Technical Report

San Joaquin River Restoration Program Steelhead Monitoring Plan Report 2024–25

Prepared by:

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EXECUTIVE SUMMARY

San Joaquin River (SJR) Basin Central Valley (CV) steelhead (*Oncorhynchus mykiss*) have been in decline in recent decades, due, in part, to impassable barriers developed in the early–mid twentieth century (McEwan 2001). Instream barriers have contributed to the reported extirpation of CV steelhead upstream of the SJR–Merced River confluence (i.e., the San Joaquin River Restoration Program [SJRRP] Restoration Area [RA]). In accordance with the 2012 SJRRP Record of Decision and National Marine Fisheries Service (NMFS) Biological Opinion (2011/05814:ELS), the U.S. Bureau of Reclamation (Reclamation) annually monitors for presence of CV steelhead in the RA when Restoration Flows are being released. This is of particular importance, as recently restored Restoration Flows, reconnecting historically desiccated river sections, could attract adult CV steelhead into the RA. Adult steelhead accessing the RA could be exposed to inadequate habitat in sloughs and would not have access to appropriate spawning habitat due to multiple impassable in–river barriers. In 2024-25, Reclamation completed the 12th year of implementing the SJRRP Steelhead Monitoring Plan (SMP). A combination of fyke netting/trapping, trammel netting, and raft electrofishing were completed for approximately two weeks monthly December 2024 through March 2025 in Reaches 4 and 5 of the RA. For the 12th monitoring effort (2012–2014 & 2017–2025) since the inception of the SMP, no steelhead were detected. During the 2024–25 SJRRP SMP monitoring activities, 894 fish representing 19 species including four native species (37.0 percent of total individuals captured) were captured. Continued monitoring of potential steelhead immigration in the RA is important to provide information regarding the status of the CV steelhead Distinct Population Segment (DPS), as well as to assess fish assemblages in the RA, an important metric to evaluate SJRRP progress.

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1.0 Introduction

In 1988, a coalition of environmental groups, led by the Natural Resources Defense Council (NRDC), filed a lawsuit challenging the renewal of long–term water service contracts between the United States and the Central Valley Project Friant Division Long–Term Contractors known as *NRDC*, *et al. v Kirk Rodgers, et al.* In 2006, a settlement was reached (NRDC 2006), and in response, the San Joaquin River Restoration Program (SJRRP) was established, followed successively by a SJRRP Fisheries Management Plan which provides guidance for implementing fisheries activities to achieve the Settlement. During Endangered Species Act (ESA) consultation with the National Marine Fisheries Service (NMFS), the U.S. Bureau of Reclamation (Reclamation) determined that implementing the SJRRP would not affect Central Valley (CV) steelhead (*Oncorhynchus mykiss*) populations, as they were extirpated from the SJRRP Restoration Area (RA) (confluence of the San Joaquin River (SJR) and Merced River to Friant Dam) following construction of Friant Dam. Thus, Reclamation did not request ESA consultation on effects to CV steelhead but proposed to implement a CV Steelhead Monitoring Plan (SMP) to determine whether CV steelhead were using the RA, with the caveat that if steelhead were detected, then Reclamation would reinitiate ESA consultation. The SMP is implemented in accordance with the SJRRP Record of Decision (ROD; Reclamation 2012), NMFS Biological Opinion (BO, NMFS 2012), and NMFS ESA Section 10(a)(1)(A) Enhancement Permit 16608-3R (NMFS 2022).

1.1 Central Valley Steelhead

The CV steelhead Distinct Population Segment (DPS) is protected under the ESA; 63 FR 13347 (NMFS 1998) 61 FR 4722 (NMFS 2005), and includes naturally spawning populations, and their progeny, in the Sacramento River, SJR, and their tributaries; including those that drain the western slopes of the Sierra Nevada Mountains (*i.e.,* Mokelumne, Calaveras, Stanislaus, Tuolumne, Merced, Chowchilla, Fresno, Kings, Kaweah, and Kern Rivers, upper SJR, and Caliente Creek; NMFS 2005). According to Eilers *et al*. (2010), CV steelhead are currently extirpated from all waters upstream of the Merced–SJR confluence. In 2024 NMFS completed a 5–year CV steelhead DPS status review and recommended they remain classified as a threatened species under the ESA (NMFS 2024).

2.0 Methods

All activities described herein were implemented in accordance with ESA Section 10(a)(1)(A) Enhancement Permit 16608–3R.

2.1 Study Period and Area

The SJRRP RA is separated into five distinct reaches and includes the mainstem SJR from Friant Dam (Reach 1) downstream to the Merced River confluence (Reach 5). Sampling was restricted to Reaches 4–5, from the Eastside Bypass Control Structure (EBCS) downstream to the Merced River confluence, including adjoining sloughs, Mud and Salt Sloughs (Figure 1).

San Joaquin River Restoration Program SMP activities were planned for December through April, the period when adult steelhead are expected to be immigrating up-river and into tributaries to initiate spawning. Restoration Flows were released into the RA in accordance with the Settlement, resulting in a connected river during 2024–25 SMP implementation. Restoration Flows were routed through the Eastside Bypass (ESBP) from the Sand Slough Control Structure to the confluence of Bear Creek and the SJR, providing conditions triggering SMP implementation.

Sampling was completed for approximately two weeks a month December–March. An adult spring-run Chinook Salmon (*Oncorhynchus tshawytscha*) was captured during SMP implementation on March 28, 2025, which marked the end of SMP implementation for 2024–25, and the immediate transition to adult Spring-Run Chinook Salmon trap and haul activities permitted under NMFS ESA Section 10(a)(1)(A) Scientific Research and Enhancement Permit 20571-2R. Site–specific passage criteria at common in river impediments to adult salmonid passage (i.e., Kelley Weir, ESBP Control Structure, etc.) in the SJRRP are available (California Passage Assessment Database 2021), but they are not fully vetted. Therefore, flows and depths at which passage may occur was estimated based on field crews' experience and best judgement. The ESBP Control Structure was deemed the most accessible upstream location to immigrating adult salmonids throughout the majority of the SMP season (December – February). Therefore, all gear was fished downstream of this location. Elevated flows mid- through late-March resulted in conditions likely suitable for adult salmonid passage at the EBCS. Due to challenges associated with transitioning larger fyke traps between monitoring locations and uncertainty regarding duration of elevated flows, immediate actions were not taken to sample at the next most likely upstream passage impediment at Sack Dam (Reach 3). However, intermittent visual inspections (March 26 – April 19, 2025) were completed, and adult spring-run Chinook Salmon fyke net (April 3 – April 7, 2024) and fyke trap monitoring (April 24 – May 1, 2025) resulted in no adult steelhead observed or captured at Sack Dam.

2.2 Fish Capture and Processing Methods

Given the frequently turbid environment in the lower reaches (4–5) of the SJRRP RA, methods commonly employed (i.e., snorkel and redd surveys) to monitor for immigrating adult salmonids are not suitable. Therefore, a multiple method sampling regime, including fyke netting, fyke trapping, trammel netting and electrofishing, was designed

and used to actively and passively monitor for steelhead in various habitat types on the SJR.

2.2.1 Fyke Netting/Trapping

Fyke nets are a passive fish sampling gear capable of spanning the full river width, and are therefore, an efficient and effective tool to capture upstream moving adult fish. Steelhead monitoring fyke nets were constructed of 2.4–cm square #252 knotless nylon netting formed over 5 consecutive 1.2–m hoops and a 1.2–m square welded–conduit frame entrance. The nets contained two throats with a 25–cm diameter opening. Wing walls, attached to the sides of the net opening, were 1.2 m deep and spanned the majority of the river's width (leaving boat passage). The opening of the net faced downstream with the wing walls extending to shore in a v–shaped pattern and were held in place with t–posts.

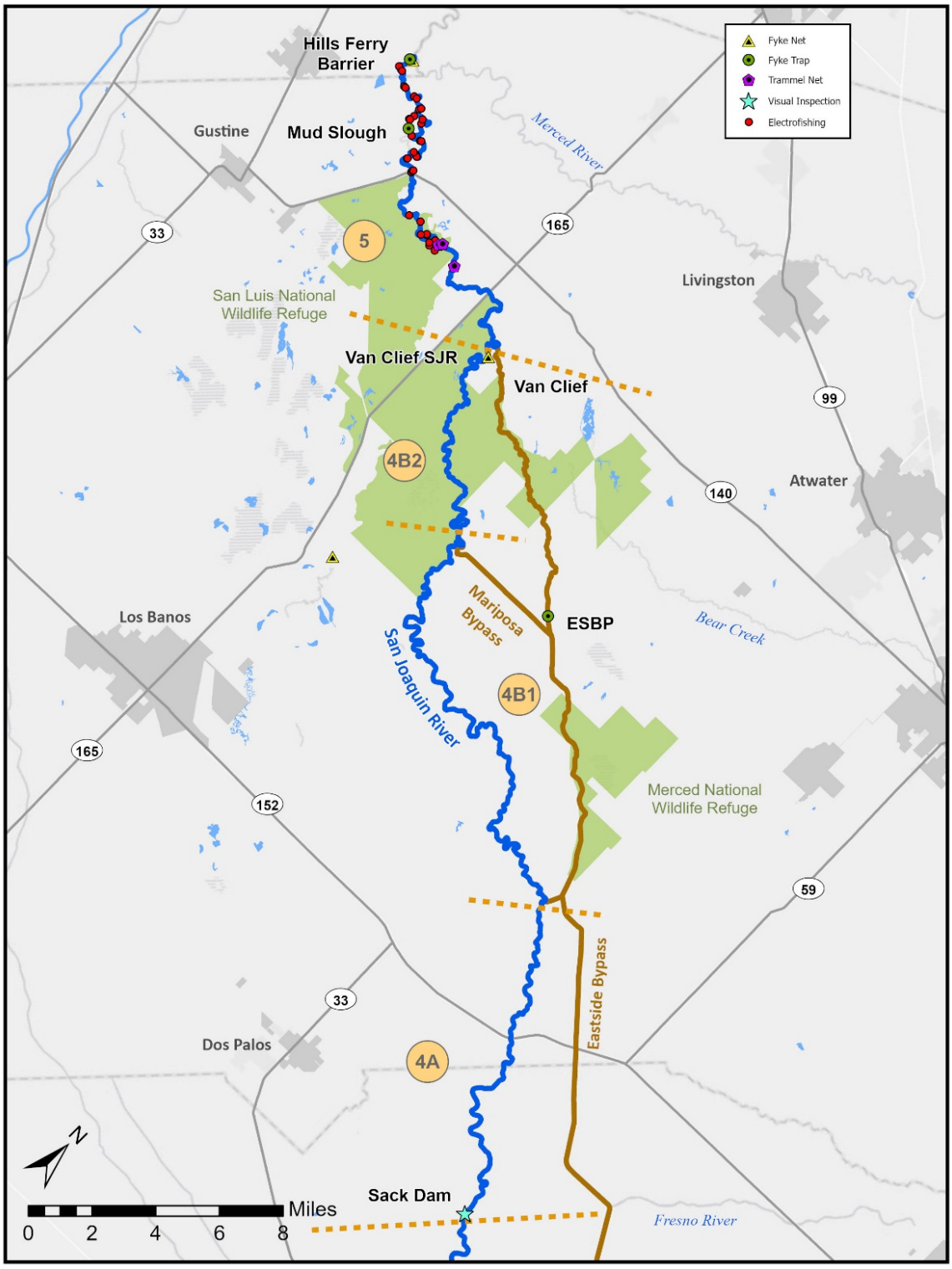

Figure 1. Map of Reach 4–5 of the San Joaquin River Restoration Program's Restoration Area (reaches and sub-reaches defined by light orange circles and dashed lines). Electrofishing locations are represented by the upstream end of each transect. The 2024–25 Steelhead Monitoring Plan efforts were constrained to Reach 4–5.

Fyke traps are similar in design as fyke nets, but do not have wing walls and their construction allows them to be fished at higher river stage and elevated flows, compared to fyke nets (Figure 2). Fyke traps have a larger opening (2.4–m or 3–m) and are constructed of 5.0–cm chain link formed over 6 consecutive 3.0–m hoops. The traps contain two throats with smaller openings of 60–cm. Traps were placed in natural riverine bottlenecks with a minimum depth of 1.5–m. The mouth of the trap faced downstream, and the trap was anchored utilizing t–posts and other readily available anchor points.

Figure 2. Fish being netted out of a fyke trap located in the Eastside Bypass during 2024-25 San Joaquin River Restoration Program's Steelhead Monitoring Plan.

During 2024–25 SMP sampling, fykes (inclusive of both fyke nets and fyke traps) were deployed in six locations: approximately 0.2 river miles upstream of the SJR and Merced River confluence (Hills Ferry; ~ RM 116.2), Mud Slough (~ RM 119.1), Salt Slough (~RM 126.9), Van Clief (~ RM 134), Van Clief San Joaquin River (~ RM 134.6), ESBP (~ RM 140; Figure 1). Fykes were fished continuously during each monthly sampling period and were checked at least once daily to reduce the likelihood of compromising fish health. All captured fish were removed, transferred to a trough filled with on–site SJR water, identified to species, measured for length (total and fork length), and released upstream of the sampling location to minimize likelihood of recapture. In cooperation with FISHBIO, common piscivores (Striped Bass [*Morone saxatilis*], Black Bass

[*Micropterus spp.*], Channel Catfish [*Ictalurus punctatus*], White Catfish [*Ameiurus catus*], and Bullhead Catfish species [*Ameiurus* spp.]) were opportunistically PIT tagged and released to support efforts to quantify piscivore populations, movements, and distribution throughout the SJR system (Montgomery et al. 2023; Lamb et al. 2024).

2.2.2 Electrofishing

Electrofishing is a common method used to monitor steelhead populations *(e.g.,* Mill and Deer creeks, and Feather, American, Mokelumne, Stanislaus, and Merced rivers), and was used during the 2024–25 SMP season to sample mainstem habitats largely inaccessible by other means (Temple and Pearsons 2007). A Smith–Root™ Apex Electrofisher (Smith–Root, Vancouver, WA; Figure 3) was used to electrofish the mainstem SJR thalweg and portions of adjacent sloughs while gradually traversing downstream (Figure 1; Appendix 1). This approach allowed efficient coverage of large expanses of river potentially traveled by immigrating steelhead. Voltage range, cyclic frequency and output (pulsed direct current) were determined based on local water conductivity and adjusted to maximize capture efficiency while minimizing electrical exposure. During electrofishing, captured fish were immediately transferred to an onboard livewell where they were maintained until each section was sampled. Fish were processed in the same manner as defined in the *Methods: 2.2.1 Fyke Netting* section. A sufficient distance (> 0.25 river miles [RM]) was given between shocking locations to minimize likelihood of resampling the same individuals at downstream locations (Figure 1).

Figure 3. Adult Striped Bass (*Morone saxatilis*) being released following capture using raft electrofisher during San Joaquin River Restoration Program's Steelhead Monitoring, Reach 5, San Joaquin River, CA.

2.2.3 Trammel Netting

Trammel nets were fished when river conditions did not allow sufficient sampling with fyke nets. This occurred on March 22, 2025, when a flow pulse necessitated removal of ESBP fyke traps, leaving only the Hills Ferry Barrier fyke trap in operation. To supplement monitoring, multiple trammel nets were fished on this day. Trammel nets ranged in size from 0.9-1.8 m tall and 11.4-30.5 m long and consisted of three parallel vertical layers of netting; the inner net has a smaller mesh size (small hole spacing to prevent steelhead from becoming gilled), while the outer nets have mesh size large enough for fish to pass. The larger and smaller mesh size nets form a pocket when fish try to swim through. A buoyant top line and weighted bottom line keep the trammel net oriented vertically in the water column. To minimize injury to fish, trammel nets were continuously monitored and set for periods not exceeding 2 hours. Captured fish were processed in the same manner as detailed in the *Methods: 2.2.1 Fyke Netting* section.

2.2.4 Steelhead Handling and Relocation

A requirement of NMFS 10(a)(1)(A) permit #16608–3R is to translocate any captured steelhead out of the RA due to insufficient spawning habitat and the possibility of irrigation canal entrainment. In the event steelhead were captured during monitoring activities, capture location and method would be documented, steelhead would be measured (FL/TL) and sexed (if possible), and tissue and scale samples would be collected. Steelhead would be checked for injuries and presence of identifying tags and photographed. If no external tags were present, fish would be provided an external spaghetti–type tag (Floy Tag & Mfg., Seattle, WA) and internally tagged with a Passive Integrated Transponder (PIT), each of which has a unique identification number for future identification if recaptured. Captured steelhead would be transported downstream in a 550–L transport tank and released outside of the RA near the SJR confluence with the Merced River.

3.0 Results

Daily water temperature and flow at Hills Ferry Barrier location is displayed in Figure 4. Monthly site–specific water quality data collected during sampling is reported in Appendix 2. In combination, all sampling methodologies resulted in monitoring spanning approximately 18.5 RM of the SJR, as well as adjacent sloughs (approximately 17.7 RM), totaling approximately 36.2 RM monitored (Figure 1). For the 12th year of SJRRP steelhead monitoring (2012–2014, 2017–2025), and since the inception of the SJRRP, no steelhead were detected. A Critical–Low Restoration Water Year type in 2015 and flood control releases in 2016–17 and 2022–23 negated the need for steelhead monitoring in all or parts of those years.

Across all sampling methods for the 2024–25 season, a total of 894 fish comprising 19 different species were captured (Figure 5). Non–native fishes comprised 63.0 % (n=563) of the total. Striped Bass (n = 105), Common Carp (*Cyprinus carpio;* n = 177)), and Spotted Bass (*Micropterus punctulatus*; n = 91) were the three most abundant non-native species captured, constituting 41.7 % of all fish captured. Four species of native fish were captured (n=331; 37.0 % of total): Chinook Salmon (n=118 [n=117 adult fall-run and n=1 juvenile spring-run], 13.2 %), Sacramento Sucker (*Catostomus occidentalis*, n = 145 [16.2 %]), Sacramento Splittail, n=21 [2.4 %]), and Sacramento Blackfish (*Orthodon microlepidotus*, n=47 [5.3 %]; Figure 5).

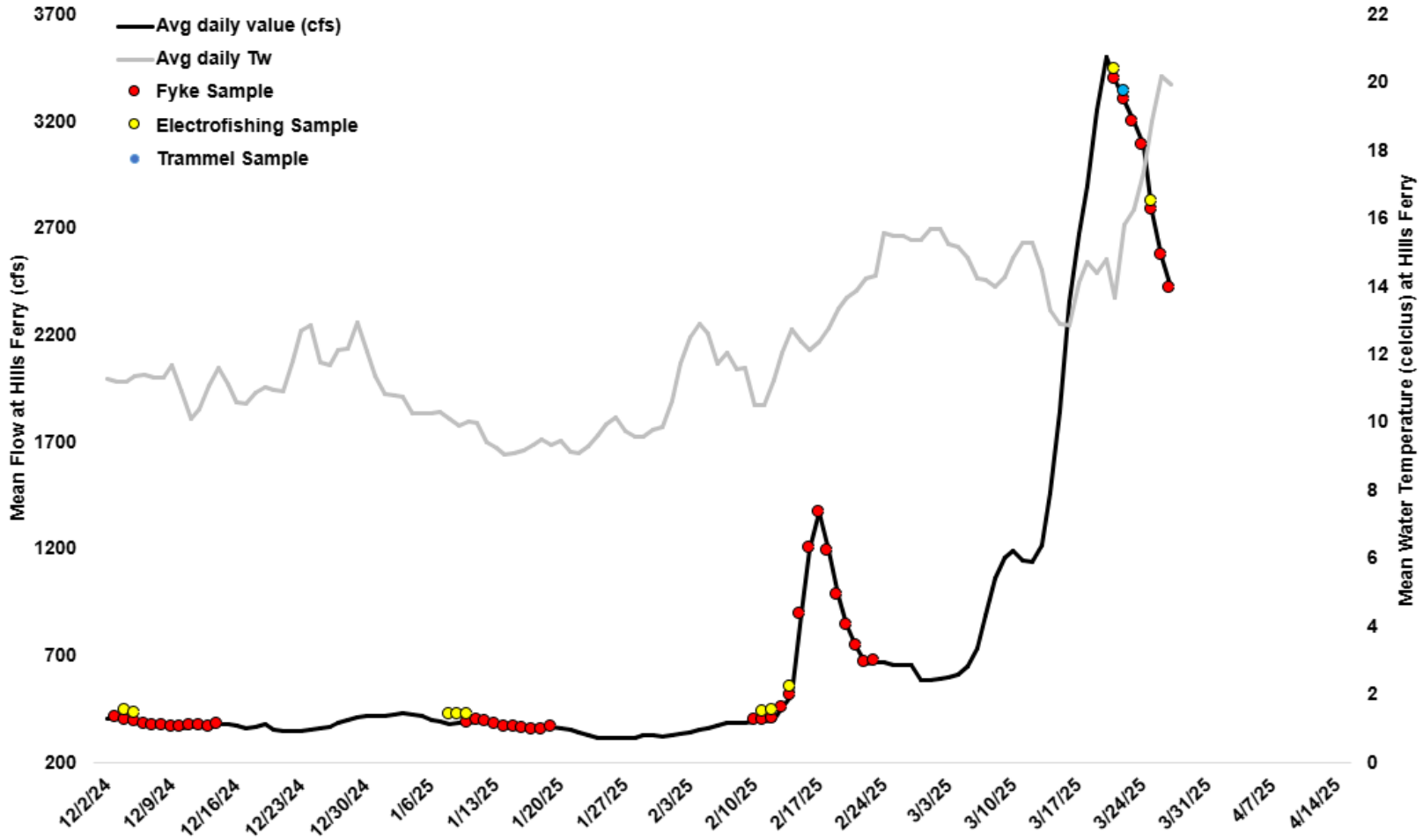

Figure 4. Mean daily water temperatures (°C) and flow (cfs) as reported at USGS gauge SJR Above Merced Near Newman (SMN). Steelhead Monitoring Plan sampling methods represented by red (fyke trapping), blue (trammel netting) and yellow (electrofishing) conducted in Reach 4-5, San Joaquin River, CA.

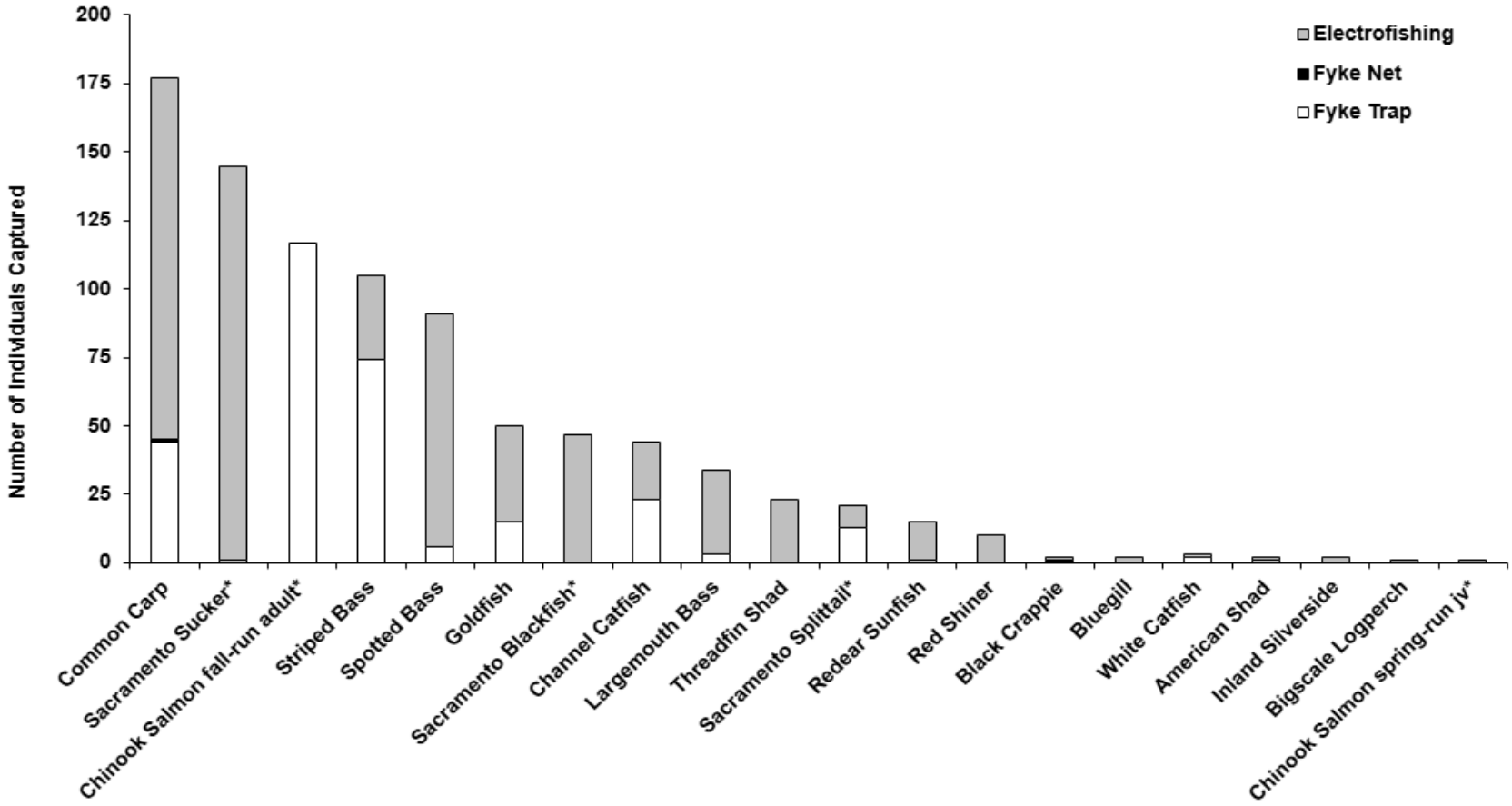

Figure 5. Fish captured (n=894) during 2024–25 Steelhead Monitoring Plan in the San Joaquin River Restoration Area. No Central Valley steelhead were captured. Native fish are identified with "*" and juveniles with "jv". Columns are stacked to show number of individuals captured by method. Chinook Salmon *(Oncorhynchus tshawytscha)* have also been segregated by run (spring & fall).

3.1 Fyke Netting

Across all sample months and inclusive of all seven sample locations, fyke trapping/netting resulted in the capture of 300 fish. Most fish captured during fyke netting/trapping were non–native (n=169, 56.3 %). The most abundant non-native species captured by fyke trapping/netting included Striped Bass (n=74, 24.7 %), Common Carp (n=44, 14.7 %), and Channel Catfish (n=23, 7.7 %). Native fish captured by fyke trapping/netting (n=131, 43.7 %) included fall–run Chinook Salmon (n=117, 39.0 %; Figure 7), Sacramento Splittail (n=13, 4.3 %), and Sacramento Sucker (n=1, 0.3 %).

Figure 6. Striped Bass (*Morone saxatilis*) captured while electrofishing during 2024-25 San Joaquin River Restoration Program's Steelhead Monitoring. Reach 5, San Joaquin River, CA.

3.2 Electrofishing

Electrofishing was completed in Reach 5 of the RA in December, January, February, and March. An adult spring-run Chinook Salmon was captured March 28, 2025, which marked the end of 2024-25 SMP efforts and the immediate transition to adult salmon

trapping and hauling activities permitted under NMFS 10(a)(1)(A) Scientific Research and Enhancement Permit 20571-2R. Electrofishing efforts resulted in the capture of 590 fish representing 17 different species (Figure 5). Non–native fishes comprised 66.1 % (n=390), whereas native fish comprised 33.9 % (n=200) of the electrofishing total. Of the native species captured electrofishing, Sacramento Suckers and Sacramento Blackfish were most abundant, comprising 24.4 % (n=144), and 8.0 % (n=47) of total fish captured, respectively (Figure 5).

Figure 7. Fall–run Chinook Salmon *(Oncorhynchus tshawytscha)* captured in a fyke trap during 2024-25 San Joaquin River Restoration Program's Steelhead Monitoring. December 2024, Reach 4, San Joaquin River, CA.

3.3 Trammel Netting

Three trammel nets were set for one hour each on March 22, 2025. Netting locations are identified in Figure 1. Trammel netting resulted in the capture of one Black Crappie (*Pomoxis nigromaculatus*) and one Bluegill (*Lepomis macrochirus*).

4.0 Discussion

Historically, the SJR RA was a potential migratory pathway for CV steelhead to reach spawning grounds; however, little detailed information on their distribution and abundance is available for these river reaches (McEwan 2001; Lindley et al. 2006). Much of the downstream habitat (Reaches 3–5) is unsuitable for rearing because of high summer water temperatures (Yoshiyama et al. 1998). However, as restoration efforts continue, increasing flows and the connection of upstream to downstream reaches in the RA may present the opportunity for steelhead to move into the area and access suitable spawning habitat in upper reaches. As a result, and in compliance with the SJRRP ROD (Reclamation 2012), BO (NMFS 2012), and Permit 16608–3R (3R; NMFS 2022), Reclamation will continue to monitor for the presence of steelhead in the RA when hydraulic conditions trigger implementation of the SMP. Though this monitoring does not target non–salmonid species, ancillary data collected are, nonetheless, valuable in providing information regarding fish distributions and presence data in the RA. These data, combined with data from other monitoring programs, may provide an indication of SJRRP progress.

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6.0 Appendices

6.1 Appendix 1: Total Fish Captured by Species During Steelhead Monitoring Program 2018–2025

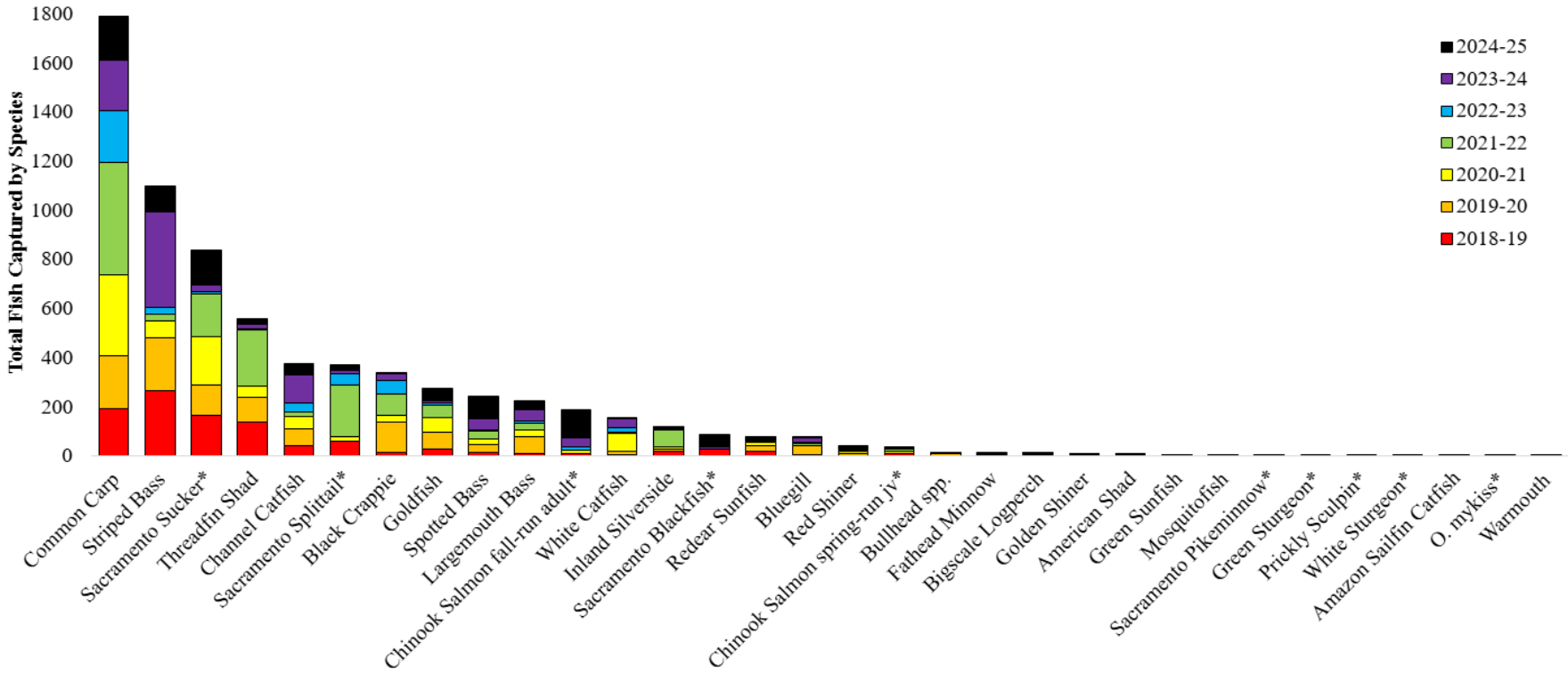

Figure A1.1. Fish captured (n=6,972) during the seven most recent seasons of Steelhead Monitoring Plan in the San Joaquin River Restoration Area (2018–25). No Central Valley steelhead were captured. Native species annotated with "*"

6.2 Appendix 2: Steelhead Monitoring Project Overview within the San Joaquin River Restoration Area 2011–25

Year	Water Year	Project	Methods	Reaches Sampled
2011-12	Dry	Steelhead Monitoring Program	Fyke Nets, Boat Electrofishing, Trammel Nets	5
2012-13	Dry	Steelhead Monitoring Program	Fyke Nets, Boat Electrofishing, Trammel Nets	4_5
2013-14	Critical High	Steelhead Monitoring Program	Fyke Nets, Boat Electrofishing, Trammel Nets	4_5
2014-15	Critical Low	Steelhead Monitoring Program	No Sampling Conducted	-
2015-16	Normal Dry	Steelhead Monitoring Program	No Sampling Conducted	-
2016-17	Wet	Steelhead Monitoring Program	Fyke Nets, Boat Electrofishing	4_5
2017-18	Normal Dry	Steelhead Monitoring Program	Fyke Nets, Boat Electrofishing, Trammel Nets	4_5
2018-19	Wet	Steelhead Monitoring Program	Fyke Nets, Fyke Traps, Boat Electrofishing, Trammel Nets	3_4_5
2019-20	Dry	Steelhead Monitoring Program	Fyke Nets, Fyke Traps, Boat Electrofishing, Trammel Nets	4_5
2020-21	Critical High	Steelhead Monitoring Program	Fyke Nets, Fyke Traps, Boat Electrofishing	4_5
2021-22	Normal Dry	Steelhead Monitoring Program	Fyke Nets, Fyke Traps, Boat Electrofishing	4_5
2022-23	Wet	Steelhead Monitoring Program	Fyke Nets, Fyke Traps, Boat Electrofishing	4_5
2023-24	Normal Wet	Steelhead Monitoring Program	Fyke Nets, Fyke Traps, Boat Electrofishing, Trammel Nets	4_5
2024-25	Normal Dry	Steelhead Monitoring Program	Fyke Nets, Fyke Traps, Boat Electrofishing, Trammel Nets	4_5

6.3 Appendix 3: Fishing Locations 2024–25

Table A1.1. Fyke Trapping Locations during 2024–25 San Joaquin River Restoration Program Steelhead Monitoring Plan.

Sites:	UTM	Easting	Northing
Eastside Bypass	10 S	704088	4120326
Hills Ferry Barrier	10 S	679243	4135295
Mud Slough	10 S	681677	4132775

Table A1.2. Fyke Netting Locations during 2024–25 San Joaquin River Restoration Program Steelhead Monitoring Plan.

Sites:	UTM	Easting	Northing
Hills Ferry Barrier	10 S	679355	4135365
Salt Slough	10 S	694231	4114783

Table A1.3. Electrofishing Locations in Reach 5 during 2024–25 San Joaquin River Restoration Program Steelhead Monitoring Plan.

Date:	Location:	UTM	UTM Start		UTM End		Shock Time (min)
12/4/2024	Salt Slough	10 S	686604	4129328	686500	4129490	13.8
12/5/2024	Fremont to Hills Ferry Barrier	10 S	683330	4131409	681500	4131645	15
12/5/2024	Fremont to Hills Ferry Barrier	10 S	682877	4132100	682699	4132787	21
12/5/2024	Mud Slough	10 S	681354	4133140	681407	4133562	9.1
1/8/2025	Fremont to Hills Ferry Barrier	10 S	683327	4131307	682604	4132047	33.1
1/8/2025	Fremont to Hills Ferry Barrier	10 S	682511	4132742	NA	NA	22.7
1/8/2025	Fremont to Hills Ferry Barrier	10 S	677917	4131913	680302	4134067	29.4
1/8/2025	Fremont to Hills Ferry Barrier	10 S	679108	4134650	679358	4135359	13.5
1/9/2025	Salt Slough	10 S	686977	4129341	686411	4129592	29
1/9/2025	Van Clief to Fremont	10 S	686136	4129616	685626	4129631	25.8
1/9/2025	Van Clief to Fremont	10 S	685428	4129875	684171	4130158	33.7
1/10/2025	Fremont to Hills Ferry Barrier	10 S	682684	4131661	682937	4132494	32.6
1/10/2025	Fremont to Hills Ferry Barrier	10 S	681952	4133414	681765	4133670	16.6
1/10/2025	Mud Slough	10 S	681435	4133051	681406	4133571	16.3
1/10/2025	Fremont to Hills Ferry Barrier	10 S	680011	4134130	679164	4134638	22
2/11/2025	Fremont to Hills Ferry Barrier	10 S	683327	4131396	682713	4131908	29.3
2/11/2025	Fremont to Hills Ferry Barrier	10 S	682962	4132054	682032	4132665	30.4
2/11/2025	Fremont to Hills Ferry Barrier	10 S	681857	4133600	681380	4133958	16.5
2/11/2025	Fremont to Hills Ferry Barrier	10 S	680729	4134133	679606	4134321	25.5
2/11/2025	Fremont to Hills Ferry Barrier	10 S	679371	4134605	679359	4135359	16.5
2/12/2025	Van Clief to Fremont	10 S	686619	4129729	686407	4129591	16.4
2/12/2025	Salt Slough	10 S	686491	4129434	686382	4129363	13
2/12/2025	Van Clief to Fremont	10 S	686108	4129652	686184	4129355	7.9
2/12/2025	Van Clief to Fremont	10 S	685913	4129414	685174	4129844	23
2/12/2025	Van Clief to Fremont	10 S	684794	4129688	684175	4130129	25.9
2/14/2025	Fremont to Hills Ferry Barrier	10 S	682700	4131669	682981	4132047	18.7
2/14/2025	Fremont to Hills Ferry Barrier	10 S	682038	4132632	682059	4133255	21.5
2/14/2025	Mud Slough	10 S	681414	4133149	681396	4133560	1.4
2/14/2025	Fremont to Hills Ferry Barrier	10 S	680895	4134138	680278	4134061	14.8
3/21/2025	Fremont to Hills Ferry Barrier	10 S	683339	4131426	682626	4131929	26.1
3/21/2025	Fremont to Hills Ferry Barrier	10 S	682710	4132112	682130	4133686	62.4
3/21/2025	Fremont to Hills Ferry Barrier	10 S	681370	4133829	680099	4134135	29.2
3/21/2025	Fremont to Hills Ferry Barrier	10 S	680099	4134135	679313	4135354	39
3/25/2025	Fremont to Hills Ferry Barrier	10 S	683342	4131435	682617	4131930	24.4
3/25/2025	Fremont to Hills Ferry Barrier	10 S	682590	4132781	681963	4133428	20.1
3/25/2025	Fremont to Hills Ferry Barrier	10 S	681416	4133933	680736	4133988	17.5
3/25/2025	Fremont to Hills Ferry Barrier	10 S	676902	4131138	679188	4134597	23.2

6.4 Appendix 4: Water Quality 2024–25

Table A2. Mean monthly water quality (± SD) at fyke netting/trapping locations during the 2024–25 San Joaquin River Restoration Program Steelhead Monitoring Plan.

Location	Month	Temp. (^{0}C):	DO (mg/L):	Cond. (µS/cm):	Turb. (NTU):
Hills Ferry Barrier	December	10.0 ± 5.2	-	868.8 ± 454.9	90.8 ± 48.0
	January	8.1 ± 3.9	10.9 ± 5.6	907.1 ± 443.1	91.6 ± 40.3
	February	11.2 ± 4.8	7.7 ± 4.0	648.6 ± 347.2	152.9 ± 84.1
	March	15.9 ± 8.1	6.5 ± 3.2	549.7 ± 295.1	103.8 ± 52.0
Mud Slough	December	10.6 ± 3.8	-	1341.3 ± 507.5	79.8 ± 35.9
	January	8.6 ± 4.0	10.4 ± 5.1	1473.5 ± 682.7	64.2 ± 31.8
	February	13.2 ± 5.9	7.2 ± 3.7	1258.8 ± 640.4	124.7 ± 62.5
Salt Slough	January	8.9 ± 4.0	9.4 ± 4.2	872.3 ± 463.7	91.4 ± 46.8
VC SJR	December	10.6 ± 5.8	-	1031.0 ± 565.2	67.9 ± 39.1
	January	9.3 ± 5.0	8.3 ± 4.5	662.0 ± 355.3	38.9 ± 21.4
Eastside Bypass	December	10.2 ± 3.6	-	1054.2 ± 1032.7	62.6 ± 26.9
	January	8.2 ± 3.8	11.8 ± 5.8	247.5 ± 115.5	45.1 ± 16.2
	February	13.4 ± 7.7	9.0 ± 5.2	209.3 ± 120.9	86.7 ± 51.2
	March	18.4 ± 10.6	6.4 ± 3.7	162.3 ± 93.7	59.7 ± 34.5