California Department of Fish and Wildlife

North Central Region

Wallace Weir Fish Trapping and Relocation Efforts

2025 – 2026



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Purpose

The purpose of this document is to summarize the fish salvage efforts during the 2025-2026 trapping season in the Knights Landing Ridge Cut (KLRC) using the Wallace Weir Fish Collection Facility (Facility). The information in this document is intended to 1) provide historical context describing why a permanent fish collection facility was constructed, 2) document fish salvage efforts in the KLRC at the Facility, 3) show species composition observed in the Facility and 4) compare salvage efforts between the Facility and temporary trapping methods (i.e., fyke traps).

Introduction

Non-natal straying is a natural occurrence for adult salmonids and serves to increase genetic diversity among populations from different watersheds (Quinn, 1984). Anthropogenic impacts to natural waterways such as damming of rivers, water diversions, and the creation of artificial waterways have led to increased straying of adult salmonids in the California Central Valley. Adult salmonids can be attracted to the outflow from man-made canals and become entrained in them. These canals are usually not connected to a river upstream and oftentimes have poor habitat and water quality for adult salmonids and can make them vulnerable to predation and poaching. The entrainment of these fishes leads to a reduction in the adult spawning population. These losses are especially detrimental to Central Valley winter-run and spring-run Chinook Salmon *(Oncorhynchus tshawytscha)*. *S*outhern distinct population segment (sDPS) of Green Sturgeon **(***Acipenser medirostris*) and White Sturgeon (*Acipenser transmontanus*) have also been rescued as part of these efforts. These species are listed as threatened or endangered under the federal Endangered Species Act (ESA) and state of California Endangered Species Act (CESA). To reduce and prevent entrainment losses, the California Department of Fish and Wildlife (CDFW) has implemented salvage efforts in these man-made canals where salmonids have been observed. Beginning in 2013, CDFW has seasonally installed temporary traps in the Colusa Basin Drainage Canal (CBDC), KLRC, and the eastern toe drain of the Yolo Bypass (Toe drain) for salvaging ESA listed anadromous species (Figure 1). Although these efforts may reduce the impacts from artificially augmented straying, they are not a permanent solution.

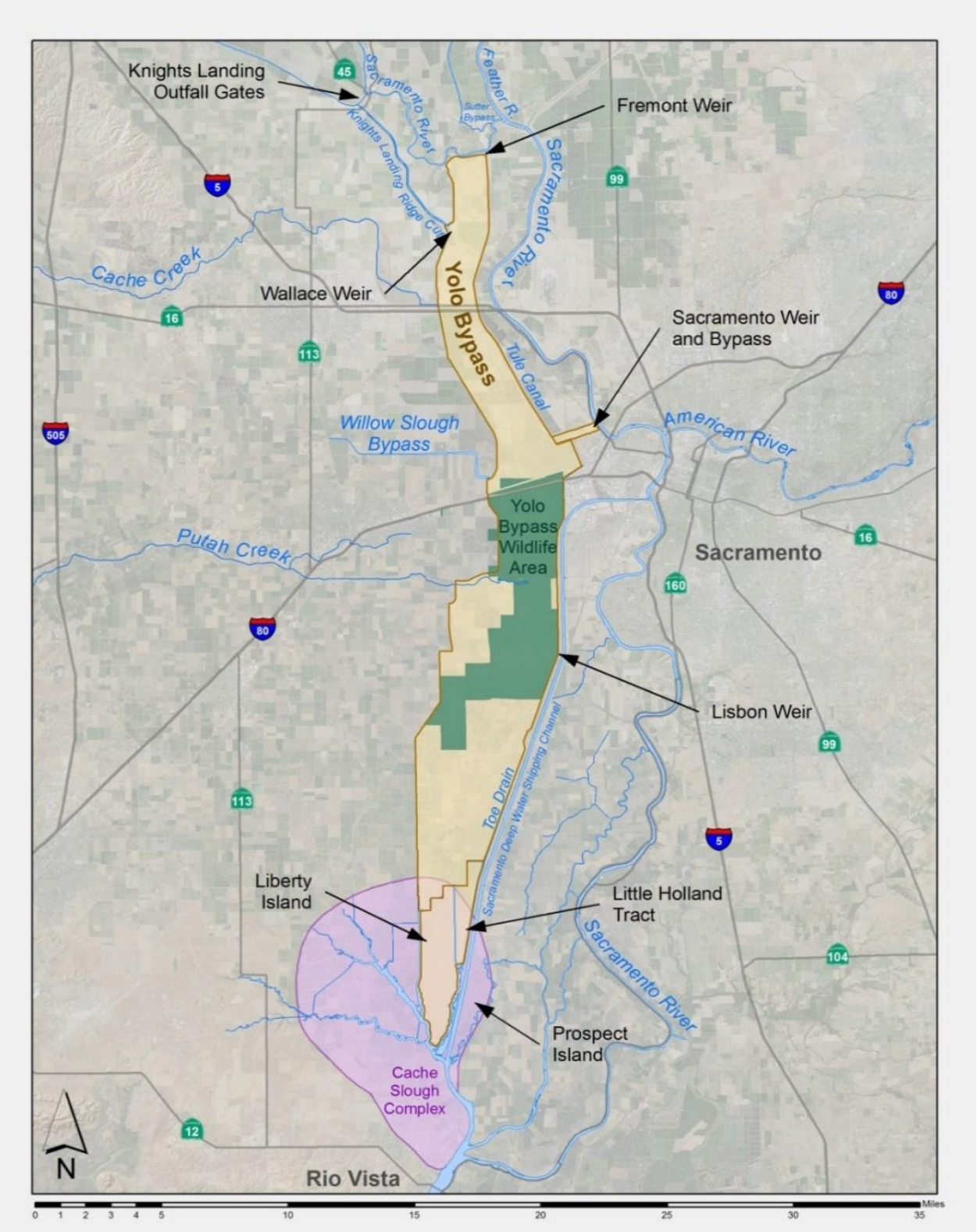


Figure 1. Map of the Yolo Bypass showing the Knights Landing Outfall Gates, Wallace Weir, and the Cache Slough Complex.

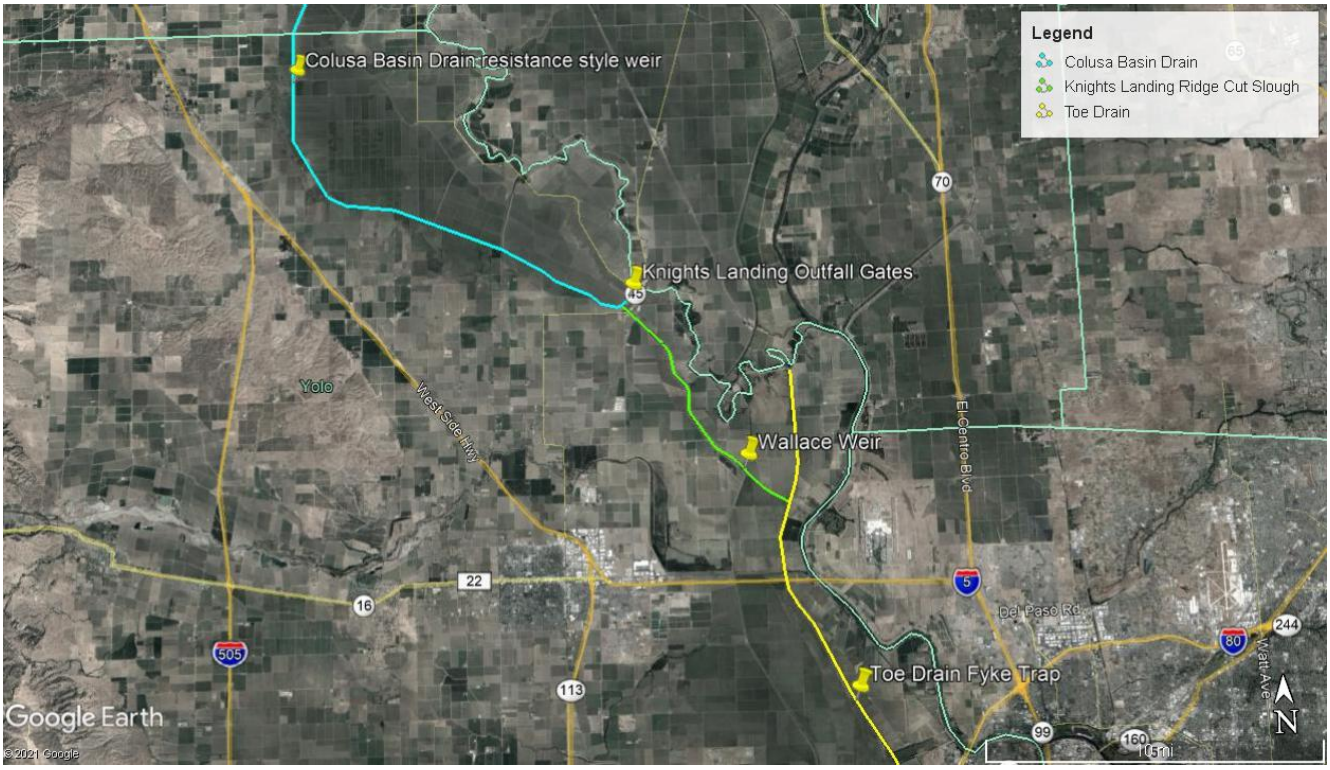


Figure 2. Map showing temporary trap site locations since 2013 in the Colusa Basin Drain (blue), Knights Landing Ridge Cut (green), and the eastern toe drain of the Yolo Bypass (yellow).

Background

During the spring of 2013, CDFW rescued 312 adult Chinook Salmon from the CBDC, a man-made canal that drains approximately one million acres of agricultural land from Glenn, Colusa, and Yolo counties. Genetic and coded wire tag analyses revealed that many of the Chinook Salmon rescued were federally listed winter-run and spring-run origin fish. Following this rescue effort, CDFW implemented trapping efforts upstream of two possible entry points into the CBDC: The Knights Landing Outfall Gates (KLOG) and the Cache Slough Complex (CSC) (Figure 1). Multiple years of trapping in these locations have revealed that much of the salmonid entrainment occurs in the KLRC via the CSC. Conditions allowing for entrainment into the KLRC occur more frequently throughout the year and under a wider range of water years compared to the number of days KLOG is passable in a given year (Gahan et al., 2016). As such, it was deemed necessary to have a more permanent means of salvaging listed Salmon and Sturgeon from the KLRC. Trapping efforts in the KLRC historically took place approximately 200 meters downstream of an agricultural water control structure known as Wallace Weir (Figure 2). The weir consisted of an earthen berm and manually operated culvert with a wooden slide gate. During high flow events in the KLRC and Yolo Bypass, the weir was subjected to overtopping flows and erosion and needed to be repaired after such events. Similarly, the temporary fyke trap used for salvage operations was also subject to severe damage during these high flow

events and needed to be removed beforehand. In an effort between CDFW, California Department of Water Resources (CDWR), and Reclamation District 108 (RD108), the weir was modified to be more robust and include a fish collection facility. Construction on the improved weir and Facility began in the summer of 2016 and was finished in the summer of 2019.

Wallace Weir

Flow Control Structure – The current Wallace Weir flow control structure, or water control structure (WCS), consists of a built-up earthen berm armored with rip rap and six concrete box culverts through which water flows. Obermeyer dams are located on the upstream side of each culvert to regulate flow. On the downstream side of each culvert are bottom hinged metal fish screens that prevent fish from swimming upstream of the weir and further into the KLRC and CBDC. Each of the screens are raised and lowered via an overhead hoist and cable system mounted on the downstream end of the retaining walls. The Obermeyer dams and fish screens are controlled through a user interface housed in a control building on the top of the levee west of the weir. Air compressors that regulate the air pressure in each of the bladder dams are also stored in this control building. The fish screens can be programmed to raise and lower at different time intervals. Lowering of the fish screens can also be triggered by the amount of force being applied to the screens. This is to prevent debris build up which could cause a mechanical failure in the hoist system and result in an uncontrolled drop of the screens.

Fish Collection Facility - The Wallace Weir Fish Collection Facility (Facility) is a concrete structure adjacent to the improved Wallace Weir water control structure, located in the KLRC, approximately 9.7 kilometers southwest of the town of Knights Landing.

The Facility has four major components: the downstream entrance pool, holding pool, Facility intake pool, and energy dissipation basins (Figure 3). The entrance pool is where fish enter the Facility and leads to the holding pool, where fish are collected. The Facility intake pool is at the upstream end of the Facility, where water is diverted from the KLRC into the Facility. A mechanized trash rack is mounted at the intake of the Facility to block large debris from entering. The trash rack is driven by a Rotork actuator. After entering the Facility intake pool, water can be diverted into two energy dissipation basins: one at the upstream end of the holding pool and one running parallel to the west side of the holding pool. Water routed through the western energy dissipation basin drains out to the upstream end of the entrance pool to provide auxiliary attraction or maintenance flow when needed.

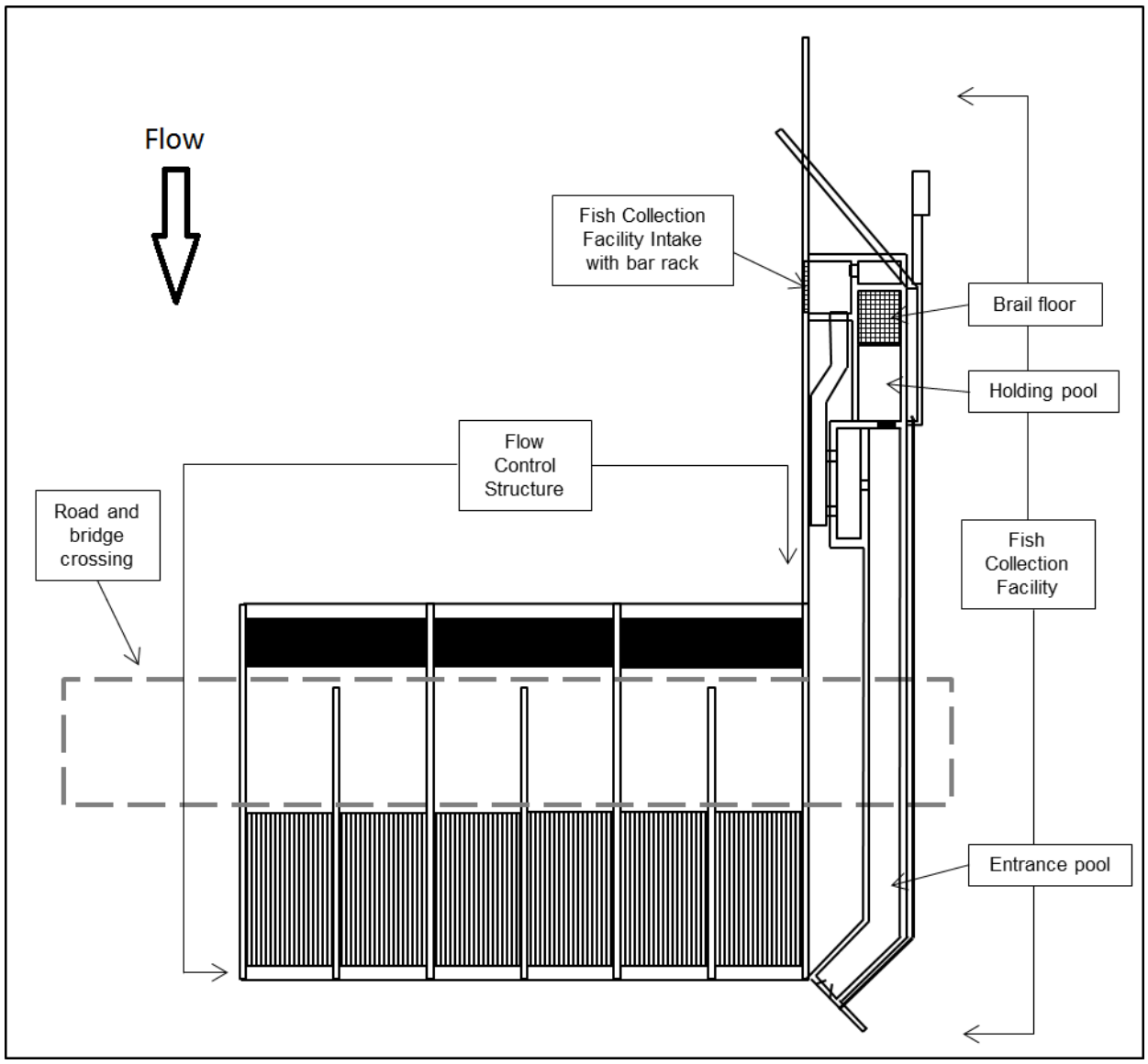


Figure 3. An overhead diagram of the Wallace Weir including the flow control structure and Facility.

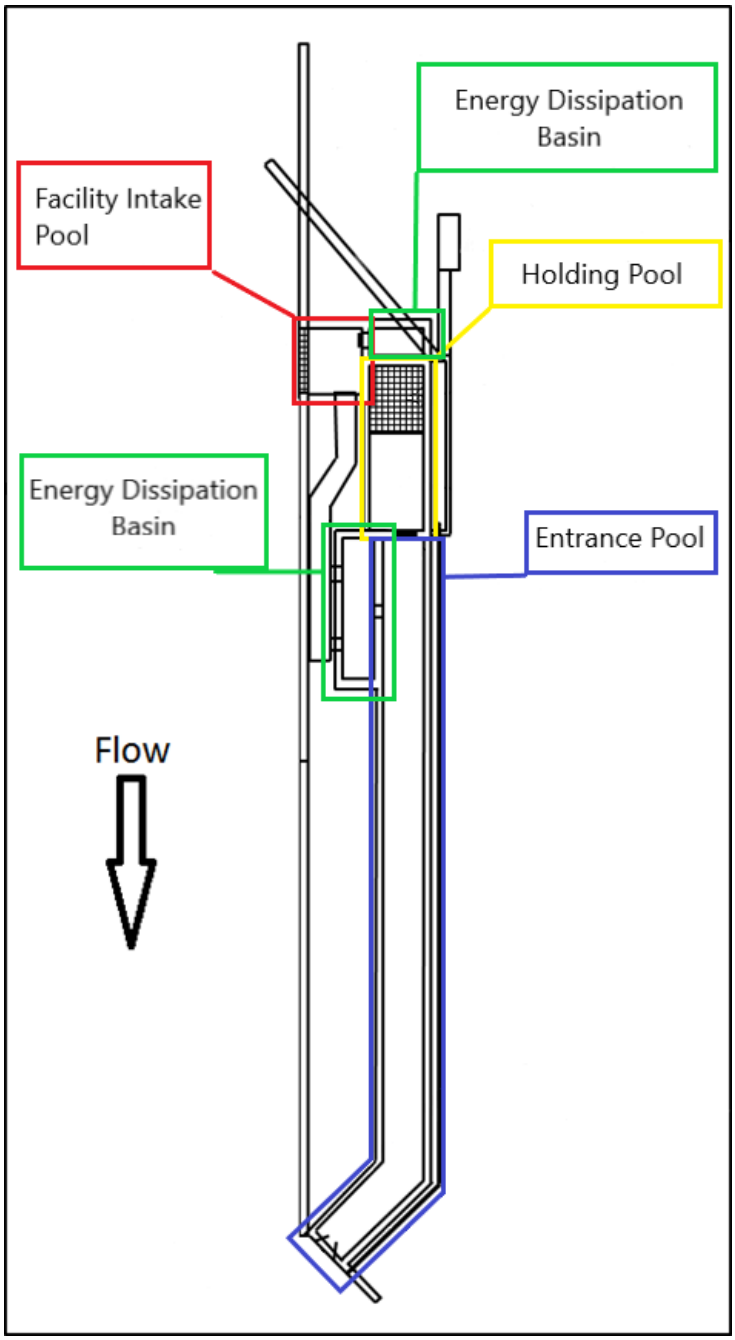


Figure 4. An overhead diagram of the Wallace Weir Fish Collection Facility with the four major components highlighted. The Facility intake pool (red), holding pool (yellow), entrance pool (blue) and the energy dissipation basins (green).

Five gates separate the major components of the Facility: the upstream Waterman gate, western auxiliary Waterman gate, slide gate, screened panel dual leaf holding pool LOPAC gate, and solid panel dual leaf entrance pool LOPAC gate (Figure 4). The upstream Waterman gate regulates flow from the KLRC to the Facility intake pool. The western auxiliary gate regulates flow from the Facility intake pool to the western energy dissipation bay. The slide gate is a stainless-steel plate used to hydraulically isolate the holding pool

from the entrance pool. The screened dual leaf panel LOPAC gate opens inwards into the holding pool and prevents fish from swimming back out into the entrance pool. These screened panels allow water to flow through even when closed, but block fish passage. The solid panel dual leaf LOPAC gates are used to adjust the head height of the water inside the Facility as well as to close the Facility.

The holding pool contains two components for collecting fish: a crowder rack and floor brail. The crowder rack is located at the downstream end of the holding pool. The top portion of the crowder rack consists of a platform with four wheels that ride along two metal rails that run lengthwise on the top of the holding pool walls. Metal handlebars mounted to either end of the crowder rack are used to manually push the crowder rack back and forth in the holding pool. The lower part of the crowder rack consists of two screen panels made of metal frames with 1" metal tubing running vertically within the frames. The metal tubes are spaced approximately 1" apart. The bottom of the two panels is raised and lowered mechanically via a chain driven by a Rotork actuator. This allows operators to control when fish pass through or to block them in when crowding in the holding pool occurs. The floor brail is a 10' by 8' metal basket consisting of 1" tubing spaced out approximately 1" apart. The floor brail sits in the upstream half of the holding pool and is raised and lowered by two steel threaded stems that are mechanically driven by a Rotork actuator. The floor brail is used to crowd fish towards the surface of the pool when staff are ready to collect fish and transfer them to a workup tub.

The mechanized components of the Facility are operated from a control panel mounted in a cabinet located on the northeast corner of the Facility. The controls are connected to the actuator of the crowder rack, floor brail, and traveling trash rack, providing power and a user interface. The two LOPAC gates and slide gate are operated via corded hand drills. Both LOPAC gates are operated via a drive nut and ball valves. The LOPAC gates open or close depending on which way the drive nut is spun, and which ball valves are opened or closed. The slide gate opens and closes via an operator nut that is rotated with a corded hand drill.

Although the Facility is intended to be operated during a wide range of river and bypass flow conditions, the area it is in is still subject to flooding when the Fremont Weir overtops during high Sacramento River flows. As such, several of the components of the Facility are removable, including: the Rotork actuators for the crowder rack, floor brail, traveling trash rack, and control cabinet. While these components need to be removed before overtopping events, the rest of the Facility can remain in place. This enables trapping to begin quickly after flooding recedes.

The Facility's flexibility and ability to be operated under a wide range of flow conditions, allow for safer and easier fish salvage operations than using temporary trapping methods.

Methods

Alternate trapping methods - At the beginning of the 2025/2026 season, the Facility was inoperable due to excessive leakage through the upstream Waterman gate that provides water for the Facility. Due to the leakage through this gate, the holding pool would not fill with water to the appropriate level for working up fish. The maximum water surface elevation that could be achieved with available pumps was still approximately 5 feet below the top of the pool, which left staff having to reach that distance from the surface of the workup area down to the water. A quick fix to this issue was not available. The Lopac gates at the entrance of the Facility, as well as the vertical slide gate and the Waterman intake gate were closed to prevent fish from entering the Facility while inoperable. On December 3, 2025, a temporary trap (trap) was installed approximately 90 meters downstream of the facility. The temporary trap was made up of hog panel fencing with 1" by 2" holes, and 4' tall that were attached to varying lengths of conduit pipe that were driven into the substrate at approximately 5-foot intervals, starting from the banks going inward towards the middle of the channel. The fencing was arranged into two wingwalls extending from both banks into the channel, turned slightly upstream, with an approximately 6" gap between the two ends in the middle of the channel. This served as a one-way opening that would act as a behavior mechanism to prevent fish from swimming out of the trap, going downstream. A U-shaped corral was formed with hog panel fencing and placed on the upstream side of the wingwalls, with the open end of the corral facing downstream, attaching to both wingwalls. Conduit pipes were driven into the substrate around the outside of the hog panel corral to provide support and help hold the shape of the corral. This corral served as the live well for the trap. A gate made of conduit and metal stringers was used as the access panel for staff to enter the trap. The gate was placed on the east side of the corral, between the end of the corral and the upstream side of the eastern wingwall. Each section of fencing was made of two layers of panel that were slightly offset to reduce the size of the mesh and prevent fish from becoming impinged. Four conduit pipes were placed on the upstream side of the wingwalls (two pipes for each wingwall) and tilted upstream. Vinyl coated steel cable was used to attach the cable to the wingwalls to provide additional support and stability for the wingwalls, preventing them from falling over. To close the trap for fishing, a mesh panel with two pieces of conduit attached on either end would be placed on the upstream side of the trap opening to block fish from entering.

The temporary trap could not withstand high flows (anything greater than 50 cfs) and would need to be completely pulled out ahead of time. This occurred on December 19, 2025, ahead of high flows in the Ridge Cut following heavy rain events in the Central Valley.

After high flows subsided later in the season, staff were able to trouble shoot and fix the issue with the leaking waterman gate.

Facility Procedures – Salvage operations at the Facility started on March 19, 2026. The dual leaf solid panel LOPAC gates, screened panel LOPAC gates, slide gate, and crowder rack gate were opened with the floor brail in the fully lowered position. While the Facility was fishing, the crowder rack was left on the downstream end of the holding pool with the gate open, allowing fish to swim into the holding pool and access the floor brail. The upstream Waterman gate at the intake pool was partially opened to allow flow through the Facility. Due to modifications made on the trap, the Waterman gate could not be fully opened.

Environmental data were measured and recorded prior to checking the Facility. Water discharge (cubic feet per second) going into the Facility was measured using a Global Water flow probe. Water samples were taken upstream of the Facility for measuring turbidity in Nephelometric Turbidity Units (NTUs). Water temperature (degrees Celsius) and dissolved oxygen (milligrams per liter) were measured in the holding pool using a YSI temperature/dissolved oxygen meter.

Once environmental data were recorded, staff would close the gate on the crowder rack and push the crowder upstream in the holding pool until it became flush with the downstream edge of the floor brail. This concentrated fish in the holding pool above the floor brail. Once the crowder was pushed into position, the floor brail was lifted until the top of the brail was visible. If fish were present, the screened panel LOPAC gate and slide gate were closed, hydraulically sealing the holding pool from the entrance pool, and blocking any other fish from entering the holding pool. After closing the gates, the holding pool was filled with water using the upstream Waterman gate until the water level in the holding pool equalized with the water level in the KLRC. Then a gas-powered trash pump was used to fill the holding pool, and the floor brail was raised to the surface to allow for easy capture of fish. Fish were netted out using large D-ringed dip nets and salmonids were transferred to a 150-gallon (568 liter) workup tub to be processed. The workup tub was filled halfway with water from the KLRC and approximately 50 milliliters of API stress coat for every 3.8 liters of water. All bycatch were identified to species, enumerated, and returned to the KLRC, next to the Facility.

Salmonids were identified to species, examined for any external markings or tags (adipose fin clips, Floy tags, etc.), measured to fork length to the nearest 0.5 centimeter, and examined for sex. Two external T-bar anchor tags marked with individual four-digit ID numbers and a contact phone number were implanted into the muscle tissue behind the dorsal fin. A subset of Chinook Salmon was implanted with a HDX23 passive integrated transponder (PIT) tag. All salmonids were sampled for genetics via a fin clip from the upper lobe of the caudal fin. Genetic samples were stored on filter paper and placed inside individually labeled sample envelopes. After salmonids were measured, tagged, and sampled for genetics, they were evaluated for Reflex Action Mortality Predictors (RAMP) (Davis, 2010). RAMP scoring has been used by other researchers as an indicator of stress and predictor of delayed mortality by testing five reflexes:

Tail grab – If the fish responds to handlers grabbing the tail by bursting forward. No response gives a score of 1.

Body flex – If fish attempts to struggle free of handler's grip when held out of the water with both hands around the center of the fish's body. No struggling gives a score of 1.

Vestibular-ocular response – If the fish's eye rolls to track the handler when rolled on its side out of the water. Eye not rolling to track handler gives a score of 1.

Head complex – If the fish exhibits a regular pattern of operculum ventilation when held above the surface of the water. If the fish is not ventilating or if ventilation is highly irregular, give a score of 1.

Orientation – If the fish rights itself within 3 seconds after being turned upside down in the water. Fish not rolling over within 3 seconds gives a score of 1.

One point for any of the five reflex tests indicated impairment of that reflex. The higher the score, the more impaired the fish was. Higher scores are also likely to lead to delayed mortality post release. If there was doubt as to whether a reflex was impaired or not, it was assumed that the reflex was impaired, and a point was given. If fish were vigorously struggling to the point where the handler could not control the fish, it was assumed that the fish's reflexes were not impaired and a total RAMP score of 0 was given.

After processing was complete, salmonids were transferred from the workup tub to a trailer mounted 400-gallon (1,514 liters) transport tank. The transport tank was equipped with two water recirculators and air stones hooked up to oxygen tanks to maintain dissolved oxygen levels while fish were in transit. The transport tanks were filled approximately 3/4 of the way full and API stress coat was added to the water in the same amount as the workup tub. A maximum of 12 fish were loaded into the transport tank at a time. Fish were transported to the Elkhorn Boat Launch on the Sacramento River, approximately 1.8 km downstream of the I-5 bridge. Dissolved oxygen inside the transport tank as well as in the river at the release point were measured and recorded. Temperatures between the transport tank water and river water needed to be within 2 degrees Celsius for fish to be released. If the difference in water temperature was greater than 2 degrees, the water in the transport tank was acclimated to the river water by slowly removing water from the tank and adding river water to the tank. Once the difference between the two water temperatures was less than 2 degrees, the transport tank was backed down the boat ramp into the water and fish were released out of the back of the tank via a slide gate.

Results

Trap Operations - The temporary trap and Facility were fished for 1,325.75 hours. The temporary trap was fished from December 3 to December 19, 2025 (weeks 49 to 51). The trap was dismantled on December 19 in anticipation of a high flow event in the canal

following heavy rains and elevated Sacramento River flows. The Facility was fished from March 18 to May 22, 2026 (weeks 12 to 21). Twice daily trap checks were initiated once the Facility started fishing. After trapping had started, the Facility was intermittently closed for repairs to the Waterman gate from March 19 to 23, and March 26 to April 9, 2026.

Environmental Conditions - Mean weekly flows in the KLRC during trapping operations ranged from -8 cfs (week 12) to 3,374 cfs (week 3). Mean weekly water temperatures ranged from 8.9°C (week 50) to 22 °C (week 20). Mean weekly dissolved oxygen levels ranged from 2.4 milligrams per liter (week 20) to 7.3 milligrams per liter (week 50). Mean weekly turbidity ranged from 17.6 NTUs (week 20) to 44.7 NTUs (week 16). Weeks 49, 51, 52, and one through 15 were not counted for weekly turbidity and dissolved oxygen averages since measurements for those parameters were not taken each day for those weeks.

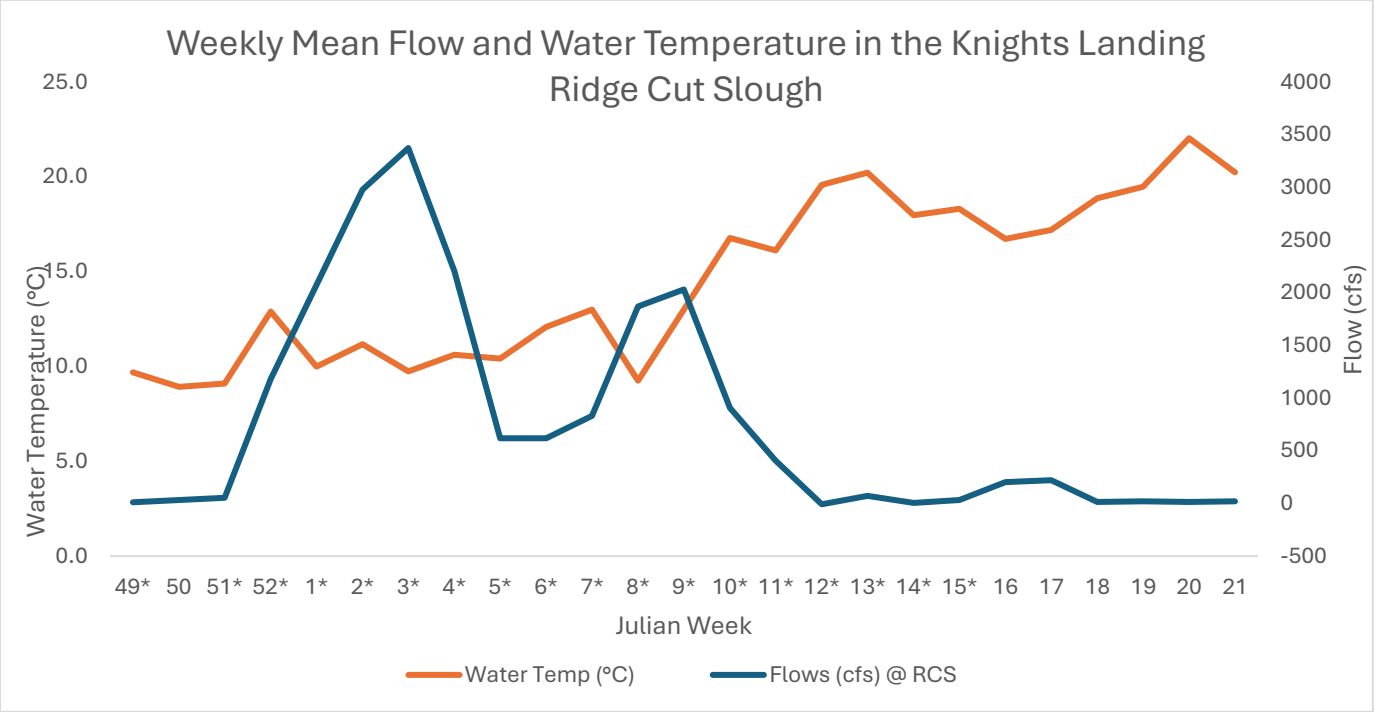


Figure 5. Mean weekly water temperatures (in degrees Celsius) and flow (in cubic feet per second) measured at the Wallace Weir Fish Collection Facility during the sampling season (Julian week). Water flow was reported by CDEC, Ridge Cut Slough (RCS) gauge in cubic feet per second.

Table 1. Weekly average turbidity, dissolved oxygen, flow in the KLRC, and water temperature, measured at the Facility. An asterisk indicates weeks where water quality measurements were not taken each day of that week for at least one of the parameters.

Julian Week	Flows (cfs) @ RCS	Water Temp (°C)	Turbidity	DO
49*	11	9.7	N/A	N/A
50	33	8.9	30.4	7.3
51*	54	9.1	N/A	N/A
52*	1181	12.9	N/A	N/A
1*	2072	10.0	N/A	N/A
2*	2980	11.2	N/A	N/A
3*	3374	9.7	N/A	N/A
4*	2203	10.6	N/A	N/A
5*	619	10.4	N/A	N/A
6*	620	12.1	N/A	N/A
7*	832	13.0	N/A	N/A
8*	1871	9.3	N/A	N/A
9*	2031	13.0	N/A	N/A
10*	907	16.8	N/A	N/A
11*	407	16.1	N/A	N/A
12*	-8	19.6	N/A	N/A
13*	71	20.2	N/A	N/A
14*	6	18.0	40.6	3.1
15*	32	18.3	23.3	2.9
16	203	16.7	44.7	5.2
17	222	17.2	31.1	4.9
18	14	18.9	22.3	3.8
19	21	19.5	19.5	2.6
20	16	22.0	17.6	2.4
21	21	20.2	27.4	3.4

Table 2. Total catch of all fish species at the Wallace Weir fish collection Facility for the 2025/2026 season. *California native fish species.

Common Name	***Scientific Name***	**Number Caught at WW**
Black Crappie	*Pomoxis nigromaculatus*	1
Brown Bullhead	*Ameiurus nebulosus*	6
*Chinook salmon	*Oncorhynchus tshawytscha*	42
Common Carp	*Cyprinus carpio*	209
Goldfish	*Carassius auratus*	1
Largemouth Bass	*Micropterus salmoides*	14
Mirror Carp	*Cyprinus carpio carpio*	3
*Sacramento sucker	*Catostomus occidentalis*	4
Smallmouth Bass	*Micropterus dolomieu*	3
Striped bass	*Morone saxatilis*	28
Threadfin Shad	*Dorosoma petenense*	8
Warmouth	*Lepomis gulosus*	4
White Catfish	*Ameiurus catus*	1
White Crappie	*Pomoxis annularis*	2

Picket weir fish – During the 2025/2026 trapping season, 147 fish were observed on the upstream side of the picket weirs of the WCS. The WCS was operated from December 22, 2025 to May 16, 2026. While the WCS passed flows, the picket weirs were flushed on a regular basis. The picket weirs were completely lowered on December 23 and 24, 2025, January 6 through 12, and March 2 and 3, 2026, as water was flowing over the top of the pickets in their fully raised position and debris loads were high. These flows over the pickets were due to both elevated CBDC flows and an overtopping event at Fremont Weir. The total count of confirmed fish species observed on the pickets was 11, four of which were native. One adipose intact adult Chinook Salmon was recovered from the upstream side of picket weir 2A on March 31, 2026. This fish was measured and a fin clip was taken for genetic analysis and run designation.

Table 3. Approximate counts of fish observed entrained on the upstream side of the picket weirs of the water control structure during the 2025/2026 season. *California native species.

Common Name	***Scientific Name***	**Number Caught at WW**
Black crappie	*Pomoxis nigromaculatus*	1
Bluegill	*Lepomis macrochirus*	1
Brown bullhead	*Ameiurus nebulosus*	3
*Chinook salmon	*Oncorhynchus tshawytscha*	1
Common Carp	*Cyprinus carpio*	44
Largemouth Bass	*Micropterus salmoides*	1
*Sacramento Blackfish	*Orthodon microlepidotus*	1
*Sacramento Splittail	*Pogonichthys macrolepidotus*	1
*Sacramento sucker	*Catostomus occidentalis*	91
Warmouth	*Lepomis gulosus*	1
White Catfish	*Ameiurus catus*	2

Table 4. Salmonid mortalities recovered from the upstream side of the picket weirs of the water control structure.

Date	Picket Weir*	Species	Fork length (cm)	Ad clip? (Y/N)	Sex (M/F/U)	Mortality (Y/N)	Comments
3/31/2026	2A	Chinook Salmon	94	No	Female	Yes	Discovered dead in bay 2A of water control structure, between pickets and Obermeyer dam, collected @ 10:00 AM.

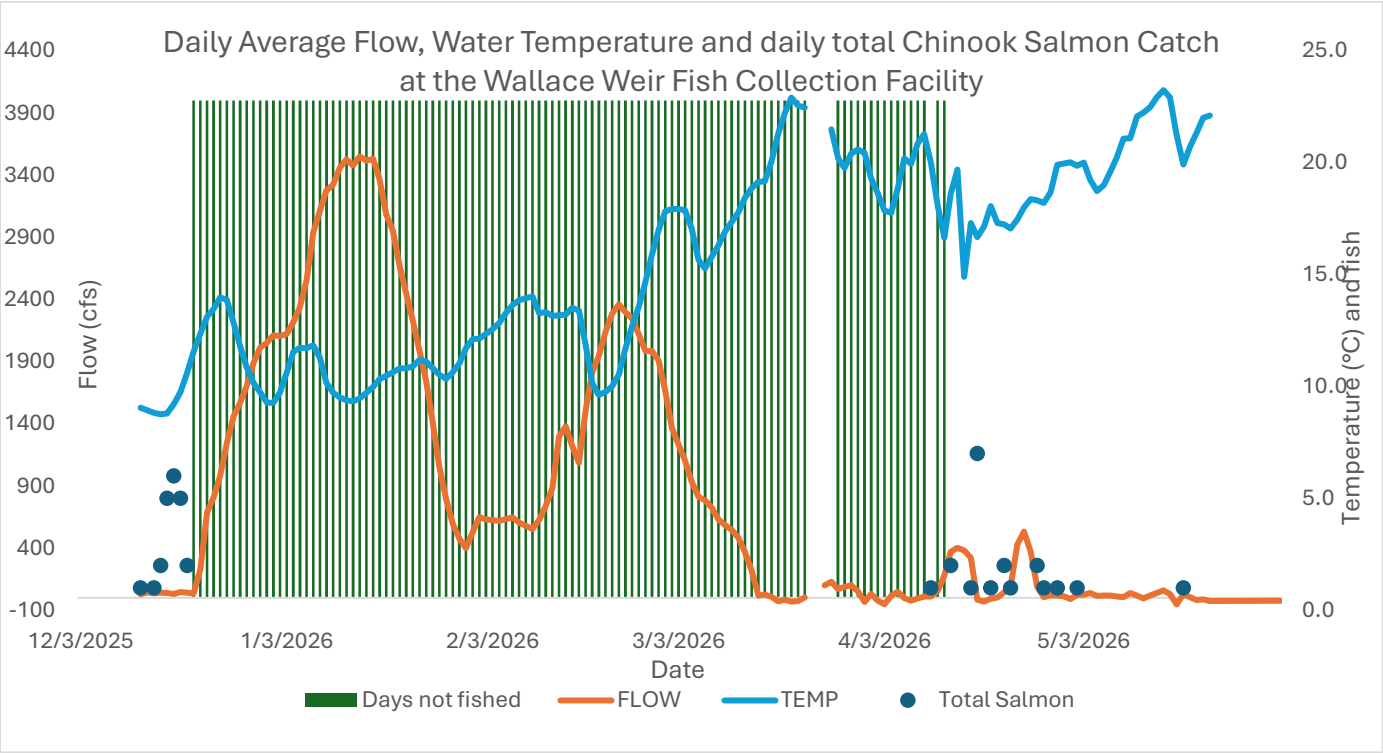


Figure 6. Daily total Chinook Salmon catch for trapping below Wallace Weir and daily average water temperatures and flows recorded on CDEC on the Ridge Cut Slough at Knights Landing gauge for water year 2025-2026. River flows reported by CDEC, Ridge Cut Slough at Knights Landing (RCS) and reported in cubic feet per second (cfs).

Salmonids – A total of 22 live Chinook Salmon were captured in the temporary trap between December 3 and 19, 2025, while 21 were captured in the Facility between March 19 and May 22. An additional 31 mortalities were found downstream of the Facility during the 2025/2026 season, 27 of which were sampled for genetics. Most of the downstream mortalities (n=29) were found between November 24 and December 5, 2025. The other two mortalities were recovered on May 15 and June 1, 2026. Of the downstream mortalities recovered in November and December, five were adipose fin clipped, four of which had CWTs successfully extracted and read indicating these fish were Fall-run from Mokelumne River Hatchery.

Table 5. Total catch of live and dead adipose fin intact, clipped and unknown status Chinook Salmon in the Facility and trap between December 2025 and May 2026. Mortalities include fish sacrificed for CWT extraction. This table does not include downstream mortalities or Chinook Salmon recovered from the picket weirs.

	Chinook Salmon Total	**Chinook Salmon (Adipose Fin Intact)**	**Chinook Salmon (Adipose Fin Clipped)**
Alive	**43**	33	10
Mortalities	**0**	0	0
Grand Total	**43**	**33**	**10**

Table 6. Catch per Julian week of Chinook Salmon and mortalities at the trap based on adipose fin clip status.

Julian Week	Chinook Salmon (Ad +)	Chinook Salmon (Ad +) MORT	Chinook Salmon (Ad -)	Chinook Salmon (Ad - Sac)	Chinook Salmon (Ad -) MORT	Chinook Salmon (Ad ?)	Chinook Salmon (Ad ?) MORT	Total
42	0	0	0	0	0	0	0	0
43	0	0	0	0	0	0	0	0
44	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0
46	0	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0	0
50	1	0	1	0	0	0	0	2
51	14	0	6	0	0	0	0	20
52	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0
15	0	0	1	0	0	0	0	1
16	9	0	2	0	0	0	0	11
17	5	0	0	0	0	0	0	5
18	3	0	0	0	0	0	0	3
19	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0
21	1	0	0	0	0	0	0	1

Table 7. Chinook Salmon carcasses found downstream of the Facility during the 2025-2026 season. *Chinook Salmon partially predated upon.

Date	Species	Fork length (cm)	Ad clip? (Y/N)	Sex (M/F/U)
11/24/2025	Chinook Salmon	95	Yes	Male
11/24/2025	Chinook Salmon	76	Yes	Male
11/24/2025	Chinook Salmon	75	Yes	Female
11/25/2025	*Chinook Salmon	N/A	No	Unknown
11/25/2025	Chinook Salmon	66	No	Male
11/25/2025	Chinook Salmon	86	No	Male
11/25/2025	Chinook Salmon	86	No	Male
11/25/2025	Chinook Salmon	91.5	No	Male
11/25/2025	*Chinook Salmon	N/A	No	Male
11/25/2025	Chinook Salmon	76	No	Female
11/25/2025	Chinook Salmon	68.5	No	Male
11/25/2025	Chinook Salmon	75	No	Female
11/25/2025	Chinook Salmon	79	No	Male
11/25/2025	Chinook Salmon	81	No	Female
11/25/2025	*Chinook Salmon	~81	No	Female
11/25/2025	*Chinook Salmon	N/A	No	Male
12/1/2025	Chinook Salmon	73.5	No	Male
12/1/2025	Chinook Salmon	80	No	Male
12/1/2025	Chinook Salmon	84	No	Female
12/1/2025	Chinook Salmon	84	No	Female
12/1/2025	Chinook Salmon	65	Yes	Male
12/1/2025	Chinook Salmon	76	No	Male
12/1/2025	Chinook Salmon	72.5	No	Male
12/1/2025	Chinook Salmon	75	No	Female
12/1/2025	Chinook Salmon	68.5	Yes	Male
12/1/2025	Chinook Salmon	67.5	No	Male
12/2/2025	Chinook Salmon	84	No	Male
12/4/2025	Chinook Salmon	85	No	Male
12/5/2025	Chinook Salmon	65.5	No	Male
5/15/2026	Chinook Salmon	79	No	Female
6/1/2026	*Chinook Salmon	N/A	Unknown	Unknown

Table 8. Coded Wire Tag (CWT) information from sacrificed Chinook Salmon, mortalities found in the Facility, on the upstream side of the picket weir of the WCS and downstream of the Facility. *Sacrifice, **In Facility mortality, ***Picket Weir mortality, ****Downstream mortality.

CWT #	Capture date	Hatchery of Origin	Run	Brood year	Release year
061280	11/24/2025	Mokelumne River Hat.	Fall	2021	2022
063006	11/24/2025	Mokelumne River Hat.	Fall	2022	2023
063006	11/24/2025	Mokelumne River Hat.	Fall	2022	2023
061840	12/1/2025	Mokelumne River Hat.	Fall	2023	2024

Post release recoveries – As of drafting this report, no post release recoveries have been reported.

Genetics – Fin clips from the upper caudal lobe were taken from all Chinook Salmon, captured at the trap and recovered downstream, for genetic analysis. As of drafting this report, results from samples taken in December show 31 Fall-run and 17 that yielded no result. The samples with no results were taken from carcasses recovered downstream of the Facility, many of which were highly degraded when collected. Results of genetic analysis from samples taken between March and May are still pending as of drafting this report.

Table 9. Summary of run-assignments based on genetic analysis of Chinook Salmon encountered at and below the Facility.

Run	Number of fish
Fall	31
Late Fall	???
Winter	???
Spring	???
No Result	17

Based on the CWT readings from the downstream mortalities, four of the five adipose fin clipped Chinook Salmon were of Mokelumne River Hatchery Fall-run origin (Table 9). Due to advanced maturity of the other carcasses found along with the adipose fin clipped fish, it is likely that the other mortalities were of the same origin.

RAMP Scores – A total of 42 Chinook Salmon captured at the trap were evaluated for a RAMP score. The most frequently observed RAMP score was zero (Table 10). Body flex was the most impacted reflex among tested individuals (Table 11). In the month of December, RAMP scores varied between zero and four, with zero being the most common, three and four the least. Between April and May, scores varied between zero and three, with zero the most common, one and three being the least (Table 12).

Table 10. Total count of Reflex Action Mortality Predictor (RAMP) scores of Chinook Salmon caught at the Facility.

Total RAMP Score	Number of Fish
0	19
1	10
2	8
3	3
4	1
5	0

Table 11. Total number of times each reflex was scored during a RAMP test.

Tail Grab	Body Flex	VOR	Head Complex	Orientation
14	16	0	1	8

Table 12. Percentage of each RAMP score during the December and April/May capture periods.

	RAMP Scores					
Month Range	0	1	2	3	4	5
December	0.35	0.33	0.19	0.05	0.05	0.00
April/May	0.57	0.10	0.24	0.10	0.00	0.00

Discussion

Mechanical issues continue to be an issue with the Facility. The start of the season was delayed and trapping methods altered due to failure of the Waterman gate, which regulates flow into the Facility. High flows forced a break in temporary trapping operations mid-season. The picket weirs in the WCS were lowered completely for several days this season due to high flows, likely allowing for fish passage past Wallace Weir. Both the Waterman gate and mid-season flooding left large gaps in the sampling effort for the 2025/2026 trapping season. Along with the large gaps in sampling came a large decrease in Chinook Salmon catch, with only 42 live individuals between the temporary trap and Facility. Chinook Salmon were captured in the Facility almost immediately after operations started in April, indicating that fish likely had been present in the area well before trapping resumed. Intensive troubleshooting of the Waterman gate has led to helpful insights that will hopefully lead to a long-term fix of the structure, ensuring consistent operation. Although this trapping season was much shorter than previous seasons, other factors may have played a role in the reduced salmonid catch, such as in-river conditions as well as pulse flows or high flows from other areas of the Bypass, such as Cache or Putah Creek.

During the Fall of 2025, trapping operations were set to begin at the Facility, only to find that the holding pool would not fill to the appropriate level for working up fish. The holding pool is usually filled nearly to the surface before fish are crowded up to be netted out and worked up. With the leak in the Waterman gate, the holding pool could only fill to approximately five feet below the surface, which would be unsafe for staff to net fish out. The first attempt at troubleshooting this issue was to use a trailer mounted trash pump to overcome the leak. The pump has a rate of 1,000 gallons per minute but could not keep up with the leak. This pump, in combination with several other gas powered and electric pumps, could not keep up with the leak. After the pumping attempt failed, the waterman gate was closed as much as possible, and a metal plate was placed on the upstream side of the hole leading to the Waterman gate. This temporarily blocked flows and allowed for the intake pool to be partially dewatered. This in turn enabled a closer examination of the Waterman gate leak. Upon inspection, two main issues were found: the cover for the Waterman gate was missing parts, and material from the sides of the cover was worn down. The missing parts included an arch and wedges. The arch is a metal bar that sits across the face of the Waterman gate cover and is tapered on either end. The tapered ends fit into spaces between the Waterman gate frame and the wedges, which help press the cover against the hole in the wall, providing a water-tight seal. The sides of the gate cover have grooves that the frame of the Waterman gate fit into. This helps hold the cover onto the frame and allows the cover to slide up and down. The material around the grooves of the cover were worn down enough so that the cover would slip off the frame when enough pressure was applied. The greater head pressure came from the upstream

side of the Waterman gate, which would push on the backside of the cover, keeping it from properly sealing against the intake hole. When water was pumped into the holding pool, this gap between the gate cover and the hole would allow for water to leak out through the intake and into the canal. After the cause of the leak was figured out, a new arch and wedges were purchased. Installation of the new parts was delayed due to elevated canal flows and Fremont Weir overtopping. After flows subsided, the gate cover was removed for parts installation and adding material around the grooves to improve adherence to the frame. Once the new parts were installed and material was added around the grooves, the cover was reinstalled onto the frame. This took several attempts before the gate would properly seal because the arch and wedges needed to be adjusted to fit together properly under pressure. Although a new arch and wedges were installed, and more material was added to the gate cover, the entire frame of the structure was noticeably warped in several places, and prolonged use will likely lead to future leakage and failure of the gate. A new Waterman gate assembly, including the frame, cover, arch and wedges were purchased. Installing a new gate will help extend the operational life of the intake. After some consultation with other users and manufacturers of Waterman gates, it was also suggested that the gate be installed on the opposite side of the wall, so that the outside of the gate cover faces upstream, towards the direction the flow comes from. This would ensure that the gate is mostly handling "seating pressure", which pushes against the face of the gate cover, helping to seat it against the hole when closed (McWane 2021).

While the Facility was inoperable due to the leaking Waterman gate and before the temporary trap was installed downstream, an early season rain event raised canal flows high enough for the WCS to pass flow. This pulse of water attracted fish into the bypass where they soon perished. These fish likely died due to a combination of factors, including low dissolved oxygen levels and timing. After flows subsided, dissolved oxygen in the canal was as low as 4.6 mg/L, which is well below minimum thresholds for Chinook Salmon (Richter and Kolmes, 2005). Although live Chinook Salmon have been observed in worse conditions at or near the Facility, these fish arrived later in the Fall-run migration period (Yoshiyama, et al., 1998), and were likely more advanced in their development, and more susceptible to poor environmental conditions.

Many of the genetic samples collected from the mortalities observed in late November/early December did not yield any results from the analysis. Many of the samples collected were from individuals that had been partially predated upon and somewhat degraded, leaving poor material to work with for analysis. Though some of these fish remain unidentified to race, they were likely all Fall-run based on their darker coloration, loss of scales and skin, rotting of fins and hooked jaws. There were also five adipose fin clipped mortalities of the 29 found between November and December, four of which were Mokelumne River Hatchery Fall-run. It is likely that with this proportion of clipped and unclipped mortalities found downstream that many of the unclipped fish were

also of the same origin, as the constant fractional marking rates for Central Valley Hatchery Fall-run are 25 percent.

Results from the genetic analysis of the fish captured in April and May are still pending, but based on the later timing, these fish are likely winter or spring-run (Yoshiyama, et al., 1998). This would also align with observations at the facility from the last two trapping seasons (Kubo, 2025 & Kubo, 2026).

No post release recoveries of Floy tags or detections of PIT tags have been reported as of drafting this report. A total of 42 Chinook Salmon were Floy tagged, 37 of which were also PIT tagged. Compared to previous seasons, this is a much smaller group of tagged individuals released. In most seasons, post release recoveries of fall-run are typically reported before the new year, as most of the fall-run in the Central Valley have spawned by that point.

A higher proportion of fish captured in April and May had a RAMP score of zero compared to fish captured in December. Although environmental conditions were more favorable for Salmon in December, many of the fish captured at that time were arriving later into their spawning migration window and were more advanced in their sexual maturity. These December fish had likely spent much more of their energy reserves and are less likely to have survived post release compared to the fresher fish captured in April and May.

During high flow events between December and March, there were ample opportunities for fish passage through Wallace Weir and into the Colusa Basin Drain. The picket weirs in the WCS had to be flushed more frequently and lowered completely due to high debris loading. An unusually large amount of aquatic primrose was seen in the KLRC, which required heavy equipment to remove from the picket weirs. The increased passage opportunities due to the heavy debris loading may have been a factor in why so few Chinook Salmon were observed in the Facility after flows subsided, compared to previous seasons. The operations of the picket weirs have their limits on what can be flushed. Longer term solutions may be to mechanically or chemically manage upstream vegetation during dry periods.

A sea lion was observed immediately downstream of Wallace Weir from February 24 to February 27. During this time, flows in the KLRC were high and the picket weirs in the WCS were fully raised up to block fish passage. With the high flows and sea lion present, it is likely that there were a large number of fish just downstream of the weir. The picket weirs were dropped sometime between February 27 and March 2, at which point, the sea lion was no longer observed downstream of the weir. It is likely that with the pickets dropped, fish migrated past the weir and the sea lion followed them up. It may have also dropped back downstream with the fish no longer being concentrated around the weir.

The Chinook Salmon catch was much lower than previous seasons, especially compared to the previous two seasons, for both the fall/winter and spring periods. With the Facility

inoperable and a temporary trap installed downstream, less flow was passed through the Facility, providing less attracting flow for Salmonids. Concurrently, pulse flows were occurring in Putah Creek for adult fall-run migration. The lower-than-normal flows from the Facility and pulse flows from Putah Creek are likely factors to explain why catch was lower during the fall/winter period. High canal flows in the late winter and early spring, frequent picket weir flushing, and complete picket weir lowering, allowed for more passage opportunities for fish. The presence of a sea lion downstream of the weir likely drove fish away from the weir, either upstream or downstream. Although having the Facility operational prior to the high flow events would have likely led to higher catch, there would have been fewer fish caught in the Facility during the high flow events, regardless of operations. The WCS can pass up to 4,000 cfs, while the Facility has a maximum of 50 cfs, providing much less attraction to the Facility when the WCS is active.

While catch was significantly lower for adult fall and winter-run than previous seasons, in-river escapement in the Central Valley was the highest recorded in the last decade for fall-run and the highest in two decades for winter-run (Azat and Killam, 2026). The overall number of returning adults in the Central Valley did not seem to be a factor in the low catch this season at the Facility.

The issues with the Waterman gate highlighted the need for further improvements and repairs needed to keep the Facility operational. Running a temporary trap is a viable alternative while the Facility undergoes repairs or improvements, but has flow limitations, which is one of the reasons why the Facility exists in the first place. While base flows in the KLRC combined with tidal influence in the Cache Slough Complex can still attract fish into the system, elevated flows during the winter and early spring tend to increase the amount of adult fish straying into the Bypass. Though catch of Chinook Salmon at the Facility was greatly reduced this season compared to the two prior years, there were other areas that fish likely strayed into, including Putah Creek, and upstream of Wallace Weir when the pickets were dropped. With the relatively small number of tagged fish released from the Facility, it is difficult to gauge the success of salvage operations from the Facility and what impact there is on fish.

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References

Azat, J. and Killam, D. 2025. GrandTab 2025.06.09 California Central Valley Chinook Salmon Escapement Database Report. California Department of Fish and Wildlife. Available from https://www.calfish.org/ProgramsData/Species/CDFWAnadromousResourceAssessment.aspx

California Department of Fish and Wildlife (CDFW). Winter-run Chinook Salmon Escapement Estimates for 2025. November 18, 2025.

California Department of Water Resources (CDWR) Data Exchange Center, Ridge Cut Slough at Knights Landing. 2023. https://cdec.water.ca.gov/dynamicapp/QueryF?s=rcs

Davis, M.W. 2010. Fish stress and mortality can be predicted using reflex impairment. Fish and Fisheries 11: 1-11.

Gahan, G., M. Healey, C. McKibbbin, H. Kubo and C. Purdy. Colusa Basin Drain and Wallace Weir Fish Trapping and Relocation Efforts. California Department of Fish and Wildlife; 1/23/2017.

Kubo, H.S. Wallace Weir Fish Trapping and Relocation Efforts 2023-2024. California Department of Fish and Wildlife Region 2; 8/21/2025.

Kubo, H.S. Wallace Weir Fish Trapping and Relocation Efforts 2024-2025. California Department of Fish and Wildlife Region 2; 2/4/2026.

McWane MPI. 2021. C-20 cast iron canal gate brochure. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://mcwanepi.com/upl/downloads/catalog/products/mpi/documents/c-20-cast-iron-canal-gate-brochure.pdf

Quinn, T.P. (1984). Homing and Straying in Pacific Salmon. In: McCleave, J.D., Arnold, G.P., Dodson, J.J., Neill, W.H. (eds) Mechanisms of Migration in Fishers. NATO Conference Series, vol 14. Springer, Boston, MA. http://doi.org/10.1007/978-1-4613-2763-9_21

Richter, A., and S.A. Kolmes, 2005. Maximum Temperature Limits for Chinook, Coho, and Chum Salmon, and Steelhead Trout in the Pacific Northwest. Reviews in Fisheries Science 13:23-49.

Yoshiyama, R.M., Fisher F.W., and Moyle, P.B. 1998. Historical abundance and decline of Chinook salmon in the Central Valley region of California. North American Journal of Fish Management 18: 487-521.