Long-term Protection for Fisheries

Glenn-Colusa Irrigation District (GCID) has historical water rights on the Sacramento River dating back to 1883, and was one of the first large-scale agricultural water users. The District conveys Sacramento River water through irrigation canals to approximately 141,000 acres of valuable, productive agricultural land. In addition, GCID delivers water to 20,000 acres of critical wildlife habitat comprising the Sacramento, Delevan, and Colusa National Wildlife Refuges.

GCID's Hamilton City pump station is located approximately 100 miles north of the City of Sacramento. The pump station is located on an oxbow off the main stem of the Sacramento River. River flow passes through the fish screens where a portion of it is pumped into GCID's main irrigation canal. The remaining flow in the oxbow passes by the screens and returns to the main stem of the Sacramento River.

GCID diverts a maximum of 3,000 cubic feet per second (cfs) from the Sacramento River, with the peak demand occurring in spring, often at the same time as the peak out-migration

Aerial photo of the District facilities

The most important objective of the GCID Fish Screen Improvement Project is to protect fish and wildlife, while ensuring a reliable water supply to District users.

GCID
GLENN-COLUSA IRRIGATION DISTRICT

of juvenile salmon. Four runs of Chinook salmon (fall, late fall, winter, and spring) use the Sacramento River. In general, all four runs have declined over the past 25 years. One reason for the decline was the lack of fish screens, or in the case of GCID, poor performance of an existing 20-year-old drum screen.

Because GCID diverts up to 25% of the Sacramento River flow at Hamilton City, GCID pumping operations were identified as a significant impediment to the downstream juvenile salmon migration. Helping fish pass GCID's main diversion facility has been a major challenge in sustaining this important agricultural area. Improving fish passage in the Sacramento River is one of the primary elements in the restoration plans being developed for the anadromous fisheries in the Central Valley by both the U.S. Fish and Wildlife Service and the California Department of Fish and Game.

In 1992, GCID proposed the construction of an interim flat-plate screen across the trashrack in front of the rotary drum screens. The interim flat-plate screen was installed in August 1993. The bypass return channel was also altered to reduce the time it takes for fish to return to the river, thereby enhancing fish protection. Biological monitoring of the interim measures amply demonstrated that the flat-plate screen is a viable method of ensuring long-term fish protection in the Sacramento River.

The design of the long-term screen solution was based, in part, on the interim measures implemented by GCID, with federal assistance from the U.S. Bureau of Reclamation (USBR). A cooperative effort, involving GCID, California Department of Fish and Game, the USBR, the U.S. Army Corps of Engineers, the California Department of Water Resources, NOAA Fisheries, (formerly the National Marine Fisheries Service), U.S. Fish and Wildlife Service, and California State Reclamation Board, resulted in the construction of a state-of-the-art fish screening facility at the Hamilton City pump station.

The GCID Fish Screen Improvement Project minimizes loss of all fish in the vicinity of the pumping plant diversion and meets current fish screening criteria, while maximizing GCID's capability to divert water to meet its water supply delivery obligations.

Project Objectives

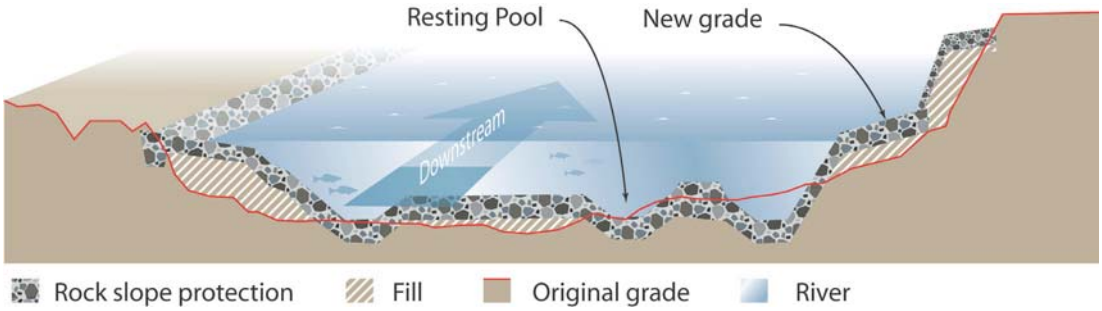
- Ensure minimal impact of water diversion on fish and wildlife
- Make entire system fish-friendly
- Maximize GCID's capacity to pump water to meet delivery obligations

Project Funding

The $76 million project includes the cost of the fish screen, gradient facility, planning, design, environmental planning, and evaluation and monitoring.

The Central Valley Project Improvement Act (CVPIA) expressly authorized the fish screen improvements at GCID. The CVPIA allocated 75% of the cost to the USBR and the remaining 25% was divided equally between GCID and the State of California.

Beneath the Gradient Facility Surface



Cross-section view of the gradient facility, which emulates naturally occuring riffles in the Sacramento River

View of fish screen facility from Montgomery Island

Aerial photo of District facilities, including the gradient facility, looking south

The U.S. Army Corps of Engineers designed and managed construction of the gradient facility.

Project Components

Fish Screen Extension

The USBR was responsible for the design and construction of the screen extension portion of the project. The new screen consists of an approximately 620-foot extension to the existing interim fish screen, upper oxbow channel improvements, two of the three bypass entrance structures, a new screen wiper (cleaning) assembly, and a flow baffling system to ensure necessary uniform hydraulic conditions across the screen. The screen cleaning wipers and screen baffling system were designed in cooperation with GCID consultants. Construction began in May 1998 and the major components were completed in September 2000.

Gradient Facility

The gradient facility provides fish-friendly hydraulic conditions designed to ease upstream and downstream fish passage, while providing adequate depths for recreational boats.

The in-river portion of the gradient facility includes sheet piles at specified elevations and intervals in the riverbed. The buried sheet piles are surrounded and covered by rock slope protection. Placement of rock slope protection upstream and downstream along both the river channel and river levee banks helps maintain river channel alignment through the in-river portion of the facility.

Other Project Features

Modifications to the existing interim screen involved one of the new bypass entrances, a new screen cleaning system, flow control baffles,

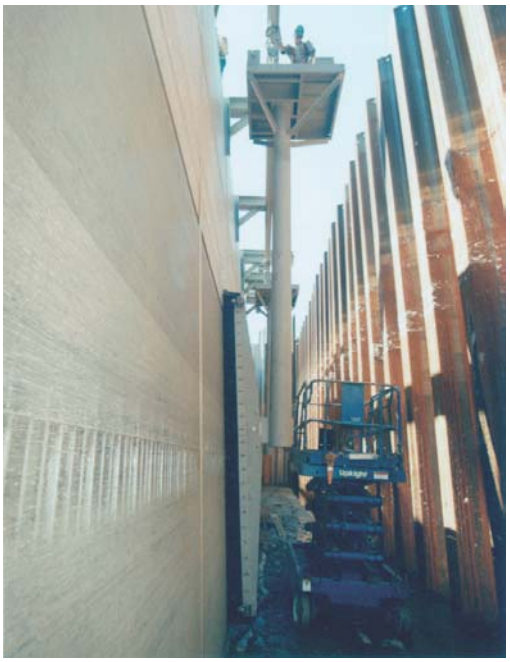
Major Project Attributes

- 620-foot-long fish screen extension
- Screen cleaning assembly
- Channel improvements
- Gradient facility

GCID
GLENN-COLUSA IRRIGATION DISTRICT

The water control structure resembles a long-throated flume to balance hydraulic conditions

54-inch steel pipe with mortar lined and coated bypass piping to allow tired or stressed fish to bypass structure and be routed downstream of the screens



One of eight sweep-cleaning masts with screen-cleaning brushes attached

View of poppies in pump station forebay; fish screen in background

structural support enhancement, extension of existing concrete abutments, and completion of the concrete deck.

The lower oxbow channel and training wall improvements help meet hydraulic criteria across the facility. The forebay was enlarged to accommodate the new screen.

In addition, GCID designed a water control structure (weir) to maintain the water elevation at the screens and a removable bridge to allow access to Montgomery Island for routine dredging. These elements were constructed under the USBR's contract.

This significant project represents the culmination of almost 13 years of effort by numerous agencies and countless individuals.

Design Challenges

- Ensure a fish-friendly system
- Maintain water deliveries during construction
- Guarantee environmental compliance by conforming with permitting requirements and construction timing windows

According to GCID Board President Don Bransford, "GCID is committed to obtaining lasting protection of anadromous fisheries at its diversion. The District's goal is to minimize the impact of its diversion on fish and wildlife, while ensuring a reliable water supply to its farmers. The completion of the Fish Screen Improvement Project is a milestone in the District's history."

W05200301RDD_06 (6/1/03)