

Assessment for Delta Operations on Salmonids

Final: *Tuesday, March 10, 2026 at 3 PM*

For more detailed data on salmonid conditions in the Delta see corresponding webpage on [SacPAS](#).

Executive Summary

- Entrainment management season is active.
- Annual Loss: 4 (0.03% of annual loss threshold) natural winter-run, 8 (0.58% of annual loss threshold) hatchery winter-run, 199 natural steelhead, 1130 (18.5% of annual loss threshold) hatchery steelhead, and 1058 (48.12% of annual loss threshold) spring-run surrogates.
- Single-year Incidental Take Limit (ITL) Status: 4 (0.07% of 5,922 ITL) natural winter-run; 8 (0.61% of 1,301 ITL) hatchery winter-run; 199 (3.76% of 5,294 ITL) natural steelhead.
- Spring-run surrogate yearlings (0.5% ITL per experimental release group): Group 1: 0 (0% of 376 ITL); Group 2: 257 (84.64% of 304 ITL); Group 3: 35 (12.26% of 286 ITL).
- LAD winter-run presence in the Delta is high based on historical monitoring.
- Steelhead presence in the Delta is high based on historical monitoring.

Natural Winter-run Chinook

Juvenile Production Estimate

The Juvenile Production Estimate for winter-run is 1,057,452 for the current water year.

Current Status

Delta Entry Timing - Historically, as of Mar 09, 60% of length-at-date (LAD) winter-run have entered the Delta based on Knights Landing RST catch, 18% have exited the Delta based on Chipps Island Trawl Catch, and 66% of DNA confirmed winter-run have been salvaged.

Table 1: Average percent of annual emigrating population for unclipped LAD winter-run captured at monitoring locations and salvaged at Delta facilities for the past 10 years.

Species	Red Bluff Diversion Dam	Tisdale RST	Knights Landing RST	Sac Trawl (Sher- wood)	Chippis Island Trawl	Salvage
Chinook, LAD Winter- run, Un- clipped	99%	98%	98%	60%	18%	58%
Chinook, DNA Winter- run, Un- clipped (Water Year)						66%

Red Bluff Diversion Dam Passage Estimate - As of Mar 04 estimated passage to date of LAD winter-run at Red Bluff Diversion is approximately 4.17 million fish. *Note that outmigration timing overlaps with spring-run migrating fish, and true winter-run abundance likely differs from these estimates.*

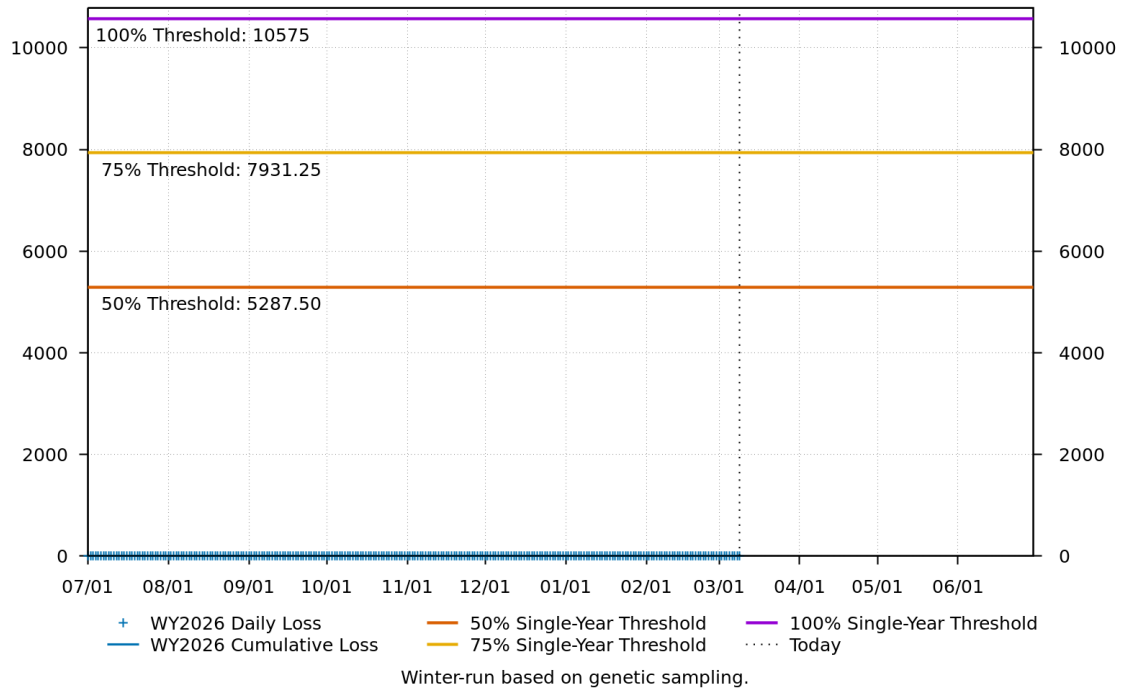
Delta Monitoring - Total catch of LAD winter-run at RSTs at Delta Entry (Tisdale, Knights Landing, Lower Sacramento River) between Feb 24 and Mar 09 is 13 individuals. Total catch at Sacramento Trawl and Beach Seines in the delta between Feb 24 and Mar 09 is 41 individuals. Total catch at Delta Exit at Chippis Island between Feb 25 and Mar 09 is 27 individuals.

Annual Loss

The annual loss threshold for natural winter-run is 1% of the JPE or 10,575 fish. The single-year incidental take limit (ITL) is 0.56% of the JPE (5,922 fish) or 0.36% on a 3-year rolling average (BiOp Table 184). As of March 09, cumulative loss of genetically confirmed winter-run is 4 or 0.03% of the annual loss threshold. Cumulative loss in the past 7 days has been 0.

STARS

WY2026 Natural DNA Winter-run Chinook Loss
Cumulative Loss to date: 3.52
Cumulative Loss percent of Threshold: 0.03%



www.cbr.washington.edu/sacramento/

10 Mar 2026 14:49:03 PDT

Figure 1: Cumulative loss of natural-origin winter-run for WY 2026. Cumulative loss is based on genetically confirmed winter-run captured in salvage or length-at-date winter-run in which genetic confirmation was unable to be obtained.

The Delta STARS Model is an individual-based simulation model that predicts survival, travel time, and routing of juvenile salmon migrating through the Sacramento–San Joaquin River Delta. This model gives insight into survival and routing patterns of winter-run based on most current conditions.

As of March 09, overall through delta STARS estimated survival probability (with 80% credible intervals) is 0.58 (0.53-0.62) placing it in the 49th percentile of historical STARS survival estimates for the month of March (WYs 2018-2025). STARS estimated routing and survival probabilities (with 80% credible intervals) into the interior delta are 0.12 (0.1-0.14) and 0.33 (0.23-0.43), respectively, corresponding to the 52nd and 48th percentiles of historical March estimates (WYs 2018-2025).

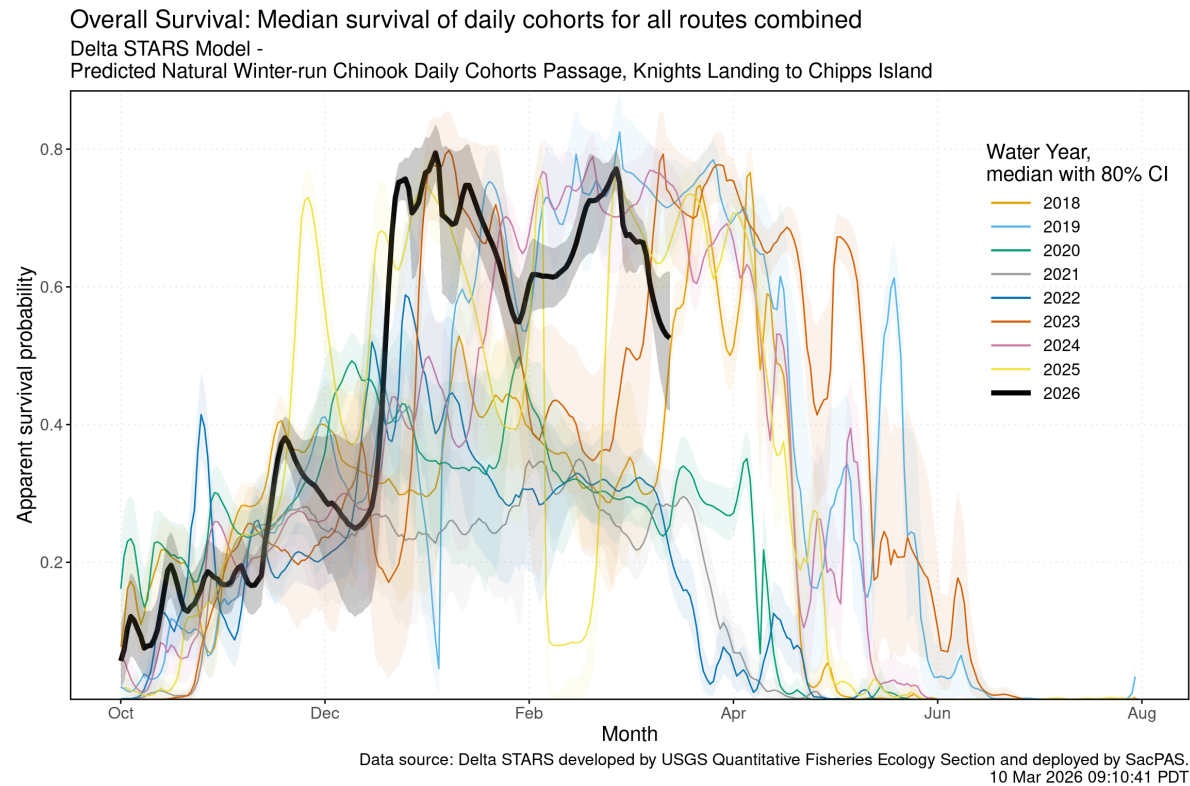
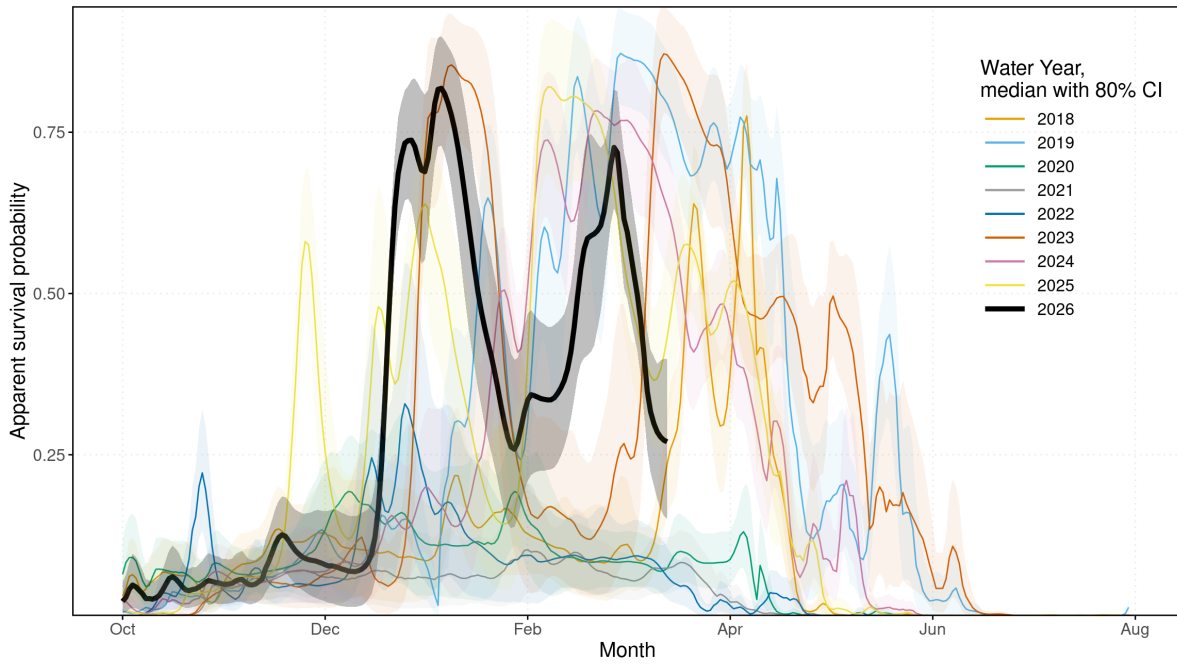


Figure 2: Estimated overall winter-run survival from Knights Landing to Chipps Island. Black line indicates the current water-year, and other colored lines correspond to past water years.

Hatchery Winter-run Chinook

Hatchery Releases

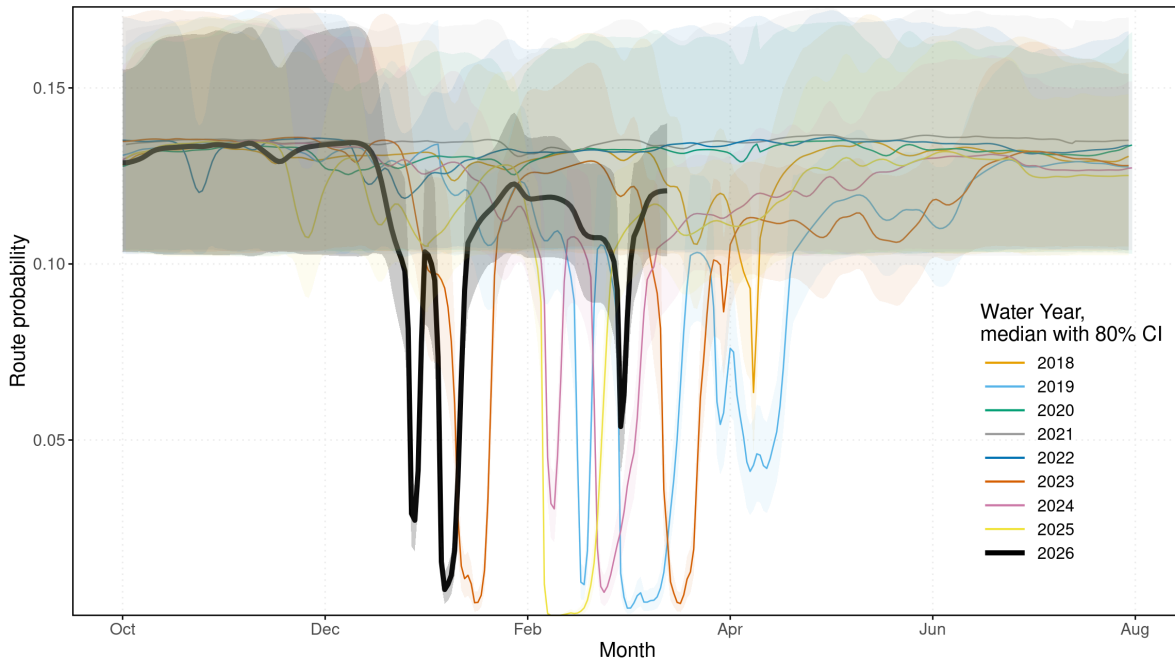
Interior Delta Route-specific Survival Probability: Median survival of daily cohorts using the Interior Delta STARS Model - Predicted Natural Winter-run Chinook Daily Cohorts Passage, Knights Landing to Chipps Island



Data source: Delta STARS developed by USGS Quantitative Fisheries Ecology Section and deployed by SacPAS. 10 Mar 2026 09:10:41 PDT

Figure 3: Estimated survival from Knights Landing to Chipps Island of simulated winter-run cohorts that route through the interior Delta. Black line indicates the current water-year, and other colored lines correspond to past water years.

Interior Delta Route-specific Probability: Proportion of daily cohorts using the Interior Delta route
Delta STARS Model -
Predicted Natural Winter-run Chinook Daily Cohorts Passage, Knights Landing to Chipps Island



Data source: Delta STARS developed by USGS Quantitative Fisheries Ecology Section and deployed by SacPAS.
10 Mar 2026 09:10:41 PDT

Figure 4: Estimated probability of winter-run routing into the interior Delta. Black line indicates the current water-year, and other colored lines correspond to past water years.

Livingston Stone National Fish Hatchery released a total of 466,344 winter-run Chinook salmon (February 18). All fish were 100% CWT-marked production fish released at the Sacramento River at John F. Reginato River Access. Release details are shown in the table below and available on SacPAS.

Table 2: Livingston Stone NFH winter-run Chinook salmon releases in Water Year 2026. Data sourced from SacPAS.

Release Date	Hatchery	Release Site	Release Type	Fish Released	% CWT Marked	CWT Tagcodes
February 18, 2026	Livingston Stone NFH	Sacramento River at John F. Reginato River Access	Production	237,004	100%	056770
February 18, 2026	Livingston Stone NFH	Sacramento River at John F. Reginato River Access	Production	229,340	100%	053800 056788 056789

Juvenile Production Estimate

The Juvenile Production Estimate for hatchery winter-run is 130,096 for Livingston Stone releases. The annual loss threshold is 1% of the JPE (1,301 fish), which is the same as the single-year ITL (BiOp Table 184).

Annual Loss

As of March 10, cumulative loss of Livingston Stone hatchery fish is 8 or 0.58% of the annual loss threshold (which equals the single-year ITL). Cumulative loss in the past 7 days has been 8.

Natural-origin Central Valley Steelhead

Current Status

Delta Entry Timing - Historically, as of Mar 09, 51% of CCV steelhead have entered the Delta based on Knights Landing RST catch, 40% have exited the Delta based on Chipps Island Trawl Catch, and 32% have been salvaged.

Table 3: Average percent of annual emigrating population for unclipped CCV steelhead captured at monitoring locations and salvaged at Delta facilities for the past 10 years.

Species	Chipps Island Trawl	Knights Landing RST	Red Bluff Diversion Dam	Sac Trawl (Sherwood)	Salvage	Tisdale RST
Steelhead, Un-clipped	40%	45%	2%	51%	32%	45%

Delta Monitoring - Total catch of unclipped steelhead at RSTs at Delta Entry (Tisdale, Knights Landing, Lower Sacramento River) between Feb 24 and Mar 09 is 2 individuals. Total catch at Sacramento Trawl and Beach Seines in the delta between Feb 24 and Mar 09 is 0 individuals. Total catch at Delta Exit at Chipps Island between Feb 25 and Mar 09 is 0 individuals.

Annual Loss

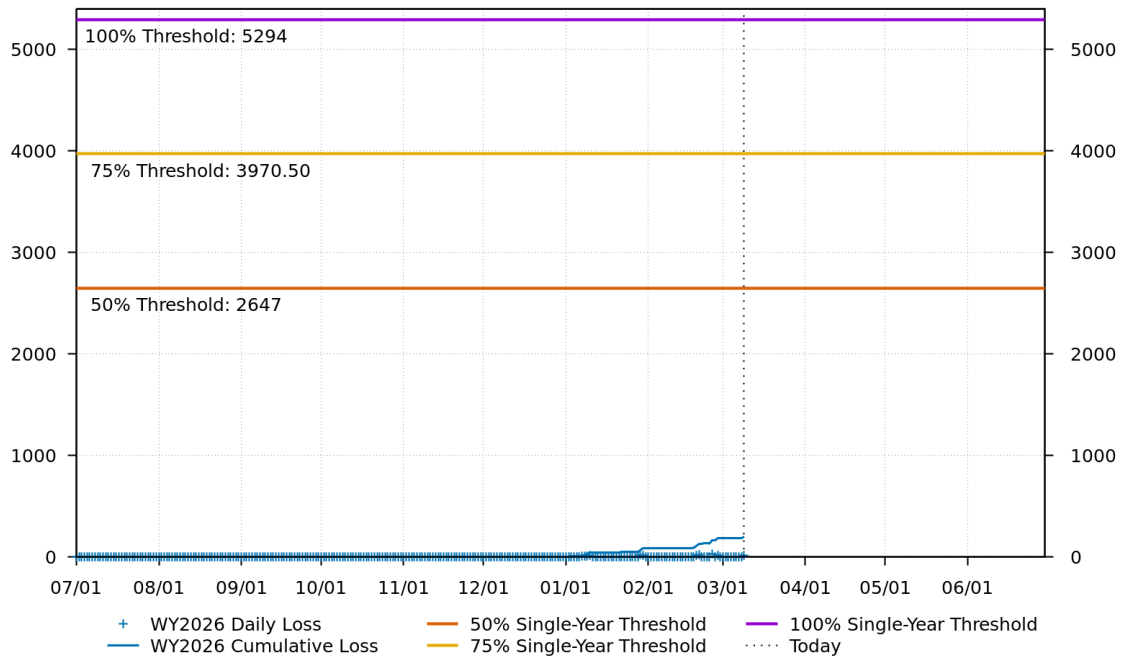
As of March 09, cumulative loss of unclipped steelhead is 199 or 3.76% of the single-year incidental take limit (ITL). There is no annual loss threshold for natural steelhead. The single-year ITL is 5,294 juveniles or 2,319 juveniles as a 3-year rolling average (BiOp Table 184). Cumulative loss in the past 7 days has been 299.

Hatchery-origin Central Valley Steelhead

Surrogate Releases

There have been a total of 7 releases totaling 1,451,464 steelhead in Water Year 2026. JPE for the hatchery releases as of today is 610,752 based on estimated survivals using forecasted water year types (see details in table below). The annual loss threshold, equal to 1% of the JPE, is currently 6,108, but is subject to change with additional steelhead releases.

WY2026 Natural Steelhead Loss
Cumulative Loss to date: 198.97
Cumulative Loss percent of Threshold: 3.76%



www.cbr.washington.edu/sacramento/

10 Mar 2026 14:49:03 PDT

Figure 5: Cumulative loss of natural-origin steelhead for WY 2026. The 5,294 line represents the single-year incidental take limit (ITL), not a loss threshold.

Table 4: Summary of steelhead hatchery releases in Water Year 2026. JPE calculated using hatchery-specific survival estimates to Delta entry from release location.

Hatchery	Date of Release	Number Released	Estimated Survival	Juvenile Production Estimate
NIM	2025-11-10	233,109	72%	167,838
Coleman	2025-12-15	555,720	38%	211,174
Coleman	2025-12-17	90,019	38%	34,207
FRH	2026-01-06	376,640	36%	135,590
FRH	2026-01-09	117,715	36%	42,377
MOK	2026-02-17	39,130	25%	9,783
MOK	2026-02-18	39,131	25%	9,783

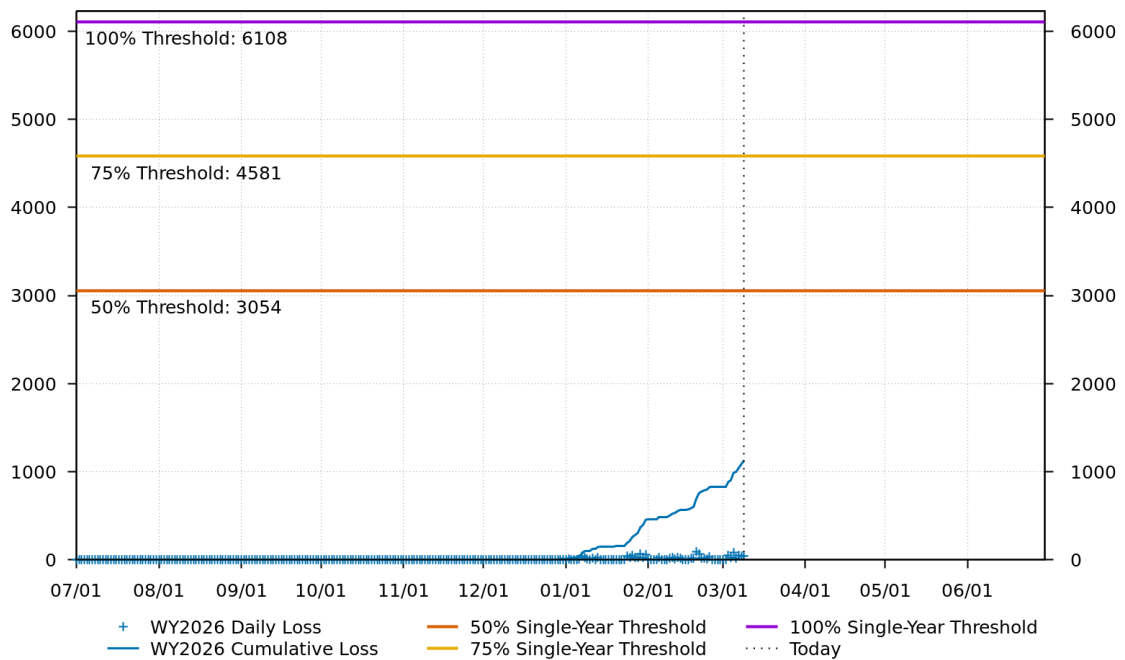
Table 5: Hatchery-specific survival estimates used for JPE calculations.

Hatchery	Survival Estimate	Source
Coleman NFH	0.205 - 0.433	Sandstrom et al. 2020
Feather River Hatchery	0.09 - 0.45	Kurth 2013
Nimbus Hatchery	0.62 - 0.83	Brodsky et al. 2020

Hatchery	Survival Estimate	Source
Mokelumne River Hatchery	0.25 - 0.33	Del Real et al. 2012

Total loss of hatchery-origin steelhead is 1130 or 18.5% of the annual loss threshold. *Note that hatchery origin of salvaged fish cannot be determined at this time and salvage is based on the assumption of similar routing and survival probabilities of individual hatchery releases.*

WY2026 Hatchery Steelhead Loss
Cumulative Loss to date: 1129.62
Cumulative Loss percent of Threshold: 18.49%



Running JPE calculated from hatchery releases to date and survival estimate range (adjusted by WSI forecast type).
www.cbr.washington.edu/sacramento/ Threshold is 1% of calculated JPE. 10 Mar 2026 14:49:03 PDT

Figure 6: Cumulative loss of hatchery steelhead for WY 2026.

Spring-run Chinook

Current Status

Delta Entry Timing - Historically, as of Mar 09, 6% of LAD spring-run have entered the Delta based on Knights Landing RST catch, 0% have exited the Delta based on Chipps Island Trawl Catch, and 2% have been salvaged.

Table 6: Average percent of annual emigrating population for LAD spring-run Chinook salmon captured at monitoring locations and salvaged at Delta facilities for the past 10 years.

Species	Red Bluff Diversion Dam	Tisdale RST	Knights Landing RST	Sac Trawl (Sher- wood)	Chipps Island Trawl	Salvage
Chinook, LAD Spring- run, Un- clipped	17%	19%	32%	6%	0%	2%

Red Bluff Diversion Dam Passage Estimate - As of Mar 04 estimated passage to date of LAD spring-run at Red Bluff Diversion is approximately 0.03 million fish. *Note that outmigration timing overlaps with winter-run and fall-run outmigration, and true spring-run abundance likely differs from these estimates.*

Delta Monitoring - Total catch of LAD spring-run at RSTs at Delta Entry (Tisdale, Knights Landing, Lower Sacramento River) between Feb 24 and Mar 09 is 76 individuals. Total catch at Sacramento Trawl and Beach Seines in the delta between Feb 24 and Mar 09 is 62 individuals. Total catch at Delta Exit at Chipps Island between Feb 25 and Mar 09 is 14 individuals.

Spring-run Surrogate Releases

A total of 805,323 spring-run surrogate fish have been released in Water Year 2026, with an estimated Juvenile Production Estimate (JPE) of 219,852 fish entering the Delta. This includes 805,323 Coleman Late-Fall Run Chinook (JPE: 219,852) released from Coleman National Fish Hatchery across 12 coded-wire tag groups. See details in table below.

Table 7: Spring-run Chinook salmon surrogate releases (all Coleman Late-Fall releases, both production and experimental).

Hatchery	Release Date	Type	# of CWT Fish Released	JPE	ITL (0.5%)	Confirmed Loss	CWT Codes
Coleman NFH	2025-11-13	Production	143,346	39,134		9	056808, 056809
Coleman NFH	2025-11-17	Experimental	75,119	20,507	376	0	056810
Coleman NFH	2025-12-17	Production	468,876	128,002		757	053700, 056806, 056811, 056812, 056814, 056815, 056817
Coleman NFH	2025-12-22	Experimental	60,873	16,618	304	257	056813
Coleman NFH	2026-01-08	Experimental	57,109	15,591	286	35	056816

Annual Loss

The annual loss threshold is 1% of the JPE entering the Delta, which equals 2,199 fish. As of March 09, cumulative loss is 1,058 fish or 48.12% of the annual loss threshold. The single-year incidental take limit (ITL) is 0.5% of the estimated number of each surrogate release group (BiOp Table 184). ITL status by experimental release group: Release Group 1 (2025-11-17): 0 loss of 376 ITL (0%); Release Group 2 (2025-12-22): 257 loss of 304 ITL (84.64%); Release Group 3 (2026-01-08): 35 loss of 286 ITL (12.26%)

Loss Prediction and Trajectories

The following figures display the current loss predictor model outputs for winter-run Chinook salmon and steelhead.

Winter Run Loss 2026-03-03 Water Year: 2026 & WY.week 22

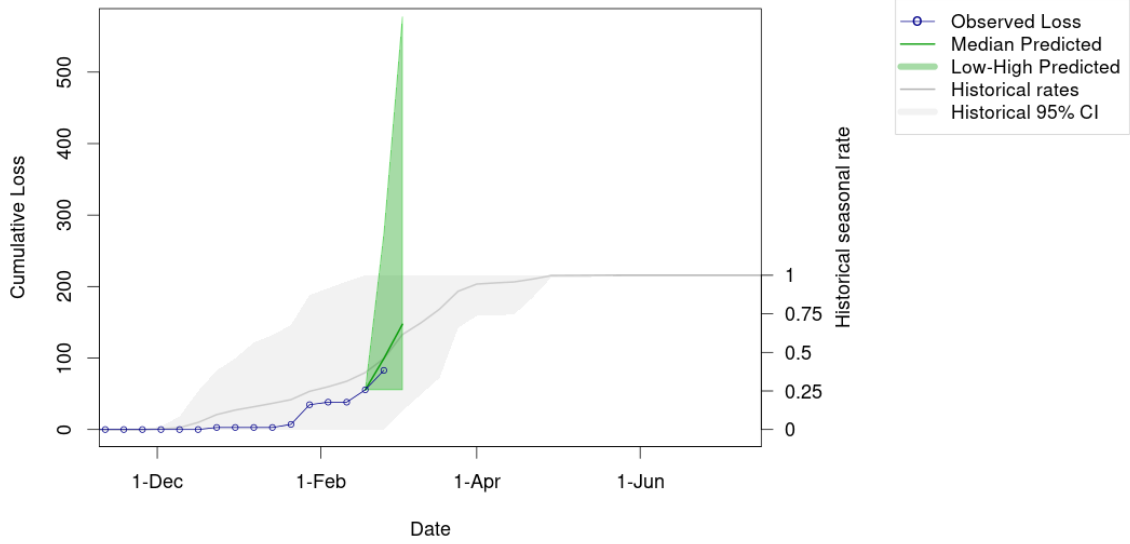


Figure 7: Estimates of winter-run Chinook loss generated by Loss and Salvage Predictor tool.

Steelhead Loss 2026-03-03 Water Year: 2026 & WY.week 22

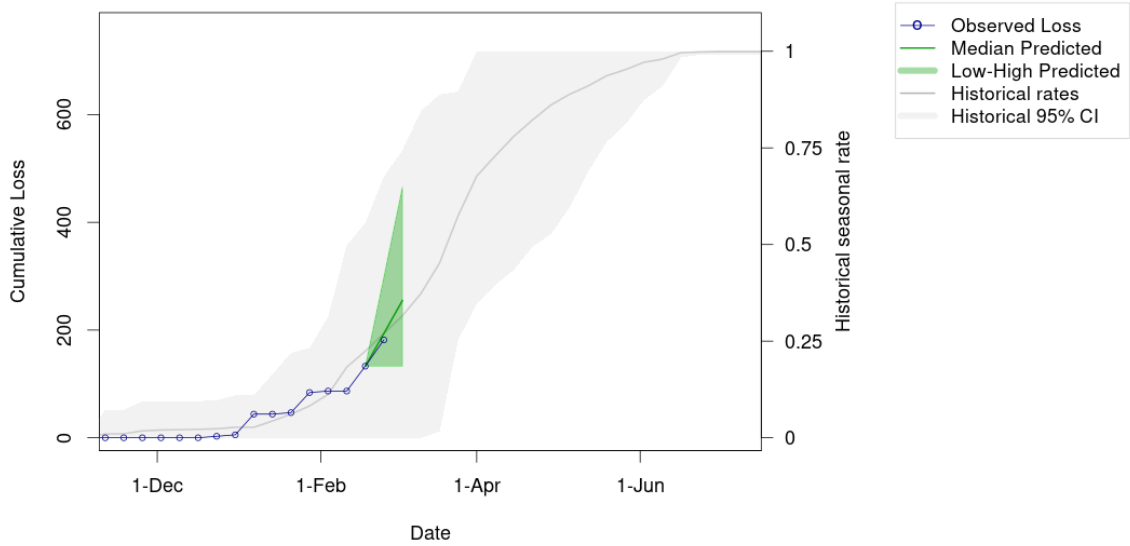


Figure 8: Estimates of steelhead loss generated by Loss and Salvage Predictor tool.

Evaluation

1. **What is the probability of exceeding natural or hatchery winter-run Chinook salmon loss thresholds in the upcoming week?**

LOW RISK: Natural winter-run cumulative loss is currently 0.03% of the threshold. LOW RISK: Hatchery winter-run cumulative loss is currently 0.58% of the threshold.

2. **What is the probability of exceeding spring-run Chinook salmon surrogate yearling loss thresholds in the upcoming week?**

LOW RISK: Spring-run surrogates cumulative loss is currently 48.12% of the threshold.

3. **What is the probability of exceeding natural or hatchery steelhead loss thresholds in the upcoming week?**

LOW RISK: Natural steelhead cumulative loss is currently 3.76% of the threshold. LOW RISK: Hatchery steelhead cumulative loss is currently 18.50% of the threshold.

References

- Brodsky, A., Zeug, S. C., Nelson, J., Hannon, J., Anders, P. J., & Cavallo, B. J. (2020). Does broodstock source affect post-release survival of steelhead? Implications of replacing a non-native hatchery stock for recovery. *Environmental Biology of Fishes*, *103*(5), 437–453.
- Del Real, S. C., Workman, M., & Merz, J. (2012). Migration characteristics of hatchery and natural-origin oncorhynchus mykiss from the lower mokelumne river, california. *Environmental Biology of Fishes*, *94*(2), 363–375.
- Kurth, R. (2013). *Downstream migration success of feather river fish hatchery steelhead smolts under different release strategies*.
- Sandstrom, P. T., Ammann, A. J., Michel, C., et al. (2020). Low river survival of juvenile steelhead in the sacramento river watershed. *Environmental Biology of Fishes*, *103*(5), 531–541.