UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
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Effective Date: January 15, 2026

MEMORANDUM FOR: Administrative Record for the Designation of a Nonessential Population of Central Valley Spring-run Chinook Salmon Downstream of Friant Dam in the San Joaquin River, California (ARN: 151422-SWR2010-SA00361) and the Biological Opinion for the Reinitiation of Consultation on the Long-term Operation of the Central Valley Project and State Water Project (CVP/SWP Opinion; ARN: 151422-WCR2021-SA00122)[1]

TO: Cathy Marcinkevage, Assistant Regional Administrator, California Central Valley Office (CCVO), West Coast Region

THROUGH: Darren Howe, Central Valley Project Operations Branch Chief, CCVO, West Coast Region

FROM: Jon Ambrose, San Joaquin River Branch Chief, CCVO, West Coast Region

SUBJECT: 2026 (January 2026 – December 2026) Technical Memorandum Regarding the Accounting of San Joaquin River Spring-run Chinook Salmon at the Central Valley Project and State Water Project Sacramento-San Joaquin Delta Fish Collection Facilities

[1] Please cite as: NMFS. 2026. Technical Memorandum to Account for Reintroduced San Joaquin River Spring-Run Chinook Salmon per CFR 233.301(b)(5)(ii).

Background

NOAA's National Marine Fisheries Service (NMFS) has prepared this Technical Memorandum (Tech Memo) to fulfill the following three purposes:

1) Address one of the requirements of the Designation of a Nonessential Experimental Population of Central Valley Spring-run Chinook Salmon Below Friant Dam in the San Joaquin River, California (70 FR 79622, December 31, 2013), which requires NMFS to release an annual technical memorandum to:

   "Calculate and document the proportionate contribution of Central Valley (CV) spring-run Chinook salmon (*Oncorhynchus tshawytscha*) originating from the reintroduction to the San Joaquin River and deduct or otherwise adjust for share of CV spring-run Chinook salmon take when applying the operational triggers and incidental take statements associated with the NMFS 2009 Biological and Conference Opinion on the Long-term Operations of the Central Valley Project and State Water Project (CVP/SWP Opinion) or subsequent future biological opinions, or Section 10 permits."

2) Present (a) methods used in 2026 to identify reintroduced, nonessential experimental population (NEP) CV spring-run Chinook salmon from the San Joaquin River when encountered outside the Restoration Area; and (b) outline the deduction, or adjustment, in the operations of the Central Valley Project (CVP) and State Water Project (SWP). The purpose of the deduction, or adjustment, is to ensure the reintroduced population will not impose more than *de minimis* water supply reductions, additional storage releases, or bypass flows on unwilling third parties as defined in P.L. 111-11, Title X, section 10011(c)(1).

3) Outline the NEP CV spring-run Chinook salmon release and monitoring plans for 2026.

In May 2013, a technical working group consisting of fisheries agencies, water management agencies, and water users was first convened to provide input on the annual Tech Memo. In January 2014, NMFS issued the first Tech Memo, which was just prior to the San Joaquin River Restoration Program's (SJRRP) implementation of the reintroduction strategies of NEP CV spring-run Chinook salmon into the SJRRP Restoration Area. The SJRRP Restoration Area (RA) is defined as the San Joaquin River from Friant Dam downstream to its confluence with the Merced River, delineated by a line between decimal latitude and longitude coordinates: 37.348930°N, 120.975174°W, and 37.349099°N, 120.974749°W (50 CFR 223.301). Since the issuance of the first Tech Memo, reintroduction strategies have been successful and CV spring-run Chinook salmon have returned to the San Joaquin River for the first time in over 60 years. As such, monitoring, scientific studies, and hatchery releases of CV spring-run Chinook salmon in the Restoration Area by the SJRRP has grown into a multi-faceted and dynamic effort based on an adaptive management process. As the SJRRP continues into the future, NMFS will continue to re-visit the format, organization, and content of the Tech Memo to ensure readability and purpose fulfillment.

Purpose 1: Accounting for NEP of CV spring-run Chinook salmon at the CVP/SWP Facilities during 2025

No changes in water export quantities were experienced during calendar year 2025 as a result of the juvenile NEP CV spring-run Chinook salmon that originated from the SJRRP RA. Appendix A contains relevant monitoring results, hatchery releases, and calculations. Appendix A also documents NEP CV spring-run Chinook salmon originating from the Restoration Area that were salvaged at the CVP/SWP facilities. The information presented in Appendix A was coordinated with Federal and State agencies and other interested parties involved in the implementation of the SJRRP.

Purpose 2: Method for accounting for NEP of CV spring-run Chinook salmon during 2026

On November 4, 2024, the California Department of Fish and Wildlife (CDFW) issued an Incidental Take Permit (ITP), pursuant to the California Endangered Species Act, for the Long-Term Operation of the SWP in the Sacramento-San Joaquin Delta (herein referred to as the 2024 ITP, as amended in December of 2025). On December 6, 2024, NMFS issued the *Biological Opinion on Long-Term Operation of the Central Valley Project and State Water Project*[2] (herein referred to as the 2024 Opinion) that superseded a 2019 Opinion for the same project. On December 19, 2024, the U.S. Bureau of Reclamation (Reclamation) adopted the 2024 Opinion by issuing its Record of Decision (ROD), which completed the environmental review and initiated operations defined by the ROD. Reclamation signed an updated ROD on December 4, 2025 to implement initial actions in response to Executive Order 14181. The SWP will operate under the terms and conditions of both the 2024 Opinion and the conditions of approval within the 2024 ITP, and any subsequent amendments to the ITP.

Given the future potential for operational restrictions or triggers based on salvage of naturally-produced CV spring-run Chinook salmon, NMFS will evaluate whether issuance of a revised 2026 Tech Memo would be warranted, if there are relevant clarifying revisions regarding operational triggers for naturally-produced CV spring-run Chinook salmon. There is potential for unmarked yearlings to be mis-identified as Sacramento River (SR) winter-run Chinook salmon based on length-at-date criteria. If unmarked yearling CV spring-run Chinook salmon, that originate from the SJRRP RA,are mis-identified as SR winter-run Chinook salmon, and an operational trigger is exceeded prior to genetic analysis results being completed, a potential exists for unmarked yearling CV spring-run Chinook salmon to contribute to an operational trigger.

Therefore, to contribute to an operational trigger, an unmarked juvenile CV spring-run Chinook originating from the SJRRP RA must out-migrate from the Restoration Area and:

1) Be counted at the CVP/SWP Facilities;

2) Be in the same size range on the length-at-date table as juvenile SR winter-run Chinook salmon at the time of capture; and

[2] Publicly available at: https://www.fisheries.noaa.gov/resource/document/endangered-species-act-section-7a2-programmatic-biological-opinion-reinitiation

3) Contribute to exceeding an annual loss threshold for SR winter-run Chinook salmon.

Genetic results of any tissue samples taken from fish observed at the CVP/SWP Facilities during calendar year 2026 will be shared with NMFS. In 2026, the SJRRP will continue to investigate the use of genetic identification to account for SJRRP RA- origin, CV spring-run Chinook salmon detected at the CVP/SWP Facilities. Steps of this investigation include:

1) Continuing to refine and learn from fish sampling and genetic testing at the CVP/SWP Facilities; and

2) Identifying and resolving (to the extent within the SJRRP's control) potential logistical issues with using genetic identification (i.e., genetic analysis protocol, sample process timing, chain of custody, and necessary agencies' commitments).

Accounting Methods

Physical Marking

All juvenile CV spring-run Chinook salmon released from the Salmon Conservation and Research Facility (SCARF[3]) into the San Joaquin River as part of the SJRRP's reintroduction efforts will be marked with an adipose fin-clip (ad-clip) and coded wire tag (CWT). The CWT contains a code unique to the SJRRP's release groups so these fish can be distinguished from all other CV spring-run Chinook salmon release groups. In addition to an ad-clip and CWT, yearling fish produced and released by SCARF may be tagged with a passive integrated transponder (PIT) tag, depending on available funding. SJRRP fish released and marked with an ad-clip are exempt from take prohibitions under the final ESA 4(d) protective regulations for West Coast threatened salmonids (70 FR 37160, June 28, 2005; and 78 FR 79622, December 31, 2013). As a result, NEP CV spring-run Chinook salmon released by the SJRRP within the Restoration Area, will not be counted toward any incidental take limits or cumulative or annual loss thresholds from any applicable ESA section 7 consultations or section 10 scientific research and enhancement permits for operation of the CVP/SWP Facilities.

Genetic Analysis

The SJRRP has established a parentage-based tagging (PBT) procedure for the San Joaquin River CV spring-run Chinook salmon populations. PBT involves the annual sampling and genotyping of adult Chinook salmon returning to the Restoration Area; these data are used to create a database of genotypes for future parentage assignment of their progeny. As such, all adult Chinook salmon captured in Reach 5 of the Restoration Area, or recovered as a carcass returning to the Restoration Area in 2026, will have tissues sampled for genetic testing.

Efforts will be made to take a tissue sample from all naturally-produced (unmarked) juvenile Chinook salmon captured during monitoring using Rotary Screw Traps (RST) during calendar year 2026. However, there may be several days during the juvenile monitoring season where sample collection for every fish may not be logistically feasible due to varying reasons. In

[3] The SCARF is located just downstream of Friant Dam in Reach 1 of the SJRRP Restoration Area.

circumstances when it is not feasible to sample every captured salmonid, tissue samples will be taken from a subset of naturally-produced juveniles captured each day of RST monitoring. All tissue samples will be part of the parental inference analysis.

CVP/SWP Facilities

Genetic analysis is a more accurate method than the length-at-date method used to distinguish SJRRP RA- origin CV spring-run Chinook salmon from other runs of Chinook salmon at the CVP/SWP Facilities. Uncertainty exists with the existing operational triggers and length-at-date method used to distinguish between the various ESUs of Chinook salmon captured at the CVP/SWP Facilities. Specifically, the key concern is whether SJRRP RA-origin CV spring-run Chinook salmon would fall into the length-at-date criteria and inadvertently contribute to an operational trigger for juvenile SR winter-run Chinook salmon. The SJRRP will coordinate with the genetic analysis effort at the CVP/SWP Facilities to ensure that SJRRP RA-origin CV spring-run Chinook salmon do not result in more than *de minimis* water supply reductions, additional storage releases, or bypass flows on unwilling third parties.

For Water Year 2026 (beginning October 1, 2025), salvage operations fully implemented the SHERLOCK (Specific High-sensitivity Enzymatic Reporter unLOCKing) genetics protocol to more effectively identify the ESU of salvaged Chinook. This screening method effectively filters out fish that are frequently misclassified by length-at-date criteria. To ensure data resolution, any samples identified by SHERLOCK as spring-run, heterozygous, or ambiguous are subsequently processed using GT-seq (Genotyping-in-Thousands by sequencing). This hybrid approach combines the speed and cost-effectiveness of SHERLOCK for routine identification with the high-resolution power of GT-seq, which provides additional genetic detail, including determining the specific tributary of origin.

Calculation of Incidental Take and Operational Triggers

All juvenile CV spring-run Chinook salmon released from the SCARF into the San Joaquin River will receive an ad-clip and CWT, which makes them readily identifiable upon capture. Any unmarked offspring of naturally-spawned adults that survive and emigrate out of the SJRRP Restoration Area, and are captured at the CVP/SWP Facilities, will be included in Reclamation's and DWR's genetic analyses and shared with NMFS. NMFS will closely coordinate with Reclamation and DWR throughout the year and will re-evaluate whether issuance of a new Tech Memo is warranted under any new operational triggers.

Continued Pilot Assessment

In addition to the methods described above, NMFS, in coordination with the SJRRP, developed an assessment to estimate the number of naturally-produced young-of-year (YOY) spring-run Chinook salmon, that originate from the SJRRP RA, and that could be observed at the CVP/SWP Facilities. The two primary elements of this assessment are: (1) an analysis on migration timing to the CVP/SWP Facilities, based on SCARF production releases in Reach 5 from 2016-2025 and (2) a conceptual method to calculate the estimated number of naturally-produced YOY CV spring-run Chinook salmon that may be observed at the CVP/SWP Facilities for the current

calendar year. The methods for both elements of this assessment will be updated and refined over the years as the SJRRP gathers and synthesizes more fish monitoring data.

Appendix B within the 2022 Tech Memo[4] contained detailed information on the pilot analyses for juvenile outmigration timing to the CVP/SWP Facilities for 2016-2021. Appendix C in this 2026 Tech memo contains updated data for a part of the same outmigration analysis for 2022-2025.

Table A2 in Appendix A of this Tech Memo provides a summary of SCARF juveniles observed in salvage at the CVP/SWP Facilities. These data show that the majority of hatchery juveniles were observed from March through April 2025. This timeframe aligns with the outmigration timing analysis completed in Appendix B of the 2022 Tech Memo and in Appendix C of this 2026 Tech Memo. Therefore, NMFS estimates that the majority of naturally- produced YOY CV spring-run Chinook salmon may be observed at the CVP/SWP Facilities from March through April 2026.

Appendix C in the 2022 Tech Memo[5] contained detailed information on the pilot analysis for the conceptual methods and calculations for estimating the number of YOY CV spring-run Chinook salmon that may out-migrate from the Restoration Area and be observed at the CVP/SWP Facilities in 2022. Appendix B of this 2026 Tech Memo continues the analyses, and contains information on the conceptual methods and calculations for estimating the number of YOY CV spring-run Chinook salmon that may out-migrate from the Restoration Area and be observed at the CVP/SWP Facilities in 2026. An accurate accounting of SJRRP CV spring-run Chinook salmon is necessary to provide a complete characterization of SJRRP data progress and needs. While incomplete, this conceptual juvenile production estimate (JPE) begins the development of that necessary piece of information.

The estimate of juvenile CV spring-run Chinook salmon exiting the Restoration Area is anticipated to increase once fish passage and screening projects within the Restoration Area are completed and channel capacity is increased to convey higher Restoration Flows. This conceptual method to estimate juvenile production from the SJRRP RA is under development and will be updated as monitoring data become available. The estimated number of juveniles observed at the CVP/SWP Facilities should be considered within the context of existing data gaps and annual environmental conditions.

Based on the results of this conceptual method, the estimated number of naturally-produced YOY CV spring-run Chinook salmon from the SJRRP RA that may be observed at the CVP/SWP Facilities is anticipated to be low in the spring of 2026 (see Table B1).

[4] NMFS. 2022. Technical Memorandum to Account for Reintroduced San Joaquin River Spring-Run Chinook Salmon per CFR 233.301(b)(5)(ii): 7. Publicly available here: https://www.fisheries.noaa.gov/west-coast/habitat-conservation/san-joaquin-river-restoration#san-joaquin-river-spring-run-chinook-salmon-reintroduction

Purpose 3: Planned releases and monitoring for NEP of CV spring-run Chinook salmon

2026 Planned Releases

Approximately 300,000 marked juvenile CV spring-run Chinook salmon from the SCARF are planned for release into the Restoration Area in spring 2026, as part of the SJRRP's reintroduction efforts.

The exact release location, date, number of release groups, and numbers of fish per release group are dependent on a variety of factors, including water year type and physical river conditions within the Restoration Area. Fish availability and size will not be known until early spring 2026. Target release timing, location, and numbers of fish per release will be identified and posted on the SacPAS website[5] when determined.

Monitoring Plans and Additional Studies for 2026

Adults

The SJRRP plans to monitor Reach 5 (or upstream to the extent of volitional passage) for returning adult CV spring-run Chinook salmon and capture/translocate them to holding and spawning habitat in Reach 1 or Reach 2. If returning adults are captured, they may be marked with a PIT tag and/or Floy tag and will be genetically sampled prior to release. Depending on funding, some adults may be tagged with an acoustic transmitter, and all translocated adults will be released in Reach 1 or Reach 2. These adults are expected to spawn naturally in the Restoration Area in early Fall 2026, and any resulting juveniles would out-migrate as early as late Fall 2026 through January 2027. Naturally-produced juveniles would not be physically marked.

The SJRRP may conduct redd and carcass surveys in the fall/winter of 2025/2026 to estimate the number of adult CV spring-run Chinook salmon in Reaches 1 and 2 and to estimate the number of redds. Results from these efforts would be presented in an annual report by the SJRRP.

Juveniles

Naturally-produced juvenile CV spring-run Chinook salmon may be monitored through Reach 1 to Reach 2 with RSTs to determine migration timing, lifestage diversity, survival, and size. If RST monitoring occurs in Fall of 2026, then up to 40,000 marked juvenile CV spring-run Chinook salmon from the SCARF may be released throughout the fall/winter 2026-2027 and through spring 2027 to test RST capture efficiencies. Up to four RST monitoring locations within the Restoration Area may be chosen based on redd locations and river access. RSTs will be operated when sufficient water velocities allow for adequate cone rotation and operations are safe for field personnel.

[5] SacPass website: https://www.cbr.washington.edu/sacramento/tmp/deltacwttable_1763405179_394.html

Timeline

Flow and temperature conditions within the Restoration Area will inform implementation of fish releases and fisheries monitoring. The SJRRP will monitor river and weather conditions and may cancel or modify fisheries monitoring and/or fish release activities, depending on expected conditions in the system, funding priorities, or due to concerns for field staff health and safety.

Final information on releases of juvenile NEP CV spring-run Chinook salmon will be available on the SacPAS website[6]. NMFS will hold monthly Tech Memo meetings as necessary, starting February 2026, to discuss implementation of the 2026 Tech Memo and to develop the 2027 Tech Memo.

Acknowledgments

NMFS acknowledges the SJRRP staff from USFWS, CDFW, and Reclamation for their contributions in collecting, summarizing, and providing the data used to produce this Tech Memo. NMFS also acknowledges the participants of the Tech Memo and Fisheries Management Work Group groups for their review and feedback on this document.

Appendix A: Accounting for Nonessential Experimental Population (NEP) of Central Valley spring-run Chinook salmon during 2025

Juvenile Releases and Recapture at Monitoring Sites and Central Valley Project and State Water Project Sacramento-San Joaquin Delta Fish Collection Facilities (CVP/SWP Facilities)

All juvenile Central Valley (CV) spring-run Chinook salmon (*Oncorhynchus tshawytscha*) released from the Salmon Conservation and Research Facility (SCARF) in 2024-2025 were marked with an adipose fin clip and a coded wire tag (CWT) with a code distinct to each release group. Table A1 provides a summary of the juvenile NEP CV spring-run Chinook salmon released. No fish were recaptured in the DJFMP[1] trawls or beach seines.

Table A2 provides a summary of juveniles that were observed at the CVP/SWP Facilities. Per protocol at the CVP/SWP Facilities, all adipose fin-clipped fish were sacrificed for CWT identification, unless a passive integrated transponder (PIT) tag was detected, in which case PIT tag codes were documented, then they were released alive. Two juveniles that were released in spring 2025 in Reach 1, successfully migrated out of the SJRRP Area and were observed at salvage in late April (Table A2). Flows in the San Joaquin River as measured at Gravelly Ford (GRF)[2] in Reach 2 ranged from approximately 850 cubic feet per second (cfs) to 500 cfs between April 1 (first releases of RST fish) and April 21 (observed at salvage). Similarly, flows in the San Joaquin River as measured at Dos Palos (SDP)[3] in Reach 3 ranged from approximately 650 cfs to 400 cfs between those date in April. These flows likely facilitated successful migration through and around passage barriers in the SJRRP Area.

One SCARF fish expressed a "natural" yearling life history strategy (Table A2). That fish was released as YOY in spring 2024, in Reach 1 as an RST efficiency test fish. The fish then reared for one year somewhere in the San Joaquin River, although it is not known whether it reared outside or inside the SJRRP Area. The length of that fish at salvage was 236 mm.

Since all YOY and yearlings from SCARF were adipose fin-clipped and coded wire tagged, these individuals were identified as NEP CV spring-run Chinook salmon released by the SJRRP and were not misidentified at the salvage facilities as juvenile Chinook salmon from other locations (refer to Figure A1).

[1] Delta Juvenile Fish Monitoring Program (DJFMP) is implemented by the U.S. Fish and Wildlife Service office in Lodi. Data is publicly available at: https://www.fws.gov/project/delta-juvenile-fish-monitoring-program

[2] Department of Water Resources, California Data Exchange Center website for Gravelly Ford station: https://cdec.water.ca.gov/cdecplotter/JspPlotServlet?sensor_id=6901&end=2025-05-01&geom=SMALL&interval=90&cookies=

[3] Department of Water Resources, California Data Exchange Center website for Dos Palos station: https://cdec.water.ca.gov/cdecplotter/JspPlotServlet?sensor_id=23084&end=2025-05-01&geom=SMALL&interval=90&cookies=

Table A1. Summary of juvenile NEP CV spring-run Chinook salmon releases made by the SJRRP in 2024-2025, and downstream recaptures from each release group, where YOY= Young of Year. All yearlings also received a unique Passive Integrated Transponder (PIT) tag.

Release Date	Lifestage	Release Location	No. Released/ CWT Code
Dec. 10, 2024	Yearling	San Joaquin River at Hwy 140	5,201/ 60700
Feb. 20, 2025	YOY	San Joaquin River at Hwy 140	43,779/ 62203
Mar. 20, 2025	YOY	San Joaquin River at Hwy 140	102,830/ 61866
Apr-May 2025	YOY	Reach 1 (RST efficiency releases)	14,000/ 60400

Table A2. Summary of juvenile NEP CV spring-run Chinook salmon that observed at the Central Valley Project (CVP) and State Water Project (SWP) Sacramento-San Joaquin Delta Fish Collection Facilities in 2024-2025. (CWT = coded wire tag; YOY = young of year; SJR = San Joaquin River)

Release Date	Release Location	Release Lifestage	CWT Code	Dates Observed in Salvage	Total Fish Observed	Median Days at Liberty	Min./ Max. Days at Liberty
12/10/2024	SJR at Hwy 140	Yearling	60700	12/18/2024 -- 3/14/2025	16	50	7/ 93
2/20/2025	SJR at Hwy 140	YOY	62203	2/25/2025 -- 4/15/2025	330	29	8/ 54
3/19/2025	SJR at Hwy 140	YOY	61866	3/22/2025 -- 4/26/2025	1,564	12	2/ 37
4/1 – 5/31/2025	Reach 1[1]	YOY	60400	4/21/2025	2	--	--
3/1 – 5/31/2024	Reach 1[2]	YOY	62870	4/9/2025	1	--	--

[1] Specific release date unknown. These were RST efficiency test fish. Lengths at salvage were 120 mm and 98 mm.
[2] Specific release date unknown, but this fish was a "natural" yearling. Fish was an RST efficiency test fish released in spring 2024. Length at salvage was 236mm.

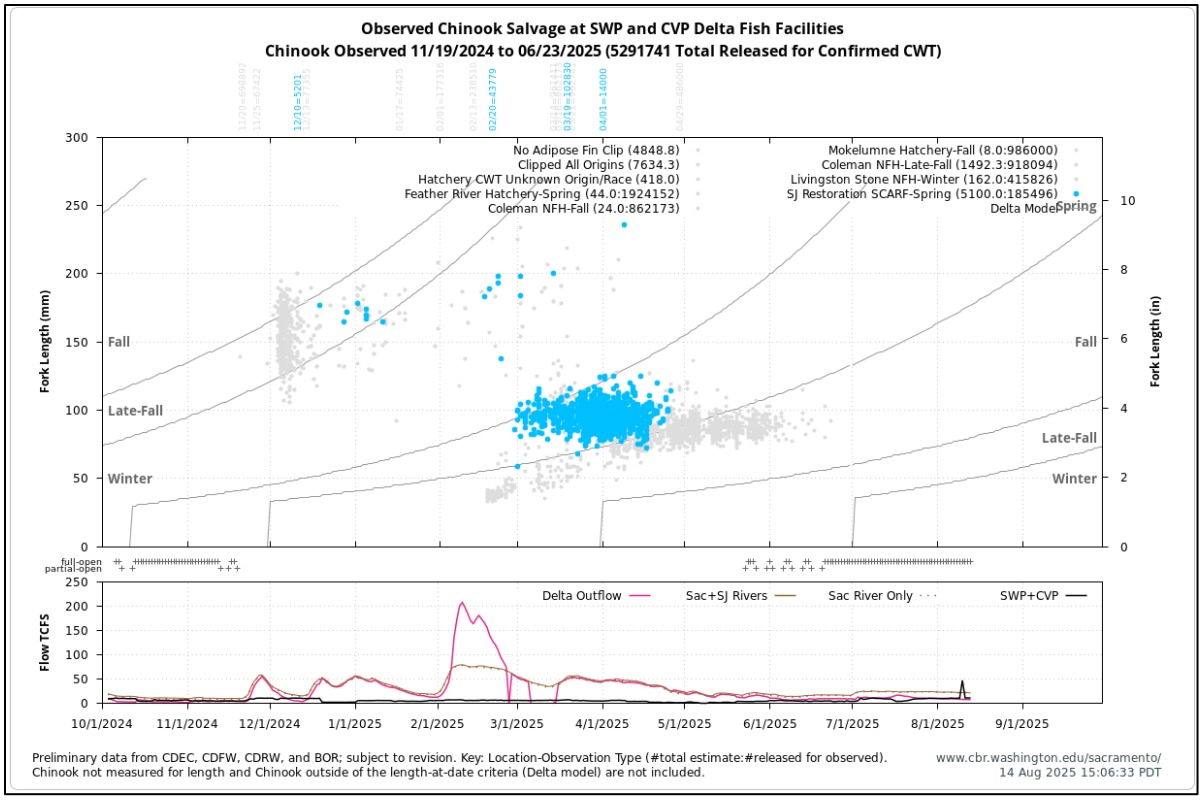

Figure A1. Observed Chinook salmon (blue dots) at SWP (Skinner Delta Fish Protective Facility) and CVP (Tracy Fish Collection Facility) Facilities between October 2024 and August 2025 from SCARF releases.

2024-2025 Rotary Screw Trap Monitoring

The data and information in this section was provided by Reclamation staff, with minor edits by NMFS staff for the purposes of this Tech Memo.

Biologists working for the SJRRP conducted rotary screw trap (RST) monitoring of juvenile Chinook salmon in the SJRRP Restoration Area (RA) during a portion of the 2024–2025 emergence-emigration season. Traps were fished at four locations in Reach 1: Owl Hollow (river mile [RM] 258.6), Scout Island (RM 250.17), Highway 99 (Hwy 99; RM 243.1), and Gravelly Ford (RM 229.3). Sampling started at the Owl Hollow and Scout Island RSTs on November 6, 2024. The Hwy 99 RST was placed in the fishing position November 7. The Gravelly Ford RST was installed and placed in the fishing position December 5. Elevated levels of periphyton resulted in trap clogging at the Owl Hollow, coinciding with elevated flows (Figure A2). Twice-daily cleanings were scheduled to improve trap operation; however, the decision was made to cease operation of Owl Hollow April 14, 2025, following an extended period of intermittent trap operation from these elevated periphyton levels. Trap operation ceased May 18, 2025, for the remaining RSTs, following a period without salmon capture.

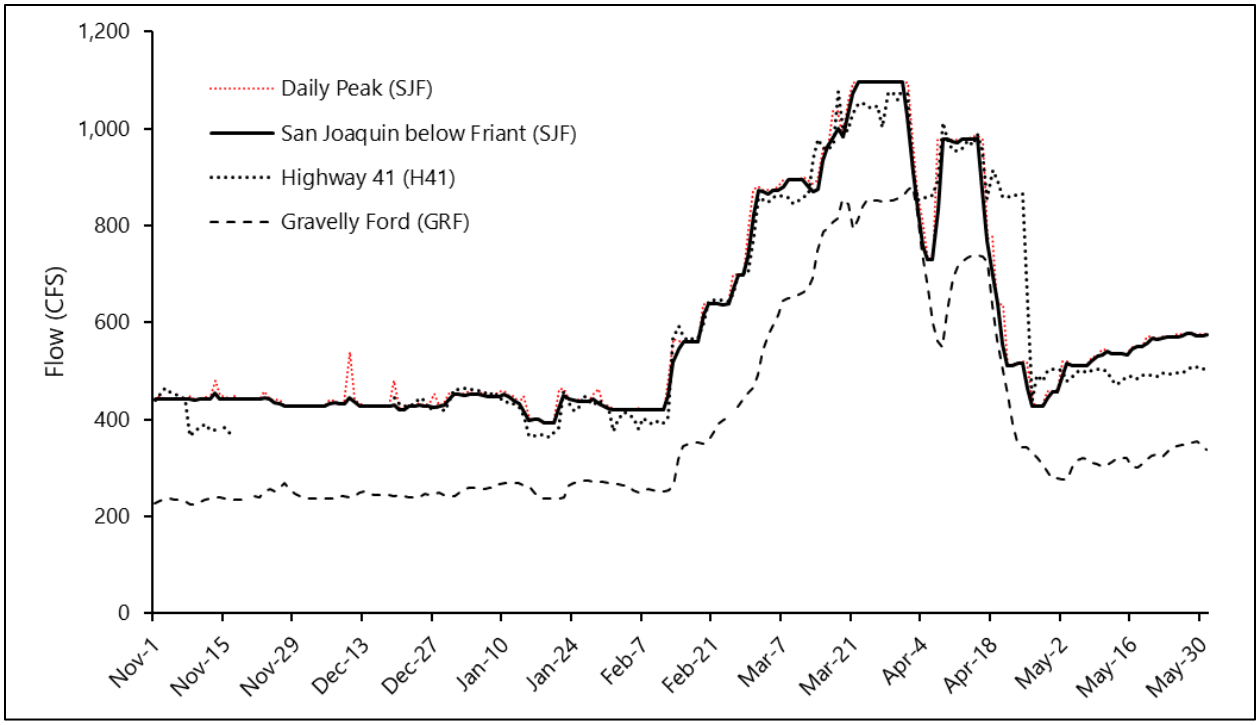

Figure A2. Average daily flow data (California Data Exchange Center website (https://cdec.water.ca.gov/), from gaging stations in the Restoration Area during the 2024–2025 monitoring period. Figure produced by Reclamation.

Captured salmon were identified to life-stage, measured to length (fork length and total length, millimeters [mm]) and weighed (nearest 0.1 gram [g], and only for fish >45mm fork length), and a tissue sample collected for genetic analyses. After processing, fish were released approximately 20–30 meters downstream from the RST. A total of 160 wild salmon (identified by an intact adipose fin) were captured in rotary screw traps during the 2024–2025 sampling season. However, based on length-at-date regressions, developed from genetic analyses of fish captured during RST efforts from 2017–2022, 150 of these fish are currently classified as spring-run Chinook salmon (Figure A3) from the current spawning period. An additional salmon was captured that was outside the upper prediction band for spring-run Chinook salmon. Pending genetic analyses, this salmon is presumed to be a yearling spring-run Chinook Salmon.

During past sampling seasons, fish outside the prediction band were often determined to be fall-run Chinook salmon juveniles, likely released after hatching from eggs from the Classroom Aquarium Education Program (CAEP; https://wildlife.ca.gov/CAEP). Additionally, *O. nerka* have also been genetically identified during previous sampling efforts, and these were likely hatchery escapees as the San Joaquin Hatchery raises kokanee (landlocked sockeye salmon). Since the CAEP fish were released February–March 2025 (*pers. comm.* Jen Giannetta, CDFW), these outliers are likely a combination of classroom releases and/or hatchery escapees. Verification of run-type and parentage will be determined through genetic analyses. Once results are available from fin clips submitted for genetic analyses, these numbers may be adjusted accordingly in subsequent reports. During the 2024–2025 sampling seasons, 131 fry and 19 smolts were captured (Table A3). The majority of fry were captured at Owl Hollow early in the season while smolts were captured, predominately at the downstream RST locations, later in the season (Figures A3 and A4). No salmon were captured at the Gravelly Ford RST location.

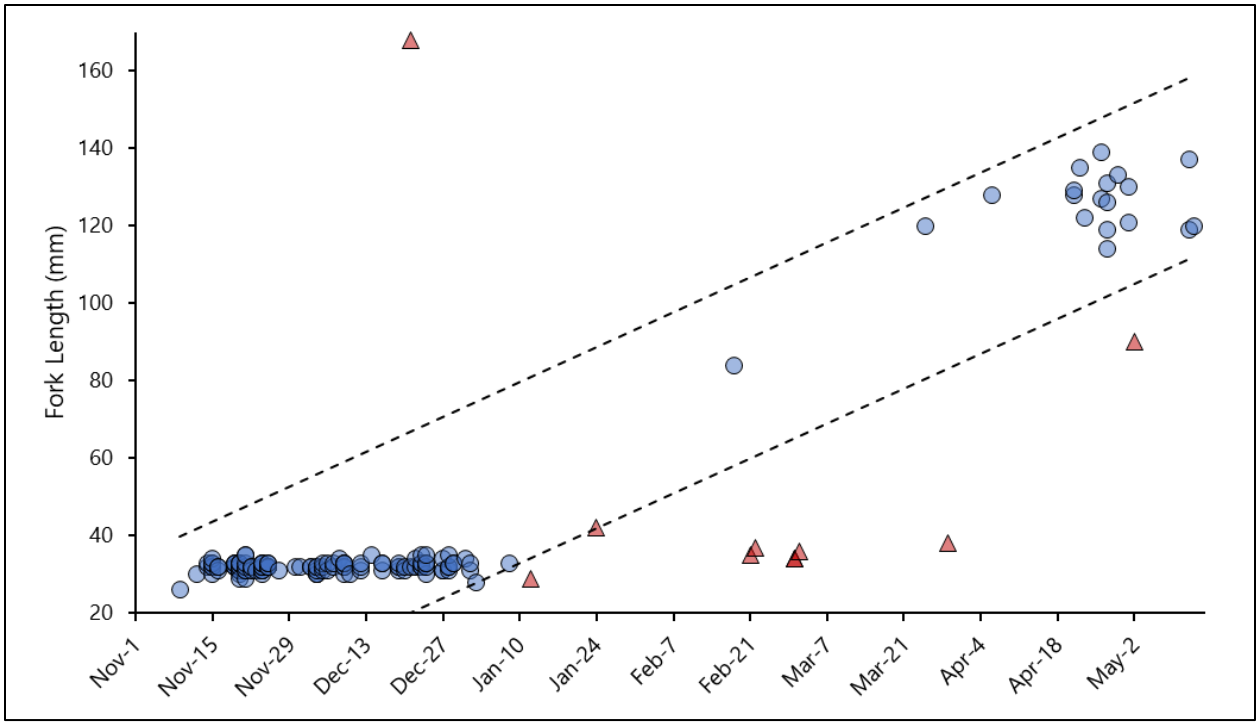

Figure A3. Fork length (millimeters [mm]) of captured CV spring-run Chinook Salmon (*Oncorhynchus tshawytscha*; blue circles) and 99% prediction band (dashed lines) for length by date of capture (linear regression), based on first five years of rotary screw trap sampling fish. Fish captured, but underneath the lower prediction band (red triangles) were determined not to be spring-run fish based on length-at-date; however, results of genetic analyses will ultimately determine run-type assignment. The single fish, indicated by the red triangle above the upper predication band was a yearling Chinook Salmon. Figure produced by Reclamation.

Table A3. Total capture of juvenile CV spring-run Chinook salmon, by life stage and rotary screw trap location, in Reach 1 of the San Joaquin River Restoration Area during the 2024–2025 sampling season. Data from Reclamation.

	RST Location				
Life Stage	**Owl Hollow**	**Scout Island**	**Hwy 99**	**Gravelly Ford**	**Total**
Fry	129	1	1	0	131
Parr	0	0	0	0	0
Smolt	0	9	10	0	19
Yearling	1	0	0	0	1
Total	130	10	11	0	151

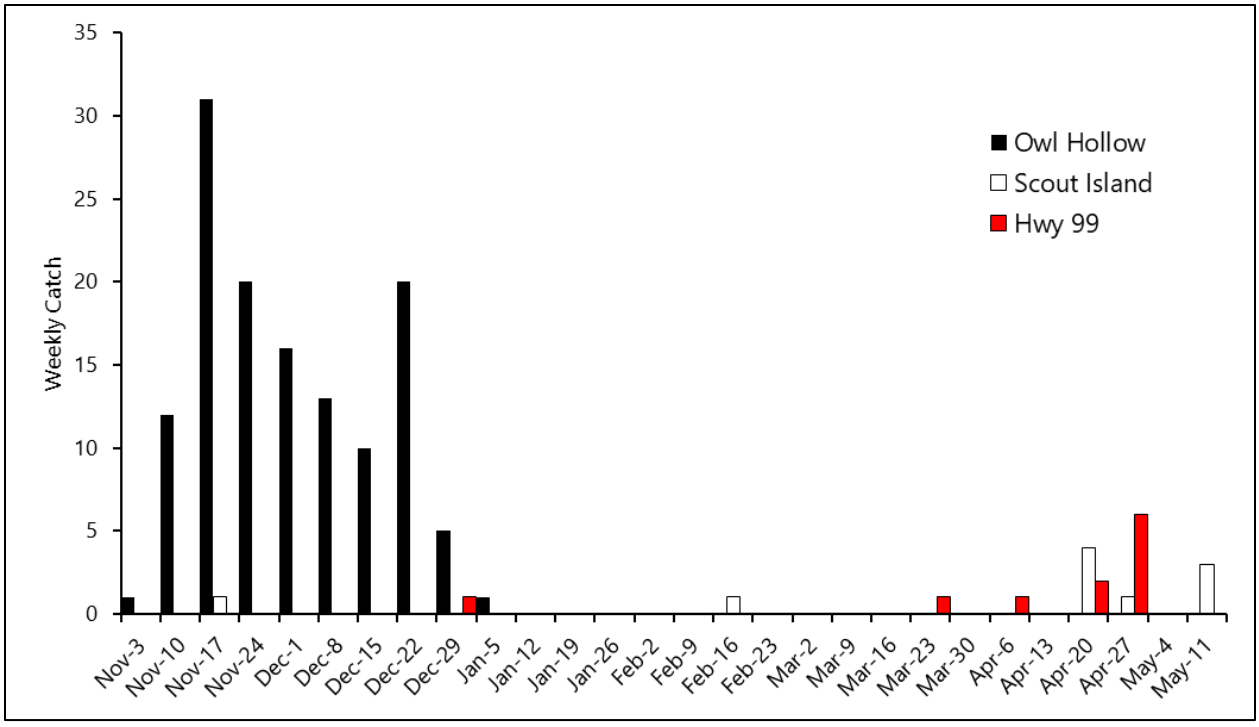

Figure A4. Total weekly catch of CV spring-run Chinook Salmon at rotary screw traps in the San Joaquin River Restoration Area during the 2024–2025 sampling season. Figure produced by Reclamation.

In conjunction with daily monitoring efforts, mark and capture/recapture trap efficiency experiments were completed to quantify juvenile salmon production and survival through sampled reaches. Rotary screw traps only sample a portion of the river, and thus do not capture all downstream moving fish. Therefore, trap efficiency estimates are necessary to extrapolate captured fish totals for production estimates. Efficiency estimates also permit quantification of survival of marked fish released and recaptured at subsequent downstream traps. Unique combinations of ink colors and fin-tag locations permitted recaptured fish to be ascribed to individual releases by location. These salmon were marked using a needleless injection gun and tattoo ink to mark the upper dermal layer of the selected fin. By varying the combination of ink color and fin location, each release group can be ascribed to a specific release date and RST. Multiple release groups occurred across the RST sampling season to account for varying river conditions and fish growth throughout the emigration period: Owl Hollow (n = 5), Scout Island (n = 6), Hwy 99 (n = 3), and Gravelly Ford (n = 3).

All fish released in the RA are required to be coded wire tagged prior to release. During the initial years of rotary screw trap monitoring, and for a period thereafter, only full-size CWTs were used, limiting tagged fish for efficiency testing to those greater than 55 mm. Both half-size (0.5 mm long) and full-size (1.0 mm long) CWTs were used during the 2024–25 sampling season; half-size CWTs permitted tagging smaller fish for release at the two upstream locations. The ability to tag smaller fish allows evaluation of RST efficiency during periods of high fry capture at upstream locations. Two salmon fry efficiency groups were released at the Owl Hollow and three at the Scout Island RST locations. These groups were released December–January. Fry releases only occurred at the upstream RST locations since fry are infrequently encountered beyond the Scout Island location. The remaining efficiency evaluations were completed at all four RSTs from April onwards. Releases continued at Owl Hollow beyond its placement into the non-fishing position to help estimate downstream survival during concurrent periods. Across all efficiency test groups, a total of 7,556 juvenile CV spring-run Chinook salmon were released into Reach 1 of the RA. Trap efficiency varied as a function of location with mean (± standard deviation) values at Owl

Hollow (19.3 percent [± 1.1 percent]), Scout Island (12.3 percent [± 4.5 percent]), Highway 99 (6.0 percent [± 2.6 percent]), and Gravelly Ford (9.2 percent [± 6.6 percent]). Currently, RST capture and efficiency data are being reviewed and analyzed. Resultantly, these data should be considered preliminary.

Adult Broodstock Releases in 2025

No adult broodstock were released into the San Joaquin River in 2025. The opening of the full SCARF facilities provided enough space to retain all broodstock spawning adults (Figure A5).

Figure A5. Aerial picture of the completed SCARF facilities with Friant Dam visible in the background. Tanks for juveniles are center left and covered in black dome netting. The adult broodstock tanks are within the covered structure at the right in the forefront of the picture. The Interim SCARF facilities can be seen in the back left with green netting coverings. The San Joaquin trout hatchery raceways can also be seen in the back right of the picture. Photo credit: California Department of Fish and Wildlife.

Adult NEP CV Spring-run Chinook Salmon Returns in 2025

Assisted migration, or trap and haul, of adult CV spring-run Chinook salmon was implemented from March 20, 2025 to June 5, 2025. In total, 448 adult CV spring-run Chinook salmon were captured in Reach 3, 4, or 5. Of those 448 fish captured: 6 fish were from the Hills Ferry Barrier trap location; 441 fish were from the Eastside Bypass trap location, the majority of which were captured in in the month of May; and one fish was from the Sack Dam trap location. A total of 394 fish were then released into Reach 1 at Scout Island, and the remainder were mortalities. Of those fish there were released into Reach 1, 39 adults were acoustically tagged for the adult over-summer holding study. A full report of the effort and related studies will be available on the SJRRP website once completed.

Redd and carcass surveys began on September 8, 2025. Preliminary data for redd/carcass surveys show that by the conclusion of surveys on November 7, 2025, a total of 12 redds were observed, and 7 carcasses were observed.

Appendix B: Conceptual method to estimate the number of naturally-produced, young-of-year (YOY), nonessential experimental population (NEP) Central Valley (CV) spring-run Chinook salmon from the Restoration Area to the Central Valley Project and State Water Project Sacramento- San Joaquin Delta Fish Collection Facilities (CVP/SWP Facilities)

As part of the continued effort to estimate the number of naturally-produced YOY CV spring-run Chinook salmon originating from (i.e., hatched within) the San Joaquin River Restoration Program (SJRRP) Restoration Area (RA) that could be observed at the CVP/SWP Facilities, NMFS, in coordination with the SJRRP, is in the early stages of developing a conceptual method to calculate the juvenile production estimate (JPE). In the future, this conceptual JPE could be used to help determine how many naturally-produced YOY juveniles may be observed at the CVP/SWP Facilities, that originated from the SJRRP RA. The data used to produce any annual JPE, including this conceptual approach, will be provided by annual SJRRP monitoring and studies. The annual JPE will be refined and updated as new data are available.

The method used to calculate the conceptual JPE is loosely based on the methods used to calculate the Sacramento River (SR) winter-run Chinook salmon JPE[1]. The development of a conceptual JPE sooner, rather than later, identifies data needed to produce a more robust estimate and, therefore, where potential future monitoring efforts could be fruitful in advancing the development of a more accurate JPE.

Table B1 outlines the components, numbers used, and associated notes for each component for the 2026 conceptual JPE. Note that the broodstock spawner row was deleted since no broodstock were released into the river in 2025. Based on the results of the conceptual JPE calculations, the estimated number of naturally-produced YOY CV spring-run Chinook salmon, that originate from the SJRRP RA, and that may be observed at the CVP/SWP Facilities in the spring of 2026, is anticipated to be low.

The results of the conceptual JPE are dependent on annual variations of environmental conditions, including water year type, flows, water temperatures, and water management decisions. Results should be interpreted within the context of annual environmental conditions that returning adults, their eggs, and juvenile fish experience in a given water year. The estimate of juvenile fish exiting the Restoration Area is generally anticipated to increase once fish passage projects within the Restoration Area are completed. The conceptual method to estimate juvenile production is still under development and is expected to be updated as data become available.

The estimated number of juveniles, that originate from the SJRRP RA, and are observed at the CVP/SWP Facilities should be considered within the context of the numerous data gaps, and will not be used to influence operational thresholds or triggers related to CVP/SWP Facility operations.

[1] Winter-run Chinook salmon JPE letter are publicly available here: https://www.fisheries.noaa.gov/west-coast/endangered-species-conservation/california-central-valley-water-operations-biological

Table B1. Table outlining the conceptual Juvenile Production Estimate (JPE) method and components, numbers used for 2026, and associated notes to explain the component and/or the number used.

JPE Component	Numbers for 2026	Notes
Total known spawners from Trap & Haul	394	na
Estimated volitional returns to Reach 1	0	Based on flows, it was assumed there was no volitional passage into Reach 1 during the spring months.
Total known + Estimated volitional returns	394	Trap & haul (394) + volitional return estimate (0)
Adult female estimate (AFE)	197	Trap & haul (197) + volitional return known females (0). If not otherwise known, the proportion of females for volitional returns is estimated to be 50%, until more data become available.
AFE minus pre-spawn mortality (AFE-spawned)	167	- Used 15% target objective for pre-spawn mortality from the 2018 Fisheries Framework. Will be revised as monitoring data become available. - AFE-spawned = 0.85*AFE
Average annual fecundity	2,600	Average annual fecundity of SCARF broodstock fish used as a surrogate for fecundity of natural returns; usually known by Oct of each year.
Total viable eggs	434,200	Total viable eggs= AFE-spawned* annual fecundity
Estimated egg-to-fry survival: Fry Production Estimate (FPE)	0.5	Based on 50% target objective from the 2018 Fisheries Framework (Table 7). May be revised as data become available, however, preliminary data since 2018 suggest the survival rate to be lower than 50%.
Fry-to-smolt survival rate estimate (SurvR2)	0.05	Based on target survival rate from the 2018 Fisheries Framework. May be revised as monitoring data become available.
Estimated survival term: Reach 2 to Reach 5 (SurvR5)	0.05	Based on target survival rate from the 2018 Fisheries Framework (same estimated as Surv2). May be revised as monitoring data become available.
Estimated survival term: Reach 5 to Delta (SurvDelta)	0.23	- Average survival rate of UC Davis tagged fish for 3 years (2017-2019) and applied to current year; it should be noted that this survival estimate is for years with higher flows and may not be representative for years with lower flows, as seen in 2020 and 2021. - May be revised annually as study data become available. For the purposes of this Tech Memo, survival to Delta is defined as fish observed at the CVP/SWP Facilities.
JPE= (FPE)*(SurvR2)*(SurvR5)*(SurvDelta)	125	Final number of naturally-produced YOY NEP spring-run Chinook salmon that may potentially be observed at the CVP/SWP Facilities. Given the numerous data gaps within this initial JPE, there is low confidence associated with this number. Note: Preliminary spawning data indicates there were 12 redds, therefore the final JPE number is expected to be lower than shown here.

Appendix C: Outmigration timing of juvenile nonessential experimental population (NEP) Central Valley (CV) spring-run Chinook salmon from the Restoration Area to the Central Valley Project and State Water Project Sacramento-San Joaquin Delta Fish Collection Facilities (CVP/SWP Facilities)

As part of the assessment to estimate the number of naturally-produced young-of year (YOY) CV spring-run Chinook salmon, that originate from the SJRRP RA, and that could be observed at the CVP/SWP Facilities, NMFS, in coordination with the San Joaquin River Restoration Program (SJRRP), evaluated outmigration timing data from ten years (2016-2025) of Salmon Conservation and Research Facility (SCARF) YOY production releases in Reach 5. The 2022 Tech Memo contains the detailed analyses for 2016-2021[1]. This 2026 Tech Memo expands upon those analyses and evaluates data from 2022-2025. Similar to the 2022 Tech Memo, the primary assumption and hypothesis for this analysis is that SCARF juveniles have outmigration behaviors and timing that are similar to naturally-produced juveniles. All the fish data used in this analysis were gathered from publicly available data on SacPAS. Only observed salvage data was used and not calculated loss.

The purpose of this timing analysis is to produce an estimate of when naturally-produced YOY juveniles, of SJRRP RA-origin, might be observed at the CVP/SWP Facilities. This timeframe estimate could then be used to help determine when naturally-produced YOY juvenile may potentially be observed at the CVP/ SWP Facilities. The 2022 Tech Memo evaluated four questions, however, due to various constraints, the analysis in this 2026 Tech Memo focuses on the first two questions previously posed in 2022, as follows:

Question 1: What is the timeframe that naturally-produced, YOY CV spring-run Chinook salmon originating from the SJRRP RA might be observed at the CVP/ SWP Facilities?

Question 2: Does the release date of the SCARF production fish affect migration timing to the CVP/ SWP Facilities? For example, would release date affect the assumption that SCARF fish have similar outmigration timing as naturally-produced juveniles?

Question 1

Figure C1 shows all ten years of data combined for SCARF production release fish that were observed at the CVP/SWP Facilities. The majority of fish were observed at the Facilities from March through April, which remains consistent with data analyzed in the 2022 Tech Memo. Figure C2 shows the total number of juvenile SCARF fish observed in salvage at the CVP/ SWP Facilities. The last few years (2023-2025) have indicated an increasing trend of fish observed at the Facilities. However, further analysis is needed to evaluate how environmental variables, such as flows, could have influenced this increasing trend. Figure C3 shows the median, minimum, and maximum rearing times indicated as "Days at Liberty" (DAL) for juvenile SCARF fish between Reach 5 and observation at the CVP/ SWP Facilities. It is somewhat unclear if there is a trend in rearing time across years, but further analysis of potential influencing environmental variables, such as flows, could inform past and future underlying trends.

[1] NMFS. 2022. Technical Memorandum to Account for Reintroduced San Joaquin River Spring-Run Chinook Salmon per CFR 233.301(b)(5)(ii): 7. Publicly available here: https://www.fisheries.noaa.gov/west-coast/habitat-conservation/san-joaquin-river-restoration#san-joaquin-river-spring-run-chinook-salmon-reintroduction

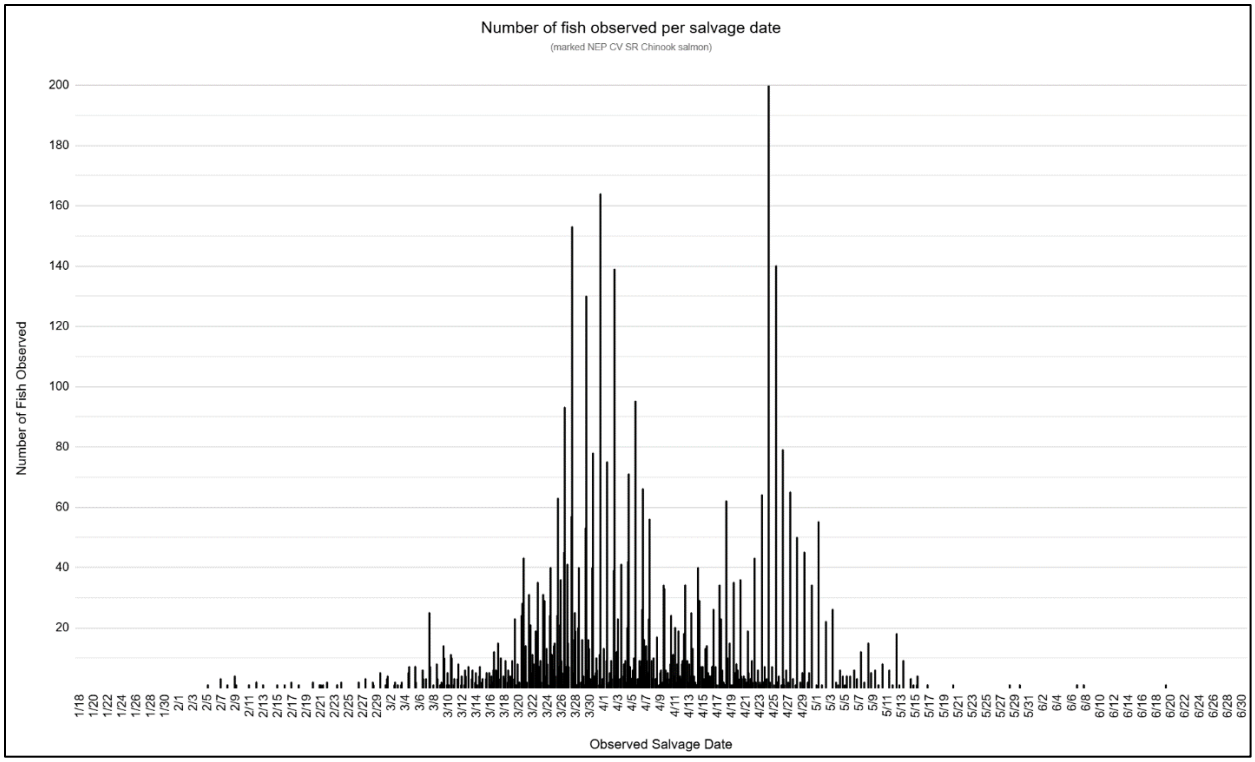

Figure C1. Graph showing the number of SCARF CV spring-run Chinook salmon observed at the CVP/SWP Facilities by date across ten years (2016-2025).

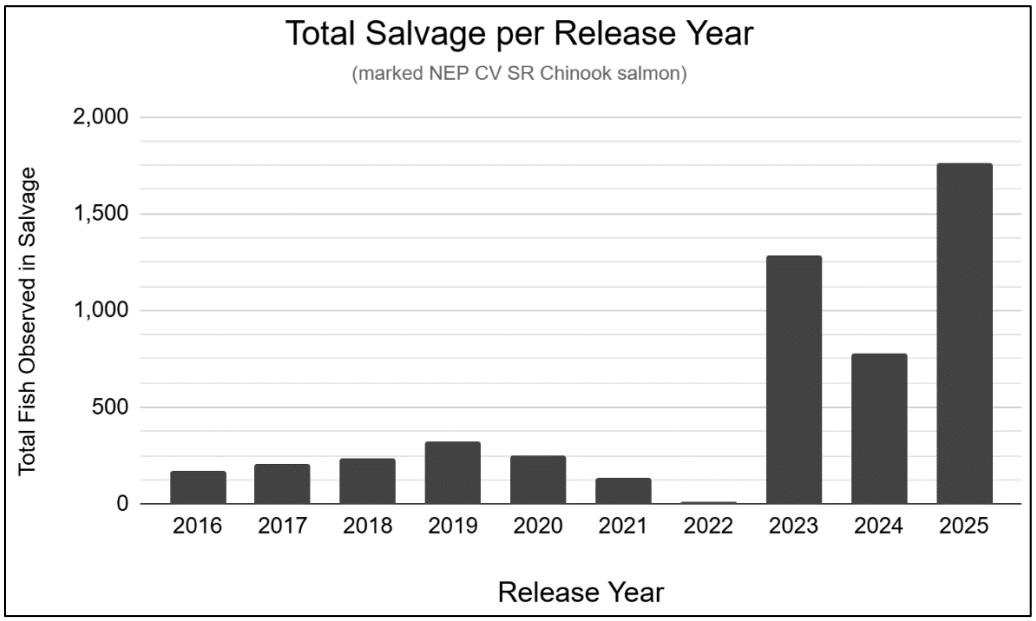

Figure C2. Total number of juvenile, YOY, SCARF CV spring-run Chinook salmon observed at the CVP/ SWP salvage facilities per production release year.

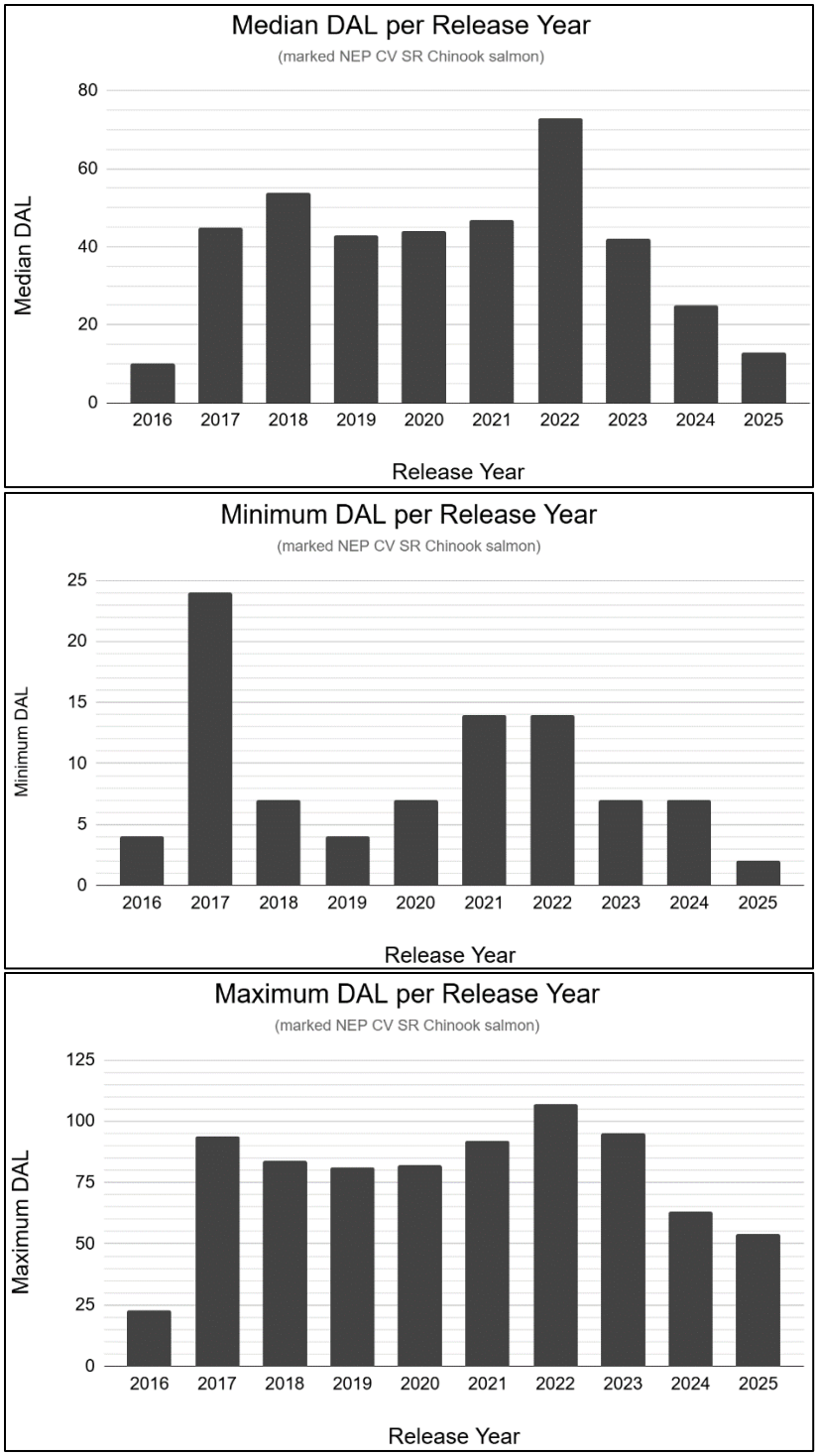

Figure C3. Set of three graphs that show the migration/rearing times of juvenile, YOY SCARF CV spring-run Chinook salmon in the San Joaquin River between Reach 5 of the SJRRP Area the CVP/ SWP Facilities, where DAL= days at liberty and is defined as the number of days between release in Reach 5 to observation at the CVP/ SWP Facilities. The top graph shows the median number of rearing days per year, the middle graph shows the minimum number of rearing days per year, and the bottom graph shows the maximum number of rearing days observed per year. Note the vertical axis has a different scale for each graph to retain readability for each dataset.

Question 2

Figure C4 shows that the date of release of the SCARF production groups produces some difference in rearing timing and variability. Similar to what was described in the 2022 Tech Memo, SCARF fish released earlier in the winter/spring (i.e. Jan or Feb), generally exhibit longer rearing times and more variability in migration and rearing times, as seen by the first line of blue dots for each year. Fish released later in the spring (i.e., in March or April), generally exhibit shorter rearing time and less variability in migration timing, as seen by the second line of blue dots for each year.

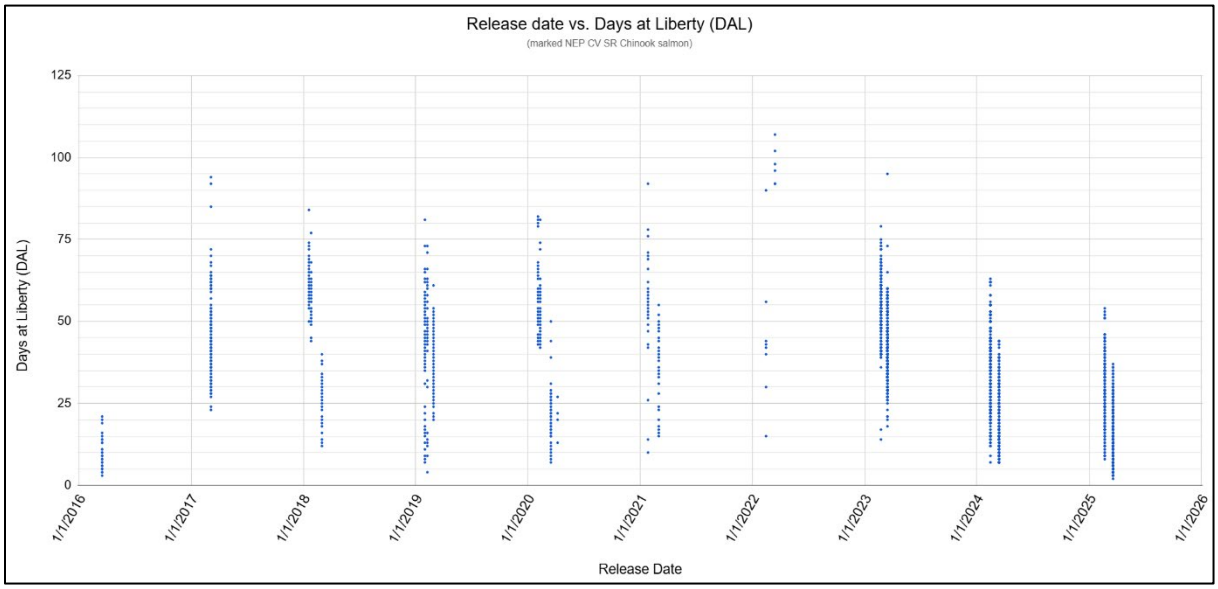

Figure C4. Graph showing the rearing times (Days at Liberty) and variability of juvenile CV spring-run Chinook salmon outmigration timing in relation to release date each year (2016-2025). DAL is defined as the number of days between release in Reach 5 to observation at the CVP/ SWP Facilities. Release dates can be identified by the vertical blue lines created by the blue dots.

Summary

The updated results of the outmigration timing analysis using SCARF fish as a proxy, indicates that naturally-produced YOY juveniles, of SJRRP RA-origin, are most likely to be observed at the CVP/ SWP Facilities in March through April. This is consistent with the results presented in the 2022 Tech Memo. Future additional RST monitoring locations in Reach 5 would provide additional data to help inform outmigration timing of naturally-produced YOY juveniles as they exit the SJRRP Area. Also, further analysis could evaluate which environmental variables, such as flow and water temperatures at specific locations, best inform rearing and outmigration timing of both SCARF and naturally-produced juveniles, and on how many and when they may be observed at the CVP/ SWP Facilities.