

2024 SWP ITP Operations Summary and Chinook Salmon Assessment

Date: 12/31/2024

Summary for the Water Operations Management Team (WOMT):

For the week beginning 12/31/24, First Flush Action (OMRI -2,000 cfs) is controlling exports at the Central Valley Project (CVP) and the State Water Project (SWP). Combined exports on 12/31/24 are 2,350 cfs resulting in an Old and Middle River Index (OMRI) of -1,900 cfs and 5.4% of inflow diverted (14-day average). The Delta Cross Channel (DCC) gates were closed on 11/18/24 and will likely remain closed this upcoming week. The SWP is exporting this week and no outages are planned.

Spring-run Chinook Salmon (SR) risk into the central Delta remains low this week. Yearling and YOY SR are anticipated to move into the Delta in the upcoming week due to recent storm events; however, due to hydrological conditions it is not anticipated that spring-run have a high risk of being entrained into the central Delta. SR risk into the facilities has increased to medium this week primarily due to OMRI decreasing from -2,000 cfs to -5,000 cfs. Since there is a decrease in OMRI to a more negative target and salvage of fish have been observed over the previous week at OMRI of -2,000 cfs, it is likely that salvage will increase with a shift to a more negative OMRI. Therefore, entrainment of spring-run into the salvage facilities has increase to medium.

Winter-run Chinook Salmon (WR) are anticipated to be moving downstream with the storm events and are likely entering the Delta in increasing numbers. The LAD WR that have been observed in salvage have been genetically confirmed as fall-run Chinook Salmon (FR).

Spring-run Chinook Salmon Risk Assessment for 12/31/24 - 1/6/25

Section 1: Sacramento River and Confluence

Assessment of risk of entrainment into the central Delta for SR in the Sacramento River:

- Exposure Risk:
 - SR: Medium
- Routing Risk:
 - SR: Low
- Overall Entrainment Risk:
 - SR: Low
- Change in risk of entrainment into the central Delta (increased/decreased risk compared to last week):
 - SR: Similar to previous week
 - Exposure Risk is estimated as medium this week. YOY SR are not estimated to be in the Delta in large numbers due to seasonal timing; however, due to hydrological conditions and seasonal timing, both YOY and yearling SR are likely migrating downstream and into the Delta. Routing Risk is estimated as low this week based on hydrologic conditions, DCC gates projected to be closed, and the STARS Model is predicting ~20% entrainment into Georgiana Slough. However, due to hydrological conditions and the Georgiana BAFF installation, it is less likely that fish will have a high entrainment risk into the central Delta this week. Therefore, the overall entrainment into the central Delta has decreased to low risk.

Section 2: Facilities Risk

Central Valley Project/State Water Project (CVP/SWP) facilities entrainment risk for SR in the central Delta over the next week:

- Exposure Risk:
 - SR: Low
- Reporting OMR/Export Risk:
 - Baseline OMR (-2,000 cfs)
 - SR: Low
 - Scenario 1 OMR: (-1,900 cfs)
 - SR: Low
 - Scenario 2 OMR: (-5,000 cfs)
 - SR: Medium
- Overall Entrainment Risk:
 - SR: Medium
- Change in risk of entrainment into the facilities (increased/decreased risk compared to last week):
 - SR: Increased from previous week
 - Exposure Risk is low this week due to few hatchery-origin yearling SR surrogates and natural-origin YOY spring-run being salvaged throughout the week. Reporting OMR/Export Risk is low to medium this week due to a no more negative than -5,000 cfs OMRI begin operated to through the week. Although an OMRI of -5,000 cfs will be operated to in the upcoming week, there is a possibility that with the decrease in OMRI from -2,000 cfs to -5,000 cfs, there may be an increase in salvage of hatchery-origin SR surrogates. Since the hatchery-origin spring-run surrogates indicate that natural-origin yearling SR are migrating through the system and may be present near the salvage facilities, it is also possible that more natural-origin yearling SR will also be salvaged in the upcoming week. Therefore, the overall entrainment risk into the facilities is estimated to be medium this week.

Section 3: Distribution and Biology

- Adult escapement:
 - Adult SR have completed their spawning.
- Redd distribution and fry emergence timing:
 - YOY SR eggs are incubating in the gravel and some are beginning to emerge. There have been some detections of early emergence based on detections at the Tisdale RST and Lower Sacramento RST in the Sacramento River and at the Eye-side RST in the Feather River. It is possible though that these LAD YOY SR being observed in real-time monitoring sites in the Delta are late emerging WR.
- Hatchery releases (Feather River Fish Hatchery and Coleman National Fish Hatchery):
 - Coleman National Fish Hatchery (CNFH) have released three late fall-run Chinook Salmon release groups into Battle Creek on 11/20/24, 11/25/24, and 12/13/24.
 - The release that occurred on 11/20/24 will count towards COA 8.4.5 for yearling SR surrogate releases as Group #1 and tracking of these fish in the SWP and CVP facilities will be closely monitored.
 - The release that occurred on 12/13/24 will count towards COA 8.4.5 for yearling SR surrogate releases as Group #2 and tracking of these fish in the SWP and CVP facilities will be closely monitored.
 - Loss has occurred from the SR surrogate Group #1. See the *Thresholds for Relevant Conditions of Approval (COAs)* section for more detailed information.
- Distribution of length-at-date (LAD) natural-origin young-of-year (YOY) and yearling SR:

- Feather River: Lower Feather RSTs has caught a few LAD SR in the RSTs. Juveniles are beginning to emerge from redds and migrate downstream but some are still in gravel.
 - Butte Creek: Butte Creek Carcass Surveys ended on 10/28/24. Only 20 carcasses were observed. 1 juvenile SR was observed passing through the RSTs on 12/3/24.
- Sacramento River: Carcass surveys are still ongoing. Red Bluff Diversion Dam (RBDD) RSTs are observing juveniles passing through.
 - Mill and Deer Creek: As of 12/16/24, 3 yearling SR were observed at the Mill Creek RST. The RSTs had not been trapping in the previous few weeks due to a storm event that damaged the traps. Mill Creek RST began trapping again but have not observed any new juveniles. Deer Creek RST is expected to begin trapping next week.
- Distribution of natural-origin yearling SR:
 - Yearling SR are likely migrating downstream into the Delta with the storm events that are projected in the upcoming week. Genetically-identified yearling fall-run Chinook Salmon have been observed at the CVP facility over the previous week and many hatchery-origin yearling SR surrogates have been observed at both the SWP and CVP salvage facilities. This indicates that natural-origin yearling SR are likely migrating downstream and present near the salvage facilities.
 - Any genetic SR that is larger than the LAD YOY SR, according to the Delta Model, will be classified as a yearling SR.

Section 4: Risk Evaluation

- Levels of risk and change in risk
 - Definitions of what “high, medium, and low” risk means relative to cumulative thresholds, weekly thresholds, and hatchery surrogate thresholds. These thresholds are based on professional opinion and scientific literature, including Perry et al. 2018, Hance et al. 2021, and NMFS 2019.
 - **Central Delta Entrainment Risk**: The intent is to characterize the risk of exceeding weekly thresholds such as Knights Landing triggers and the potential to set fish up rearing in the interior with reduced survival and for those fish that would pass closer to the export facilities when they transition to emigrating, elevating the chance that those fish would be lost at the export facilities.
 - **Exposure Risk**: Percentage of fish anticipated to be near the DCC gates, Knights Landing, Lower Sacramento River, and/or in the North Delta and anticipated to be moving downstream (due to storm events, seasonal migration timing, etc.). For YOY SR, the percentages below may be based on the fish distribution table. For yearling SR, the percentages may be based on genetically confirmed observations at the salvage facilities for yearling SR and detections of yearling SR surrogates/yearling FR.
 - High: Majority of the population is estimated to be in the Delta (> 60%)
 - Medium: 40%-60% of the population is estimated to be in the Delta
 - Low: Minimal proportion of population estimated to be in the Delta (0%-40%)
 - **Routing Risk**: Characterize risk of fish affected by flow conditions that divert fish from the main channel.
 - High:
 - Low flows at Freeport [FPT gauge] (< 12,000 cfs)
 - DCC gates are open

- STARS Model indicates a significant proportion of flow being diverted into Georgiana Slough (> 35%)
 - Georgiana Slough Bio-Acoustic Fish Fence (BAFF) not operating
 - Medium:
 - Low flows at Freeport (< 12,000 cfs)
 - STARS Model indicates a proportion of flow being diverted into Georgiana Slough (30-40%)
 - Low
 - High flows at Freeport (> 12,000 cfs)
 - Mute tidal effects at Georgiana Slough junction and STARS Model indicates a low proportion of flow being diverted into Georgiana Slough (< 30%)
 - Overall Risk: Informed by above two risk categories
- **Facilities Entrainment Risk**: The intent is to characterize the risk of exceeding a daily, weekly, or annual loss threshold. For fish in the central Delta, OMRI levels could result in entrainment into the facilities.
 - Exposure Risk:
 - High:
 - Large numbers of fish are being observed in salvage over the previous week
 - Exposure Risk for central Delta entrainment is high
 - Medium:
 - Fish are being observed over the previous week
 - Low:
 - No fish have been observed over the previous week
 - Exposure Risk for central Delta entrainment is low
 - Reporting Risk:
 - High: OMR index is more negative -5,000 cfs
 - Medium: OMR index is between -3,500 cfs to -5,000 cfs
 - Low: OMR index is more positive than -3,500 cfs
 - Overall Risk: Informed by above two risk categories and can be further informed by models such as the Winter-Run Chinook Salmon Machine Learning Tool Model

Thresholds for Relevant Conditions of Approval (COAs)

COA 8.2.1 Natural-origin Winter-run Chinook Salmon Early Season Weekly Loss Thresholds

- December Weekly Loss Threshold: 32.64
 - Date(s) threshold was triggered in previous week: None
 - Rolling 7-day sum: 0

COA 8.4.3 Winter-run Chinook Salmon Annual Loss Thresholds

- Natural-origin WR: N/A [0.5% of the natural-origin WR Juvenile Production Estimate (JPE)]
 - Current Annual Loss: N/A
 - 50% Threshold based on natural-origin WR JPE: N/A
 - Risk of exceeding threshold: N/A
 - Days Threshold was exceeded in previous week:
 - Days Operated to Threshold after Exceedance:
 - 75% Threshold based on natural-origin WR JPE: N/A
 - Risk of exceeding threshold: N/A
 - 100% Threshold based on natural-origin WR JPE: N/A
 - Risk of exceeding threshold: N/A
 - Hatchery WR: N/A [0.12% of the Livingston Stone National Fish Hatchery (LSNFH) hatchery release JPE]
 - Current Annual Loss: N/A
 - 50% Threshold based on hatchery WR JPE: N/A
 - Risk of exceeding threshold: N/A
 - 75% Threshold based on hatchery WR JPE: N/A
 - Risk of exceeding threshold: N/A
 - 100% Threshold based on hatchery WR JPE: N/A
 - Risk of exceeding threshold: N/A

COA 8.4.4 Natural-origin Winter-run Chinook Salmon Weekly Distributed Loss Thresholds

- Thresholds for January were calculated with the CHNWR JPE surrogate calculation per COA 8.4.4 due to a final natural-origin CHNWR JPE not being available January 1. These thresholds will be updated once the final JPE is issued.
- January Weekly Loss Thresholds based on CHNWR JPE surrogate: [50% of the annual loss threshold x Weekly percentage of CHNWR in the Delta x Annual Loss Threshold using JPE surrogate]
 - $1/1/24 - 1/7/24: 0.50 \times 0.0032 \times 348.98 = \underline{0.56}$
 - Date(s) threshold was triggered in previous week: N/A
 - Days operated to threshold: N/A
 - $1/8/24 - 1/14/24: 0.50 \times 0.0032 \times 348.98 = \underline{0.56}$
 - Date(s) threshold was triggered in previous week: N/A
 - Days operated to threshold: N/A
 - $1/15/24 - 1/21/24: 0.50 \times 0.013 \times 348.98 = \underline{2.27}$
 - Date(s) threshold was triggered in previous week: N/A
 - Days operated to threshold: N/A
 - $1/22/24 - 1/28/24: 0.50 \times 0.013 \times 348.98 = \underline{2.27}$
 - Date(s) threshold was triggered in previous week: N/A
 - Days operated to threshold: N/A

COA 8.4.5 Spring-run Chinook Salmon Protection Action and Surrogate Annual Loss Threshold

- COA 8.4.5 requires a weekly risk assessment for spring-run Chinook Salmon. See above section (*Spring-run Chinook Salmon Assessment for 12/30/24 – 1/6/25*) for weekly risk assessment that fulfills that requirement.
- Hatchery-origin Yearling SR Surrogates (0.25% of total in-river FR releases for each release group from Coleman National Fish Hatchery (CNFH):
 - Group 1 Loss Threshold: 1,747.23
 - Total Loss as of 12/23 (excluding SWP loss due to not having tag code information for those fish): 910.44
 - Highest Daily Loss: 252.2 on 12/4
 - Group 2 Loss Threshold: 193.39
 - Total Loss as of 12/23: 7.04
 - Highest Daily Loss: 7.04
- Hatchery-origin Young-of-Year SR Surrogates (0.25% of total in-river FR releases for each release group from Coleman National Fish Hatchery (CNFH)): Releases have not yet occurred.
- Hatchery Origin Young-of-Year SR Surrogates (0.25% of total in-river SR releases for each release group from Feather River Hatchery (FRH)): Releases have not yet occurred.

Hydrology and Operations Updates

Water Operations

Weather Conditions:

- Meteorological Forecast on 12/30/24:
 - *“Dry weather returns today and continues through the most of the week with cold morning lows and patchy Valley frost and fog. Chances for precipitation return late in the week.”*
 - [NOAA - National Weather Service Forecast](#)

Antecedent Actions: (e.g., Actions such as integrated early winter pulse protection, etc.)

- N/A

Exports and OMRI Ranges:

- Exports: 12/31/24 – 1/6/25
 - SWP: 1,400 to 2,100 cfs
 - CVP: 900 to 4,200 cfs
- For previous 30 day CVP and SWP operation updates: [Operations and Delta Status](#)

OMRI: 12/31/24 – 1/6/24

- Expected Daily Values: -1,800 cfs to -2,200 cfs

DCC Gates position:

- DCC gates closed 11/18 and are not likely to re-open for the remainder of the calendar year.

Freeport flows:

- 35,000 cfs to 58,000 cfs

Georgiana Slough Bio-Acoustic Fish Fence (BAFF):

- The Georgiana Slough BAFF is installed and began operating on 11/15/24. However, a car collided into the facility which caused the aerator machine to break and is unrepairable. A temporary aerator is likely to be installed soon; however, in the meantime the lights and sound are the only thing working on the BAFF until the temporary aerator is installed. It is expected that the BAFF will be fully operational by the end of January.

- Releases of acoustically-tagged hatchery fish are anticipated to occur from December through March to study the effectiveness of the BAFF. These studies are included in the table below and on CalFishTrack (https://oceanview.pfeg.noaa.gov/CalFishTrack/pageGSSMB_LFCS_2025.html).

Table 1. Late fall-run Chinook Salmon acoustically tagged releases for efficiency of Georgiana BAFF.

Release Date	Race	# of Fish Released	% Entrained into Georgiana Slough
12/4/24	Late Fall-Run	478	14.6%

Real-time Monitoring Data

SacPAS Tools

Section 1: STARS Model

Available on SacPAS at: [Delta STARS Model](#)

Table 2. STARS Model

<u>Date:</u> (12/29/24)	<u>DCC</u> <u>Gates</u>	<u>Georgiana</u> <u>Slough</u>	<u>Sacramento</u> <u>River</u>	<u>Sutter and</u> <u>Steamboat Slough</u>	<u>Yolo</u> <u>Bypass</u>
Late Fall-Run Proportion of Entrainment	N/A- not open	0.19	0.47	0.34	N/A
Late Fall-Run Survival	N/A- not open	0.34	0.70	0.69	N/A

Section 2: Historical Migration

Knights Landing RST and Chippis Island Trawls Historical Timing from Brood Years 2009-2023. Available at: [Unclipped Winter Chinook Cohort Juvenile Migration Timing and Conditions Graph and Table: SacPAS Sacramento Prediction and Assessment of Salmon and other fishes](#)

Delta Monitoring Stations

Rotary Screw Trap Data

Red Bluff Diversion Dam RST: Estimated juvenile WR passage at Red Bluff Diversion Dam for 12/15/24 is 414,399 fish.

Table 3. Fish monitoring data for RST data for the 12/31/24 SaMT meeting. The following table presents fish monitoring data summarized over the past week. Unless otherwise noted, reported sizes are fork length. FR = fall-run, WR = winter-run, SR = spring-run, LFR = late-fall-run.

Location	Butte Creek RST	Tisdale RST	Knights Landing RST	Lower Sac RST	Lower Feather RST	Feather at Eye-Side RST	Feather at Herringer RST
Sample Date	N/A	N/A	N/A	N/A	12/21/24 - 12/28/24	12/22/24 - 12/28/24	12/22/24 - 12/28/24
Chinook Adults	N/A	N/A	N/A	N/A	0	0	0
FR Chinook	N/A	N/A	N/A	N/A	548	676	231
SR Chinook	N/A	N/A	N/A	N/A	0	2	1
WR Chinook	N/A	N/A	N/A	N/A	1	0	0
LFR Chinook	N/A	N/A	N/A	N/A	0	0	0
Chinook (ad-clip)	N/A	N/A	N/A	N/A	0	0	0
Steelhead (wild)	N/A	N/A	N/A	N/A	0	0	0
Steelhead (ad-clip)	N/A	N/A	N/A	N/A	0	0	0
Green Sturgeon	N/A	N/A	N/A	N/A	0	0	0
Flows (avg. cfs)	N/A	N/A	N/A	N/A	4,028	800	1,750
W. Temp. (avg. °F/C)	N/A	N/A	N/A	N/A	10.2 °C	11.3 °C	9.3 °C
Turbidity (avg. NTU)	N/A	N/A	N/A	N/A	9.9	3.4	2.1

Delta Trawl and Seine Data

Table 4. Fish monitoring data for trawl and seine data for the 12/31/24 SaMT meeting. The following table presents fish monitoring data summarized over the past week. Unless otherwise noted, reported sizes are fork length. FR = fall-run, WR = winter-run, SR = spring-run, LFR = late-fall-run.

Location	Chippis Island Midwater Trawls	Mossdale Kodiak Trawls	Beach Seines	Sac Trawls	EDSM Trawls
Sample Date	12/22/24 – 12/28/24	N/A	12/22/24-12/28/24	12/22/24-12/28/24	12/22/24-12/28/24
Chinook Adults	0	N/A	0	0	0

Location	Chipps Island Midwater Trawls	Mossdale Kodiak Trawls	Beach Seines	Sac Trawls	EDSM Trawls
FR Chinook	0	N/A	10	17	0
SR Chinook	0	N/A	3	2	0
WR Chinook	0	N/A	4	4	0
LFR Chinook	0	N/A	0	1	1
Chinook (ad-clip)	3	N/A	0	9	0
Steelhead (wild)	0	N/A	0	1	0
Steelhead (ad-clip)	1	N/A	0	3	3
Green Sturgeon	0	N/A	0	0	0

Hatchery Release Information

Telemetry Data:

Information for telemetry data can be found at: [CalFishTrack](#)

The Central Valley Enhanced Acoustic Tagging Project has not tagged any fish so far this WY; therefore, there are no updates to the telemetry data this week.

Tracking Hatchery Releases:

Currently there have not been any hatchery releases so far this WY.

Table 5. Hatchery salmon release data for BY 2024 and WY 2025.

Release Date	Hatchery	Race	CWT	Marked Release Number	Total Release	Percent Marked	Release Location	Mark	Agency	Release Type
11/20/24	CNFH	Late Fall	05-00-38	74,376	74,376	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
11/20/24	CNFH	Late Fall	05-00-39	50,787	50,787	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
11/20/24	CNFH	Late Fall	05-00-40	71,154	71,154	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
11/20/24	CNFH	Late Fall	05-00-41	68,959	68,959	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
11/20/24	CNFH	Late Fall	05-00-42	62,132	62,132	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
11/20/24	CNFH	Late Fall	05-00-43	73,963	73,963	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
11/20/24	CNFH	Late Fall	05-00-44	57,585	57,585	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
11/20/24	CNFH	Late Fall	05-26-00	46,496	46,406	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
11/20/24	CNFH	Late Fall	05-33-00	66,185	66,185	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
11/20/24	CNFH	Late Fall	05-34-00	61,619	61,619	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
11/20/24	CNFH	Late Fall	05-35-00	65,726	65,726	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
11/25/24	CNFH	Late Fall	05-32-00	67,422	67,422	100%	Battle Creek at CNFH	CWT and Ad-Clip	USFWS	Production
12/10/24 - 12/11/24	SCARF	Spring	06-19-69	514	514	100%	San Joaquin River at Highway 140	PIT, CWT, and Ad-clip	CDFW	SJRRP

LAD/Genetic Loss Data for Older Juvenile Chinook Salmon and Spring-run Chinook Salmon

SWP and CVP Weekly Loss Updates:

- Loss of yearling SR surrogates from CNFH were observed at the SWP and CVP facilities last week that counted towards the COA 8.4.5 threshold. Total loss as of 12/29/24 for Group #1 is 910.44. Total loss as of 12/29/24 for Group #2 is 7.04.
 - 10 fish from the SWP are awaiting CWT information. Once CWT codes are read and confirmed, loss will be added to the total for COA 8.4.5 if tag codes confirm they are part of the CNFH Surrogate Group #1 or #2.
- No LAD natural-origin older juvenile (LAD winter-run sized) were observed at the CVP or SWP facilities over the previous week that counted towards the threshold for COA 8.2.1.
- [SacPAS - Salvage Timing](#)

Table 8. Data taken from Aasen Geir’s spreadsheet (Salmon_2025_12292024.csv) and Kyle Griffiths Salmon Salvage Report from 12/24/24 – 12/30/24. Chinook Salmon data were taken from those spreadsheets and included in the table below. Only Chinook Salmon data that are associated with the current COA’s that are in effect will be included, which includes COA 8.4.5 and COA 8.17. Other loss data were not included. *Older juvenile is defined as any Chinook Salmon measured above the minimum length for CHNWR, according to the Delta Model LAD criteria. FR = fall-run, WR = winter-run, SR = spring-run, LFR = late-fall-run.*

Race (LAD)	Race (DNA)	Race (CWT)	Associated COA for Tracking Loss	Weekly Total Loss 12/24-12/29	Total Loss for Season	Natural-origin Older Juvenile (Y/N)	Hatchery-origin (Y/N)
N/A	N/A	LFR	COA 8.4.5 Group 1	0	910.44	N	Y
N/A	N/A	LFR	COA 8.4.5 Group 2	7.04	7.04	N	Y
N/A	N/A	LFR	COA 8.4.5 Group 3	N/A	N/A	N/A	N/A
LFR (older juvenile)	N/A	N/A	COA 8.17	0	18.2	Y	N
Yearling FR (older juvenile)	N/A	N/A	COA 8.17	0	5.2	Y	N
WR (older juvenile)	N/A	N/A	COA 8.17	0	5.48	Y	N

2024 SWP ITP COAs Currently in Effect

The 2024 [Incidental Take Permit for Long-Term Operation of the State Water Project in the Sacramento-San Joaquin Delta](#) 2081-2023-054-00 (SWP ITP). This week's operations summary and assessment is based on the following COAs which are currently applicable:

COA 8.2.1 Natural-origin Winter-run Chinook Salmon Early Season Weekly Loss Thresholds

To minimize entrainment and loss of early-migrating natural-origin CHNWR, Permittee shall, in coordination with Reclamation, adjust south Delta exports to achieve a 7-day average of the OMR index no more negative than -5,000 cfs for seven consecutive days, when the genetically verified 7-day rolling sum of CHNWR loss, calculated daily, exceeds the following thresholds (see calculation details and survival variables in Attachments 2 and 6):

- *From November 1 through November 30: Product of November Multiplier and the Red Bluff Diversion Dam juvenile CHNWR brood year passage total at the end of the second biweekly period in October, whereby the November Multiplier is: $\text{November Multiplier} = 0.0011 \times 0.25 \times \text{SurvivalFry-to-Smolt} \times \text{SurvivalSmolt}$*
- *From December 1 through December 31: Product of December Multiplier and the Red Bluff Diversion Dam juvenile CHNWR brood year passage total estimated at the end of the second biweekly period in November, whereby the December Multiplier is: $\text{December Multiplier} = 0.0021 \times 0.25 \times \text{SurvivalFry-to-Smolt} \times \text{SurvivalSmolt}$*

If the 7-day rolling sum of CHNWR loss, calculated daily, is exceeded during a period of reduced exports, Permittee shall, in coordination with Reclamation, continue to adjust south Delta exports to achieve a 7-day average of the OMR index no more negative than -5,000 cfs, until seven days after the most recent exceedance. Loss shall be calculated for the south Delta export facilities using the 2018 CDFW loss equation (Attachment 8). Permittee shall, in coordination with Reclamation, initially adjust exports in response to meeting the thresholds above based on length-at-date identification of natural-origin older juvenile Chinook Salmon. If genetic analysis of natural-origin juvenile Chinook Salmon observed in salvage at the SWP or CVP subsequently indicates that any given Chinook Salmon is not a genetically confirmed CHNWR, that fish will not count toward the loss threshold exceedance, and continued export adjustments pursuant to the OMR limit may not be required. While a new, more rapid genetic method, SHERLOCK, undergoes field testing, both it and the current genetic method, GT-seq, shall be used to determine the final identification. In the event that SHERLOCK and GT-seq provide different run assignments, the results from the GT-seq method shall be used to determine the final run assignment for the purposes of implementing Condition of Approval 8.2.1. If a fish is not genetically identifiable or if genetic identification is pending, then the Delta model length-at-date criteria shall be used to classify the race of the juvenile Chinook Salmon in salvage for the purposes of implementing Condition of Approval 8.2.1.

COA 8.4.3 Winter-run Chinook Salmon Annual Loss Thresholds

To minimize entrainment and loss of juvenile CHNWR, Permittee shall, in coordination with Reclamation, adjust south Delta exports to manage the OMR index to avoid exceeding the following annual loss thresholds:

- *Natural-origin CHNWR Loss Threshold: 0.5% of JPE*
- *Hatchery-origin CHNWR Loss Threshold: 0.12% of JPE*

JPEs and annual loss thresholds will be calculated for natural-origin CHNWR, for hatchery-origin CHNWR from Livingston Stone National Fish Hatchery (LSNFH) released into the Sacramento River near Redding, and for

LSNFH hatchery-origin CHNWR released into Battle Creek. The JPE for natural and hatchery-origin CHNWR is calculated by the JPE Subteam annually, consistent with Attachment 2, and is described in the yearly recommendation letter produced by the JPE Subteam and transmitted to NMFS and CDFW. NMFS and CDFW issues an Annual JPE Letter, with the JPE Subteam recommendation included as an enclosure to the letter, to Permittee and Reclamation. Hatchery releases of CHNWR are tracked individually, and Permittee shall sum cumulative loss, confirmed by coded wire tag (CWT), across release groups with the same JPE and annual loss threshold. Permittee shall calculate loss for the south Delta export facilities using the 2018 CDFW loss equation (Attachment 8). Permittee shall count annual loss of natural and hatchery-origin CHNWR at the SWP and CVP salvage facilities for each brood year, starting July 1 of the calendar year through June 30 of the following calendar year. If cumulative loss of either natural or hatchery-origin CHNWR in a brood year exceeds 50% of the annual loss thresholds, then Permittee shall, in coordination with Reclamation, adjust south Delta exports to achieve a 7-day average of the OMR index no more negative than -3,500 cfs for seven consecutive days. If a CHNWR is salvaged during the 7-day action, the action will be extended for another seven days. At the conclusion of the action, Permittee, in coordination with Reclamation shall revert to the weekly distributed loss threshold until the 75% threshold is reached or throughout the end of the OMR Management season (Condition of Approval 8.6).

COA 8.4.4 2024 Early Season Natural Winter-run Chinook Salmon Discrete Daily Loss Threshold:

Natural-origin Winter-run Chinook Salmon Weekly Distributed Loss Thresholds. To minimize the potential for a disproportionate impact of entrainment and loss on any single week of natural-origin juvenile CHNWR present in the Delta, Permittee shall, in coordination with Reclamation, manage the OMR index based on a natural-origin CHNWR weekly distributed loss threshold. The natural-origin CHNWR weekly loss threshold is a product of the weekly percentage of natural-origin CHNWR present in the Delta, scaled to 100% (Table 4, Column E), and 50% of the natural-origin CHNWR annual loss threshold (Condition of Approval 8.4.3). If the weekly distributed loss threshold is exceeded on any single day by the 7-day rolling sum of natural-origin CHNWR loss, then Permittee shall, in coordination with Reclamation, adjust south Delta exports to achieve a 7-day average of the OMR index no more negative than -3,500 cfs for seven consecutive days until seven days after the most recent exceedance. Permittee shall calculate loss for the south Delta export facilities using the 2018 CDFW loss equation (Attachment 8). If the natural-origin CHNWR JPE is not available at the start of OMR Management season (Condition of Approval 8.3), then the Red Bluff Diversion Dam brood year total from the most recent bi-weekly period shall be used and applied as described for early season management (Condition of Approval 8.2.1) to the annual loss threshold until the final natural-origin CHNWR JPE is available. The CHNWR JPE surrogate is calculated using the following formula:

- *Natural-origin CHNWR JPE Surrogate = Red Bluff Diversion Dam juvenile CHNWR brood year passage total estimated from the most recent biweekly period x SurvivalFry-to-Smolt x SurvivalSmolt*

Permittee shall, in coordination with Reclamation, adjust south Delta exports in response to meeting the below natural-origin CHNWR weekly thresholds based on the initial length-at-date identification of natural-origin older juvenile Chinook Salmon and the thresholds described below. If genetic analysis of natural-origin older juvenile Chinook Salmon observed in salvage at the SWP or CVP subsequently confirms that any given Chinook Salmon is not genetically identified as a CHNWR, that fish will not count towards the loss threshold exceedance, and continued export restrictions pursuant to the OMR index limit may not be required. While the new rapid genetic method, SHERLOCK, undergoes field testing, both it and the current GT-seq method shall be used to determine the final identification. In the event that SHERLOCK and GT-seq provide different run

assignments, the results from the GT-seq method shall be used to determine the final run assignment for purposes of implementing Condition of Approval 8.4.4. If a fish is not genetically identifiable or if genetic identification is pending, then the length-at-date identification shall be used to classify the race of the juvenile Chinook Salmon in salvage for the purposes of implementing Condition of Approval 8.4.4. Weekly thresholds shall be based on historical distribution (Table 4, Column E) of genetically identified CHNWR from water years 2017 through 2021 and will change every week (e.g., January 1-7, January 8-15). After the conclusion of the OMR Management season each summer, Permittee and Reclamation, through SaMT, shall compare weekly Delta entry and exit information to determine if the presence data were distributed similarly to the historical distribution data. The results of this review will be utilized as a part of the AMP to implement the Winter-run Old and Middle River Flows Management Adaptive Management Action (Attachment 4 and Condition of Approval 7.9.2).

COA 8.4.5 Spring-run Chinook Salmon Protection Action and Surrogate Annual Loss Thresholds

To minimize entrainment and loss of juvenile CHNSR, Permittee shall, in coordination with Reclamation, restrict exports based on the presence of hatchery-origin CHNSR and associated yearling late fall-run and young-of-year fall-run Chinook Salmon surrogate groups at the SWP and CVP salvage facilities. Permittee shall, in coordination with CDFW, Reclamation, USFWS, and NMFS through the SaMT, select CHNSR yearling and young-of-year surrogate groups. Yearling CHNSR surrogates shall be selected from late fall Chinook Salmon in-river release groups from the Coleman National Fish Hatchery. Young-of-year CHNSR and associated surrogate groups shall be selected from fall- and spring-run Chinook Salmon in-river release groups from the Feather River Fish Hatchery and Coleman National Fish Hatchery.

From November 1 through the end of OMR Management (Condition of Approval 8.6) each water year:

(1) If a cumulative loss threshold for a surrogate release group is exceeded in November or December, Permittee shall, in coordination with Reclamation, adjust south Delta exports to achieve a 7-day average of the OMR index no more negative than -5,000 cfs for seven consecutive days; and

(2) If a cumulative loss threshold for a surrogate release group is exceeded after the onset of OMR Management (Condition of Approval 8.3), or on or after January 1 through the end of OMR Management or June 30, whichever comes first, Permittee shall, in coordination with Reclamation, adjust south Delta exports to achieve a 7- day average of the OMR index no more negative than -3,500 cfs for seven consecutive days.

The cumulative loss threshold for CWT CHNSR surrogate groups at the SWP and CVP salvage facilities is greater than 0.25% for each release group:

- Yearling CHNSR surrogates: WOMT, with input from SaMT, shall select three inriver releases of late fall-run Chinook Salmon from Coleman National Fish Hatchery from November through February to use as yearling CHNSR surrogates. Input from SaMT may include a proposal with several alternatives. If three in-river releases appropriately distributed from November through February are not achievable in a given year because of hatchery limitations, then an alternative plan shall be developed to ensure the adequate characterization and minimization of natural-origin yearling CHNSR can still be achieved that year. This plan shall be subject to CDFW approval.*
- Young-of-year CHNSR surrogates: WOMT, with input from SaMT, shall select six in-river releases comprised of CHNSR and fall-run Chinook Salmon from the Feather River Fish Hatchery and fall-run Chinook Salmon from the Coleman National Fish Hatchery from March through May to use*

as young-of-year CHNSR surrogates. Input from SaMT may include a proposal with several alternatives. If six in-river releases appropriately distributed from March through May are not achievable in a given year because of hatchery limitations, then an alternative plan shall be developed to ensure the adequate characterization and minimization of natural-origin young-of-year CHNSR can still be achieved that year. This plan shall be subject to CDFW approval.

Permittee shall, in coordination with Reclamation and SaMT, use real-time monitoring data, relevant tools, and new science gained through ongoing efforts to develop a CHNSR JPE and LCM to inform weekly risk assessments (October through June) for natural-origin juvenile CHNSR. If the risk assessment or WOMT representatives identifies a more positive OMR flow may be needed to minimize take of natural-origin juvenile CHNSR, WOMT may consider a more positive OMR flow requirement.