Salmon Monitoring Team Weekly Meeting
Conference call: 3/16/20 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, Kyle Griffiths, Chris McKibbin, Krystal Davis-Fadtke, Paige Utley, Jason Julienne, Duane Linander, Ken Kundargi, Jonathan Williams
DWR: Brittany Davis, Farida Islam, Ian Uecker, Kevin Reece, Tracy Pettit, Mike Ford
Kearns & West: Matt Marvin
NMFS: Kristin Begun, Jeff Stuart
Reclamation: Elissa Buttermore, Josh Israel, Suzanne Manugian, Tom Patton, Towns Burgess
SWRCB: Chris Carr, Michael Macon
USFWS: Katherine Sun

Agenda Items:

1. Agenda review and introductions
2. Assessment
3. Relevant Actions and Triggers
4. Weekly Ops and Fish Outlook Document
5. Current Operations and Weather Forecast
6. Fish Abundance, Distribution, and Lifestage
    a. Environmental surrogates and catch indices
    b. Fish Monitoring: RSTs/trawls/seines
    c. Hatchery Releases
    d. Fish Monitoring Acoustic Telemetry Data
    e. Fish Monitoring by different strata
    f. Historical Fish Monitoring Data
    g. Fish Monitoring: Salvage
    h. Migration Status: Salmon Monitoring Team Estimates of Fish Distribution
7. Fish Exposure and Behavioral Cues
8. Other Topics
9. Action Items
10. Additional Considerations for WOMT
11. Next SaMT Meeting

Agenda Item 2.
Assessment Document

A discussion of hydraulic effects on outmigration salmon through the South Delta resulted from the description of this topic in the draft Assessment. Multiple comments focused on the assessment's description of South Delta survival focused on: (1) Chinook salmon study fish that had a higher survival rate to Chipps Island that went through the Project's salvage facilities did

so by travelling through the Old River route (via the Head of Old River junction) rather than remaining in the main stem of the San Joaquin River. These study fish originated from releases in the San Joaquin River upstream of the Delta, and pertain to migration survival for fish originating in that basin, not the Sacramento River basin. This migration route is not the direction that winter run Chinook salmon entering the south Delta would take, (2) the drought conditions when these survival estimates were collected were under the previous BiOp's operating requirements, not the current LTO action's operations under these conditions, and are reflective of those unique hydrologic conditions, (3) there remains considerable uncertainty in the fate of Sacramento River basin fish migrating within the South Delta, and, (4) the assessment language may be misleading for someone unfamiliar with these nuances of the previous observations. This input was incorporated into a new version of this week's assessment document that was subsequently distributed to WOMT.

Agenda Item 3.
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 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 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/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.

Agenda Item 4.
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 Delta Performance Thresholds. SaMT reviewed this document and members provided the following feedback. SaMT members were encouraged to provide additional feedback on this document via email.

Agenda Item 5.
Current Operations (3/17/20)

Current Operations	Location	Value (Last week)	Value (This Week)
Clifton Court Inflow	Clifton Court Forebay	2,300 cfs reducing to 1,000-1,500 cfs	2,300 cfs, decreasing to 1,600 cfs tomorrow, with additional reductions possible.
SWP Reservoir Releases	Feather – Oroville	2,255 cfs	1,750 cfs
SWP Reservoir Storage	San Luis (SWP)	932 TAF	948 cfs
SWP Reservoir Storage	Oroville	1,750 TAF	2,260 TAF
Environmental Parameters	Sacramento River at Freeport	11,800 cfs receding to 11,000 cfs	Currently 12,000 cfs, expected to increase temporarily over the next few days, then recede
Environmental Parameters	San Joaquin River at Vernalis	2,500 cfs receding	1,900 cfs, may increase 100-200 cfs in response to recent storm

Current Operations	Location	Value (Last week)	Value (This Week)
Environmental Parameters	Delta Outflow Index	9,400 cfs	12,500 cfs, potentially increasing up to 19,000 cfs then decreasing
Environmental Parameters	E:I (exports to Delta inflow)	30%	33%
Environmental Parameters	X2	>81 Km	>81 Km
CVP Exports	Jones Pumping Plant	2,700 cfs (3 units)	2,700 cfs, increasing on 3/18/20 to 3,600 cfs (4 units)
CVP Reservoir Releases	American - Nimbus	1,750 cfs reducing	1,500 cfs
CVP Reservoir Releases	Sacramento - Keswick	5,000 cfs ramping down.	4,500 cfs and holding
CVP Reservoir Releases	Stanislaus - Goodwin	1,000 cfs ramping down to 200 cfs on 3/10/20 for stepped release plan. Critical year based on San Joaquin Basin Index)	200 cfs (minimum flow)
CVP Reservoir Releases	Trinity - Lewiston	300 cfs	300 cfs
CVP Reservoir Storage	San Luis (CVP)	467 TAF	469 TAF
CVP Reservoir Storage	Shasta	3,528 TAF	3,531 TAF
CVP Reservoir Storage	Folsom	431 TAF	447 TAF
CVP Reservoir Storage	New Melones	1,893 TAF	1,890 TAF
CVP	DCC Gates	Closed	Closed

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cfs = cubic feet per second
TAF = thousand acre feet
Km = kilometer
Location of X2 measured from the Golden Gate

Factors controlling Delta exports:

- 3/10/20 – 3/14/20: X2 requirements.
- 3/15/20 – 3/16/20: E:I controlling

OMR Demonstration Project: OMR Index and USGS Tidally Filtered Values are displayed on SacPAS. http://www.cbr.washington.edu/sacramento/data/delta_loss.html

Approximate OMR gage data as of 3/12/20:

	USGS gauges (cfs)	**Index (cfs)**
Daily	-4500	-3500
5-day	-4300	-3700
14-day	-2300	-2100

Approximate OMRs as of 3/16/20:

	Index (cfs)
Daily	-3700
5-day	-3600
14-day	-2800

Weather Forecast
The rain and snow, that began the past weekend, continues on Monday, then a gradual "drying out" pattern is forecast for the rest of week w/ temperatures warming. Another storm pattern potentially arriving this weekend into early next week.
https://forecast.weather.gov/product.php?site=STO&issuedby=STO&product=AFD&format=CI&version=1&glossary=1

Environmental Surrogates and Catch Indices

- The First Alert has two components. Capture of yearling-sized spring-run Chinook salmon at the mouths of natal tributaries between October and April indicates that emigration from the tributaries has started or is occurring. As an environmental surrogate to the capture of the yearling-sized spring-run Chinook salmon, which are difficult to capture in the rotary screw traps, tributary flow increases are used to signal conditions conducive to emigration. The First Alert is triggered if either the first component (greater than 95 cfs flow threshold) or second component (greater than 50% change in mean daily flow) are exceeded. The First Alert was triggered due to flows greater than 95 cfs every day this past week.

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
3/9/20	156	-4%	134	0%

Mill Creek (MLM)			Deer Creek (DCV)	
3/10/20	151	-3%	131	-2%
3/11/20	147	-2%	124	-5%
3/12/20	140	-4%	116	-6%
3/13/20	141	1%	115	0%
3/14/20	146	4%	120	5%
3/15/20	156	7%	142	19%

- The Second Alert is triggered only if **both** Wilkins Slough flows are greater than 7,500 cfs and Knights Landing temperature is less than 56.3°F. The second alert is in effect beginning 10/1/2019 and was not triggered this past week.

	Wilkins Slough (WLK)	Knights Landing (KL)
Date	Mean Daily Flow (cfs)	Daily water temperature (°F)
3/9/20	6,306	6,041
3/10/20	6,053	6,049
3/11/20	5,984	5,847
3/12/20	5,855	5,812
3/13/20	5,807	5,678
3/14/20	5,707	5,634
3/15/20	5,664	5,581

Alert on likelihood of entrainment or salvage at the export facilities:

- The third alert is triggered during November 1-February 28 when Knights Landing Catch Index (KLCI) or Sacramento Catch Index (SCI) > 10 older juvenile fish. The third alert was not triggered this week.

Hatchery Releases

On 3/17/20, the Department of Fish and Wildlife will release approximately 337,000 brood year (BY) 2019 Spring Run Chinook salmon from Feather River Hatchery into the Feather River at Boyd's Pump. An additional approximately 350,000 Spring Run Chinook Salmon will be released into the Feather River at Gridley boat launch. CDFW inspected the Live Oak boat launch site and determined the water at end of the dock at the projected point of release to be too shallow and increased the risk of fish stranding. Both releases will include 100% marked (adipose fin clip) and Coded Wire Tagged (CWT) fish (Table 1). CDFW has made allocations for Battle Creek releases in recent weeks, however, no decision has been made on the timing of their releases. The San Joaquin River Restoration Program is due to release the last of its fish (totaling ~100,000) during the week of 3/16/20.

Table 1 – Planned release summary of Feather River Hatchery Spring run Chinook salmon.

Date	Location	CWT Code or mark	Fish/lb.	Fork length (mm)	With Mark	Total Fish
3/17/20	Feather River Boyd's pump	Ad Clip/CWT 06-20-43	97.5	82	336,947	336,947
3/17/20	Feather River-Gridley Boat ramp	Ad Clip/CWT 06-20-42	89	84	349,829	349,829

Agenda 6.

Fish Monitoring: The following table presents fish monitoring data summarized over the past week. Unless otherwise noted, reported races are based on fork length (length-at-date).

Location	Feather River RST Eye Channel[A]	Feather River RST Herringer[B]	GCID RST[C]	Tisdale RST[D]	Knights Landing RST[E]	Beach Seines	EDSM	LAR RST	Sac. Trawl	Chipps Island Midwater Trawl	Mossdale Kodiak Trawl	Caswell RST
Dates	3/9-3/13	3/9-3/13	3/10- 3/16	3/9-3/15	3/9-3/16	3/9, 3/11-3/13	3/9-3/12	3/10-3/12	3/8-3/10, 3/12-3/13	3/8-3/10, 3/12	3/9, 3/11, 3/13	3/10-3/12
FR Chinook	35,152	2,817	89 juv.	1	6	28		35,355	2			15
SR Chinook	94		104 juv.	1		17		17	1			
WR Chinook			2 juv. 4 smolt				5	42		20		
LFR Chinook												
Chinook (ad-clip)		22 SR	9 WR juv. 97 WR smolt									
Steelhead (natural)	17							7 fry				
Steelhead (ad-clip)							4	4		17		
Green Sturgeon												
Flows (avg. cfs)	800	1,750	824	5,417	5,806							
W. Temp. (avg. °F)	54	55.5	55.2	56.1	56.2							
Turbidity (avg. NTU)	1.53	2.13	3.6	4.6	6.5							

A. Feather River RST data from Eye Channel sampling period were from 03/09/20 at 14:04 to 03/13/20 at 11:59.

B. Feather River RST data at Herringer sampling period were from 03/09/20 at 10:40 to 03/13/20 at 14:54.

C. GCID sampling period was from 03/10/20 at 9:00 to 03/16/20 at 9:00. Traps were operating in Full cone configuration.

D. Tisdale RST sampling period w from 03/09/20 at 10:30 to 03/15/20 at 09:45.Traps were operating in full cone configuration.

E. Knights Landing RST sampling period was from 03/09/20 at 10:00 to 03/16/20 at 11:00. Traps were operating in full cone configuration.

Green Sturgeon
No new monitoring data for this week. 2 juvenile green sturgeon were detected north of Sherman Lake on March 3 and one juvenile was detected at this location on March 5. One adult was detected at the Fremont Weir on 3/5/20. No new real-time detections were posted on the Central Valley Acoustic Telemetry web page https://calfishtrack.github.io/real-time/index.htm

Red Bluff Diversion Dam Biweekly Report
USFWS biweekly report (2/26/20 - 3/10/20) for preliminary estimates of passage by BY and run for unmarked juvenile Chinook salmon captured by rotary screw traps at RBDD included:

Run and Species	Biweekly Total	BY Total (90% CI)
Winter-run Chinook (BY2019)	680	3,804,532 (2,474,909 - 5,134,154)
Spring-run Chinook (BY2019)	6,984	60,820 (23,427 - 98,212)

Historical Fish Monitoring Data
Because of challenges with limited data and interpretation 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 3/15 for the years 2005 to 2018.

Brood Years	Species, species run	Average Percent Captured at Red Bluff Diversion Dam	Average Percent Captured at Tisdale RST	Average Percent Captured at Knights Landing RST	Average Percent Captured in Beach Seines	Average Percent Captured in Sac Trawl (Sherwood)	Average Percent Captured in Chipps Island Trawl
2005 – 2018	Winter-run Chinook salmon	99.6%	97.5%	97.9%	99.3%	66.1%	34.1%
2005 – 2018	Spring-run Chinook salmon	45.4%	29.5%	49.5%	76.3%	16.9%	0.2%
2005 – 2018	Steelhead	2.6%	57.5%	51.8%	70.4%	88.3%	74.4%

Salvage timing:
Average percent for each species (based on length at date) of interest captured at SWP and CVP Delta Fish Facilities by 3/15 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)	70.3%
Average 2005 – 2018	Spring-run Chinook salmon (unclipped)	1.3%
Average 2005 – 2018	Steelhead (unclipped)	41.6%

DOSS Weekly Salvage Update

Reporting Period: March 9-March 15, 2020

Prepared by Kyle Griffiths on March 16, 2020 15:3

Preliminary Results -Subject to Revision

Criteria	9-Mar	10-Mar	11-Mar	12-Mar	13-Mar	14-Mar	15-Mar	Mean
Loss Densities								
Wild older juvenile CS	0.44	0.30	0.30	0	0.38	0	0	0.20
Wild steelhead	0	0.06	0	2.46	0.65	0	0	0.45
Exports								
SWP daily export	4,390	5,220	5,220	3,871	2,980	2,961	3,197	3,977
CVP daily export	5,364	5,388	5,377	5,382	5,374	5,389	5,374	5,378
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**	**Salvage**	**Loss**
Wild					
	Winter Run	13	14	23	50
	Spring Run	0	0	0	0
	Late Fall Run	0	0	12	8
	Fall Run	0	0	48	33
	Unclassified	0	0	0	0
	Total	**13**	**14**	**83**	**91**
Hatchery					
	Winter Run	1	1	9	6
	Spring Run	0	0	128	88
	Late Fall Run	0	0	195	153
	Fall Run	0	0	21	14
	Unclassified	0	0	0	0
	Total	**1**	**1**	**353**	**261**

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**	**Salvage**	**Loss**
Wild	21	29	21	29
Hatchery	36	57	76	84
Total	**57**	**86**	**97**	**113**

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

*** The season totals indicate that the wild winter-run Chinook salmon salvaged by CDFW in this week's data equals the total for the season. This is a result of genetic results being applied through the end of February 2020. See Weekly Fish and Operations document for total LAD winter-run loss for WY2020. On 3-13-2020, Winter-run Chinook salmon loss based entirely on LAD is estimated to be 64 (FTP site accessed 3-16-2020. File indicated it was last updated on 3-16-2020, but summarizes data up to 3-13-2020). The new 2019 NMFS BiOp and Proposed Actions Delta Performance Triggers that we are currently operating to are based on LAD Winter-run Chinook salmon loss.

One clipped hatchery winter run Chinook salmon was initially reported as non-clipped. It was later confirmed to be a San Joaquin River Restoration Program hatchery fish without a clipped fin and has since been accounted for as a hatchery fish.

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 in salvage during this water year.

CONFIRMED HATCHERY (ADIPOSE-FIN CLIPPED) CHINOOK SALMON LOSS AT THE SWP & CVP DELTA FISH FACILITIES as of 3/16/2020

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]
12/9/2019	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
12/18/2019	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 10/1/2019 through 2/6/20.

[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.**

DWR-DES Revised 2/7/20

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

SaMT Estimates of Fish Distribution

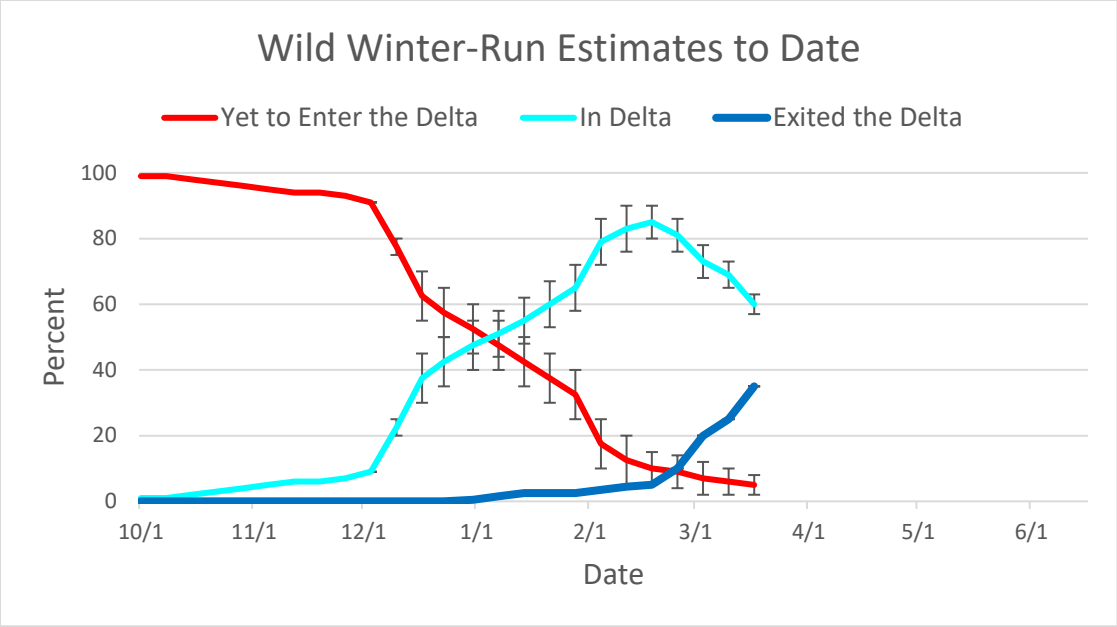
SaMT estimates of the current distribution of listed Chinook salmon, as a percentage of the population, are based on recent monitoring data and historical migration timing patterns.

Location	Yet to Enter Delta (Upstream of Knights Landing)	In the Delta	Exited the Delta (Past Chipps Island)
Young-of-year (YOY) winter-run Chinook salmon	2-8% Last week: 2-10%	57-63% Last week: 65-73%	35% Last week: 25%
YOY spring-run Chinook salmon	40-60% Last week: 37-47%	40-60% Last week: 53-63%	0 Last week: 0%
YOY hatchery winter-run Chinook salmon	100% (released 3/10/20)	0%	0%

Rationale for changes in distribution

Natural winter-run Chinook salmon:

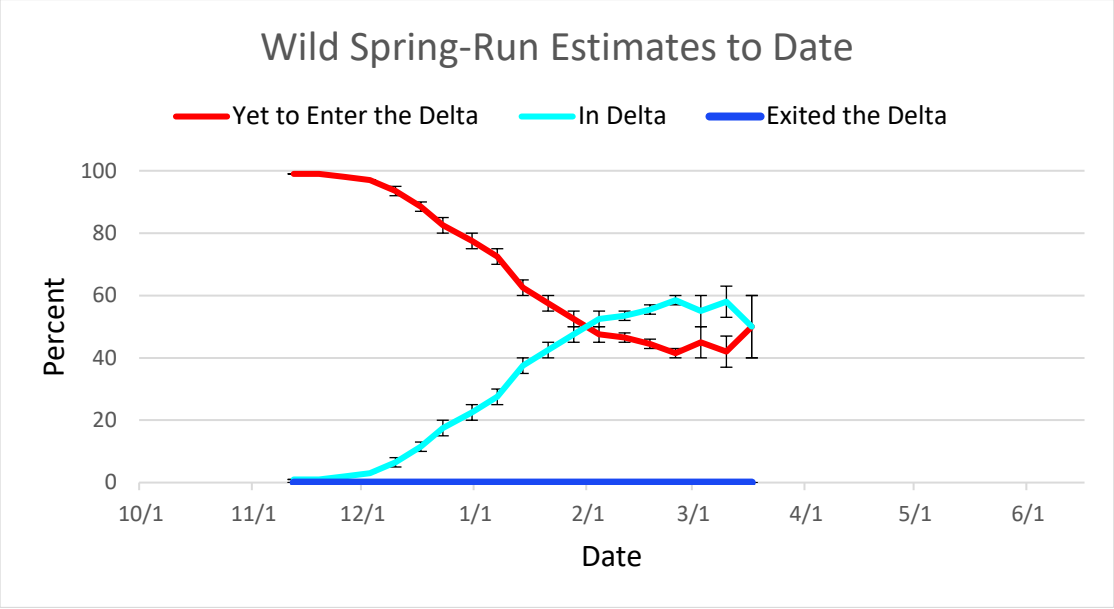
Over 3.8 million BY 2019 winter-run Chinook salmon have passed RBDD so far in water year 2020. In the last week, 20 winter-run were captured in Chipps Trawl. SaMT estimates that the percentage of winter-run Chinook salmon population that has moved downstream into the Delta changed from 65-73% to 57-63%. SaMT also estimates an additional 10% exited past Chipps Island. Based on the time of year, Winter-run Chinook salmon juveniles are likely to be shifting from rearing in the Delta to migrating out of the Delta.



WY 2020 natural winter-run Chinook salmon distribution estimates to date

Hatchery winter-run Chinook salmon: 60% of the hatchery Sacramento River winter-run Chinook salmon production was release last week. There were detections of 4 acoustically-tagged hatchery winter-run at Butte City Bridge during the past week. https://calfishtrack.github.io/real-time/pageLSWR_2020.html

Natural spring-run Chinook salmon:
104 length-at-date spring-run Chinook salmon were caught at the GCID RST, 1 at Tisdale, 17 in the beach seines, 1 Sac Trawl this past week. Butte Creek and Feather River spring-run Chinook salmon typically emigrate into the Delta later in the season and are may not be captured at the Knights Landing monitoring station. The proportion of the Butte Creek juvenile population that enters the Sacramento here is largely unknown as this is dependent on timing of both juvenile emigration and flow/stage height differences between Butte Creek and the Sacramento River at the Butte Slough Outfall Gates near Wards Landing. When the stage height of Butte Creek exceeds that of the Sacramento River at the Butte Slough Outfall Gates, spring-run Chinook can enter the Sacramento River and can subsequently be sampled by the RST at Knights Landing. In addition, historical timing based on passage at Knights Landing indicate that 49.5% of the natural young-of-year spring-run Chinook salmon are considered to be in the Delta by this time of year. 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. The SaMT estimates 40-60% of the spring-run Chinook salmon population are upstream of the Delta and 40-60% are in the Delta. This updated distribution is reflective of the SaMT groups agreed upon decision to widen the range to capture the uncertainty surrounding the distribution of spring-run Chinook salmon currently 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 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 and in the Chipps Island monitoring. Historically, 41.6% of steelhead are salvaged by this time of the year. Last week 8-15% were estimated to be in the Delta.

Agenda 7.
Fish Exposure and Behavioral Cues

Behavior: Catches in Chipps Island trawl indicate that winter-run are emigrating. Catches also indicate that winter-run are still rearing upstream and exploring non-natal tributaries. There were 2 winter-run observed at GCID with fish execution structure at head of the diversion oxbow and 42 were observed at the American River RSTs, 9 miles above the confluence with the Sacramento River.

Because spring tide is shifting to neap tide, we expect steelhead and winter-run to move with the incoming neap tide. Precipitation between 3/14/20 – 3/15/20 will also reduce entrainment risk, especially at Georgiana Slough.

Routing Probability: 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. The STARS model predicts the following proportion of entrainment: 0% DCC, 28% Georgiana Slough, 45% Sacramento River, and 26% Sutter and Steamboat Slough. Precipitation between 3/14/20 – 3/15/20 may also have decreased the probability of entrainment into Georgiana Slough, increasing the probability of entrainment into Sutter and Steamboat sloughs. The STARs model tool does not predict routing probability.

SaMT Feedback on Entrainment Risk
Assessment for Old and Middle River Flow Management Evaluation.

The questions from OMR Flow Management Guidance Document (page 20) are provide below. SaMT did not discuss these questions on this week's call. However, they were provided to SaMT for their review and input after the call.

1) After January 1, are more than 5% of the juveniles from one or more salmonid species present in the Delta?
    - Yes. Currently 57-63% winter-run and 40-60% are estimated to be in the Delta. Greater than 5% of steelhead are in the Delta.
2) Does the action impact fish movement and change the potential distribution of fish?

- The hydrologic footprint typically does not extend far outside of the south Delta Region.
- Winter-run 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. Not as many fish were detected in the seines as previous weeks. Seines sample near the shore and are better at capture rearing salmonids. Trawls sample in the channel and are better at capturing fish that are actively migrating.
- Storms events will also cue fish movement. Precipitation events occurred over the past weekend and are forecasted for the next weekend (3/21/20 – 3/22/20)
- Considering historical timing of outmigration for winter-run and steelhead as well as monitoring data (in salvage and 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 being experienced currently in past years, a lot of fish have been routed through Old River. However, we are not observing many San Joaquin origin fish in monitoring (RSTs, salvage, Mossdale trawl). Although we did observe 3 San Joaquin Restoration Program spring-run in salvage on 3/17/20 (expanded salvage = 12).
- With increased exports, we are observing an increase of salvage of salmonids (clipped and wild-origin steelhead and winter-run LAD).
- Risk is greater than the previous week.

3) How much loss has occurred in the past week (3/9/20 - 3/15/20)?
   - In the past week, winter-run sized chinook were salvaged at the Delta Fish Collection facilities (estimated loss = 14).
   - Hatchery-origin steelhead were observed in salvage (weekly loss = 57).
   - Natural-origin steelhead were observed in salvage for the first time during this water year (weekly loss = 29).
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.
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 Managment (ROC on LTO BiOp) are not the controlling regulatory factor. X2 position and EI (D-1641) is the controlling regulatory factor influencing 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 8.
Other Topics

- Assessment timeline was discussed. Data for portions of the assessment pertaining to DSM2 modeling are not available until Monday midday. Confidence in forecast models

decreases after 6 days thus model runs on Friday are most valid only through Wednesday whereas model runs on Monday are most valid through the end of the week.
- SaMT is considering scheduling separate call to learn more about inputs and results of DSM2 modeling as they pertain to the Assessment.

Agenda 9.
Action Items
- SaMT members are encouraged to provide comments to the Assessment via email.
- USBR to follow up with CDFW to confirm weekly/seasonal salvage and loss figures.
- As it becomes available, DWR to provide its guidance to SaMT members on monitoring protocols as it relates to COVID-19.

Agenda 10.
Additional Considerations for WOMT
- Impacts COVID-19 has on the ability to complete monitoring activities and subsequently assess risk to fish populations.

Agenda Item 11.
Next SaMT Meeting is scheduled for Tuesday, 3/24/20 at 9:00 am