



— BUREAU OF —  
RECLAMATION

## Salmon Monitoring Team (SaMT) Weekly Meeting

Teams call: 2/7/23 at 9:00 a.m.

**Objective:** Provide information to the Water Operations Management Team (WOMT), the U.S. Bureau of Reclamation (Reclamation) and California Department of Water Resources (DWR) 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. Final versions of the Proposed Action Assessment, and Fish and Water Operations Outlook will be posted to [Reclamation's Delta Monitoring Work Group](#) webpage, while final version of the Meeting Notes will be posted to Reclamation's [Salmon Monitoring Team](#) webpage. Meeting participants include representatives from: California Department of Fish and Wildlife (CDFW), DWR, National Marine Fisheries Service (NMFS), State Water Resources Control Board (SWRCB), Reclamation, and the U.S. Fish and Wildlife Service (USFWS).

### Agenda Items:

1. Introductions
2. Updates on Water Operations and Biological Conditions
3. Open Discussion on Species Status
4. Live-edit Assessments (Proposed Action Assessment and ITP Risk Assessment)
5. Additional Considerations/Other Topics
6. Next Meeting

### Agenda Item 2. Updates on Water Operations and Biological Conditions

Dry weather is forecasted through the week with cool nights and daytime highs at or above normal levels. There is a slight chance of precipitation in the North Coast, Shasta Basin, and Sierra Nevada range on 2/10/23 – 2/11/23.

Clear Creek releases from Whiskeytown Dam remain at 200 cfs.

Sacramento River releases from Keswick Dam are at 3,250 cfs.

Sacramento River flows at Freeport are approximately 21,000 cfs. Flows are expected to increase from recent precipitation and then decrease to around 15,000-20,000 cfs.

San Joaquin River flows at Vernalis are approximately 6,200 cfs and are expected to decrease to 5,500 cfs.

Clifton Court Forebay (CCF) exports are currently at 5,900 and may decrease as low as 3,500 cfs in order to meet the -5,000 OMR objective.

Feather River releases from Oroville Dam are currently at 950 cfs with no expected changes this week.

American River releases from Nimbus Dam are currently at 4,000 cfs with potential to decrease this week to 3,000 cfs.

Stanislaus River releases from Goodwin Dam are currently at 200 cfs.

The Delta outflow index is approximately 21,200 cfs and expected to remain in the low 20,000 cfs range.

Jones Pumping Plant exports are currently at 4,200 cfs.

QWEST flow values are approximately +4,000 cfs. Flows may decrease this week to +3,000 cfs.

X2 is currently at Port Chicago.

Rio Vista flows are approximately 17,000 cfs and are expected to remain around 15,000-20,000 cfs.

The tidal cycle is transitioning from a spring tide to a neap cycle this weekend after the full moon on 2/5/23.

For details on salvage that occurred in the past week please refer to the Operations Outlook, PA Assessment, and ITP Risk Assessment documents. Additionally, all salvage information can be found online at <https://filelib.wildlife.ca.gov/Public/salvage/>.

***Actions Currently in Effect:***

- Delta Cross Channel (DCC) Gate operations (PA 4.10.5.3): Gates closed for the season on 11/28/22 to meet LTO Proposed Action. The gates will remain closed until May unless an opening is needed to meet D-1641 water quality requirements.
- OMR Management Season (PA 4.10.5.10.1, COA 8.3.2): Onset of OMR Management season began on 1/1/23 due to the exceedance of the 5% threshold for the winter-run Chinook salmon population presence within the Delta. Old and Middle River (OMR) flows cannot be more negative than -5,000 cfs on a 14-day average. Additional restrictions and changes to operations may be required per the PA and the CDFW Incidental Take Permit (ITP- COA 8.3.2).
- ITP Winter-run Single-year Loss Threshold (COA 8.6.1): DWR will operate Banks Pumping Plant consistent with Condition of Approval 8.6.1 of the ITP. These values are based on the juvenile production estimate (JPE) of 49,924 fish.
  - The ITP natural-origin Winter-run Single-year Loss Threshold for this year is loss of unclipped length-at-date winter-run Chinook salmon from the CVP and SWP greater than or equal to 1.17% of the winter-run Chinook salmon JPE (loss  $\geq$  584.11). If 50% of the threshold is exceeded (loss  $\geq$  292.06), the required response is to reduce SWP exports by its proportional share, according to the coordinated operations agreement (COA), that would be required to reach a 14-

day average OMR of -3,500 cfs. If 75% of this threshold is exceeded (loss  $\geq$  438.08), the required response is to reduce SWP exports by its proportional share, according to the COA, that would be required to reach a 14-day average OMR of -2,000 cfs.

- The ITP hatchery-origin Chinook salmon Single-year Loss Threshold for this year is loss of clipped length-at-date winter-run Chinook salmon from the CVP and SWP greater than or equal to 0.12% of the winter-run Chinook salmon hatchery-origin JPE (loss  $\geq$  229.15). If 50% of the threshold is exceeded (loss  $\geq$  114.58), the required response is to reduce SWP exports by its proportional share, according to the coordinated operations agreement (COA), that would be required to reach a 14-day average OMR of -3,500 cfs. If 75% of this threshold is exceeded (loss  $\geq$  171.86), the required response is to reduce SWP exports by its proportional share, according to the COA, that would be required to reach a 14-day average OMR of -2,000 cfs.
- ITP Mid- and Late-season Natural Winter-run Chinook Salmon Daily Loss Threshold (COA 8.6.3): DWR will operate Banks Pumping Plant consistent with Condition of Approval 8.6.3 of the ITP. The ITP Daily Loss Threshold for February is loss of older juvenile Chinook salmon from CVP and SWP greater than 0.00991% of the winter-run Chinook salmon JPE (loss  $>$ 4.95). If the loss threshold is exceeded, the required response is to reduce SWP exports by its proportional share, according to the COA, that would be required to reach an OMR of no more negative than -3,500 cfs for five consecutive days.
  - Amendment to COA 8.6.3 in effect as of 1/20/2023: In water year 2023, Permittee shall restrict exports in response to the initial length-at-date identification of natural older juvenile Chinook salmon and the thresholds described above. If genetic analysis of an individual natural older juvenile Chinook salmon observed in salvage at the SWP or CVP indicates that it is not CHNWR, that individual shall not count toward the daily loss threshold and continued export restrictions under this Condition of Approval are not required if the daily loss threshold has consequently not been met. All genetic analyses shall be conducted using CDFW-approved genetic methods.

### ***Weekly Fish and Water Operations Outlook, Current Operations***

SaMT reviewed and updated the Outlook document. The updated Outlook document will be distributed to the SaMT via email by close of business (COB) 2/7/23.

SaMT discussed Fish Monitoring Gear Efficiency/Disruptions as addressed within the Operations Outlook and updated accordingly.

### ***SaMT Estimates of Fish Distribution***

SaMT estimates of the current distribution of listed Chinook salmon and CCV steelhead, as a percentage of each population, are based on recent monitoring data and historical migration timing patterns. Estimates this week are based on YOY winter-run and YOY spring-run as well

as natural origin steelhead at the real-time monitoring locations. These estimates are reported in the final Assessment document, available on the [Delta Monitoring Workgroup](#) webpage.

Location	Yet to Enter Delta	In the Delta	Exited the Delta
Young-of-year (YOY) winter-run Chinook salmon	Current: 25-35% Last week: 25-50%	Current: 55-75% Last week: 50-70%	Current: 0-10% Last week: 0-5%
YOY spring-run Chinook salmon	Current: 58-75% Last week: 63-79%	Current: 25-40% Last week: 20-35%	Current: 0-2%* Last week: 1-2%
YOY hatchery winter-run Chinook salmon	Current: 98-100% Last week: 100%	Current: 0-2% Last week: 0%	Current: 0% Last week: 0%
Natural origin steelhead	Current: 65-75% Last week: 75-84%	Current: 20-25% Last week: 15-20%	Current: 5-10% Last week: 1-5%

\*0-2% of YOY spring-run are estimated to have ‘Exited the Delta’ due to juvenile fall-run Chinook salmon being caught in the Fish Restoration Program’s monitoring sites which is west of Chipps Island. This was adjusted from the previous week due to clarification of data. Due to the high flow events that have occurred in the past few weeks, it is likely that fall-run and spring-run Chinook salmon may have been pushed out of the system and are rearing west of Chipps Island; however, because SaMT does not have data to show that YOY SR have exited the system, 0-2% was determined to be more accurate. Since fall-run have similar migration patterns as spring-run and catch efficiencies at the FRP sites are very low, it is possible that many spring-run and fall-run are rearing past Chipps Island. The young of year Chinook Salmon that were observed by the Fish Restoration Program (FRP) west of Chipps Island were actually Fall-run Chinook salmon, not spring-run. Distribution estimates were adjusted to reflect this clarification.

One unmarked Delta Smelt was detected by EDSM in the Lower San Joaquin near Antioch on 1/31/23, and eight marked adult Delta Smelt were reported captured by EDSM in Suisun Bay, the Lower Sacramento River, the Sacramento Deepwater Ship Channel and Liberty Island between 2/1/2023 and 2/6/2023.

### Agenda Item 3. Open Discussion on Species Status

#### **Salvage Update:**

The seasonal (10/1/22 – present) salvage totals of all adipose-clipped Chinook salmon at the federal facility are 760 (loss = 581.38). The seasonal (10/1/22 – present) salvage totals of all adipose-clipped Chinook salmon at the state facility are 499 (loss = 2,164.59). The seasonal (10/1/22 – present) salvage totals of all non-clipped Chinook salmon at the federal facility are 424 (loss = 265.39). The seasonal (10/1/22 – present) salvage total of all non-clipped Chinook salmon at the state facility are 25 (loss = 110.74).

The seasonal (10/1/2022 – present) salvage totals of all adipose-clipped steelhead at the federal facility are 104 (loss= 70.72). The seasonal (10/1/22 – present) salvage total of all clipped Steelhead at the state facility are 100.17 (loss = 433.72).

The seasonal (10/1/22 – present) salvage total of all non-clipped Steelhead at the federal facility are 20 (loss = 13.60). The seasonal (10/1/22 – present) salvage total of all non-clipped Steelhead at the state facility are 20 (loss = 86.6).

Two clipped, untagged fish taken at the CVP facility on 2/2/23 will undergo genetic testing to verify whether or not those salmonids were Chinook or Steelhead.

#### **Agenda Item 4. Live edit Assessments**

##### ***Proposed Action Assessment***

SaMT reviewed and updated the current week's Proposed Action Assessment document. The updated Proposed Action Assessment will be distributed to the SaMT via email by COB 2/8/23. The final assessment will be posted to [Reclamation's Delta Monitoring Workgroup](#) webpage.

##### ***ITP Risk Assessment***

SaMT discussed the ITP Risk Assessment document. The updated draft ITP Risk Assessment will be distributed via email by COB 2/7/23 for review by SaMT members with comments due COB Thursday 2/9/23. The ITP Risk Assessment will be finalized by COB Friday 2/10/23 and can be found at [CDFW's Water Project Operations](#) webpage.

#### **Agenda Item 5. Additional Considerations/Other Topics**

##### ***"SHERLOCK for Rapid Genetic Chinook Run Assignment: Pilot Testing at Salvage" Presentation by Dr. Melinda Baerwald, DWR***

Baerwald discussed Chinook run type assignment and acknowledged the difficulty in visually identifying the run type of a particular salmon. A length-at-date identification is often the first step taken but presents accuracy concerns due to overlap of fork length distribution and incorrect classifications.

Recent data collected from a spring-run JPE study revealed that for juveniles collected in the tributaries and the Delta, the accuracy levels were mixed between salmon whose field identification matched their genetic identification and salmon whose identifications did not match.

Genetic methods can be used to increase accuracy in identifying run type. The current protocol features a fin clip method of collection and requires 2-3 days to run a rapid test. Screening results include ESU, population assignment, and sex. A new protocol, SHERLOCK (Specific High sensitivity Enzymatic Reporter unLOCKing), features either a mucus swab for rapid testing, or can utilize a fin clip. Screening results are ready between 2-24 hours and include only ESU assignment data. Screening can be performed either at salvage or a lab.

The SHERLOCK method has advantages such as: low cost, rapid results, simplicity of use, and requires minimal equipment. To collect a sample, a mucus swab is taken from the fish's scales. That sample is mucus mixed with buffer, and two microliters of the mixture are added to pre-prepared SHERLOCK test tubes. The tubes are run through a portable, battery-operated machine and results are ready in as little as 1-2 hours.

When evaluating early and late-migrating phenotypes, 245 samples run through SHERLOCK resulted in 98 percent agreement between genotype and phenotype for homozygous individuals. For heterozygous individuals, agreement rate was 94 percent. When evaluating spring and winter-runs, 105 samples resulted in 98 percent agreement between genotype and phenotype for homozygous individuals. For heterozygous individuals, agreement rate was 97 percent.

While SHERLOCK presents many advantages in screening, limitations to be noted include that the technology does not distinguish between fall-run and late-fall-run, and it does not target many loci, and therefore does not assign a population location.

### Discussion Questions

1. To clarify the population structures versus SHERLOCK, which snips are most closely associated with their run type?
  - It is known to be a gene of large effect. The Central Valley is doing well in terms of close association with run type. Different results can be obtained if different marker panels are used. One panel was designed specifically for the Central Valley, and another was not.
2. How was phenotype determined?
  - Phenotype can be determined in many ways. For SHERLOCK, it was determined via carcass surveys which can result in errors. The phenotype could be misclassified. The most accurate method is freshwater entry, but that is difficult to obtain. The overall best approach might be tagging fish for tracking. There is still room for coming up with a more optimal way to obtain adult phenotype data.
3. Were heterozygous fish considered hybrids if between run types?
  - They are considered intermediates; we don't actually know if they are hybrids. Heterozygotes could be hybrids, as they have one copy of an early [gene] and one of a late [gene] for region of association. In general, there is some evidence to support that heterozygosity is not very advantageous because it implies the fish will be in between migration times.
4. What is the archival value for a SHERLOCK swab end product? Does it have alternative uses for genetic methods?
  - We have done studies showing we can keep the mucus in the buffer and have done so for up to a year without a loss of efficacy. Some will take a swab and leave it to dry, but it needs to be tested to see if it still holds up. For archiving, when you need a sample, I recommend taking a clip in addition to a swab. Cramer Fish Science clips, [DWR] swabs, and then we compare across samples. However, additional implications for genetic methods could be further studied.
5. SHERLOCK runs at body temperature. Could weather conditions alter the results?

- No, the sample is put into an instrument that maintains the temperature so weather conditions would not alter the genetic results.
6. Do you see potential for using SHERLOCK in the current regulatory framework?
- The regulatory side is outside of my scope of work. Right now, I'm focusing SHERLOCK on reliably identifying runs, its performance with our existing methodology, and the possibility of using it as a faster method of operational decision making.
7. If optimal results from SHERLOCK take 1-2 hours, what is the longest processing time?
- The assay takes an hour to run. Causes for delays are mainly due to staff, meaning if staff at the salvage facilities are working on other things and do not have time to run these analyses it will take longer to obtain the results. Also, if we don't get a result for either assignment, the genetic test needs to be repeated which also causes delays.

#### ***Discussion on Fish Loss Calculations***

SaMT members discussed the winter-run Chinook salmon and steelhead that were accidentally bagged on 1/29/23 at the federal fish facility. SaMT agreed that +1 loss should be added to the steelhead total seasonal loss if it was accidentally euthanized. Kyle Griffiths will inform the Stockton database about today's discussion and resolution.

#### **Agenda Item 6. Next Meeting**

The next SaMT Meeting is scheduled for Tuesday, 2/14/23, immediately following the Joint Operations & Outlook 9 a.m. meeting.

**Action Item:** Kearns & West to distribute the presentation slides with the draft notes on 2/7/23.