

MONITORING PLAN

Araujo Fish Passage and Water Quality Improvements Project

(SWQCB Agreement # 06-538-550-0)

Shasta Valley RCD

July 30, 2007

I. INTRODUCTION

Specific goals of the Araujo Fish Passage and Water Quality Improvements project include improving fish passage and water quality in the Shasta River at the Araujo dam site. The collection of monitoring data will assist the Shasta Valley RCD in verifying whether the water quality and fish passage goals and objectives have been met.

II. BACKGROUND

Five flashboard diversions are currently utilized in the mainstem Shasta River each summer to facilitate diversion of water for irrigation of agricultural lands. Five private landowners utilize the Araujo Dam to divert agricultural water for cow-calf and alfalfa production. The Araujo diversion is one structure identified in the North Coast Regional Water Quality Control Board's (NCRWQCB) TMDL for the Shasta River (2006) and the Recovery Strategy for California Coho Salmon (2004) as a high priority project that will assist the NCRWQCB and the CDFG with achieving their goals of improving water quality and restoring coho in the Shasta River. The current flashboard dam obstructs both juvenile and adult passage to colder waters upstream and refugia downstream from the diversion. The flashboard dam also creates water quality conditions in the river that is low in dissolved oxygen and high in water temperature.

This proposed project would work with multiple partners to replace an existing diversion system with others more suitable to meet the current needs of both fish and water. The Shasta River is considered an impaired water body by the Regional Water Board for dissolved oxygen (DO) and temperature. Furthermore the Southern Oregon/Northern California (SONC) coho has been listed as threatened both state and federally. In order to meet the needs of water users and to assist in coho restoration and improving water quality in the Shasta River the following project activities are proposed:

1. Design and install a boulder weir that would provide fish passage to both juvenile and adult salmonids as well as reduce the volume of impounded water necessary to supply agricultural water to the five landowners.
2. Design and install a new fish screen at a new pumping station.
3. Convert a gravity fed irrigation system to a pumping system which will eventually lead to more efficient water use by landowners;
4. Install piping in existing irrigation ditches in order to reduce the input of warm water back into the river system and eliminate the amount of herbicides needed to maintain the ditches;

5. Implement on-farm improvement projects on individual lands to improve stakeholder water use efficiency;
6. Remove existing flashboard diversion dam.

III. OVERVIEW

The QAPP Preparer has prepared this monitoring plan for use by Shasta Valley RCD personnel. Shasta Valley RCD personnel are responsible for coordinating and performing the sampling events, including providing sampling equipment, and taking field notes. The following sections provide details of the monitoring plan, including constituents, sampling locations, frequency, and sampling team. In a separate document, the QAPP will discuss the details of how the samples are collected to provide data that are representative and scientifically defensible.

IV. WATER QUALITY SAMPLING

Components to be monitored include water temperature, dissolved oxygen and width of wetted channel. Dissolved oxygen data will be collected at 4 locations throughout the project area (Figure 1). Water temperature will be collected in the project area at the dissolved oxygen sampling locations as well as other upstream and downstream areas. Sampling of water temperature upstream from the project area will provide the Shasta Valley RCD with a better picture as to surface and subsurface water inputs into the river system as well as monitor any changes of water temperature as a result of piping the ditches. As the project progresses, there may be a need to add or remove sampling sites and to adjust the timing of the sampling events. This monitoring plan will be updated with changes to the locations and schedule as needed.

Constituents

The constituents to be monitored as a result of this project are temperature and dissolved oxygen as well as collection of data measuring the width of wetted channel. The list of sampling constituents and rationale for each is summarized in Table 1 below.

Table 1 Sampling Constituents

Constituent	Purpose	Comment
Temperature	General water quality	Electronic meter/probe.
Dissolved oxygen	General water quality	Electronic meter/probe.

Pre-construction dissolved oxygen grab samples will be taken using a YSI-55 DO Meter. Samples will be taken pre-dawn, in areas where the water flowing otherwise well enough mixed to be representative of site specific conditions. In areas where water velocity is low, the probe will be raised and lowered in the water column so to assure a minimum of 1 ft/sec of flow past the sensor consistent with the mfg recommendations for accurate sampling. Post-construction dissolved oxygen data will be taken by continuous DO meters installed in the project area.

Water temperature will be taken by using HOBO temperature probes placed in the river in areas that are not directly exposed to the sun's radiation and/or are shaded by a device.

River cross sections will be established at representative places throughout the project area that will best reflect the overall change of the channel due to the project activities. This data will be tracked and compared with pre-project aerial photography to discuss changes.

In addition, overall electrical demand (pre and post project) will be tracked as well as costs of herbicide to maintain the ditches.

A minimum of two photo points will also be established to show that adequate fish passage is being provided at the boulder weir sites as well as to document change in wetted channel over time.

Sampling Locations

Dissolved oxygen sampling sites have been selected to: monitor pre and post project changes of DO levels in the project area. Table 2 below describes the location of each dissolved oxygen sampling site and Figure 1 shows these location spatially. Temperature probes will be placed along the river stretching upstream from the project area 4.5 miles to Hwy A-12. HOBO temperature probes will be placed in the river at locations where landowner access agreements have been acquired. A total of 9 probes will monitor water temperature in the river including five probes placed upstream of the project area and four probes which will measure both DO and water temperature. In addition 1 temperature probe will be placed at the existing SRWA pump house to record air temperature.

Based on field conditions, the program may be modified by the project team during the sampling event to provide for field safety and make the collection accurate and thorough. Any changes made to the plan will be documented within the field notebooks and added to this Monitoring Plan as Appendices.

Table 2. Sampling Locations

<i>DO Meter Location</i>	<i>Estimated Pre-Project Results</i>	<i>Estimated Post-Project results</i>
<i>DO Meter #1: Upper limits of the pre-project pond.</i>	<i>DO Levels should be low in this area due to the current pond length stretching 4,600 feet above the existing dam.</i>	<i>DO levels should be higher in this area since the ponded length will be reduced by 3,300 feet.</i>
<i>DO Meter #2: Placed upstream of the upper extent of the new pond created by the new weir.</i>	<i>DO levels should be low due to the current pond reaching over 4,600 feet upstream from the dam.</i>	<i>Results may show lower levels of dissolved oxygen at this site due to ponding in this section of the river.</i>
<i>DO Meter #3: Placed upstream of the existing dam.</i>	<i>DO levels should be low in this area due to ponding caused by the dam.</i>	<i>DO levels should show higher levels of DO due to the elimination of the pond.</i>
<i>DO Meter #4: Placed downriver</i>	<i>DO levels should be high in this location since water flows over the</i>	<i>Post project results should not show much of a difference with DO at this</i>

<i>from the existing dam.</i>	<i>dam as it travels downriver.</i>	<i>location. If there is a difference it may show slightly higher DO levels.</i>
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Sampling Frequency and Schedule

Pre-construction dissolved oxygen monitoring will be collecting using grab samples this 2007 field season. Grab samples will be taken during the months of June and July 2007. Temperature will also be taken during this time. Post-construction monitoring will occur continuously via installed DO and temperature meters. Inspection of the DO meters will occur three times during the season with calibration occurring at both the beginning and middle of the season. Maintenance will occur as necessary on the DO meters. Inspection of the temperature probes will also occur three times during the field season with calibration occurring once at the start of each field season.

Sampling events will be conducted throughout the summer irrigation season when water quality is generally at its worst (May-August). Sampling during the Summer of 2007 will consist of discreet grab samples, whereas continuous sampling will occur during the Summer of 2008 and 2009 with DO and installed Temperature probes. Cross sectional widths of the river will occur 1-2 times during the summer seasons to monitor any changes in wetted channel widths.

Specific sampling dates have not been identified but will occur in 2007 during the months of June and July. It is expected that the DO meters will be installed and operational by May 2008. The RCD will update the monitoring plan if any changes are expected.

Sampling Team

The RCD is currently in the process of hiring a Planner/Monitoring Specialist whose task will be to run the monitoring program for this project. This person will be tasked with following the guidelines set forth in this Monitoring Plan and approved QAPP, updating these plans as necessary, installing, calibrating and maintaining equipment and collection of data. The RCD expects to have this position filled by July 1st. In the interim the Project Coordinator will be acting as the Monitoring Project Coordinator.

V. REPORTING

Results obtained from the field investigation parameters are to be validated for quality, accuracy, and completeness according to the guidelines set forth in the QAPP document. The data are then to be tabulated in database format compliant with the SWAMP program, saved, and maintained by the Shasta Valley RCD. Results of these reports will be provided as described in the contractual agreement with the Regional Water Board.

Figure 1: Araujo Dissolved Oxygen and Temperature Sample Points.

