Study 11

Assessment of Predator Abundance and Distribution in Mine Pit Habitat in the San Joaquin River Restoration Area

Public Draft
2014 Monitoring and Analysis Plan

SAN JOAQUIN RIVER
RESTORATION PROGRAM

September 2013

Fish Management Workgroup

Study Workplan

Study Title: Assessment of Predator Abundance and Distribution in Mine Pit Habitat in the San Joaquin River Restoration Area Location (Year 2): San Joaquin River Restoration Area

Principal Investigator(s): Michelle Workman, USFWS

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Proposed Staff: Crystal Castle, Nathan Cullen, Jerrad Goodell (USFWS); Matt Bigelow, Patrick Ferguson (DFW).

County(ies) affected by Study: Fresno, Madera

I. Study Management

A. Study Description

1. History or Background

a. General project background discussion.

The San Joaquin River has been impacted historically by in channel and floodplain sand and gravel mining leaving both off channel mine pits and captured mine pits in the channel. Many off channel pits have been breached and allow the river to run through them. Based on available data about 33 river miles have been directly impacted by mining actions (FWUA/NRDC 2002). Studies on the Tuolumne River have shown instream and captured gravel pits and the lentic habitat they create favor largemouth bass and predation losses in these habitats may be significant enough to affect populations of salmonids (TID/MID 1992 as cited in Stillwater 2003). Largemouth bass are adapted to high water temperatures and are commonly found in captured mine pits in the San Joaquin basin (FMWG 2009a, CDFG 2007).

Predation is recognized as a limiting factor for juvenile salmonids to be addressed during restoration actions in the San Joaquin River Restoration Program. The Restoration Area is known to harbor a number of likely predators on juvenile salmonids including largemouth bass (Micropterus salmoides), smallmouth bass (M. dolomieu), Sacramento pikeminnow (Ptychocheilus grandis), green sunfish (Lepomis cyanellus), warmouth (L. gulosus) black crappie (Pomoxis nigromaculatus) and striped bass (Morone saxitalis) (CDFG 2007)

The FMWG has proposed a number of actions necessary for the successful reintroduction and management of salmon. A number of these actions include evaluating habitat conditions, predation potential, and entrainment risks to juvenile and adult salmonids in the Restoration Area. Actions identified to address predation as a limiting factor include filling the 'highest priority' mining pits, and reducing the number of predatory non-native fish (FMWG 2009b). The settlement agreement calls for reintroduction of salmonids to the restoration area by December 2012 (NRDC v USBR 2006). Currently, the reintroduction actions have included developing spring-run Chinook salmon broodstock with in the interim San Joaquin Conservation Facility, and experimental trap and haul of fall-run Chinook salmon adults into reach 1 from reach 5, as well as experimental releases of progeny of streamside spawned fall run in reach 1. In order to manage reintroduction actions appropriately, assessment and management of predator populations will be necessary to provide the information needed to help achieve the population objectives outlined in the FMP (FMWG 2009b).

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

The Fish Management Work Group has prioritized this proposal as medium-high priority due to the need to fill data gaps on predator populations and temperature regimes in captured mine pits for Phase II settlement actions of prioritizing mine pits for restoration (NRDC v. USBR 2006). Currently, existing data includes bathymetric surveys completed by USBR, and temperature modeling efforts proposed by USBR in the 2013 MAP.

Fishery and aquatic resource assessments have been conducted by the California Department of Fish and Game from 2003-2005 as the first step in pre-restoration monitoring (2007). Predator presence data, by reach, is available from these studies. A more specific assessment of population distribution and abundance is needed to develop a management strategy for predator populations for restoration purposes, specifically in the mine pit habitats of the San Joaquin River.

Water temperature data is currently being collected by DFW. The water temperature monitoring is being developed to "collect sufficient data to develop and implement a systematic water temperature and meteorological monitoring scheme capable of fully describing the water temperature conditions likely to be experienced by all life stages of spring- and fall-run Chinook salmon in the San Joaquin River Restoration Area (Restoration Area)" (Guzman 2009). Additionally, modeling efforts are under way by USBR (2013 MAP).

It is recognized that these efforts will need to be supplemented by more intense monitoring levels in the mine pits and other potential predator habitats in order to assess these areas as predator habitats and guide restoration actions that may include filling mine pits, closing breaches, reducing

residence times of water and fish through these habitats through restoration actions, or physical population management through culling, increased warmwater angling opportunites and incentives, or by implementing creative reintroduction actions to avoid these habitats in the near term.

2. **Site Description –**

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

There are 6 major complexes of captured mine pits from Friant Dam to Gravelly Ford. Each of these complexes will be considered one sampling site. These sampling locations are identified as:

1. First Set of Captured Mine Pits (Fort Washington) – River Mile 257-256
2. Second Set of Captured Mine Pits (Sycamore Island)– River Mile 254-252
3. Third Set of Captured Mine Pits (Milburn Unit) – RM 248
4. Fourth Set of Captured Mine Pits (Camp Pashayn)– River Mile 243-242
5. Fifth Set of Captured Mine Pits (Hwy 99 to HWY 145)– River Mile 239-241
6. Sixth Set of Captured Mine Pits (Skaggs Park)– River Mile 233

3. **Study purpose**

Initial predator studies are providing baseline data for this year's study. Stomach samples have been collected to develop a description of current prey base for predators in the system. External marks were placed on predators in 2013, and results of recapture data will be used to assess source v. sink habitats for predators, and large scale predator movements. These data will be processed prior to 2014 spring sampling to guide levels of effort and to guide juvenile Chinook releases in the pit areas to assess mortalit rates. These data will help guide reintroduction scenarios for salmonids reintroduced to the Restoration Area in order to minimize predation risk while maximizing imprinting ability. This information will also be critical to informing the Adaptive Management approach as described in the Fisheries Management Plan (FMWG 2009b).

    a. **Statement of study goals.**

The goal of this project is to collect data for the assessment of predator population status and mine pit habitat characteristics to inform future actions regarding predator management and mine pit prioritization.

    b. **List the objectives of the study**

1. Develop predator species distribution, richness and abundance estimates in the mine pit habitat in the Restoration Area.

2. Determine if predator populations move across mine pits, or maintian resident populations within each mine pit.

3. Characterize the temperature regime in existing mine pits in the Restoration area to assess predator habitat suitability and prioritize mine pits for restoration.

4. Develop baseline diet composition information for predator species

5. Use the above information to develop a prioritization ranking of existing mine pits for restoration actions.

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

Spring-run and fall-run Chinook reintroduction actions may be altered due to information gathered in this study to avoid predation losses where critical levels of predator populations may impact reintroduced populations. In the near term, Chinook may be introduced below this habitat if predation risk is suspected to be too great to support the population targets identified in the FMP (FMWG 2010). Mine pits that contain large densities of predators, and are accessible to juvenile Chinook, may be prioritized for restoration, including filling, closing breaches, or physical manipulation of the predator population based on data collected in this study.

B. Study Organization and Responsibilities

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

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Fish and Wildlife Service field crew will consist of one GS-7 Fish Biologist – Jerrad Goodell (field crew lead) and 2 GS-5 technicians: Nathan Cullen and Crystal Castle.

2. Chain of command (if appropriate).

Order listed above.

3. Collaborators (agencies, NGOs, academia, etc.) and contact persons:

collaboration with Ca. Dept. of Fish and Wildlife staff: Patrick Ferguson and Matt Bigelow for, boat operation and field sampling. Dr. Steve Blumenshine, and graduate student Kyle Griffiths, CSU Fresno for diet and water sample collection and processing.

Is an MOU and/or contract already established with the collaborator(s)?

Yes, CESU agreement with CSU Fresno

c. Describe study milestones. Identify products and timelines.

Placement of receiver array, range testing of equipment – March; tag and release juvenile fall-run Chinook (April1-May 15); track movement with stationary receivers and weekly mobile tracking (April-June); summary report will be prepared and submitted to the ATR process for the program.

C. Study Design

1. **List the specific research questions (state them clearly as a null or positive hypothesis) to be answered by this study, including methodology:**

   a. If the study includes sampling, describe the sampling design and measurement variables. Be specific: describe the sampling unit, independent variables, dependent variables, and tests or techniques to be used. Explain how bias will be avoided in selection of sampling units. For hypothesis tests, state the null hypothesis and alternative hypotheses.

Boat electrofishing will be conducted at all sites, and trammel/gill netting will be added in to sample for predator species in waters too deep for effective assessment with electrofishing alone. Individuals captured will be identified, weighed, measured, and tagged with an external tag that will provide individual identification (eg., numbered floy tags) and/or internal PIT tags. Gastric lavage will be used to collect diet information for predator species captured. CSU Fresno will provide diet sample analysis for the study.

Each sampling location will be sampled up to 5 times annually (February through June) to develop relative population estimates of predators within each complex, and assess predator activity seasonally through the time period when predator/prey interactions between existing predators and juvenile Chinook salmon would be most prevalent.

Gastric Lavage (stomach pumping) will be conducted on a 30% subsample per species per sampling location to assess the existing diet of appropriate sized predators (i.e., no predators that are too small to consume a salmon fry will be sampled). Diet information collected here will serve as baseline data to assess any dietary shifts that may occur related to reintroduction of salmon.

Vertical temperature strings will be placed in each sampling location to assess the physical habitat and its suitability to maintain predator populations annually. This activity will be covered under California Department of Fish and Game's temperature monitoring program.

Catch per unit effort (species/minute of electrofishing) will be calculated for each pit, and for each pit complex. Relative differences in population structure will be examined. Species diversity, richness, and population structure (adults, juveniles, young of year) will be summarized.

Data collected during these studies will be combined with physical habitat data collected by all implementing agencies to develop an overall assessment of predator populations and habitat conditions.

In addition to the above activities, during acoustic tag juvenile Chinook releases, mobile tracking within the mine pits will occur to confirm predator prey interactions.

D. Study Resource Needs

Equipment : all major equipment for this study has already been procured. Small field equipment needs are covered under our bioday rate.

Staff time –

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

Predator Abundance Mine Pit Habitat	**# of Days**	**people**	**Net Total**
Field work - technicians	40	2	60000
Field Crew Lead Time (0.20*FTE)			47,388
			107388,

TRAVEL	**# of Days**	**people**	**hotel**	**m&ie**	**Net total**
5 months of sampling (7 days per month)	35	4	12,040	10980	23,020

Total Study Budget: $130,408

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

E. Compliance Considerations

1. **This study currently is covered by a Notice of Exemption for CEQA from CDFW, an intra service Section 7 determination of Not Likely to Affect, a categorical exclusion for NEPA, and valid scientific state collecting permits for all staff involved in the study.**

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?

All gear will be washed and dried before entering the study area, and only used for work in the San Joaquin River between washing and drying. Care will be taken not to use personal gear in watersheds that contain New Zealand Mud Snail, and care will be taken to make sure no vegetation is transported between the study area and duty station. The USFWS AFRP office has developed an ISRAP (invasive species risk assessment planning) protocol this activity. This is available upon request.

G. Due Dates and Products

1. **Describe the timeline for the study, with due dates for deliverables, including drafts.**

Sampling will be conducted the first 2 weeks of each month February-June. Reports will be submitted to the mid-year and end of year ATR as appropriate.