

MokeWISE Program Scope of Work:
*Project 1d: Fish Screens for Riparian Diversions in the Lower
Mokelumne River*

April 2015

Problem Statement and MokeWISE Stakeholder Interests	2
Background Information	2
Project Information	3
Project Description.....	3
Project Location.....	3
Project Sponsor	4
Scope of Work	4
Task 1. Planning and Outreach	4
Task 2. Funding Assessment	6
Task 3. Prioritize Screens for Installation.....	6
Task 4. Screen Installation	7
Budget	8
References.....	8

Problem Statement and MokeWISE Stakeholder Interests

Water users, water purveyors, resource managers, landowners, and environmental groups who use, manage and enjoy the lower Mokelumne River have a common interest in sustaining a productive and robust salmon, steelhead, and resident trout fishery in the river. Beyond a direct interest in maintaining aquatic health to avoid the need for regulatory action, many of these entities share the value that the fishery and its aquatic environment are intrinsically positive and an enhancement of life.

The juvenile lifestage of both salmon and steelhead/rainbow trout is widely believed by resource managers of the Mokelumne River to be their most vulnerable lifestage. One of these vulnerabilities stems from lack of swimming ability to escape velocities associated with unscreened instream water diversions. While the magnitude of entrainment of juvenile salmon and steelhead/trout on the lower Mokelumne is unknown, it is likely that effect of entrainment increases in dry years when irrigation starts early and small juveniles stay longer in the river.

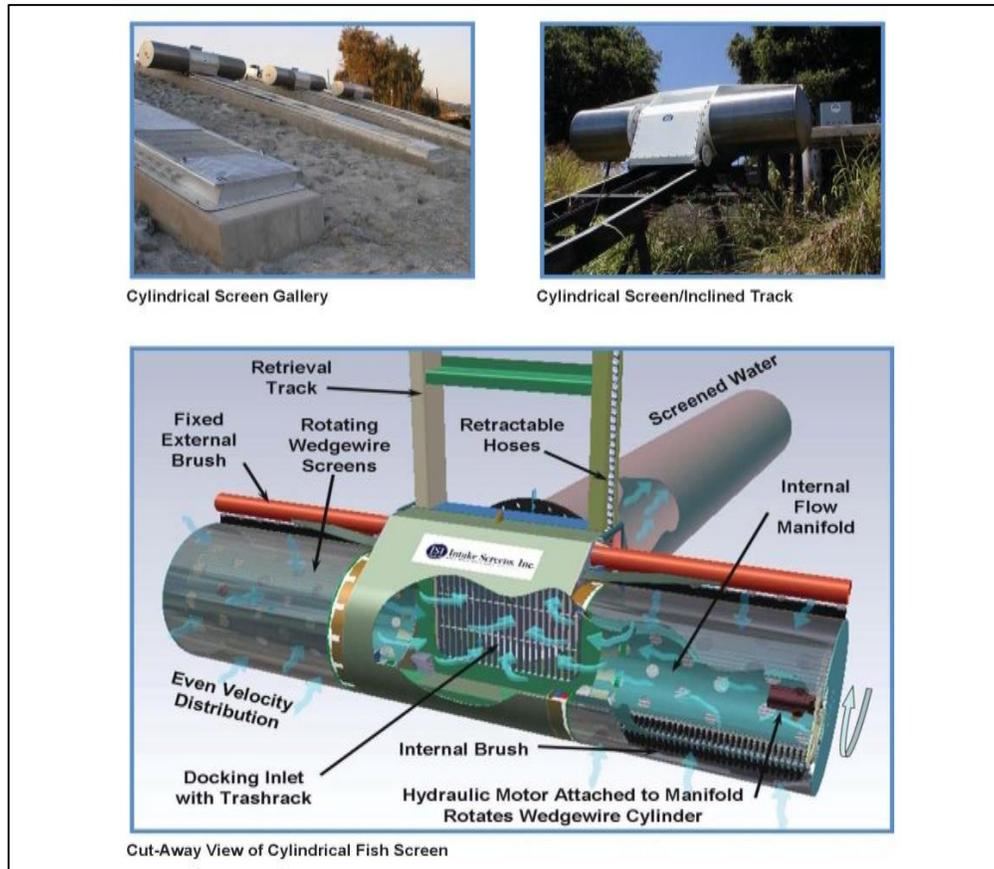
The Fish Screens for Riparian Diversions in the Lower Mokelumne River Project will develop and implement a program to identify and prioritize riparian diversions on the lower Mokelumne River for installation of new fish screens. This includes conducting a diversion assessment and establishing screening design criteria for individual diversions. The project would conduct a funding assessment to determine potential funding sources for screen installation. Working with willing landowners, the project will secure necessary permits, install fish screens, and develop a monitoring strategy. Costs for this project are dependent on the number of fish screens installed and the size of each fish screen. Costs are estimated at \$10,000 per cubic feet per second (cfs) screened; thus, screening a 10 cfs diversion would cost \$100,000. Total project costs are estimated to be \$300,000 for the preliminary assessment and prioritization and \$10,000 multiplied by the number of cfs screened.

Background Information

Currently, the four largest pumps and diversions on the lower Mokelumne River are screened, but according to an assessment conducted in the late 1990's, approximately 60 diversions remain unscreened. However, this estimate may be conservative, because the California Fish Passage Assessment Database prepared by CalFish identifies over 400 diversions on the main stem of the Mokelumne River.

Figure 1 provides several examples of typical cylindrical fish screens.

Figure 1: Examples of Typical Cylindrical Fish Screens



Source: SRCSD 2012

Project Information

Project Description

This project purpose would be to develop and implement a program to identify and prioritize riparian diversions on the lower Mokelumne River for installation of new fish screens. Working with willing landowners, the program would then secure and install fish screens on these riparian diversions to reduce entrainment of fish.

Project Location

The project would be located along the Lower Mokelumne River, specifically in locations with unscreened diversions.

Project Sponsor

Trout Unlimited (TU) would serve as the lead; a co-sponsor has not yet been identified.

Scope of Work

Task 1. Planning and Outreach

The first steps in this project are to: (1) conduct data collection and analysis to understand the extent of existing diversions and analyze the condition of each diversion to assist with the development of a project implementation and funding strategy; and (2) build trust and understanding with landowners that may be candidates for the program. In addition to reviewing publicly available information, one of the primary mechanisms to obtain site-specific information about diversions is through direct outreach to landowners. Trout Unlimited (TU) will work with the San Joaquin Resource Conservation District (SJCRCDD), the Lower Mokelumne River Watershed Stewardship Steering Committee (LMRWSSC), Woodbridge Irrigation District, and North San Joaquin Water Conservation District, entities that have well-established landowner relationships in the lower Mokelumne watershed, to conduct extensive outreach in the lower Mokelumne watershed with the goal of obtaining landowner and water user support for the program and identifying specific project implementation opportunities.

Trout Unlimited and the SJCRCDD and/or the LMRWSSC will disseminate information about the program and build momentum for its advancement through public meetings, individual contacts and outreach materials. During the outreach events we will discuss the benefits of fish screens, the technical, educational and financial assistance provided to landowners participating in the program, the roles of the various entities engaged in the program and how the program intersects with federal and state priorities. It is important to provide opportunities for landowners to voice their opinions and express their view of the program. Based on outcomes of similar efforts in other processes, TU and SJCRCDD anticipates that they will identify and work with a critical mass of landowners interested in providing baseline information to assist with the development of a project implementation and funding strategy. Landowners who voluntarily agree to participate in the program will have an active role in the development of the strategy and other relevant program activities. If initial outreach activities are successful, it is anticipated that landowner interest in participating in the program will continue to increase the program moves forward.

Subtask 1.1 Diversion Assessment

The first step in the analysis is to work with regulators and local stakeholders to verify the number and location of existing diversions.

This assessment will require direct coordination with CalFish to understand the California Fish Passage Assessment Database and its accuracy. If information in the database is deemed accurate, the database will serve as the basis for completing additional analyses.

Additional analyses will involve mapping to identify the location of unscreened diversions on the lower Mokelumne River. Once mapping is completed, field work will be conducted to verify the location of diversions and also determine whether or not diversions are still operational. Field work will also include physical and biological analysis, direct coordination with landowners and diverters to gather data pertaining to site conditions that will affect ultimate screening design (see Task 1.2 for more information).

Coordination with landowners will be necessary to ensure that new fish screens are only pursued where the landowner is a willing program participant.

Subtask 1.2 Conduct Cultural Assessment

A cultural resources analysis will be performed to identify areas of high sensitivity that may be affected by construction of any required project element. Existing data records and information will be reviewed and both federally recognized and currently unrecognized Native American tribes within the region will be consulted.

The results of previous cultural resource studies and recorded cultural resources in the records search area will be plotted on 7.5-minute topographic quadrangles. Based on this analysis, an assessment will be prepared to address the sensitivity of the project elements with respect to cultural resources.

Subtask 1.3 Establish Screening Design Criteria

The design of fish screens can vary substantially; as such, it is important to design criteria that will be used to determine which type of screen is appropriate for each diversion. According to the National Oceanic and Atmospheric Administration (NOAA), swimming ability of fish is a primary consideration in designing a fish screen facility (NOAA 1997). Further, information from NOAA indicates that the swimming ability of fish is variable based upon a multitude of factors, including: species, physiological development, duration of swimming time required, behavioral aspects, physical condition, water quality, temperature, lighting conditions, and many others.

In addition, for practical design purposes, design criteria should take into account factors about the diversion, such as:

- Location
- Size
- Piping material

- Average flow
- Diversion capacity
- General conditions (age, condition, etc.)

Subtask 1.4 Screening Design

This task will include execution of a design analysis to consider cost, environmental, permitting, technical, operational, and other programmatic differences of various screening mechanisms. The screen types to be considered in the alternatives analysis will be relevant to the diversion being considered and may vary between diversions. The alternatives analysis should result in a preferred alternative that is selected based upon the design criteria and the type of diversion being screened (refer to Task 1.2 for more information).

Once an alternative has been selected, final design should be completed to establish formal construction and operations that respond to the unique characteristics of each diversion.

Task 2. Funding Assessment

Upon finalizing a design for each diversion, an evaluation will take place to assess potential funding sources for project implementation. The assessment will include identifying and evaluating potential funding sources to determine how each potential funding source may apply to implementation tasks – the analysis will include information about who may apply (type of applicant), likelihood of success (competitiveness of each potential funding source), studies and documentation required for the application process, the potential cost of each application, and grant administration considerations.

Task 3. Prioritize Screens for Installation

Subtask 3.1 Determine a Prioritization Process

There are two commonly used methods for prioritization: quantitative and qualitative. Quantitative methods use a structured approach that often involves numerical ranking based on a set of pre-determined criteria. Qualitative approaches typically rely on discussions with stakeholders or the formation of an expert panel that provides input on what should be prioritized. Qualitative approaches can allow for consideration of unique features of individual diversions that cannot be easily classified and ranked in a quantitative scoring process. In some cases, quantitative scoring can be used to inform a qualitative approach.

The prioritization process may include the following considerations:

- Costs (Task 2)
- Size of diversion
- Access to diversion point

- Likely benefit to be realized by installing screen (reduction in number of entrained fish)
- Environmental documentation

Subtask 2.2 Implement the Prioritization Process

Once a prioritization process has been identified, all diversions being considered will undergo prioritization. This will provide a ranked list, including diversions with the highest priority. Once the prioritization has taken place, adjustments as necessary will be made to the list

Task 4. Screen Installation

Subtask 4.1 Environmental Permitting

This task involves securing necessary permits to install fish screens. Permitting will need to be in compliance with the Fish Screening Criteria of the California Department of Fish and Game, as well as National Marine Fisheries Service (NMFS) Fish Screening Criteria that may vary based upon the types of fish for which screens are being installed. It is anticipated that at a minimum, the following types of permits will need to be acquired from the below-listed agencies:

California Department of Fish and Wildlife

- 1603 Lake and Streambed Alteration Agreement

Regional Water Quality Control Board

- Clean Water Act 401 Water Quality Certification

United States Fish and Wildlife Service and NMFS:

- Section 7 Consultation

Subtask 4.2 Installation

Screen installation will take place in accordance with final design and environmental permitting specifications. It is anticipated that screening will take place at dry points in the year when diversions are not active. If necessary, custom screens will be developed and installed per final design specifications.

Subtask 4.3 Monitoring

Upon final installation, screens will need to be monitored for at least a full year. Depending upon the location of screens, monitoring may require divers to go underwater and videotape fish screens to determine how well they are operating. If necessary, adjustments will be made to ensure that screens are functioning properly and in accordance with design specifications.

Budget

The budget for this project is dependent on the number of fish screens installed and the size of each fish screen. Costs are estimated at \$10,000 per cubic feet per second (cfs); thus, screening a 10 cfs diversion would cost \$100,000. Costs associated with the project are broken down as follow:

- Preliminary Study and Prioritization: \$300,000
 - Assumes a cost of approximately \$5,000 per diversion to assess each of the estimated 60 remaining unscreened diversions.
- Implementation: \$10,000/cfs
 - Total cost is variable and dependent on total cfs to be screened.
 - Information from Trout Unlimited indicates that there are approximately 1,500 cfs that remain to be screened, which would result in a total implementation cost of \$15,000,000 to screen all remaining unscreened diversions (estimated to be 60 diversions).
- **Total Project Costs: \$300,000 + \$10,000 * cfs to be screened**

References

National Oceanic and Atmospheric Administration (NOAA). 1997. Fish Screening Criteria for Anadromous Salmonids. Available:

[http://www.westcoast.fisheries.noaa.gov/publications/hydropower/southwest region_1997_fish_screen_design_criteria.pdf](http://www.westcoast.fisheries.noaa.gov/publications/hydropower/southwest_region_1997_fish_screen_design_criteria.pdf)

Sacramento Regional County Sanitation District (SRCSD). 2012. South Sacramento County Recycled Water Feasibility Study – River Intake Alternatives Analysis.