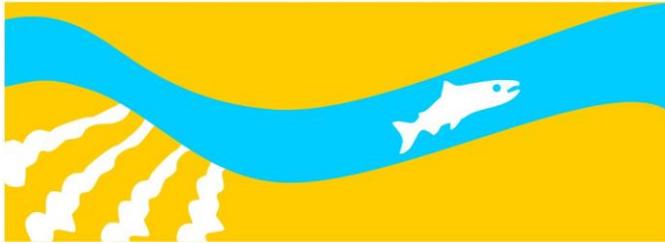


Study 52

Gravel Pit Delineation

**Final
2015 Monitoring and Analysis Plan**

**SAN JOAQUIN RIVER
RESTORATION PROGRAM**



1.0 Gravel Pit Delineation

Theme(s):

- Flow management;
- Rearing habitat;
- Predation protection;
- Entrainment protection

Related Question(s):

Predation Protection:

- What are the expected predation rates on juvenile Chinook salmon in mine pit habitats in Reaches 1A and 1B during rearing and outmigration?
- What can be done to minimize predation on juvenile Chinook salmon during rearing and outmigration, and what mine pits should be prioritized in Reaches 1A and 1B?
- Does trapping of sediment in gravel pits impact salmon habitat? Does it impact predator habitat? Which gravel pits trap sediment?
- Which gravel pits present migration pathway challenges that result in juvenile mortality?
- Does flow attenuation caused by Reach 1 gravel pits cause negative impacts to Chinook salmon survival? If so, which pits present greatest negative impacts due to attenuation?
- Do gravel pits in Reach 1 impact river water temperatures?
- Does isolation of gravel pits in Reaches 1A and 1B affect river temperature (attenuation of water into pits reducing peak temperatures, heating effect of the pits), and does that affect relate to predation rates on migrating or rearing juvenile Chinook salmon?

1.1 Statement of Need

Gravel pit delineation in Reach 1 is a necessary first step in eventually identifying which pits are highest priority for the SJRRP to address.

1.2 Background

The Stipulation of Settlement states high priority gravel pits will be filled or isolated as part of Phase II improvements, but before that can happen, the pits must be prioritized. With other agencies and organizations already planning actions in the reach, many of which will potentially limit future SJRRP activities, it is important for the SJRRP to know which pits are high priority as soon as possible so that it may provide input or identify opportunities to help ensure future SJRRP goals can be met. Pit Delineation is the first step in defining the pits based on relevant criteria, but is only one aspect of the overall effort to assess pit impacts.

Predation is recognized as a potential limiting factor for salmon in the Fisheries Management Plan (FMP), and one of the primary goals in the FMP is to reduce predation (Goal S, page 5-56). Action S1 of the FMP is to fill and isolate the highest priority mining pits. It also lists Action S6, which is to use pulse flows to displace nonnative predatory fishes, and the ability to do so could be impacted by gravel pit flow attenuation.

Other current efforts by other SJRRP agencies include studies looking at juvenile survival and migration and predator abundance in the area, as well as temperature impacts in the reach. Information from those studies could be combined with the pit delineation document to create a more comprehensive gravel pit information database.

1.3 Anticipated Outcomes

The study will result in several outcomes:

- When complete, the delineation will be a resource for SJRRP to allow evaluation of conditions in each pit. The preliminary report will list depths, areas, location, and connectivity with the river channel for each gravel pit in Reach 1, and will reference all known existing data.
- The preliminary report will identify gaps in existing data and recommend which gaps to fill through additional data collection.
- After data gaps are filled, a final pit delineation report will provide SJRRP with a complete set of defining information for each gravel pit. That information will then be available to be used as part of the input needed to prioritize gravel pits. Prioritization will be a separate, later effort that has not yet been developed.

1.4 Methods

Type of Study: Literature, modeling, and field

Reach(es): 1

The plan is to assess various characteristics of each pit as they relate to juvenile mortality, particularly predation potential, as well as other habitat and river function impacts. Some key characteristics that will be defined for each pit include location, area, depth, connectivity to the river channel, and distance from the river channel. Depths and areas will be based on a designated baseflow condition. Additional information about the methods follow:

- 1) Existing information available includes aerial photos, bathymetric mapping from 2008 surveys, water surface surveys at various flows, and hydraulic model output at various flows.
- 2) The preliminary delineation report will be complete in 2014, and data gaps identified through that process will be filled through data collection activities through 2015.
- 3) The entire reach containing gravel pits will be assessed, including all of Reach 1A and most of Reach 1B.
- 4) Results and outcomes are meant to benefit SJRRP understanding related to the juvenile life stage through helping pinpoint potential predation impacts.
- 5) Permits and other environmental compliance will not be needed for the initial effort of compiling existing information or for additional topographic surveys.

1.5 Deliverables and Schedule

The draft preliminary report will be distributed for comment in late 2014. A final preliminary report will be completed by early 2015. Data gap resolution, including additional surveys, would be completed in 2015. By late 2015, an updated pit delineation report will be completed that will include additional data collected to fill data gaps.

Many aspects identified as potential gravel pit impacts in the predation theme questions will require the information developed as part of this study to completely and accurately evaluate. Others will be able to use this information to improve estimates of predation potential, temperature impacts, flow attenuation, juvenile migration impacts, and sediment trapping efficiency. It will also provide a basis for identifying high priority pits.

1.6 Budget

The total cost estimate is \$150,000 for 2015.

Table 1-1. Proposed 2015 Budget

Task	Cost
Finalize Preliminary Report	\$20,000
Collect additional Survey Data	\$25,000
Process additional Survey Data	\$25,000
Analysis and Reporting	\$80,000
Total	\$150,000

1.7 Point of Contact / Agency Principal Investigator

Byron Willems, DWR, 559-230-3332

1.8 References

No applicable references.