

Delta Operations for Salmonids and Sturgeon (DOSS) Group
Conference call: 1/7/2020 at 9:00 a.m.

Objective: Provide advice to the Water Operations Management Team (WOMT) and National Marine Fisheries Service (NMFS) on measures to reduce adverse effects from Delta operations of the Central Valley Project (CVP) and the State Water Project (SWP) on salmonids and green sturgeon. DOSS will work with other technical teams. DOSS notes and advice can be found here: [CCV Water Operations DOSS page](#).

CDFW: Ken Kundargi, Duane Linander, Kyle Griffiths, Chris McKibbin, Jonathan Williams

DWR: Norman Lee, Kevin Reece, Farida Islam, Chris Cook, Mike Ford, Tracy Pettit

NMFS: Jeff Stuart, Kristin Begun

Reclamation: Suzanne Manugian, Tom Patton, Elissa Buttermore

SWRCB: Chris Carr, Michael Macon, Craig Williams

USFWS: Felipe Carrillo, Craig Anderson

Agenda Items:

1. Agenda review and introductions
2. RPA Implementation review (For the DOSS Dashboard, click on the "Triggers & Indices" tab at: [Bay Delta Live](#))
3. Current Operations
4. Smelt Working Group
5. Fish Monitoring: RSTs/trawls/seines
6. Fish Monitoring: Salvage
7. DOSS Estimates of Fish Distribution
8. Risk of Entrainment
9. Other Discussion
10. DOSS Advice
11. Next DOSS Meeting

Agenda Item 2.

RPA Implementation Review

Delta RPA Actions affecting operations during January:

Action IV.1.1 Alerts that indicate the Delta Cross Channel (DCC) gate operations may be triggered soon¹:

- 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

¹ For details, see pages 60-61 in Enclosure 2 of the [2011 Amendments to the 2009 RPA document](#). Note that in October 2014, NMFS approved a modification of the first component of the first alert to a 95 cfs mean daily flow threshold in either Mill Creek or Deer Creek in lieu of operating the Mill and Deer Creek rotary screw traps.

than 95 cfs flow threshold) or second component (greater than 50% change in mean daily flow) are exceeded. The First Alert was triggered (yellow highlights) this past week due to flows greater than 95 cfs.

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
12/31/2019	148	-4%	155	-4%
1/1/2020	146	-1%	151	-2%
1/2/2020	150	3%	156	3%
1/3/2020	145	-3%	151	-3%
1/4/2020	146	1%	151	1%
1/5/2020	145	-1%	150	-1%
1/6/2020	141	-3%	143	-5%

- 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 triggered on 12/31/2019, 1/1/2020, and 1/2/2020 (assuming temperatures were below 56.3°F on 1/1-1/2/2020).

Wilkins Slough (WLK)		Knights Landing (KL)
Date	Mean Daily Flow (cfs)	Daily water temperature (°F)
12/31/2019	8,584	47.9
1/1/2020	8,072	*
1/2/2020	7,727	*
1/3/2020	7,401	49.7
1/4/2020	7,063	50.1
1/5/2020	6,903	49.9
1/6/2020	6,821	**

* Data not recorded due to the holiday.

** KL Data not updated for 1/6/2020 by the time of the DOSS call.

Action IV.1.2² (DCC gate operations):

- DCC gates will remain closed per operations described in RPA Action IV.1.2 starting 12/1/2019 and are expected to remain closed until mid-May.

Action IV.2.3³ (OMR Management):

- Implementation of this action in WY 2020 began on 1/1/2020, and requires that Old and Middle River (OMR) flow be no more negative than -5,000 cfs. OMR flows are reported

² For details, see pages 62-66 in Enclosure 2 of the [2011 Amendments to the 2009 RPA document](#).

³ For details, see pages 74-79 in Enclosure 2 of the [2011 Amendments to the 2009 RPA document](#).

weekly with the OMR index and the tidally filtered USGS gauges at the 5-day and 14-day running averages.

- Until the official JPE letter is issued, the first stage trigger is exceeded when the combined daily SWP/CVP older juvenile Chinook salmon loss is 8 fish/TAF and second stage trigger is 12 fish/TAF, as described in Action IV.2.3 for length-at-date fish.
- The interim first stage trigger is exceeded if genetically verified combined daily loss density of older-juvenile-sized winter-run Chinook salmon exceeds 5.23 fish per TAF of water exported, and the interim second stage trigger is exceeded if the genetically verified daily loss density of older-juvenile-sized winter-run Chinook salmon exceeds 10.45 fish per TAF of water exported.

Action IV.3⁴ (Reduce likelihood of entrainment or salvage at the export facilities, including alert that indicates that export operations may need to be altered):

- The third alert is triggered during November 1-February 28 when Knights Landing Catch Index (KLCI) or Sacramento Catch Index (SCI) >10 fish.
- Although a large number of juveniles were observed in the Sacramento seines on 12/31/2019 (41 spring-run and 17 fall-run Chinook salmon), the third alert was not triggered based on length-at-date older juvenile Chinook salmon this past week.
- Since the action went into effect on 11/1/2019, no salvage-based triggers that would require export reduction have been exceeded.

Agenda Item 3.

Current Operations (1/7/2020)

SWP		CVP	
Exports (cfs)			
Clifton Court Forebay	2,100	Jones Pumping Plant	4,200*
Reservoir Releases (cfs)			
Feather - Oroville	2,000	American - Nimbus	2,500
		Sacramento - Keswick	5,000
		Stanislaus - Goodwin	800
		Trinity - Lewiston	300
Reservoir Storage (TAF)			
San Luis (SWP)	899	San Luis (CVP)	440
Oroville	2,094	Shasta	3,328
New Melones	1,983	Folsom	499
Delta Operations			
DCC	Closed	Sacramento River at Freeport (cfs)	14,420
Outflow Index (cfs)	9,500	San Joaquin River at Vernalis (cfs)	2,162
E:I	35.6% (3-day avg.)	X2	79 km

⁴ For details, see pages 79-80 in Enclosure 2 of the [2011 Amendments to the 2009 RPA document](#).

SWP	30.7% (14-day avg.)	CVP	
------------	---------------------	------------	--

* CVP pumping was down 1 unit yesterday (1/6/2020) and exports are back up to 4,200 cfs today.

Factors controlling Delta exports:

- 1/1/2020-1/7/2020: OMR limit of no more negative than -5,000 cfs per Action IV.2.3.

Approximate OMRs as of 1/4/2020:

	USGS gauges (cfs)	Index (cfs)
Daily	-4,490	-4,937
5-day*	-5,472	-5,911
14-day**	-7,798	-8,052

* The 5-day running average OMR included 1 day in December. RPA Action IV.2.3 implementation of OMR flows no greater than -5,000 cfs began on January 1.

** The 14-day running average OMR included daily OMR flows mostly in December (10 of 14 days).

Approximate OMRs as of 1/6/2020:

	Index (cfs)
Daily	-5,000
5-day	-5,000
14-day*	-7,400

* The 14-day running average OMR included daily OMR flows mostly in December (8 of 14 days). RPA Action IV.2.3 implementation of OMR flows no greater than -5,000 cfs began on January 1.

Weather Forecast

The forecast for the Sacramento valley predicts dry weather today, with light precipitation tonight into Wednesday and again on Thursday. More widespread rain and mountain snow is possible with a cool system Friday into the weekend.

Agenda Item 4. Smelt Working Group

The Smelt Working Group (SWG) met on Monday, 1/6/2020.

The SWG reviewed current Delta conditions, survey data, expected exports, and forecasted weather. The current OMR index value is -5,000 cfs in compliance with the NMFS RPA which went into effect on 1/1/2020. Turbidity in the Delta is low (<5 NTU). The SWG concluded that there was no evidence of fish in the entrainment zone and not enough information to warrant advice.

The SWG does not believe that a recommendation under Action 1 (adult pre-spawning Delta Smelt) is necessary to protect Delta Smelt at this time. The SWG will continue to monitor Delta Smelt survey and salvage data and Delta conditions. The SWG will meet again on Monday, 1/13/2020, at 10 am.

Agenda Item 5.

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	GCID RST	Tisdale RST ^A	Knights Landing RST ^B	Beach Seines ^C	Sacramento Trawl ^C	Chippis Is. Midwater Trawl ^C	Mossdale Kodiak Trawl ^C
Sample Date	12/31-1/6	12/30-1/5	12/29-12/31, 1/2-1/5	12/30-12/31, 1/2-1/3	12/29-12/31, 1/2-1/3	12/29-12/31, 1/2, 1/5	12/30-12/31, 1/3
Adult Chinook				1			
FR Chinook	104 juveniles	5	16	32			
SR Chinook	8 juveniles	1		53			
WR Chinook	4 juveniles	1	1	21			
LFR Chinook							
Chinook (ad-clip)	6 LFR smolts				1	3	
Steelhead (wild)	2						
Steelhead (ad-clip)	42						
Green Sturgeon							
Flows (avg. cfs)	1,012.5	6,930	7,833				
W. Temp. (avg. °F)	51.5	49	49.0				
Turbidity (avg. NTU)	N/A	5.3	8.78				

^A Tisdale RST sampling period was from 12/30/2019 at 9:45 am to 1/5/2020 at 9:15 am.

^B Knights Landing RST sampling period was from 12/29/2019 at 10:15 am to 12/31/2019 at 9:45 am and 1/2/2020 at 11:30 am to 1/5/2020 at 10:15 am (traps removed for the holiday). Cone effort was 50%.

^C Data reported in the 12/29/2019 to 1/4/2020 DJFMP sampling summary.

Red Bluff Diversion Dam Biweekly Report

USFWS biweekly report (12/17/2019-12/31/2019) for preliminary estimates of passage by Brood Year (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)	17,506	3,950,314 (2,580,674-5,319,954)
Spring-run Chinook (BY2019)	1,979	259,756 (156,080-363,432)

Juvenile Green Sturgeon Monitoring Summary for DOSS; 1/7/2020 Sampling Season Summary. 2020 Season sampling initiated on 1/2/2020.

- No detections of juvenile sturgeon tagged during the 2018 and 2019 seasons were detected on 1/2/2020.
- One adult white sturgeon tagged by USFWS Lodi staff in the San Joaquin River was detected at sampling site northwest of Sherman Lake on 3/11/2014 was detected on 1/2/2020 (A69-9001-25741).

CDFW Lower American River Carcass Survey

Reporting for survey period 12/30/2019-1/3/2020:

- 1,306 observed carcasses
 - 175 females
 - 62 unclipped
 - 113 clipped
 - 175 female carcasses evaluated for spawn condition:
 - 19/175 (19%) prespawn mortalities
 - 6/175 (6%) partially spawned
 - 128/175 (73%) spawned
 - 22 were too deteriorated to determine spawning condition
 - 167 males
 - 45 unclipped
 - 122 clipped
 - 97 Jaw Tag Recaptures
 - 867 carcasses too deteriorated to determine sex
- Temperatures at Fair Oaks (USGS gage 11446500, ~0.25 mile downstream of Hazel Ave) during the survey period:
 - Minimum: 50.5°F
 - Mean: 50.8°F
 - Maximum: 51.1°F

Hatchery Releases

No updates received this past week.

Feather River RST Data

Cook (DWR) provided Feather River RST data for two RST sites on the Feather River. At the Eye Side Channel from 12/30/2019 to 1/6/2020, 347 juvenile fall-run Chinook salmon were observed. A large number of mortalities were observed at the Eye Side trap (246 of 347 fish) for unknown reasons. Similar mortalities have been seen in the hatchery production fish over the same time period. Samples have been sent out to pathology labs at CDFW and UC Davis for examination. Flows at the Eye Side Channel were an average 800 cfs, water temperature 47°F, and turbidity 1.2 NTU. At the Herringer site from 12/30/2019 to 1/6/2020, 231 fall-run Chinook salmon were observed. Flows were an average 2,000 cfs, water temperature 47°F, and turbidity 1.2 NTU.

Agenda Item 6.

Fish Monitoring: Salvage

Griffiths (CDFW) provided the following salvage summary for the period of 12/30/2019-1/5/2020.

Chinook salmon:

Unclipped (natural origin) Chinook salmon: Weekly salvage of natural-origin Chinook salmon: None. Total WY 2020 salvage of natural-origin Chinook salmon: 12 fish.

Clipped (hatchery origin) Chinook salmon: 44 ad-clipped late-fall-run and 4 fall-run Chinook salmon were observed this week in salvage. Total WY 2020 salvage of ad-clipped Chinook: 312 fish.

Operations:

Counts have been reduced at the SWP through 1/1/2020. Starting on 1/1/2020, counts are up to 30 minutes/2 hour fish counts.

DOSS Weekly Salvage Update

Reporting Period: December 30-January 5, 2020
 Prepared by Kyle Griffiths on January 6, 2020 15:19
 Preliminary Results -Subject to Revision

Criteria	30-Dec	31-Dec	1-Jan	2-Jan	3-Jan	4-Jan	5-Jan	Trend	
Loss Densities									
Wild older juvenile CS	0	0	0	0	0	0	0	→	0.00
Wild steelhead	0	0	0	0	0	0	0	→	0.00
Exports									
SWP daily export	13,403	14,529	6,494	4,399	3,883	4,535	4,095	↘	7,334
CVP daily export	6,884	7,414	8,143	8,143	8,122	8,074	8,113	↘	7,842
SWP reduced counts	100%	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	
	Salvage	Loss	Trend	Salvage	Loss
Wild					
Winter Run	0	0	→	0	0
Spring Run	0	0	→	0	0
Late Fall Run	0	0	→	8	6
Fall Run	0	0	→	4	3
Unclassified	0	0	→	0	0
Total	0	0		12	9
Hatchery					
Winter Run	0	0	→	0	0
Spring Run	0	0	→	128	88
Late Fall Run	44	44	↘	164	126
Fall Run	4	3	↘	20	14
Unclassified	0	0	→	0	0
Total	48	47		312	227

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	0	0	→	0	0
Hatchery	0	0	→	4	3
Total	0	0		4	3

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

DWR provided the below summary of hatchery salmon loss at the facilities (table updated after the DOSS call):

CONFIRMED HATCHERY (ADIPOSE-FIN CLIPPED) CHINOOK SALMON LOSS AT THE SWP & CVP DELTA FISH FACILITIES as of 1/10/20

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
12/9/2019	LF	Coleman NFH	Battle Creek	Spring Surrogate	15.88	84,869	n/a	0.019	n/a	0.5%	12/22/2019	1/2/2020
12/18/2019	LF	Coleman NFH	Battle Creek	Spring Surrogate	25.03	77,672	n/a	0.032	n/a	0.5%	1/1/2020	1/4/2020

SWP and CVP adipose-fin clipped Chinook lost from 10/1/2019 through 1/9/2020.

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.

DWR-DES Revised 1/10/2020

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

During the DOSS call, Islam (DWR) updated spring-run Chinook salmon surrogate losses through 1/7/2020: the cumulative loss from spring surrogate group #1 was 15.88 fish and the cumulative loss from spring surrogate group #2 was 7.8 fish. Islam notified NMFS in an email after the DOSS call that the tag code from clipped Chinook salmon salvaged at the SWP on 1/3/2020 was from spring surrogate group #2, bringing the total loss to 25.03 fish from spring surrogate group # 2 (see table above).

Agenda Item 7.

DOSS Estimates of Fish Distribution

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

Location	Yet to Enter Delta (Upstream of Knights Landing)	In the Delta	Exited the Delta (Past Chipps Island)
<i>Young-of-year (YOY) winter-run Chinook salmon</i>	40-55% Last week: 45-60%	44-58% Last week: 40-55%	1-2% Last week: 0-1%
<i>Young-of-year (YOY) spring-run Chinook salmon</i>	70-75% Last week: 75-80%	25-30% Last week: 20-25%	0% Last week: same

Rationale for changes in distribution

Wild winter-run Chinook salmon:

Over 3.9 million BY 2019 winter-run Chinook salmon have passed RBDD this year and approximately 6,300 BY19 winter-run Chinook salmon have been captured by the GCID RSTs since 8/1/2019. In the last week, 4 length-at-date winter-run Chinook salmon were captured at GCID, 1 at Tisdale, 1 at Knights Landing, and 21 at the beach seines. Because of continued presence of winter-run Chinook salmon at monitoring locations in the lower Sacramento River and Delta, DOSS estimates that an additional 3-4% of the winter-run Chinook salmon population

has entered the Delta, and that 1-2% of the winter-run Chinook salmon population has exited the Delta.

Wild spring-run Chinook salmon:

8 length-at-date spring-run Chinook salmon were observed at GCID, 1 at Tisdale, and 53 in the beach seines this past week. Because of continued presence of spring-run Chinook salmon at monitoring locations in the lower Sacramento River, DOSS estimates that an additional 5% of the spring-run Chinook salmon population has entered the Delta. No spring-run Chinook salmon have yet been observed in the Chipps Island Trawl.

Agenda Item 8.

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** (similar conditions in the Delta compared to previous week)
 - Approximately 44-58% of juvenile winter-run Chinook salmon estimated to be in the Delta.
 - Approximately 25-30% of juvenile spring-run Chinook salmon estimated to be in the Delta.
 - Anticipate continued migration of salmonids into Delta.
- **Routing Risk: LOW**

- DCC is closed.
- Flows are predicted to be high enough to partially mute tidal effects around Georgiana Slough.
- Lack of precipitation in forecast and decreasing river flows increase risk of routing risk into Central and Interior Delta.
-
- **Overall Entrainment Risk: LOW-MEDIUM**

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

- **Exposure Risk: LOW-MEDIUM**
 - Listed Chinook salmon from the Sacramento River basin continue to be observed in monitoring sites in the lower Sacramento River and northern Delta.
 - Flows are expected to decrease this week due to lack of precipitation. Salvage is expected to decrease this week compared to last week, since exports will be reduced to manage to the -5,000 cfs OMR limit from Action IV.2.3 of the NMFS 2009 BiOp. Decreased exports are associated with a less negative OMR and a reduced zone of entrainment
- **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: HIGH
 - OMR -9,000 cfs⁵: HIGH
- **Overall Entrainment Risk:**
 - OMR -2,500 cfs: LOW
 - OMR -3,500 cfs: LOW
 - OMR -5,000 cfs: LOW-MEDIUM
 - OMR -6,250 cfs⁵: MEDIUM-HIGH
 - OMR -7,500 cfs⁵: MEDIUM-HIGH
 - OMR -9,000 cfs⁵: HIGH

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

Agenda Item 9.

Other Discussion

Buttermore (Reclamation) distributed preliminary genetic data for the first wild Chinook salmon of this water year, collected in salvage at the CVP, which was assigned non-winter-run Chinook

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

salmon. Buttermore also discussed Reclamation taking on technical team responsibilities with assistance from their contracting group, once the new BiOp takes effect. DOSS members should send any suggestions or concerns to Buttermore.

Agenda Item 10.

DOSS Advice to WOMT and NMFS:

No recommendations for changes to current operations. DOSS does recommend that the interim loss density triggers described in last week's DOSS notes be implemented until the final JPE letter is issued.

Agenda Item 11.

Next Meeting: The next DOSS conference call will be on **1/14/2020 at 9 am.**

Preliminary Genetic Data for CVP/SWP Salvage – Data subject to revision.

Caution should be exercised when interpreting population assignment results, as the nuances of the statistical analysis used to generate the results may not be apparent. The mathematical error regarding the broad determination of winter run versus non-winter run is essentially zero. There is high confidence in the “Assignment” and probability shown in “PosProb1”, so that information could be viewed as “certain”. Regarding finer sub-divisions of population assignment, error can increase. The “Group” label is categorized by run type (or race); however, there is little genetic difference between fall and late-fall. It is more appropriate to collapse the information into the National Marine Fisheries Service’s designated Evolutionary Significant Units (ESU): 1) fall/late fall; 2) spring; and 3) winter. Regarding the probabilities themselves, a value greater than 0.80 is viewed as highly likely and is interpreted as the observed assignment was statistically greater to the group shown than to any other possible group. Similarly, values lower than 0.80 are statistically less uncertain.

For the results provided, assignment probabilities shown in “PosProbs 2” were low at the race level (i.e. fall or late fall), but were quite certain at the ESU level (i.e., fall and late fall). In addition, known introgression between Feather River spring-run and Feather River fall-run Chinook salmon may result in low assignment probabilities. These results are described as ‘unassigned’ in the Group column.

The “Best” label is a legacy term, and denotes the single reference collection – in the baseline used for assignment – that the individual fish assigned to most-likely matches. The “Best” results are provided for personal interest only, as many of reference collections are not genetically different. In other words, in most cases, we currently are not able to reliably distinguish between sub-populations originating from different rivers within the Central Valley.

Preliminary genetic results indicate that all Chinook salvaged during this water year that have been analyzed were fall/late fall-run.

Sample Date	Fork Length	Assignment	Pos Prob1	Group	Pos Prob2	Best	Pos Prob3	Central Valley_fa	Central Valley_lfa	Central_Valley_sp	Central_Valley_wi	Delta Model	Facility
12/3/19 18:00	185	Non-winter	1.000	Late Fall	0.500	USacramentoRlfa	0.500	0.498	0.500	0.002	0.000	Fall	CVP

Preliminary Results