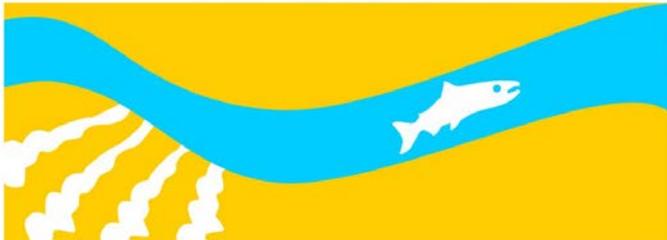


Study 10

Juvenile Survival and Migration (year 3 – telemetry)

**Public Draft
2013 Monitoring and Analysis Plan**

**SAN JOAQUIN RIVER
RESTORATION PROGRAM**



San Joaquin River Restoration Program

2013 Monitoring and Analysis Plan

Juvenile Survival and Migration (year 3 – telemetry)

Fish Management Work Group

Principal Investigator(s): Michelle Workman (FWS); Paul Adelizi (DFG); Matt Bigelow (DFG)

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Proposed Staff: 1 DFG scientific Aid; 2 FWS field crew in addition to PIs

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

I. Study Management

A. Study Description

1. History or Background

a. General project background discussion.

A number of critical questions regarding habitat suitability, biological impacts, migration patterns and rates can be addressed through the use of acoustic telemetry. Currently a large array of acoustic telemetry receivers is used throughout the Sacramento-San Joaquin River Tributaries, Delta and Estuary to evaluate the movement of Chinook salmon, steelhead, and sturgeon. Recent advancements in this technology have allowed for the successful tagging and tracking of subyearling smolt-sized (about 120 mm fork length) juvenile Chinook salmon. In spring 2013, a newly developed small tag (V-5) should allow studies of smaller juvenile salmon that better match the size of naturally produced smolts.

The long-term objective of this acoustic tagging study is to test the hypothesis that the flow management objectives are adequate to sustain the survival of downstream migrating juvenile salmon and to identify all physical features that impede downstream migration. The current flow management objectives are to meet water temperature targets at various locations in the river during specific time period that are believed to be critical to the survival of juvenile salmon. Physical features that potentially impede downstream migration of juvenile salmon include flow control structures, road crossings, water diversions, inadequate water depth, and in-river mine pits and the predaceous species of fish that are commonly associated with these features.

Studies of survival and migration patterns in the Restoration Area are currently constrained by the inability to release full Restoration Flows due to seepage impacts. As a result of seepage impacts, releases of spring pulse flows are reduced and typically no flow is released below Sack Dam throughout most of the spring and summer. Continuous flows through the river and/or bypass system will only occur during flood control releases until the seepage impacts have been addressed.

The first year of study occurred during the 2011 flood control releases which made it possible to study migration and survival through the San Joaquin River and through the Chowchilla and Eastside Bypass system. However due to seepage impacts and constrained flows that occurred in spring 2012, the study focused on migration rates related to flow pulses of varying magnitude in the upper reaches, and movement through Reach 5 and through the Delta (in coordination with other ongoing studies outside the SJRRP). The 2013 study will focus on predation rates on juvenile salmon through the mine pits (RM 259- RM 230) in Reach 1. Restoration of the mine pits is identified as a high priority action in the Settlement and studies are needed to help quantify predation risk and if necessary, the habitats that pose the greatest risk of predation. The 2013 study will also continue annual releases in near Friant Dam and in Reach 5 to develop multi-year comparisons of migration rates, routes, and survival estimates. The objectives of future studies are expected to refocus on the long-term objectives of flow management and passage below Sack Dam as seepage impacts are managed.

c. Why is the study necessary (context of settlement requirements, reintroduction efforts, interim flow information needs, etc.)? Restoration of the mine pits is identified as a high priority action in the Settlement and studies are needed to help quantify predation risk and if necessary, the habitats that pose the greatest risk of predation. The 2013 acoustic tagging study will help identify potential predatory fish species and the habitats that they use. This study will also provide data on juvenile salmon mortality and passage impediments that can be used to inform reintroduction strategies, such as release number, timing, and location for juvenile salmon. In addition, these data can be used to estimate project-wide smolt survival rates allowing for refinement of fish population models (e.g., Emigrating Salmonid Habitat Estimation (ESHE) and Ecosystem Diagnosis and Treatment (EDT)). On a long-term basis, this study will also help assess the effectiveness of the Program's flow management and the site-specific restoration actions.

2. Site Description

a. Location of the study (include maps, geographic data, etc.). The study will occur over the entire Restoration Area (Friant Dam to the confluence with the Merced), as well as data

collected through the Delta through collaborative datasharing with other ongoing acoustic telemetry studies.

3. Study purpose

a. Statement of study goals Continue the collection of movement and survival information of juvenile salmonids through the restoration area to develop information for a number of water year types and operations scenarios to help inform reintroduction, and habitat restoration/management decisions.

b. List the objectives of the study

1. Determine Reach specific survival rates, migration rates, and route selection of fish released below Friant Dam, and (if the river does not have connectivity) at the uppermost end of the downstream connected river (e.g., release at the top of reach 5 or below Sack Dam, etc.). Downstream release location will be implemented only if flows allow migration to the downstream extent of the Restoration Area.

i. Percent survival of replicate releases at Friant Dam to the bottom of reach 1 (Hwy 99); migration rate (mph of replicates to Hwy 99), use of river channel v. bypass systems (if available) will be compared to releases in 2011, and 2012 to assess changes in operation and fish behavior.

2. Determine survival rates, and migration rates through the mine pit reach of the Restoration Area

i. Percent survival of replicate releases in the mine pit reach.

ii. migration rate (mph) in the mine pit reach

iii. Predator contact with tagged fish (assessed in mine pit predation study) – diet samples and movement patterns of tagged fish.

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

Data collected over the life of the study will be used to determine the most appropriate release locations for reintroduced salmonids based on predation risk, survival estimates, travel time, and water quality parameters to optimize survival of reintroduced salmonids. Information gathered here may also be paired with results of the mine-pit predator assessment in determining a prioritized list of restoration actions through the mine pit reach.

Flow scheduling for the 2013 spring interim flows period should be coordinated closely with fish release studies. While the study does not depend on specific flow actions, flow variability during the study could complicate data interpretation. Long-term study analysis will take into account how flow scheduling effects fish survival and behavior. Downstream releases are dependent on connectivity. If connectivity cannot be achieved, releases will have to be adjusted to accommodate flows.

B. Study Organization and Responsibilities

1. Person(s) responsible (names, title, phone numbers, addresses, e-mail) and role.

Michelle Workman: michelle_workman@fws.gov. Responsibilities include budgeting and staffing the study, equipment ordering/preparation, study design and implementation, draft and final report preparation.

Paul Adelizi: padelizi@dfg.ca.gov. Responsibilities include study stock appropriation, husbandry during holding/tagging, coordination of releases and associated data (providing equipment and staff).

Matt Bigelow: mbigelow@dfg.ca.gov. Responsibilities include coordinating DFG staff for tagging, transporting, and releasing study fish, and coordinating river access locations for both releases and receiver deployment.

C. Study Design

1. Describe the sampling design and measurement variables.

a. Describe the experimental design and projected sample sizes. For manipulative experiments, describe the table of treatments and number of replicates, and how experimental units will be grouped or blocked if appropriate.

Tagging Juvenile Fall Run Chinook Salmon- Replicate core group releases (100 in Reach 1 as 2 replicates of 50 fish each; 100 tagged lower connected reaches, released as 2 replicates of 50 fish each) Additional releases directly above mine pit complexes (6 release groups of 100 fish (2 fifty fish replicates each) each at RM 259, RM 255, RM 249, RM 244 RM 237 and RM 234. Source fish for these releases has not yet been determined and will be worked out through the California Department of Fish and Game. As part of an overall fall-run reintroduction strategy, these fish may be in-basin fall run and large numbers of pilot fish may be incorporated into this study plan as fall run strategies develop further. The mine pit releases will represent the year 3 ‘special study’ releases in addition to annual releases below Friant and in the lower connected reaches. Tagging will be conducted in the interim conservation facility or the mobile processing trailer on loan to the SJRRP from the Anadromous Fish Restoration Program (AFRP). All fish will be coded wire tagged (CWT) and a subsample will have acoustic tags implanted. CWTs will be injected in the snout of the fish using a Mark IV Tag injector (Northwest Marine Technology). Acoustic tag placement will involve surgical techniques requiring an approximate ½ inch incision closed by suturing with standard absorbable suture material by staff experience in the procedure. Fish will be recovered for no

less than 24 hours to ensure no latent mortality from surgical implanting of tags effects tag results.

Release Fall Run Chinook Salmon –Releases in mine-pit complexes will be coordinated with mine-pit predation assessment scheduling to validate predation losses through diet analysis. Specific release locations, mentioned above, will be confirmed through DFG access agreements.

Receiver Download and Data Processing/Analysis - Receivers will be interrogated on a standard schedule, and additional mobile tracking with a handheld tag detector will be conducted within the mine pits to assess predation.

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

Equipment - tags (800) \$280,000; miscellaneous supplies \$5,000 (cables, clamps, weights, floats)

Equipment overhead (6%)- \$17,100

Staff time - \$74,943.60

Bioday rate (this rate includes salary, benefits, administrative costs, use of vehicles, gasoline, office materials, etc; \$750 day for technical, \$900 day for senior staff)

25 biodays for 1 technical staff to deploy and download receivers + mobile tracking- \$18,750; DFG technicians will assist with downloading receivers in Reach 1 (no cost)

10 biodays to tag and release fish (4 technical staff, \$750 rate; 1 senior biologist, \$900 rate)- \$30,000; 2 DFG staff will assist with setting up receivers (no cost)

0.10 FTE – Field Study Coordinator – for oversight of all FWS lead MAP studies - \$23,693.60

Staff overhead (25.5%ⁱ for outside CVPIA)- \$19,110.62

Travel - \$ 4,500 (4 staff for 1 week (tagging)= \$2,000; 1 staff for 5 weeks (deployment/downloads/retrieval) = \$2,500)

Operations: \$74,943.60
Operations Overhead: \$19,110.62
Total Operations: \$94,054.22
Equipment: \$285,000.00
Equipment Overhead: \$17,100.00
Total Equipment: \$302,100.00

Study Total: \$396,154.22

E. Compliance Considerations

1. Route study through FRRT for compliance considerations

This study is permitted for a 5 year period beginning in 2011. We currently have valid: NOE (CEQA), CatEx (NEPA), Nationwide 5 (ACOE), NLAA and Internal Section 7 FWS (ESA compliance), and a concurrence that it does not affect any Indian Trust Assets (ITA) under the programmatic document. Need to resubmit a Special Use Permit (SUP) for receiver placement in the San Luis Refuge Complex 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 are developed for this activity.

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).

This study will be implemented in the spring/early summer of 2013. A draft report to the mid-year ATR will provide information on fish size and condition at tagging, receiver deployment locations, release location and timing. Receivers will be downloaded up to 3 times during the study based on release timing, and spacing between release groups. An annual summary of results will be prepared for the December ATR which will include survival estimates by release group and reach, migration rates and route selection information for various release groups.

ⁱ The rate for CVPIA is 22.5% and 25.5% for agreements made outside CVPIA