

Executive Summary

The Sacramento River Small Diversion Fish Screen Program is a collaborative effort to screen small agricultural diversions along the Sacramento River involving landowners, Family Water Alliance, National Fish and Wildlife Foundation, Natural Resource Conservation Service, National Marine Fisheries Service, Bureau of Reclamation, U.S. Fish & Wildlife Service, California Department of Fish and Game, CALFED, and private foundations. The program has been in place for two years. Currently, four diversions have been screened, and another three diversions will have screens in place by the end of 1999. It is anticipated that by the end of 2000, an additional five screens will be placed between Redding and Sutter County.

The first four diversions were screened with cylindrical water purge systems that were considered off-the-shelf technology. Of these four diversions, three of the systems failed within the first year and half of operation. Two of the systems imploded rendering the screens completely inoperable. One screen suffered a bearing malfunction, however, the screen remained cylindrical, and when the bearing was replaced functioned properly. It continues to function today, and an automatic cycling system was added to ensure that fine silt would not build up in the bearings during the period of time when the pump is not in operation.

When this program started it was assumed that off-the-shelf technology would be sufficient when screening small diversions (under 40 cfs), yet, this experience has taught all of the individuals involved with the program that there are many aspects to fish screening that were not previously anticipated, and further monitoring, research, and development is necessary in order to find a screening solution that will provide farmers with a reliable and economic fish screen.

In order to assist in the finding solutions to the fish screening problems that have occurred in the Sacramento River, Family Water Alliance is proposing a mechanical monitoring and maintenance program that will enhance the existing fish screen installation program. This program will consist of three parts: 1.) Modifying the existing fish screens to include a pressure sensing device that will shut down the pump before catastrophic screen failure occurs, or pump cavitation causes the loss of a pump, 2.) Twice yearly maintenance checks on the installations, and 3.) Compilation of data to be used to aid in future screening decisions, and development of a pre-installation checklists and post installation maintenance checklists that are site specific.

Since each site is unique in many of it characteristics a one size fits all approach will not work even for small screens, however, the information gathered from these maintenance checks can be used to determine common

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variables, and then be used when examining future sites to help determine the best screening technics. This information will be shared with all interested agencies, or private individuals that are involved in the screening of diversions in California.

Project Description

Proposed Scope of Work

The water purge systems uses a rotating bar to spray debris from the surface of the screen. These rotating bars use either a water lubricated bearing or a sealed bearing. There have been difficulties with both types of bearing in the stretch of the river going through Colusa County due to the high load of fine sediment in the water. The existing screen installations require the addition of pressure sensors that will recognize a change in the water pressure inside the screen caused by a malfunctioning cleaning mechanism. This change in pressure will send a relay to shut the pump down and notify the landowner that there is a problem with the system. This will allow the landowner to address the problem before additional damage is done to either the pump or the screen. Family Water Alliance will document the cause of the malfunction, the river conditions, and any repairs that were necessary. This information will be added to the site chronicle to be used both in the development of pre-installation and maintenance checklist. The information gathered will aid in decisions for the future use of water purge systems.

There will be two USBR (Universal Stream Bottom Retrievable) fish screens in place in Colusa County by the end of April. These screens use an air purge cleaning system that has no moving parts. We are optimistic about the reliability of this screen, but the system is to date un-tested for long-term reliability in true river conditions. With this in mind, it is difficult to anticipate what problems may be encountered at these sites. The mechanical monitoring will allow independent research and documentation on the screen, along with the development of pre and post maintenance checklists.

In order to assure the proper functioning of all of the fish screens, Family Water Alliance proposes a twice yearly inspection, and preventive maintenance check. This maintenance check will be performed by a private company that is specially equipped to inspect and repair any minor damages to the fish screens. This company will be proficient in the installation of fish screens, have certified divers on staff, and also have access to all of the necessary equipment for the removal and repair of the screens if necessary.

The cost of crane rental adds exorbitant amounts to the cost of maintaining a fish screen, moreover, bank conditions often hinder safe access for divers, or the removal of malfunctioning screens in a timely manner, and there are environmental impacts associated with using a crane. To help