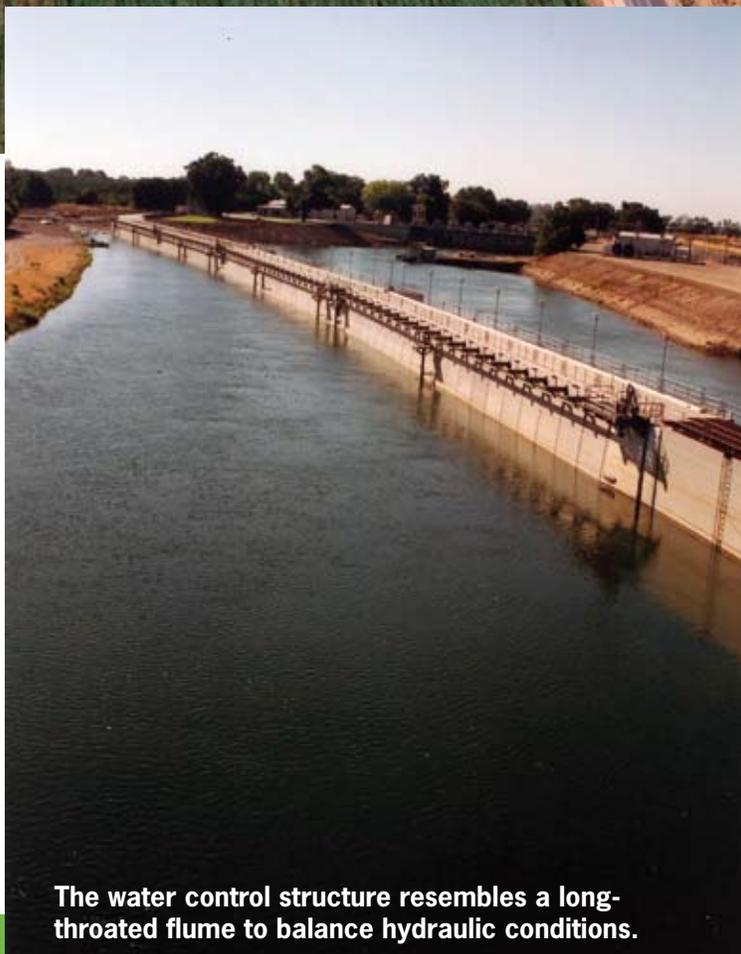


Aerial photo of district facilities, including the gradient facility.



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

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*"The construction of the fish screen and gradient restoration facility enabled GCID to continue its mission of delivering water to agricultural land in the area."*

*- Thad Bettner,  
GCID General Manager*

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# Pioneering Fish Screen and Gradient Restoration Facility Serve as Example for Large-Scale Recovery Projects

By **Thad Bettner**

California's Glenn-Colusa Irrigation District (GCID) diverts a maximum of 3,000 cubic feet per second of flow from the Sacramento River, primarily during the spring growing season. This water is then conveyed through miles of irrigation canals to around 141,000 acres of high-value farmland, as well as 20,000 acres of critical wildlife habitat.

The early spring growing season is also the peak out-migration of juvenile salmon on the river. In general, all four runs of Chinook salmon have declined over the past 25 years and a lack—or poor performance—of fish screens was an oft-cited reason by 1991, when a federal court injunction halted GCID's ability to pump water from the Sacramento River to provide to its water-righted acreage. Eventually, a stipulated agreement was reached to ensure the continued availability of irrigation water for this important agricultural area. However, more recent data have shown that river diversions are not quite as significant an impact as previously thought compared to other stressors.

In August 1993, GCID replaced a 20-year-old drum screen with an interim, 1,100-foot flat-plate screen at its main diversion structure, which had a history of poor performance. It also altered the existing bypass return channel to reduce the time it takes fish to return to the river. Monitoring after installation demonstrated that the flat screen was a viable method to ensure fish protection on the river.

However, the interim solution was only the precursor to a far larger project. As part of the congressionally authorized Central Valley Project Improvement Act, the installation of a new, permanent screen was proposed. Along with the construction of a gradient restoration facility, and associated planning, design, evaluation, and monitoring, project costs were estimated to be \$76 million. Federal funding amounted to 75 percent of project costs with the remaining 25 percent split evenly between the state and GCID.

Construction began on the new fish screen in May 1998, and it was complete by September 2000.

Reclamation was responsible for the design of the new screen, with GCID consultants cooperating throughout the planning and design process. Ultimately, a 620-foot extension to the interim screen was engineered, in addition to channel and bypass structure improvements, a new screen cleaning assembly, and a flow baffling system that ensures uniform hydraulic conditions across the screen.

The associated gradient restoration facility also produced strong returns. A major reason for the old drum screen's loss of functionality was degradation of river gradient from flood events dating back to the early 1970s. By the late 1980s, water surface had decreased by 3 feet at GCID's main diversion structure, leaving much of the old fish screen out of the water.

The goal of the new facility—designed and constructed by the U.S. Army Corps of Engineers—is to ensure that the river gradient does not continue to degrade, and the new fish screen does not suffer the same plight as its predecessor. The facility also allows for safe and effective fish passage by ensuring adequate flow velocity past the screen and conditions that enable the bypass system to safely conduct fish downstream under gravity flow.

Overall, the construction of the fish screen and the gradient restoration facility enabled GCID to continue its mission of delivering water to agricultural land in the area. I encourage other managers involved in similar situations to remain actively engaged in the process. Costs, permitting, and ensuring the flexibility of a project going forward should river operations or conditions change are critical to the continued effectiveness of restoration efforts. Plans can often change over the long life of a major project, and preparedness and flexibility is always the best defense.

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