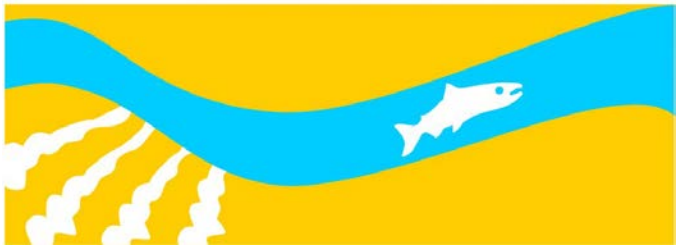
Study 14

Central Valley Steelhead Monitoring Plan

Final
2014 Monitoring and Analysis Plan

SAN JOAQUIN RIVER
RESTORATION PROGRAM



November 2013

San Joaquin River Restoration Program

2014 Monitoring and Analysis Plan

Central Valley Steelhead Monitoring Plan

Principal Investigator(s): Donald E Portz, PhD (Reclamation)

Contact Info. Of Principal Investigator(s): dportz@usbr.gov

Proposed Staff: 4 Reclamation staff,

County(ies) affected by Study: Fresno, Madera, Merced

I. Study Management

A. Study Description

1. History or Background

a. General project background discussion.

Potential routes to spawning habitats for migratory fish such as the Central Valley (CV) steelhead (*Oncorhynchus mykiss*) are believed to have been historically unhindered in the San Joaquin River (SJR) before completion of the Friant Dam. Although little detailed information on steelhead distribution and abundance is available (Lindley et al. 2006, McEwan 2001), they are mostly distributed higher in watersheds with large river systems than Chinook salmon (*Oncorhynchus tshawytscha*; Voight and Gale 1998, as cited in McEwan 2001). Therefore, steelhead may have spawned at least as far upstream as the natural barrier located at the present-day site of Mammoth Pool and the upper reaches of SJR tributaries. Modeling of potential steelhead habitat by Lindley et al. (2006) suggests that a portion of the upper SJR basin historically supported an independent steelhead population. However, much of the habitat downstream from this population's modeled distribution may have been unsuitable for rearing because of high summer water temperatures (Lindley et al. 2006). Lindley et al. (2006) concluded that suitable steelhead habitat existed historically in all major SJR tributaries, although to a lesser degree than in stream systems in the Cascades, Coast Range, and Northern Sierra Nevada. Additionally, steelhead are historically documented in the Tuolumne and Kings river systems (McEwan 2001).

Steelhead abundance and distribution in the SJR basin have substantially decreased (McEwan 2001), and steelhead have been extirpated from the Restoration Area after the construction of Friant Dam. Based on their review of factors contributing to steelhead declines in the Central Valley, McEwan and Jackson (1996) concluded that basin-wide population declines were related

to water development and flow management that resulted in habitat loss. Dams have blocked access to historical spawning and rearing habitat upstream, thus forcing steelhead to spawn and rear in the lower portion of the rivers where water temperatures are often high enough to be lethal (Yoshiyama et al. 1996, McEwan 2001, Lindley et al. 2006). However, steelhead continue to persist in low numbers in the Stanislaus, Tuolumne, and Merced River systems (McEwan 2001, Zimmerman et al. 2008). CV steelhead distinct population segment (DPS; smallest division of taxonomic species protected under the U.S. Endangered Species Act; 61 FR 4722) includes tributaries to the SJR that drain the western slopes of the Sierra Nevada Mountains (i.e., Mokelumne, Calaveras, Stanislaus, Tuolumne, Merced, Chowchilla, Fresno, upper San Joaquin, Kings, Kaweah, and Kern rivers, and Caliente Creek; NMFS 2009).

Monitoring of CV steelhead populations in the SJR and its tributaries is especially challenging due to extremely low abundance of fish. CV steelhead populations are depressed to the point where monitoring opportunities are limited because sample sizes are too low to use statistical analyses (Eilers et al. 2010), and depressed to the point that even determination of presence is difficult. According to Eilers et al. (2010), CV steelhead are currently extirpated from all waters upstream of the Merced-San Joaquin river confluence. However, spring interim flows occurring from February 1–June 1 and fall interim flows occurring from October 1–December 1 could attract adult steelhead into the Restoration Area. Attracted steelhead would not have access to appropriate spawning habitat due to a number of impassable barriers. Therefore, the Bureau of Reclamation (Reclamation) implemented a steelhead monitoring and detection plan (SMP) for the San Joaquin River (SJR) upstream of the Merced River confluence that would, in the event of a capture, document and transport the fish to suitable habitats downstream of the mouth of the Merced River.

c. Why is the study necessary (context of settlement requirements, reintroduction efforts, interim flow information needs, etc.)?

The Steelhead Monitoring Plan is conducted under the auspices of the San Joaquin River Restoration Program (SJRRP). SJRRP intends to determine the effects of increased spring-time water flows on the hydrology of the San Joaquin River, and will evaluate the interim flows within the SJRRP Restoration Area, identified as the San Joaquin River above th confluence of the Merced River and below Friant Dam. This evaluation will support the two primary goals of the SJRRP: (1) to restore and maintain fish populations in “good condition” in the mainstem San Joaquin River below Friant Dam to the confluence of the Merced River, including naturally reproducing and self-sustaining populations of salmon and other fish, and, (2) to reduce or avoid adverse water supply impacts on all of the Friant Division long-term contractors that may result from the Interim and Restoration Flows provided for in the Settlement. Spring interim flows

occurring from February 1 to June 1 could attract adult steelhead into the restoration area. Attracted steelhead would not have access to appropriate spawning habitat due to a number of impassable barriers. Bureau of Reclamation (Reclamation) in coordination with the Fisheries Management Work Group has proposed a Steelhead Monitoring Plan to facilitate detection of steelhead on the San Joaquin River (SJR) upstream of the Merced River confluence and transport to suitable habitats downstream of the mouth of the Merced River.

Fall interim flows occurring from October 1 to December 1 could also attract adult steelhead into the restoration area if the interim flows are higher than the flows in the SJR tributaries. However, during fall interim flows, the Hills Ferry Barrier (HFB) is in place just upstream of the confluence with the Merced River and ongoing fish monitoring occurs near HFB. Steelhead that pass the HFB could be detected and potentially trapped. In the fall of 2010 and 2011, a fyke trap was installed by the California Department of Fish and Wildlife (CDFW) and operated by Reclamation, Denver Technical Service Center to assess the barrier's effectiveness. Some fall-run Chinook salmon were able to pass the barrier during the 2010 and 2011 interim flow period, so the effectiveness of HFB is in question (Portz et al. 2011). No steelhead were detected, however bar spacing on the trap could allow steelhead that are smaller and slimmer than salmon to escape.

2. Site Description

a. Location of the study (include maps, geographic data, etc.).

Steelhead monitoring activities are proposed as the area of the San Joaquin River below Sack Dam to the confluence with the Merced River and adjoining sloughs. Sack Dam is considered the furthest upstream extent for CV steelhead migration because it is impassable in low water year types. During the winter and spring 2011-2013 monitoring was confined to the river below Bear Creek as water was too shallow to navigate. Therefore, if the water year-type is similar to last, the extent of the sampling area will most likely be limited to approximately one mile upstream of Highway 165 Bridge to the confluence of the Merced River and slough tributaries.

3. Study purpose

a. Statement of study goals

To monitor for adult steelhead CV Steelhead in the Restoration Area detection that are attracted from spring and fall interim flows and relocate captured fish to more suitable habitat below the confluence of the Merced River to provide a higher probability of survival and reproduction.

b. List the objectives of the study

1. Monitor for adult steelhead CV Steelhead on the San Joaquin River from Sack Dam to the Merced River confluence.

2. Relocate CV steelhead to more suitable habitat below the confluence of the Merced River.

4. What are the management or policy implications of the study?

The steelhead monitoring plan is an important study for the SJRRP to ensure its commitment to restore and maintain fish populations within the Restoration Area. Although no CV steelhead were detected or captured during this sampling period, continued monitoring of adult CV steelhead migration in the Restoration Area is important to provide information regarding the progress of the Restoration Program. Monitoring population abundance trends, rare and native species occurrences, and fish community assemblages will provide a biological indication of SJRRP's success.

B. Study Organization and Responsibilities

1. Person(s) responsible.

Don Portz: Project lead and coordinator, including budgeting and staffing, landowner access, equipment ordering/preparation, study design and implementation, draft and final report preparation.

C. Study Design

1. Describe the sampling design and measurement variables.

Migrating adult steelhead are difficult to monitor using techniques commonly used (e.g., carcass surveys, snorkel surveys, redd counts) to assess salmon populations due to their unique life-history traits. Steelhead, unlike salmon, may not die after spawning. Therefore, carcasses may not be available for a mark-recapture survey. In addition, steelhead migrate and spawn during the late-fall, winter, and spring months when rivers have periods of pulse flows (e.g., Vernalis Adaptive Management Plan or VAMP), high flows (e.g., flood releases), and turbid water conditions. Three sampling methods will be implemented for the CV steelhead monitoring plan:

Electrofishing

Electrofishing is a common method used in monitoring steelhead population (e.g., Mill and Deer creeks, and Feather, American, Mokelumne, Stanislaus, and Merced rivers). One potential drawback for using electrofishing in rivers involves the difficulty in obtaining permits due to the possibility of injuring fish in anadromous salmonid waters (Eilers 2008). However, electrofishing

effectiveness and safety have improved over time (Bonar et al. 2009). Design specifications to reduce injury to fish, and a comprehensive review of electrofishing literature can be found in Snyder (2003).

Sampling frequency will be monthly from December–March. Capture of resident fish multiple times is anticipated, thus monthly sampling is important to ensure fish recovery from sampling and handling stress between captures. Electrofishing methods follow NMFS guidelines for sampling waters with anadromous fish. SJRRP raft electroshocker will be used and shocker set at Low 50-500 volts with an average power of 40% depending on water conductivity and a direct current at 30 pulses per second to ensure that electrical injury to fish is minimized.

Fyke traps with wing walls

Fyke nets with wing walls and traps will be used to sample upstream migrating CV steelhead. Fyke nets have long been used to capture migrating fish to monitor their yearly changes and abundances. Fyke nets are constructed specifically for capturing steelhead without inadvertently gilling or injuring fish. The nets are made of two 150 ft long, 4-ft tall, 1-inch square #21 treated nylon netting wing walls funneled to a 4ft x 4ft collection box that leads to five, 3.5-foot fiberglass hoops with a 8-inch diameter funnel throats. The wings walls and fyke nets are long enough to span the river. Nets will be held in place with anchored t-posts and will be deployed in sampling locations (i.e., upstream of the Hills Ferry Barrier location, the mouths of Mud, Slough, Salt Slough, Newman Wasteway, and downstream of Bear Creek near HWY 165 bridge). This proposed sampling technique will be implemented once the Hills Ferry Barrier is removed in mid-December. Fyke nets will be deployed at sampling locations until March 15, 2013. Marking buoys and flashing amber lights will be affixed for safety and to alert boaters of the nets presence. The traps are checked daily so the likelihood of fish being physically injured is low. In the event of a steelhead capture, the fish will be measured, weighed, transported, and released downstream of the mouth of the Merced River.

Steelhead specific trammel nets

Trammel nets are most common as stationary gear to block off channels with low velocities or no flows. However, they can also be used to drift in short durations (e.g., 20 min) in moving water currents. For this study, short duration drifting of trammel nets will be deployed as well as stationary sets. Short fishing durations prevent fish from being severely entangled and lessen the chance of harm. Trammel nets are advantageous and relatively efficient in turbid waters. The nets consist of three parallel vertical layers of netting; the inner net has a very small mesh size, 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. Similar to seine nets, trammel nets are equipped with floats attached to the head rope and lead weights along the ground rope. Colored floats will

be attached to the head rope so boaters and other recreationists can be alerted to the nets and avoid entangling themselves, their boats, and/or their fishing gear. To ensure safety of steelhead, fisheries biologists tending the nets will follow at a close distance to observe, reduce risk of entanglement, and retrieve nets in short time intervals. Trammel net sampling will be used during adult steelhead migration December–March.

Fish Handling and Relocation

In the event that CV steelhead are captured during monitoring activities, fish will be recorded, measured (i.e., fork length and total length), sexed (if possible), sampled for scales and tissues, and checked for injuries and presence of tags. Fish will be Floy tagged with a unique identification number to document any recaptures that may occur in the study area. Captured steelhead will be transported downstream of the mouth of the Merced River in a 150-gallon transport tank. The transport tank will be immediately filled with river water prior to transport using a portable screened water pump. Steelhead are to be transferred from the river to the transport tank using a water-to-water transfer to help minimize stress and loss of slime. Oxygen gas is to be supplied using compress oxygen gas cylinders and micro-bubble diffusers to maintain dissolved oxygen levels at near saturation during transport. Sodium chloride will be added to the transport water to decrease ionic gradient as a means to minimize stress. The truck will be stopped after 30 minutes of transportation and each hour thereafter for visual inspection of the life-support system and fish wellbeing. Captured CV steelhead will be acclimated in the transport tank to receiving water temperature and water quality at the predetermined release location. Steelhead will be gently coaxed into a plastic vessel and a water-to-water transfer to the river accomplished.

2. **Describe the contingency plans to assure the question is resolved and uncertainties are addressed:**

Contingency planning will occur based on 1) changes in planned operations schedule, 2) issues with access, purchasing, equipment, staffing, etc.

D. Study Resource Needs

1. **Detailed budget**

	Estimated Costs
Field work and monitoring (Base Amount):	
Reclamation	
4 Reclamation fisheries biologists ($736/day/biologist) (12•12-hr days each month (January, February, March)	$158,976
2 weeks data entry	$7,360
Report writing (2 biologists, 2 weeks)	$14,720
Travel (airfare, lodging, per diem, truck, fuel, parking, etc.)	$42,912
Miscellaneous	$2,000
SJRRP presentation & meeting attendance	$2,000
Total	$227,968

E. Compliance Considerations

1. Compliance considerations

A NOE (CEQA), CatEx (NEPA), Nationwide 5 (ACOE), CA collection permits, and other relevant permits will be obtained before starting this study. A Special Use Permit (SUP) for access to the San Luis Refuge Complex will be requested three weeks prior to proposed access, if river connectivity necessitates.

F. Invasive Species: What measures will be taken to ensure field staff does not spread invasive plants or animals to new sites during the study?

HACCP plans were developed for this activity for aquatic nuisance species.

G. Due Dates and Products

1. Describe the timeline for the study, with due dates for deliverables, including drafts (this should relate to section I.A.2.c).

Final report is submitted to the ATR and NMFS for permitting.