BUREAU OF RECLAMATION

Assessment for CVP and SWP Delta Operations on ESA and CESA-listed Species

May 12, 2025

Executive Summary

Operational Conditions

Section 3.13.3.4.1 of the Proposed Action and Section 8.1.4. of the Incidental Take Permit provide that during Old and Middle River (OMR) Management, the California Department of Water Resources, in coordination with Reclamation, shall provide State Water Project (SWP) and Central Valley Project (CVP) operational outlooks and assessments on a weekly basis to Water Operations Management Team (WOMT).

- The steelhead annual and weekly distributed loss thresholds have not been exceeded.
- The natural winter-run weekly distributed loss threshold has been exceeded pending genetic confirmation.
- As of May 11, 7-day average Qwest was 3,080 cfs. Modeling shows the zone of influence by exports of -5,000 is restricted to the South Delta.

Natural Winter-run Chinook Salmon

Loss of length-at-date (LAD) winter-run Chinook Salmon occurred on 5/11/2025. Pending genetic confirmation of the LAD winter-run, additional loss of natural winter-run and exceedances of thresholds and incidental take limit is unlikely over the next week based on historical data.

Central Valley Steelhead

Loss of natural-origin steelhead has occurred in the past week. Over the next week, loss of limited steelhead is likely, based on historical data, and unlikely to exceed the annual or weekly distributed loss threshold. The steelhead incidental take limit will not be exceeded by any loss that may occur.

Operational and Regulatory Conditions

See current Weekly Fish and Water Operation Outlook document.

Biology, Distribution, and Evaluation of Winter-run Chinook Salmon

- Delta Life Stages
    - Juveniles, Adults
- Brood Year 2025 Information
    - Adult winter run Chinook salmon have returned to the Sacramento River.
    - As of March 27, Livingston Stone National Fish Hatchery has collected 40 females (13 natural origin) and 38 male (2 natural origin) winter-run chinook salmon adults at the Keswick Fish Trap site. For the Battle Creek Reintroduction Program, 30 females and 12 males have been collected and are being held at Livingston Stone NFH. Many winter-run Chinook salmon were reported to be in the Keswick trap on April 24.
    - As of April 24, more than typically observed numbers of winter-run adult carcasses have been observed during the late-fall run Chinook carcass surveys and one spawned out winter-run hatchery female had been observed. The winter-run carcass surveys started the first week of May.
- Brood Year 2024 Information
    - All winter-run have passed downstream into the Delta. Final Red Bluff Diversion Dam biweekly estimate (90% CI) as of December 31, 2024 was 422,554 (310,893-534,214). The final winter-run Chinook salmon Juvenile Production Estimate, which estimates the abundance of fish entering the Delta, for Brood Year 2024 is 98,893.
    - Delta entry sampling have not captured winter-run in the past week. Historically, on average 100% of winter-run have been captured at delta entry rotary screw traps and 99.9%, on average, have been captured exiting the delta at Chipps Island as of May 11 (see Table 1). Based on historical data, the week of May 12-19 is past the end of genetically identified winter-run Chinook presence in the Delta. Historically, on average 99.9% of natural winter-run have been lost at the facilities by May 11 (Table 1).
    - The STARS model estimates of winter-run Chinook salmon through-Delta survival has decreased compared to earlier in the season. From May 01 to May 15, the STARS model estimated overall survival between 0.02 (80% CI: 0.004-0.05) and 0.05 (80% CI: 0.001-0.13). Overall survival is expected to remain low in the next few days (Figure 1), indicating poor migratory conditions in the Delta.
    - This season, cumulative loss of winter-run Chinook salmon remained far below cumulative loss thresholds, was low, and peaked by early April, based on historical trends (Figures 2 & 3).

- Overall, seasonal loss has been less than predicted for winter-run Chinook salmon (Figure 4) and is 0.029% of the juvenile production estimate. A total of ten genetically confirmed winter-run Chinook salmon have been salvaged this season. In the last 7 days, A length-at-date winter-run Chinook salmon has been salvaged leading to a weekly 7-day running loss of 3.88 as of May 11 (Table 2).

Table 1. Historic migration and salvage patterns for salmon and steelhead. Average percentage and 95% confidence intervals in parentheses. Last updated 5/12/2025.

Species	Red Bluff RST	Knights Landing RST	Sac Trawl Catch	Chipps Island Trawl	Salvage
Chinook, LAD Winter-run, Unclipped	100.% (100%,100%) BY: 2015 - 2023	100% (100%,100%) BY: 2015 - 2023	100% (100%,100%) BY: 2015 - 2023	100% (100%,100%) BY: 2015 - 2023	100% (100%,100%) WY: 2015 - 2024
Steelhead, Unclipped (January-December)	23% (10%,35%) BY: 2015 - 2024	75% (57%,92%) BY: 2015 - 2024	84% (74%,95%) BY: 2015 - 2024	84% (75%,93%) BY: 2015 - 2024	N/A
Chinook, DNA Winter-run, Unclipped (Water Year)	N/A	N/A	N/A	N/A	100% (100%,100%) WY: 2020 - 2024
Steelhead, Unclipped (Water Year)	N/A	N/A	N/A	N/A	87% (77%,97%) WY: 2015 - 2024

Brood Year 2024 Hatchery Winter-run

Livingston Stone National Fish Hatchery released approximately 240,404 brood year 2024 winter Chinook Salmon into the Sacramento River on February 1, 2025, and 261,222 were released into the Sacramento River on February 13, 2025. Of these 888 were released with telemetry tags. The hatchery winter-run Juvenile Production Estimate estimates a JPE of 135,342 for these releases. Coleman National Fish Hatchery released 117,225 brood year 2024 winter-run Chinook Salmon into Battle Creek on April 16, 2025.

As of May 12, 236 of the acoustically tagged hatchery fish were detected on real-time receivers in the Sacramento River near the city of Sacramento and 222 were detected exiting the delta at Benicia Bridge (CalFishTrack). Estimates for survival to Tower Bridge were 41% in 2025 compared to 37% in 2024. Routing probability into Georgianna Slough and the interior delta in 2025 was 17%, which is almost double the estimate routing probability in 2024 (9%). Through-Delta survival (from the City of Sacramento to Benicia) for the 2025 hatchery winter-run Chinook

salmon acoustically tagged release groups was estimated to be 64% compared to 69% in 2024. This real-time data suggests two things. The first is that survival to delta entry was higher than survival estimates used for calculating the hatchery winter-run JPE. Secondly, that a significant proportion of fish that survived to delta entry likely exited the Delta at Benicia Bridge and a smaller proportion routed towards the Delta export facilities.

A total of 42 hatchery winter-run Chinook Salmon from the Livingston Stone National Fish Hatchery were salvaged this year, with none of these fish being salvaged since April 4. This has produced a cumulative loss of 216.58 fish, which is 133% of the 100% cumulative loss threshold (Figure 3). No fish from the Battle Creek released have been observed in salvage.

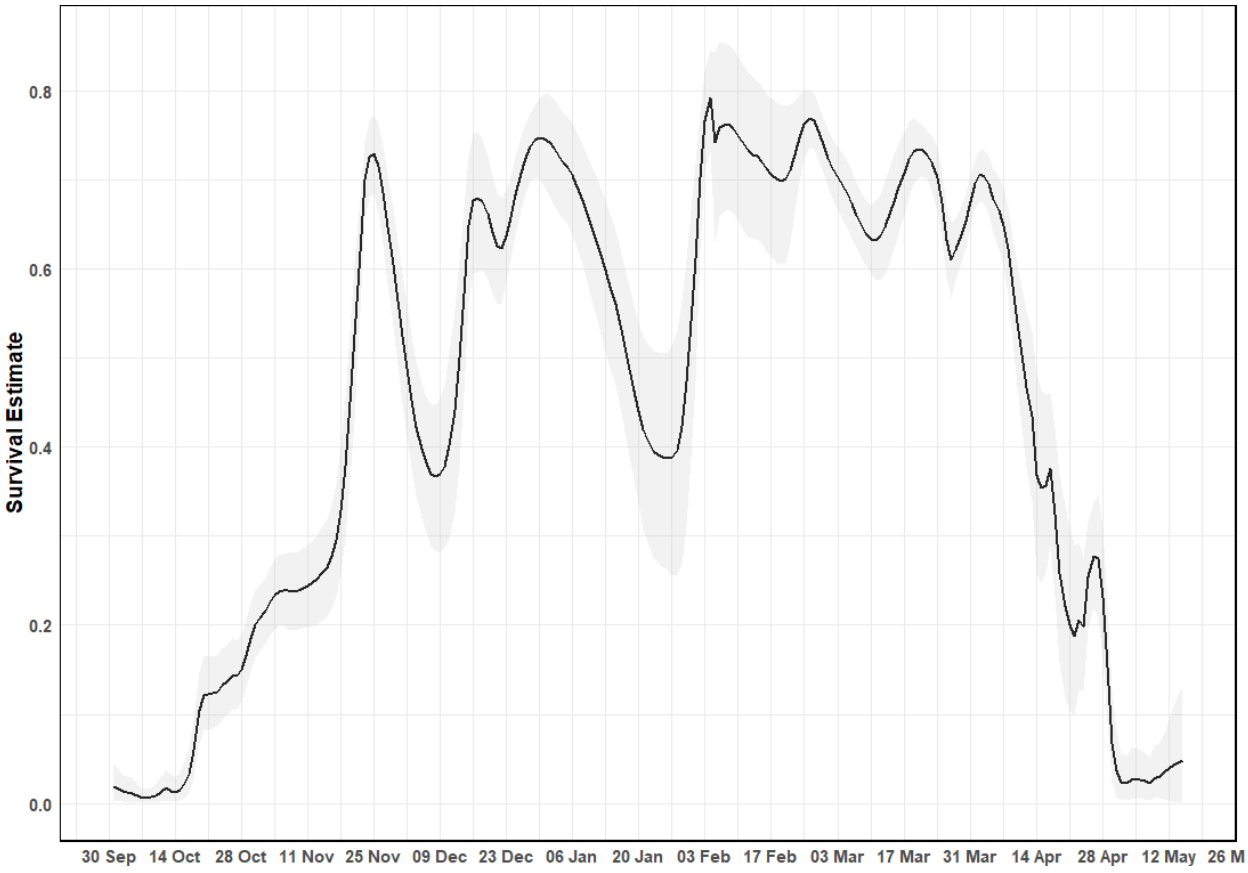


Figure 1. Temporal variation in overall survival estimates for outmigrating juvenile winter-run Chinook Salmon in the Delta with 80% credible intervals (shaded region) from October to May 15.

Figure 1 is a line graph depicting Survival Estimate (0.0-0.8) over Dates (30 Sep-26 May). Peaks are shown in November through March, and significant valleys are seen in early October and early May.

Biology, Distribution, and Evaluation of Central Valley Steelhead

- Delta Life Stages
    - Juveniles, Adults
- Brood Year 2025 Information

        - Adult steelhead are migrating through the Bay-Delta.

- Brood Year 2024 Information
    - Catch of steelhead at Red Bluff Diversion Dam has slowed. Mean cumulative weekly passage of steelhead during calendar year 2025 through April 20 at Red Bluff Diversion Dam (RBDD) for the last 20 years of passage data is 8%. A majority of this brood year passed RBDD in 2024.
    - Delta entry sampling (i.e. Knights Landing RST, Sacramento Trawl) have observed no steelhead in the past week suggesting that few steelhead are still migrating into the Delta. Historically, on average 84% of steelhead have been captured at the delta entry Sacramento Trawl and over 84%, on average, have been captured exiting the delta at Chipps Island as of March 31 (see Table 1).
    - The STARS model estimates of steelhead through-Delta survival were not available from the website. This model used acoustically tagged later fall Chinook released during the winter and early spring.
    - Historically, on average 87% of steelhead have been lost at the facilities by May 11 (Table 1). If historical loss trends continue during water year 2025, cumulative loss of juvenile steelhead is expected to continue at a low rate, but not reach the annual loss threshold (Figure 2).
    - Cumulative loss of juvenile steelhead has peaked, based on historical trends, and has been low this water year (Figures 5 & 6). Overall, seasonal loss (n=587) has been less than predicted for steelhead (Figure 4) and is 19.6% of the steelhead annual loss threshold. In the last 7 days, 3 steelhead have been salvaged leading to a weekly 7-day running loss of 40 as of May 11 (Table 2).

Delta Hydrodynamics

Based on forecasted Sacramento and San Joaquin River inflows in the weekly fish and water operations outlook, the Delta hydrodynamics continues to approximate those in a MedMed category (USBR 2024). In the MedMed condition, when the modeled proportion of the total DSM2 channel length experiencing medium hydrologic influence at -5,000 and -3,500 is measured, we see the proportion of channel length experiencing hydrologic influence is approximately twice as large at -5,000 from 164,174 feet to 337,165 feet. (USBR 2024 Figure I.3-121). When this is considered spatially, areas that reflect medium and high hydrologic alteration (0.0-0.75 proportional overlap of estimated velocities) at DSM2 nodes is stable and remains close to Railroad Cut at -5,000 and -3,500 OMR flows (USBR 2024 Figure I.3-107). At OMR values of -5,000 this zone of influence extends past the Head of Middle River compared to not including Grant Line Canal at -3,500. This zone of influence does not reach Head of Older River under OMR conditions of -3,500 or -5,000.

Evaluation

Last week, natural-origin steelhead loss and LAD winter-run loss was observed. Natural-origin steelhead loss is likely to continue at a reduced rate and winter-run loss is unlikely based on

historic trends, modeling, and this year's observations (Table 1, Figures 2, 3, & 4). Median predicted loss is expected to occur at similar rates in the –5000 OMRI scenario than the more positive OMRI scenarios (Figures 7; Table 3a, 3b) using the Tillotson et. al. model (2022) with a high amount of uncertainty in the predictions.

Hydrodynamics in the Delta suggest the export footprint does not extend into the Interior Delta and remains south of Frank's Tract. These conditions suggest a small risk on entrainment for migrating juvenile steelhead from the Sacramento River and San Joaquin rivers.

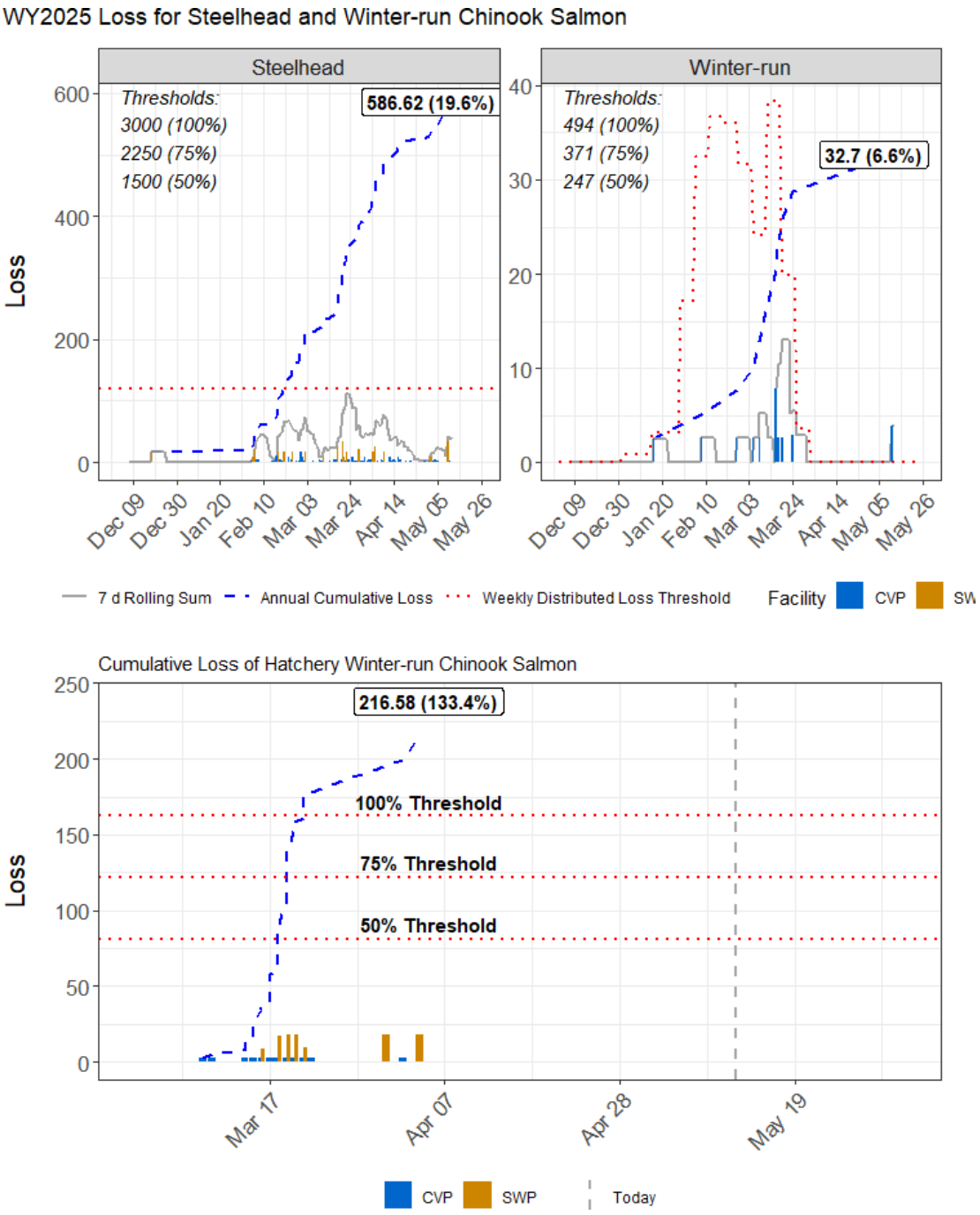


Figure 2. WY 2025 Loss for Steelhead and Winter-run Chinook Salmon

Figure 2 is three line graphs for cumulative steelhead, natural winter-run, and hatchery winter-run loss. Blue dashed lines present cumulative loss, solid grey lines represent 7 day rolling sum of loss, and dotted red lines represent relevant thresholds.

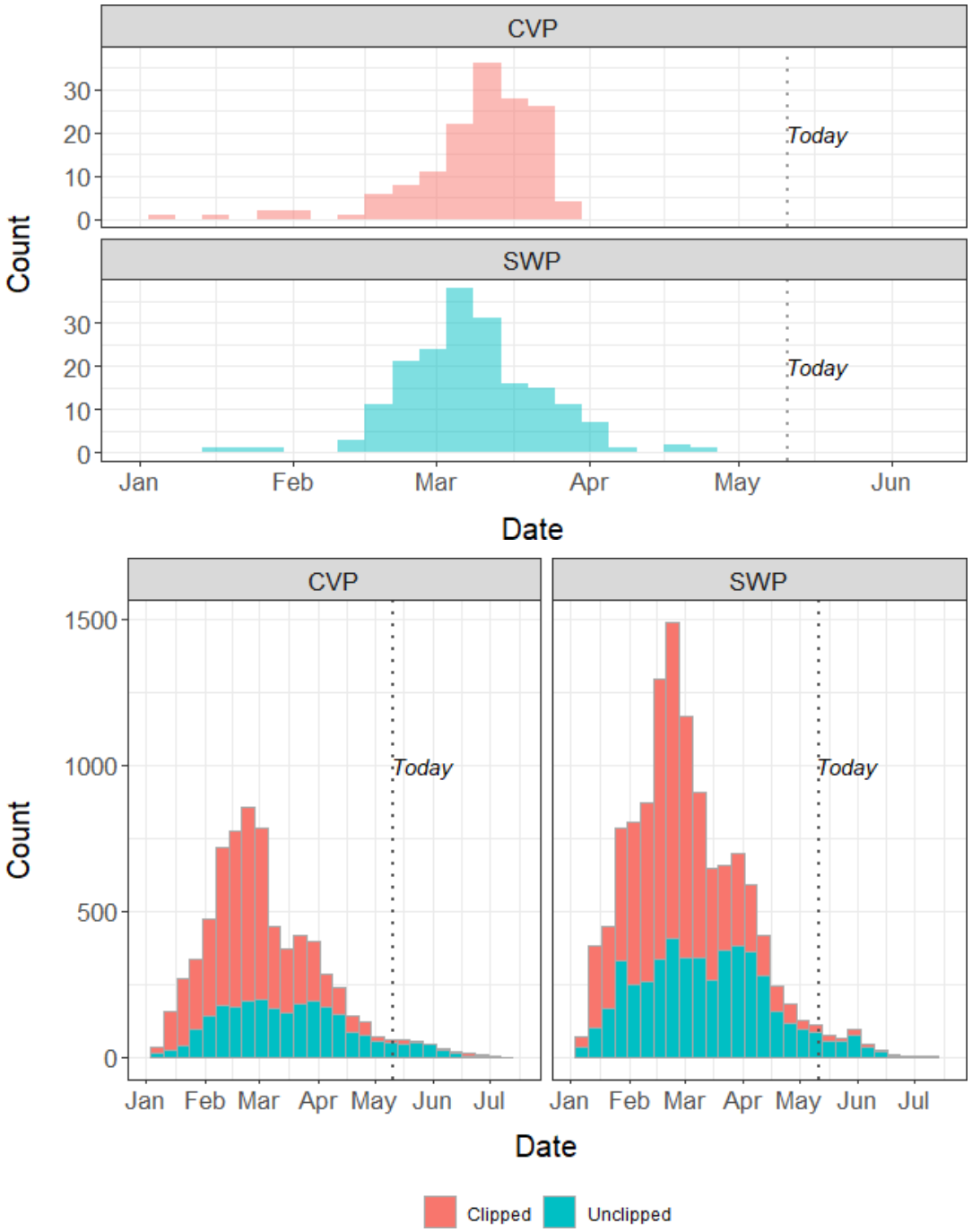
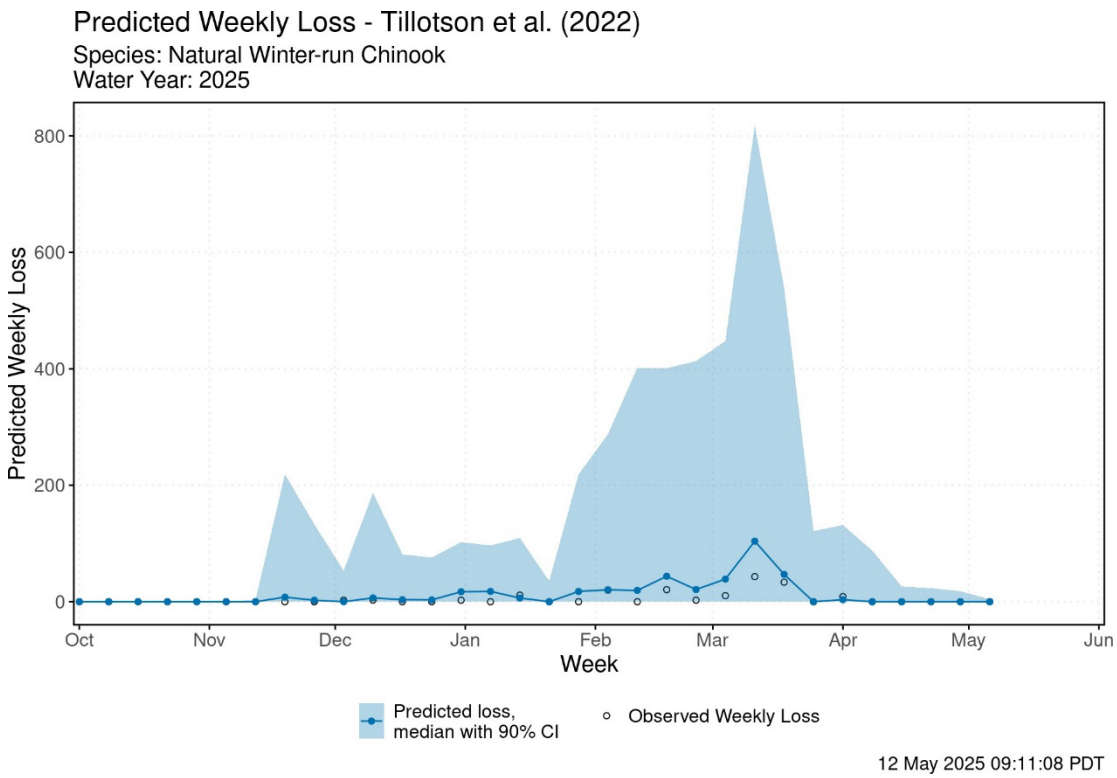


Figure 3. Distribution of genetically confirmed winter-run (top; 2008-2024) and natural and hatchery steelhead (bottom, 1994-2024) salvaged at the Central Valley Project (CVP) and State water Project (SWP).

Figure 3 is four bar graphs representing Count over Months. Clipped steelhead are depicted in orange, and unclipped steelhead are depicted in turquoise.



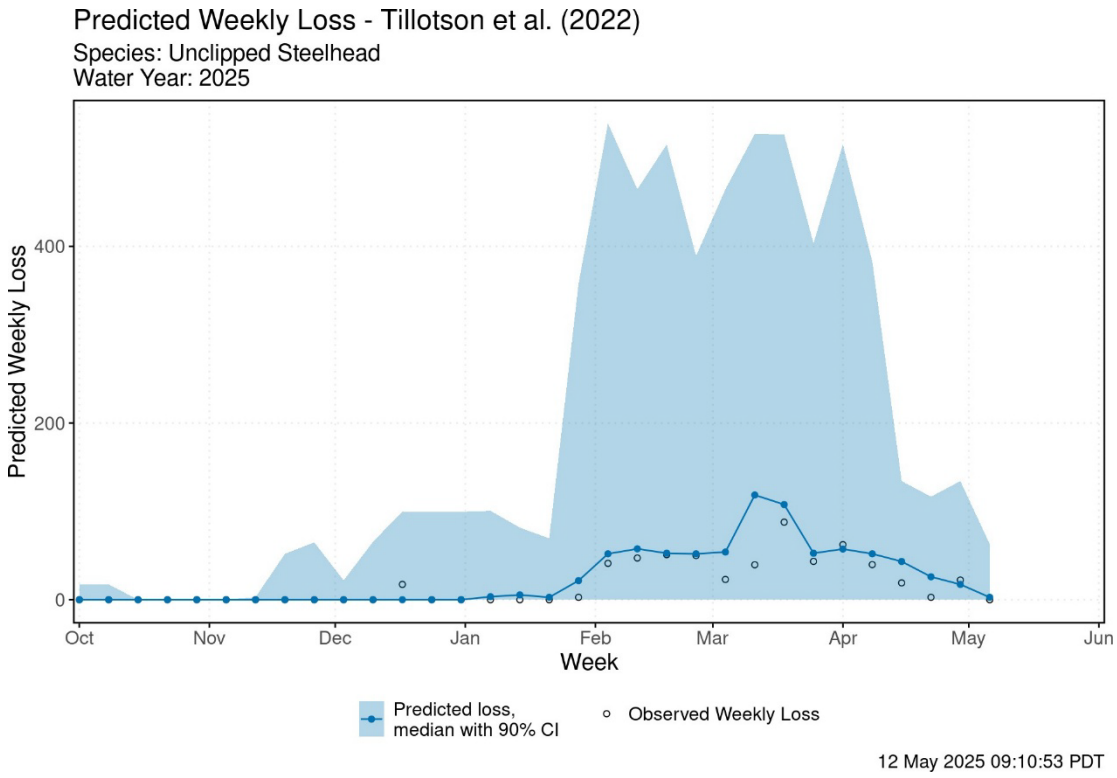


Figure 4. Predicted Weekly Loss – Tillotson et al. (2022)

Figure 4 is two line graphs depicting predicted weekly winter-run (top) and steelhead (bottom) loss through the OMR management period using the Tillotson et al. (2022) model.

Table 2. Summary of daily loss of winter-run and steelhead to inform weekly distributed loss thresholds. Steelhead weekly distributed loss thresholds are triggered when 7-day rolling sum of estimated loss 120 fish.

Date	Steelhead Daily Salvage	Steelhead 7-day rolling sum loss	Steelhead Daily Trigger	Winter- run Daily Loss	Winter- run 7-day rolling sum loss	Winter- run Daily Threshold	Winter- run Daily Trigger
May 06	0.00	22	No	0	0.00	0	No
May 07	0.00	22	No	0	0.00	0	No
May 08	0.00	20	No	0	0.00	0	No
May 09	0.00	11	No	0	0.00	0	No
May 10	34.64	43	No	0	0.00	0	No
May 11	2.72	40	No	3.88*	3.88	0	Yes
May 12	0.00	37	No	0	3.88	0	Yes

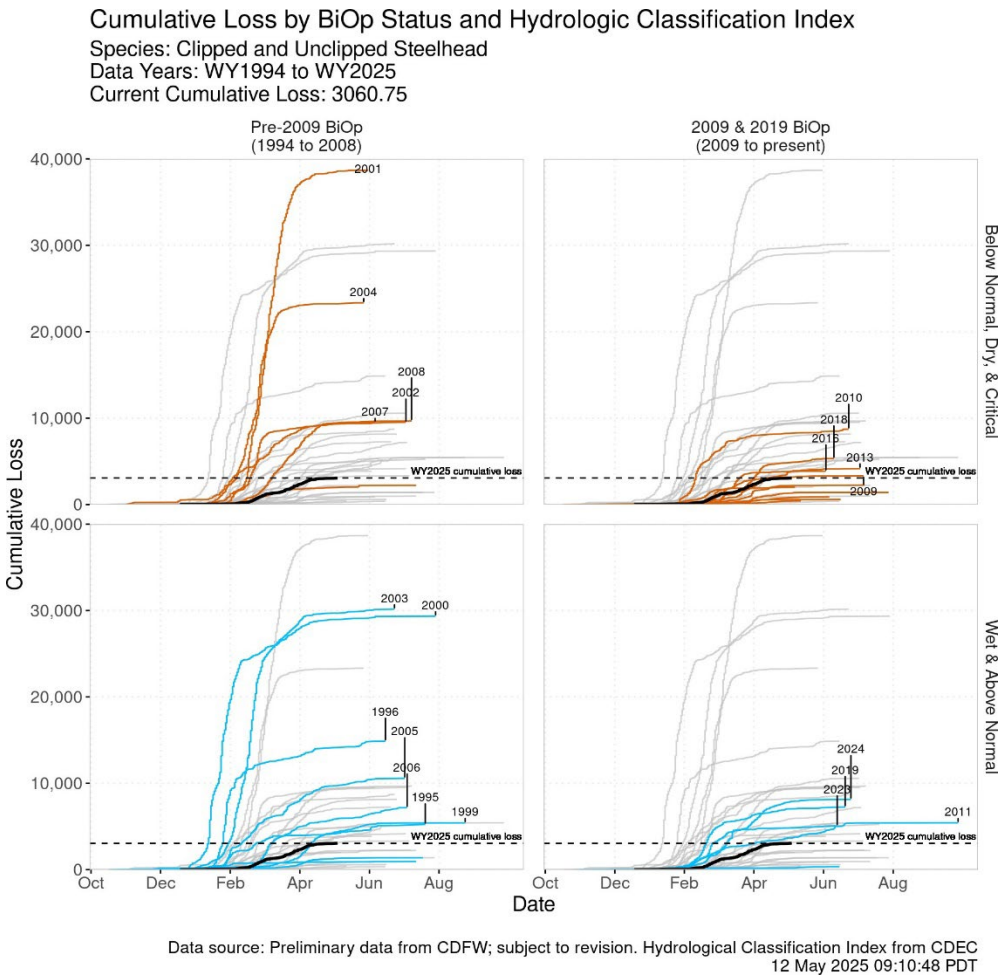


Figure 5. Cumulative Loss by BiOp Status and Hydrologic Classification Index

Figure 5 depicts four line graphs. Each quadrant of the faceted plot includes grey lines for historical years, colored lines (blue for wet years, red for dry years) for years within the BiOp status and HCI type, a black line for the current year, and a dashed horizontal line indicating the current cumulative loss maximum.

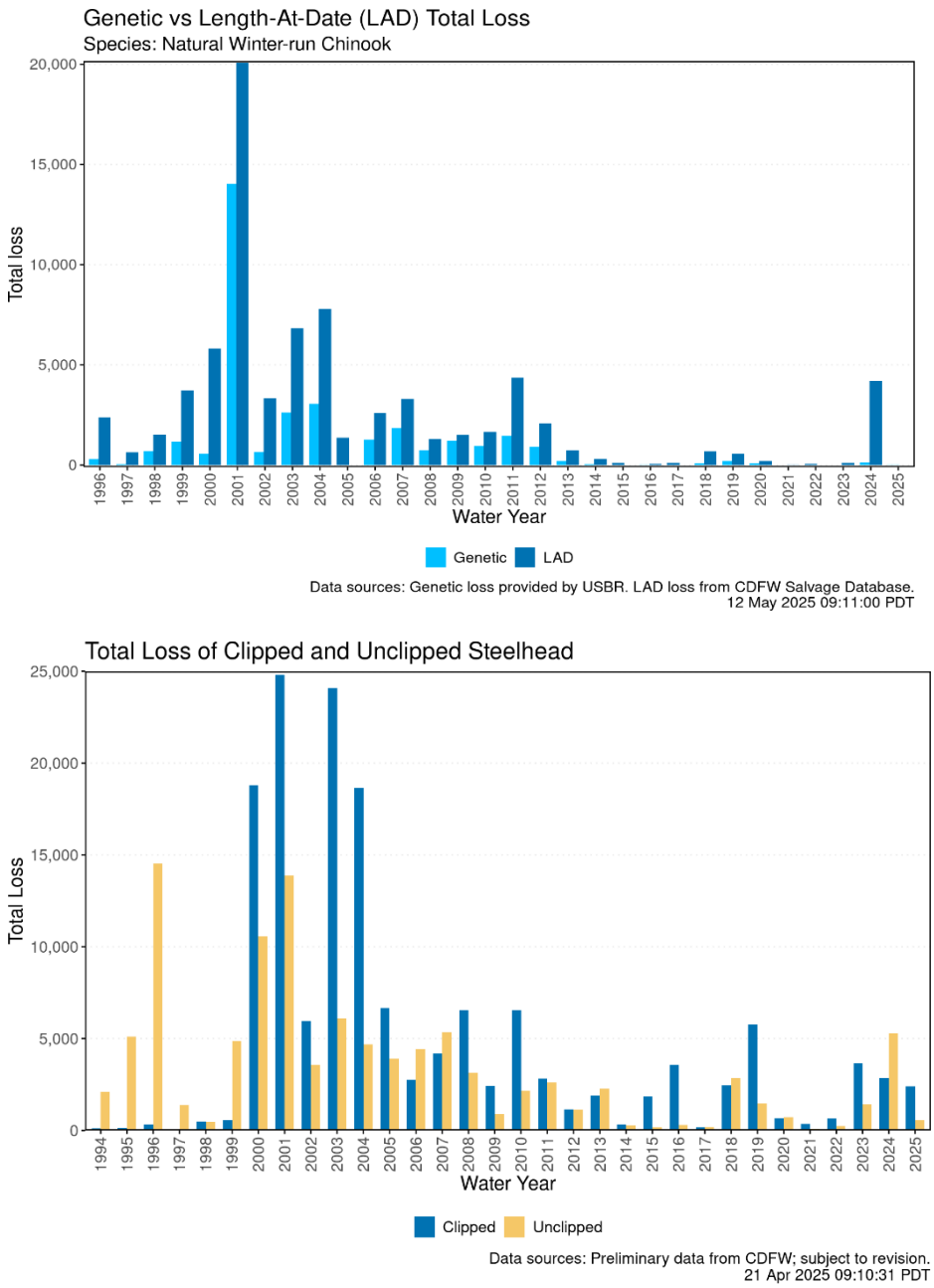


Figure 6. Genetic vs. Length-At-Date (LAD) Total Loss; Total Loss of Clipped and Unclipped Steelhead

Figure 6 depicts two bar graphs with Total Loss over Water Year. The top graph, Genetic vs. Length-At-Date (LAD) Total Loss depicts Genetic in light blue, and LAD in dark blue. The bottom graph, Total Loss of Clipped and Unclipped Steelhead, depicts Clipped in dark blue, and Unclipped in yellow.

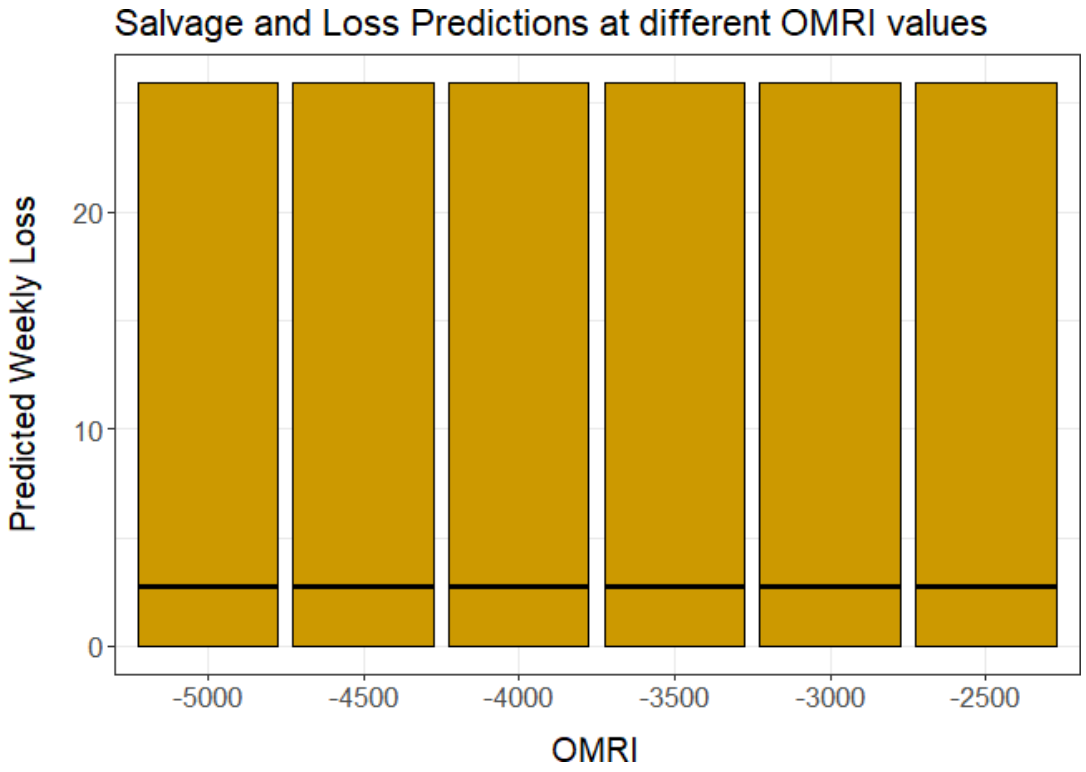


Figure 7. Salvage and Loss Predictions at Different OMRI Values

Figure 7 is a bar graph depicting predicted weekly loss of Central Valley steelhead at different OMRI values using the Tillotson et al model (2022). Bar extents represent 25th and 75th percentile of predicted weekly loss and a horizontal solid line represents median predicted weekly loss. Updated 5/12/25. Winter-run model predictions for upper and lower percentiles and median are zero for all OMRI scenarios.

Table 3a. WY 2025 loss and salvage predictor data: Predicted weekly loss of Central Valley steelhead at CVP and SWP facilities. Updated 5/12/25.

Output	Modeled Current Week	Projected -5000 OMRI	Projected -3500 OMRI
Predicted Chinook Winter Run, Median	0	0	0
Predicted Chinook Winter Run, High	13	16	7
Predicted CCV Steelhead, Median	3	3	3
Predicted CCV Steelhead, High	55	69	55

Table 3b. Environmental and operational details for current, projected -5000, and -3500 scenarios. Only OMR flows were changed to evaluate potential changes in loss.

Parameter	Current Condition	Projected -5000	Projected -3500
Temperature (Mallard Island, C)	17.4	17.4	17.4
Precipitation (5-d running sum, inches)	0.21	0.21	0.21
Old and Middle River Flows (cfs)	-2217	-5000	-3500
Sacramento River Flow (Freeport, cfs)	20719	20719	20719
DCC Gates	closed	closed	closed
San Joaquin River Flow (Vernalis, cfs)	2317	2317	2317
Export	2009	2009	2009

References

U.S. Bureau of Reclamation. 2024. Attachment 1.5 Survival, Travel Time, and Routing Simulation Model. Environmental Impact Statement for the Long-term Operation of Central Valley Project and State Water Project. 33 p.

Attachment A: Relevant Proposed Action and Incidental Take Permit Sections

3.7.4.5.5 Steelhead Annual Threshold

In each year, Reclamation and DWR will manage exports to reduce loss at the CVP and SWP salvage facilities. To support survival and decrease entrainment loss, Reclamation and DWR will manage OMR to avoid exceeding the following annual loss threshold at CVP and SWP salvage facilities through the weekly distributed loss threshold described below.

- Unclipped juvenile California Central Valley steelhead loss = 3,000

Annual loss of unclipped juvenile CCV steelhead at the CVP and SWP salvage facilities will be counted cumulatively for each Brood Year, starting July 1st of the calendar year through June 30th of the following calendar year. Loss will be calculated for the South Delta Export Facilities using CDFW's steelhead loss multiplier until a loss method for steelhead (see Section 3.11.1 is approved by CDFW and NMFS. This loss threshold will be used until a new loss threshold is developed through the steelhead JPE Special Study (See Section 3.11.1).

3.7.4.5.6 Steelhead Weekly Distributed Loss Threshold

To minimize the potential for a disproportionate impact of entrainment of steelhead present in the Delta on any single week, Reclamation and DWR will manage OMR based on a weekly distributed loss threshold. The weekly loss threshold is the annual loss threshold distributed over the period of observed steelhead salvage between January 1 and June 30 using the 7-day weekly periods identified in the weekly distributed loss table for winter-run Chinook salmon, extended through June 30. DWR and Reclamation will reduce exports to achieve a 7-day average OMR value no more negative than -3,500 cfs for seven consecutive days when the 7-day rolling sum of steelhead salvage, calculated daily, exceeds the weekly loss threshold of 120 fish.