Chinook juveniles present and 40% past Chipps Island. • 45-60% Spring-run Chinook juveniles present and 0% past Chipps Island. • Fall-run Chinook juveniles rearing. • Steelhead juvenile migration occurring. • Green Sturgeon adult and juveniles present. • Adult Delta Smelt likely spawning. • Spawning adult and larval Longfin Smelt present. (updated 3/24/2020)

Table 2. Relevant Water Year 2020 Fish and Environmental Criteria and Status in 2019 Reclamation LTO Action and NMFS and USFWS Biological Opinions.

Species/run	Threshold	Current Status	Weekly Trend	Updated through
Natural Winter-run Chinook Loss	Single-year loss threshold = 50% of 1.17% of JPE: 5,001 WY2020 JPE: 854,941	Loss (LAD) = 79	Increasing	3/23/2020
Hatchery Winter-run Chinook loss	~60% (152,000) released on 3-10-2020 ~40% (97,505) released on 3-23-2020 Loss = 50% of 0.12% of Sac. R release JPE = 56.7	Loss (CWT) = 0	No change expected	3/16/2020
Steelhead, non-clipped	Loss = 50% of 1,414 from Dec - March = 707	Loss = 48	Increasing	3/23/2020
Hatchery Spring-run Chinook surrogates	0.5% of each release group; 1) 12-9-2019: 84,869 = 424.3 2) 12-18-2019: 77,672 = 388.4 3) 01-13-2020: 77,866 = 389.3	1. 20.2 2. 25.0 3. 0	No change expected	3/22/2020
Green sturgeon	Cumulative salvage = 74	0	No change expected	3/22/2020
Delta Smelt	No First Flush identified, Daily Avg. < 12 NTU at OBI Ripe Female Observed March-June: OMR no more negative than -5000 cfs	Turbidity = 2.75 NTU at OBI	Expected to remain stable	3/24/2020
Longfin Smelt	Dec.- Feb.: Cumulative Salvage Index (CSI) >5 OMR Advice Warranted Jan. - July: larvae found in at least 8 of 12 Stations Catch per tow exceeds 15 in at least 4 stations Larvae are detected at station 716	CSI < 5 Larval Smelt Detections warrant advice on OMR	OMR advice to be given. Barker Slough to be off ramped	3/24/2020

Table 3. Relevant Water Year 2020 Fish Criteria and Status under the CDFW Interim ITP.

Species/run	Threshold	Current Status	Weekly Trend	Updated through
Natural Winter-run Chinook loss	1% of the Juvenile Production Estimate = 8,549.4 WY2020 JPE: 854,941	Loss (LAD) = 79	Increasing	03/23/2020
Winter run and Older Chinook daily loss density	1) JPE based trigger, first stage: 4.27 genetic WRC and yearling SRC/TAF 2) JPE based trigger, second stage: 8.55 genetic WRC and yearling SRC/TAF 3) 8 fish/TAF: first stage trigger IV.2.3 4) 12 fish/TAF: second stage trigger IV.2.3	Weekly Density range = 0 to 0.83 fish/TAF	Expected low density and stable	03/23/2020
Hatchery Winter-run Chinook loss	0.5% of each release group Trigger (Action IV.2.3) 1) Sacramento Release: 472.5 Incidental Take Limits (1% of estimated # of survivors to Delta): 2) Sacramento Release: 945 ~60% (152,000) released on 3-10-2020 ~40% (97,505) released on 3-23-2020 3) Battle Creek Release: 673 168,650 released on 3-23-2020	1, 2. Loss = 0 3. Loss = 0	No change expected	03/16/2020
Steelhead salvage density	First stage trigger: > 8 fish/TAF Second stage trigger: > 12 fish/TAF	Weekly Density range = 0 to 1.86 fish/TAF	No change expected	03/23/2020
Steelhead, non-clipped	Cumulative salvage = 3,000 fish	Salvage = 49	No change expected	03/23/2020

Operations (3/24/20)

Operations Category	Location	Operations Reported on 3/17/2020	Operations on 3/24/2020
Clifton Court Inflow	Clifton Court Forebay	2,300 cfs	1,800 cfs
SWP Reservoir Releases	Feather – Oroville	1,750 cfs	1,750 cfs
SWP Reservoir Storage	San Luis (SWP)	948 TAF	950 TAF
SWP Reservoir Storage	Oroville	2,260 TAF	2,270 TAF
Environmental Parameters	Sacramento River at Freeport	12,000 cfs	12,166 cfs
Environmental Parameters	San Joaquin River at Vernalis	1,900 cfs	1,894 cfs
Environmental Parameters	Delta Outflow Index	12,500 cfs	8,188 cfs
Environmental Parameters	E:I (14-day)	33%	33.6 % (14-day)
Environmental Parameters	X2	>81 Km	80.4 Km
CVP Exports	Jones Pumping Plant	2,700 cfs	3600 cfs, potential reduction of 1,800 to 2,700 cfs later in week
CVP Reservoir Releases	American - Nimbus	1,500 cfs	1500 cfs
CVP Reservoir Releases	Sacramento - Keswick	4,500 cfs	4500 cfs
CVP Reservoir Releases	Stanislaus - Goodwin	200 cfs	200 cfs

Operations Category	Location	Operations Reported on 3/17/2020	Operations on 3/24/2020
CVP Reservoir Releases	Trinity - Lewiston	300 cfs	300 cfs
CVP Reservoir Storage	San Luis (CVP)	469 TAF	505 TAF
CVP Reservoir Storage	Shasta	3,531 TAF	3,564 TAF
CVP Reservoir Storage	Folsom	447 TAF	465 TAF
CVP Reservoir Storage	New Melones	1,890 TAF	1,892 TAF
CVP	DCC Gates	Closed	Closed

cfs = cubic feet per second

TAF = thousand acre feet

Km = kilometer

Location of X2 measured from the Golden Gate

Factors controlling Delta exports:

3/17/20 to 3/24/20: E:I Delta outflow or X2 position will potentially be the controlling factor later this week depending on if there is any rain (at Stockton gage) that will change Delta outflow conditions. May see export reductions if hydrology becomes drier.

Weather Forecast

Widespread precipitation will return Tuesday and Wednesday with showers lingering into Thursday. Dry and warmer late this week.

Agenda Item 4.
Review of Environmental Data

- USGS gage at Old River at Bacon Island (OBI) is not currently reporting data. OMR cannot be measured without this gage data.

Approximate OMRs as of 3/23/20:

	Index (cfs)
Daily	-4,000
5-day	-4,000
14-day	-3,800

Agenda Item 5.
Fish Abundance and Distribution

Hatchery Releases

On 3/16/20, CDFW released an estimated 89,784 BY 2019 spring-run Chinook salmon from the San Joaquin River Restoration Program’s (SJRRP) Interim Salmon Conservation and Rearing Facility (SCARF) into the San Joaquin River. This release consisted of juveniles marked with an adipose fin clip and coded wire tagged (CWT), released at the Fremont Ford Bridge (Highway 140 crossing). JSATS acoustic transmitters were surgically implanted, by UC Davis researchers, into 350 juveniles released.

Approximately 168,650 winter-run Chinook salmon were released by the USFWS into the North Fork Battle Creek on 3/23/20. This is the first, and only, planned release of BY 2019 juvenile winter-run Chinook salmon to be released into Battle Creek. These fish are the progeny of captive broodstock from the Livingston Stone National Fish Hatchery (LSNFH), and have been reared at the Coleman National Fish Hatchery (CNFH). They are approximately 75 mm fork length and are 100% CWT and marked with both an adipose-fin clip and a left pelvic-fin clip. When available, final release information will be submitted to the RMIS database (www.rmpec.org).

Approximately 97,505 winter-run Chinook salmon were released by the USFWS on 3/23/20 at the Caldwell Park Boat Ramp in Redding, CA. This is the final release for the supplementation group of LSNFH BY 2019 winter-run Chinook salmon. These fish are approximately 100 mm fork length and are 100% CWT and marked with an adipose-fin clip. When available, final release information will be submitted to the RMIS database (www.rmpec.org).

Between 3/23/20 and 3/24/20, the USFWS released approximately 6.3 million BY 2019 fall-run Chinook salmon from the CNFH into Battle Creek. This release included 25% marked (adipose fin clip and CWT) and 75% unmarked fish. When available, final release information will be submitted to the RMIS database (www.rmpec.org).

On 3/24/20, the USFWS released approximately 375,540 BY 2019 fall-run Chinook salmon from the CNFH into Battle Creek. This release was 100% marked with an adipose fin clip and CWT. When available, final release information will be submitted to the RMIS database (www.rmipc.org).

Fish Monitoring:

Historical Fish Monitoring Data

Because of challenges with limited data and interpretation of real-time steelhead catch data, SaMT reviews historical catch data on SacPAS’s Migration Timing and Conditions page and the Salvage Timing page.

SacPAS main page: <http://www.cbr.washington.edu/sacramento/>

Migration Timing: http://www.cbr.washington.edu/sacramento/data/query_hrt.html

Migration Timing

Average percent of annual emigrating population for each species of interest captured at the following locations by 3/22/20 for the years 2005 to 2018.

Brood Years	Species, species run	Average Percent of Annual Population Captured at Red Bluff Diversion Dam	Average Percent of Annual Population Captured at Tisdale RST	Average Percent of Annual Population Captured at Knights Landing RST	Average Percent of Annual Population Captured in Beach Seines	Average Percent of Annual Population Captured in Sac Trawl (Sherwood)	Average Percent of Annual Population Captured at Chipps Island Trawl
2005 – 2018	Winter-run Chinook salmon	99.7%	99.1%	98.7%	99.6%	75.8%	46.9%
2005 – 2018	Spring-run Chinook salmon	47.7%	33.8%	53.5%	79.7%	19.8%	0.4%
2005 – 2018	Steelhead	2.8%	64.1%	57.7%	74.0%	90.2%	79.5%

Salvage timing:

Average percent for each species (based on length at date) of interest salvaged at the SWP and CVP Delta Fish Facilities by 3/22/20 in previous years. Average sampled represents historic data spanning years 2005 – 2018.

Brood Year	Species, species run	Average Percent Salvaged at SWP and CVP Delta Facilities
Average 2005 - 2018	Winter-run Chinook salmon (unclipped)	82.6%
Average 2005 – 2018	Spring-run Chinook salmon (unclipped)	4.4%
Average 2005 – 2018	Steelhead (unclipped)	49.6%

Current Fish Monitoring Data

Fish monitoring data summarized over the past week are found on Bay Delta Live. Unless otherwise noted, reported races are based on fork length (LAD).

<https://www.baydeltalive.com/fish/djfm-highlights>

<https://www.baydeltalive.com/fish/triggers-and-indices>

Location	GCID RST ^C	Tisdale RST ^D	Knights Landing RST ^E	Beach Seines	EDSM	LAR RST	Sac. Trawl	Chippis Island Midwater Trawl	Mossdale Kodiak Trawl
Dates	3/17 – 3/23	3/17 to 3/21	3/16 – 3/23	3/17	3/16-3/20	3/18-3/19	3/15-3/20	3/18-3/20	3/16
FR Chinook	408 juv.	5	19	20		1,573	2		
SR Chinook	334 juv.	1	11	11		23	1		
WR Chinook	8 juv, 12 smolt		1			4	1	8	
LFR Chinook									
Chinook (ad-clip)	32 WR smolt		1 WR						1
Steelhead (natural)									
Steelhead (ad-clip)			2	1		10		2	
Green Sturgeon									
Flows (avg. cfs)	987		6,898						
W. Temp. (avg. °F)	53.04		52.66						
Turbidity (avg. NTU)	8.64		8.31						

C. GCID sampling period was from 3/17/20 9:00 to 3/23/20 9:00. Traps were operating in full cone configuration.

D. Tisdale RST most recent data (as of 3/26/20) was recorded on 3/14/20.

E. Knights Landing RST sampling period was from 3/16/20 at 11:00 to 3/23/20 at 11:15. Traps were operating in full cone configuration.

Delta Juvenile and Fish Monitoring Program data (e.g., Beach Seines, Chipps Island) were not received until 3/26/2020. At the time of the SaMT call, 3/20 Chipps Island were not available.

- Spring Kodiak Trawl data and catch reports to be provided by CDFW moving forward. As of 3/9/20 – 3/12/20, 12 winter-run Chinook salmon and nine steelhead (all clipped) were observed.
- Cal Fish data on Tisdale and Knights Landing were noted to not be updated (likely a result of staff working remotely). Last week, five unmarked fall-run Chinook salmon and one unmarked spring-run Chinook salmon were observed at Tisdale. At Knights Landing, 19 unmarked fall-run Chinook salmon, 11 unmarked spring-run Chinook salmon, one unmarked winter-run Chinook salmon, one clipped winter-run Chinook salmon, and two clipped steelhead were observed. Fish from the recent Battle Creek fall-run Chinook salmon releases are expected to be observed in the next five days at the Tisdale and Knights Landing RST locations as they migrate downstream.

Fish Monitoring Gear Efficiency/Disruptions:

- Monitoring constraints as it relates to the state and federal COVID-19 procedures include the following:
 - Fish Bio is suspending all operations as of 3/17/20.
 - CDFW’s programs have been suspended until at least 4/1/20. CDFW is still anticipating taking over the implementation of the Mossdale Trawl from April through June pending further state guidance.
 - EDSM sampling by USFWS is continuing at a reduced rate.
 - In the San Joaquin River basin, federal entities are continuing to implement monitoring in their respective systems via a letter of exception.
 - As of last week, the Skinner facility is conducting standard salvage operations, and 30-minute counts while integrating social distancing practices.
 - While federal beach seines monitoring has been halted, boat-related monitoring will continue.

Green Sturgeon

Summary of sturgeon detections in the Sacramento River north of Sherman Lake; approximate coordinates 38.06024° N and -121.08015° W; 19 March 2020.

Species; life stage	Date tagged	Tag ID	Tagging Location	Tagging Entity	Detection Date(s)
Green sturgeon; juvenile	10/03/19	A69-1602-12237	Sacramento River north of Sherman Lake	CDFW	3/19/20
Green sturgeon; adult	12/12/19	A69-1602-12220	Sacramento River north of Sherman Lake	CDFW	3/19/20
Detection data for other tag IDs not available until 3/31/20.					

Red Bluff Diversion Dam Biweekly Report

The biweekly report expected on 3/24/20 was not available by the time of the SaMT meeting,

DOSS Weekly Salvage Update
 Reporting Period: March 16 - March 22, 2020
 Prepared by Kyle Griffiths on March 23, 2020
 Preliminary Results - Subject to Revision

Criteria	16-Mar	17-Mar	18-Mar	19-Mar	20-Mar	21-Mar	22-Mar		Mean
Loss Densities									
Wild older juvenile CS	0.36	0.00	0.83	0.00	0.00	0.27	0.00	↗	0.21
Wild steelhead	0.00	0.00	1.66	0.00	1.83	0.76	0.55	↗	0.69
Exports									
SWP daily export	3,441	5,150	3,400	3,659	2,427	3,658	2,845	↘	3,511
CVP daily export	5,366	5,412	7,008	7,094	7,060	7,058	7,045	↗	6,578
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;

Category	Weekly Total			Season Total		Season Total - LAD		
	Salvage	Loss		Salvage	Loss	LAD Race	SALVAGE	LOSS
Wild								
Winter Run	20	15	↗	43	65	Winter Run	63	79
Spring Run	8	5	↗	8	5	Spring Run	8	5
Late Fall Run	0	0		12	8	Late Fall Run	12	8
Fall Run	0	0		48	33	Fall Run	28	19
Unclassified	0	0		0	0	Unclassified	0	0
Total	28	20	↗	111	111	Total	111	111
Hatchery								
Winter Run	4	3	↗	13	9	Winter Run	66	48
Spring Run	52	35	↗	180	123	Spring Run	52	35
Late Fall Run	0	0		195	153	Late Fall Run	186	144
Fall Run	0	0		21	14	Fall Run	105	72
Unclassified	0	0		0	0	Unclassified	0	0
Total	56	38	↗	409	299	Total	409	299

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 CWTT 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		Salvage	Loss
Wild	28	19	↗	49	48
Hatchery	28	48	↘	104	132
Total	56	67	↗	153	180

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

A PIT-tagged Chinook salmon was salvaged on 3/20/20 at the CVP. This may have been a fish that the Tracy Fish Collection Facility (TFCF) released itself to test for facility efficiency at the TFCF. CDFW to include salvage locations of these fish moving forward. CDFW to follow up on salvaged acoustic-tagged spring-run Chinook salmon.

DWR provided the below summary of losses of hatchery spring-run Chinook salmon surrogates at the facilities last week. No additional spring-run Chinook salmon surrogates have been observed in salvage since 1/9/20. No hatchery winter-run Chinook salmon have been observed (to date) in salvage this water year.

CONFIRMED HATCHERY (ADIPOSE-FIN CLIPPED) CHINOOK SALMON LOSS AT THE SWP & CVP DELTA FISH FACILITIES as of 3/23/20

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
12/9/19	LF	Coleman NFH	Battle Creek	Spring Surrogate	20.21	84,869	n/a	0.024	n/a	0.5%	12/22/19	1/9/20
12/18/19	LF	Coleman NFH	Battle Creek	Spring Surrogate	25.03	77,672	n/a	0.032	n/a	0.5%	1/1/20	1/4/20
1/13/20	LF	Coleman NFH	Battle Creek	Spring Surrogate		77,866	n/a		n/a	0.5%		

SWP and CVP adipose-fin clipped Chinook lost from 10/1/19 through 2/6/20.

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

¹% Loss of Number Released = (Confirmed Loss/Number Released)*100.

²% 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.

DWR-DES Revised 2/7/20

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

SaMT Estimates of Fish Distribution

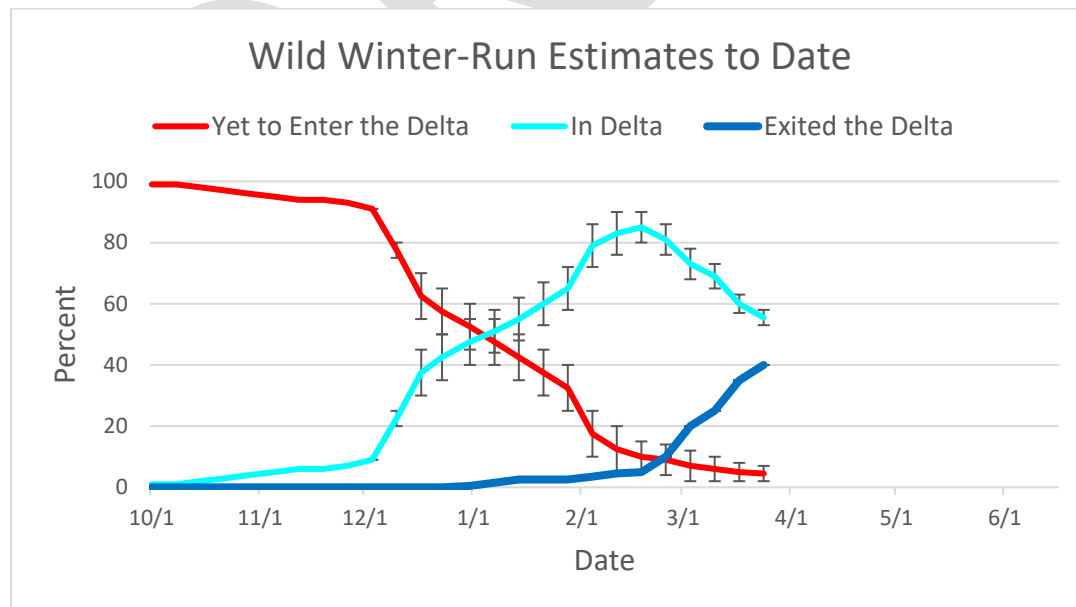
SaMT estimates of the current distribution of listed Chinook salmon, as a percentage of the population, are based on recent monitoring data and historical migration timing patterns.

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>	2-7% Last week: 2-8%	53-58% Last week: 57-63%	40% Last week: 35%
<i>YOY spring-run Chinook salmon</i>	40-55% Last week: 40-60%	45-60% Last week: 40-60%	0% Last week: 0%
<i>YOY hatchery winter-run Chinook salmon</i>	60-65% Last week: 100%	30-35% Last week: 0%	5% Last week: 0%
<i>Steelhead</i>		20-40% 2 wks. ago: 5-15%	

Rationale for changes in distribution

Natural winter-run Chinook salmon:

Over 3.8 million BY 2019 winter-run Chinook salmon have passed RBDD so far in water year 2020. In the last week, 8 winter-run were captured in Chipps Island Trawl and 1 was captured in the Sacramento Trawl. SaMT estimates that the percentage of winter-run Chinook salmon population that has moved downstream into the Delta changed from 57-63% to 53-58%. SaMT also estimates an additional 5% exited past Chipps Island equating to an estimated 40%. Based on the time of year, winter-run Chinook salmon juveniles are likely to be migrating out of the Delta.



WY 2020 natural winter-run Chinook salmon distribution

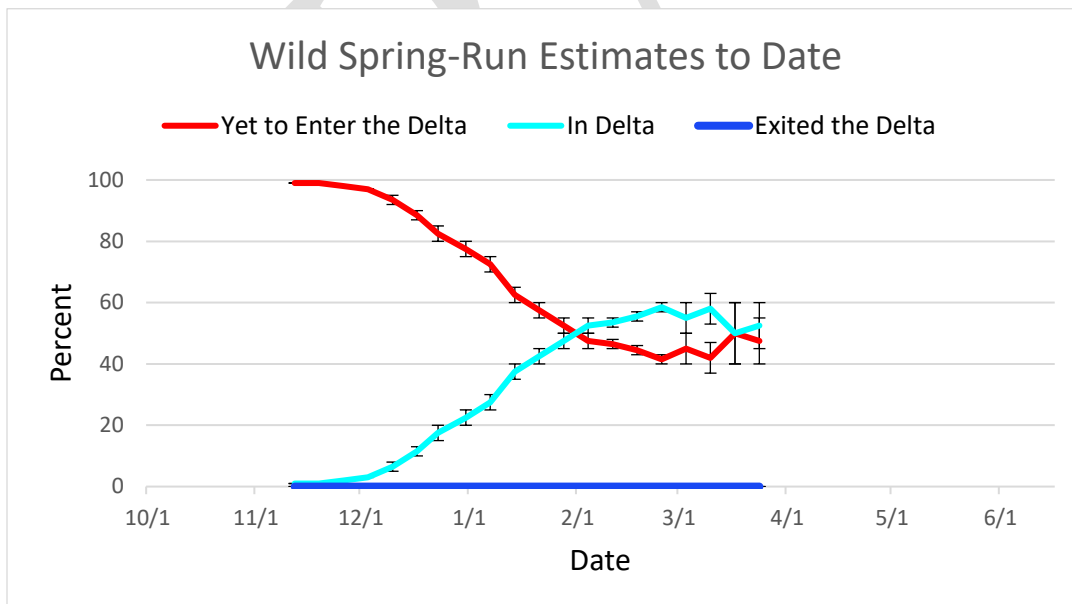
Hatchery winter-run Chinook salmon: Hatchery winter-run Chinook salmon were released recently into Sacramento River and Battle Creek (3/10/20, 3/23/20). Acoustic tagged hatchery winter-run Chinook salmon were detected at Butte City Bridge every day during the past week. Acoustic tagged fish have been detected at several locations including: Butte City (23 detections; 6%), Wilkens Slough, I-80/I-50 (20 detections, 5%), Tower Bridge (21 detections, 6%), Georgiana Slough (5 detections, 1%), and Benicia (1 detection, 0.3%).

https://calfishtrack.github.io/real-time/pageLSWR_2020.html

[Taking into account that approximately two thirds of the hatchery winter-run Chinook salmon were released yesterday \(3/23/20\), SaMT estimates that the majority of these fish are upstream of Knights Landing.](#)

Natural spring-run Chinook salmon:

In the last week 11 juvenile spring-run Chinook salmon were observed in the beach seines, 1 at Sacramento Trawl, and 11 at Knights Landing. Historical timing based on passage at Knights Landing indicate that 54% of the natural young-of-year spring-run Chinook salmon are considered to be in the Delta by this time of year, but excludes Butte Creek and Feather River spring-run Chinook salmon that typically emigrate into the Delta later in the season and are not captured at the Knights Landing monitoring station. In previous years with similar hydrological conditions (i.e., low flows and limited environmental cues), juvenile Chinook salmon have been observed to hold and rear in the upper river later than years with consistent winter storms and elevated flows. SaMT estimates 40-55% of the spring-run Chinook salmon population are upstream of the Delta and 45-60% are in the Delta. No spring-run Chinook salmon have been observed in the Chipps Island Trawl this season and therefore the SaMT estimates that no spring-run Chinook salmon have exited the Delta.



WY 2020 natural spring-run Chinook salmon distribution estimates to date.

Natural Steelhead:

Several factors increase uncertainty of measuring downstream movements of steelhead including varying life history and residency times, as well as monitoring gear avoidance. To provide an estimate of steelhead presence in the Delta, the SaMT discussed historical catch and emigration timing data. Clipped steelhead were observed in salvage (loss = 48) and in the Chipps Island monitoring (n = 2) during this past week. Historically, 49.6% of steelhead are salvaged by this time of the year. SaMT estimates that 20-40% of steelhead are in the Delta this week. SaMT did not estimate proportion of steelhead for the “yet to enter” or “exited the delta” categories.

Agenda Item 6. Fish Exposure and Behavioral Cues

Current Conditions

Entrainment into the Interior Delta:

<https://oceanview.pfeg.noaa.gov/shiny/FED/CalFishTrack/>

The Delta STARS Model is an individual-based simulation model that predicts survival, travel time, and routing of juvenile salmon migrating through the Delta. The model's structure and parameters are based on a recent analysis (Perry et al. in press) that relates individual survival, travel time, and routing of late-fall-run Chinook salmon to daily Sacramento River flows at Freeport and Delta Cross Channel operations. SaMT reviewed the STARS model for route-specific survival and routing probabilities.

Routing probabilities into the interior Delta from the Sacramento River appeared to be similar to last week based on minute changes in Sacramento River flows. The STARS model estimates the following proportion of entrainment: 0% DCC, 26% Georgiana Slough, 47% Sacramento River, and 26% Sutter and Steamboat Slough (Last updated on 3/19/20).

Routing probabilities at Three Mile Slough and Broad Slough (junction of the Sacramento and San Joaquin rivers) are not predicted by the STARS model. However, over the weekend, QWEST shifted from positive to negative, likely leading to higher likelihood of juvenile salmon being entrained at Three Mile Slough and at Broad Slough (confluence of Sacramento and San Joaquin rivers).

Sensitivity to Operational Actions - SaMT Feedback on Entrainment Risk

The questions from OMR Flow Management Guidance Document (page 20) are provide below.

- 1) After January 1, are more than 5% of the juveniles from one or more salmonid species present in the Delta?
 - o Yes. Currently 53-58% of the winter-run Chinook salmon and 45-60% of the spring-run Chinook salmon juvenile populations are estimated to be in the Delta. Greater than 20% of the juvenile steelhead population is in the Delta.
- 2) Does the action (Delta exports, OMR flows, DCC gate operations) impact fish movement and change the potential distribution of fish?
 - o The action impacts fish that are within the footprint of the exports.
 - o Winter-run Chinook salmon and steelhead are shifting from a rearing phase (where they are closer to river banks) to migration phase (where they are moving

in the river channel). This behavior makes them more vulnerable to exports. No winter-run Chinook salmon were detected in the seines during the past week. Seines sample near the shore and are better at capturing rearing salmonids, although site selection is based more on access than quality rearing habitat. Trawls sample in the channel and are better at capturing fish that are actively migrating. Winter-run Chinook salmon were observed in both the Sacramento Trawl and the Chipps Island Trawl last week.

- Storm events will also cue fish movement. Precipitation events occurred over the past week and are forecasted during this week.
 - Considering historical timing of outmigration for winter-run Chinook salmon and steelhead as well as monitoring data (in salvage and the Chipps Island Trawl), we believe that the distribution of Sacramento-origin fish are likely to be affected by Delta exports.
 - San Joaquin River flows are low. Under conditions similar to those experienced in past years, a lot of fish are expected to be routed into Old River from the San Joaquin River at the Head of Old River junction. We are not observing many San Joaquin River basin origin fish at the Mossdale trawl, but have salvaged SJRRP spring-run Chinook salmon at the CVP's TFCF during the past week (total estimated loss > 114).
 - With increased exports, we are observing an increase of salvage of salmonids (clipped and wild-origin steelhead and LAD winter-run Chinook salmon).
- 3) How much loss has occurred in the past week (3/16/20 - 3/22/20)?
- In the past week, natural-origin winter-run sized Chinook salmon were salvaged at the Delta fish collection facilities (weekly loss = 15).
 - Natural-origin spring-run sized Chinook salmon were salvaged last week at the Delta fish collection facilities (weekly loss = 5)
 - Hatchery-origin steelhead were observed in salvage (weekly loss = 48).
 - Natural-origin steelhead were observed in salvage (weekly loss = 19).
- 4) What is the likelihood of increased loss exceeding the next single year loss threshold based on the population distribution, abundance, and behavior of fish in Delta?
- Highly unlikely. Loss is not approaching any of the Delta Performance Thresholds. Please refer to the operations and fish outlook document for details.
- 5) If a single-year loss threshold has been exceeded, do continued OMR restrictions benefit fish movement based on real-time information?
- Not applicable. No thresholds have been exceeded during this water year. Currently, OMR flows management (ROC on LTO Proposed Action) is not the controlling regulatory factor. E/I ratio (D-1641) is the controlling regulatory factor limiting Delta exports.
- 6) If OMR is more negative than -5,000 cfs, are there changes in spawning, rearing, foraging, sheltering, or migration behavior beyond those anticipated to occur under OMR management at -5,000 cfs?
- Not applicable. Current OMR flows more positive than -5,000 cfs.

Agenda Item 7.

Other Topics

- Kearns & West to coordinate with members on scheduling of a call specific to spring-run Chinook salmon distribution.
- SaMT members are encouraged to provide edits to the Draft Assessment of CVP and SWP Delta Operations on ESA-listed species document. Kearns & West will coordinate with members to schedule a separate call to discuss.
- Members are asked to consolidate draft notes revisions and provide a single document from each agency.
- Confirm hatchery releases numbers are consistent with number that was used to develop the JPE and ITLs
- *Action Item:* Reclamation to update formatting of “Relevant Water Year 2020 Fish and Environmental Criteria and Status in 2019 Reclamation LTO Action and NMFS and the U.S. Fish and Wildlife Service (USFWS) Biological Opinions” table to clearly indicate threshold limit. Reclamation revised the document following the WOMT call on 3/18/2020 after receiving this feedback on that call. Reclamation further revised the document on 3/24/2020.

Agenda Item 8.

Additional Considerations for WOMT

- Mossdale and SWP not salvaging many fish, which is not typical. Exports are low. Potential ocean productivity and thiamine deficiency issues affecting juvenile salmonid survival may be potential causes for low fish observations this year. Feather River monitoring programs have reported an increase in juvenile salmonid mortality ranging from 25-30% in the past week which may be indicative of other upstream issues affecting fish prior to Delta entry.

Agenda Item 9.

Next SaMT Meeting is scheduled for Wednesday, 4/1/20 at 9:00am