

**HYDROACOUSTIC SALMON GUIDANCE PROJECT
GEORGIANA SLOUGH
December 1994**

BACKGROUND

Juvenile Chinook salmon migrate out to the ocean from spawning and rearing areas in the Sacramento and San Joaquin Rivers and their tributaries. Some juvenile salmon enter the central Delta through Georgiana Slough.

Studies have shown a higher mortality rate for fish entering the interior Delta. Higher mortality rates may result from increased predation, longer distance travelled to reach the ocean, and direct and indirect losses associated with the State Water Project and the Central Valley Project export pumping and other diversions in the Delta.

This project has the potential to help protect and restore salmon populations (such as the endangered winter-run) which have declined over the last few decades.

THE PROJECT

The project, conducted at the fork of Georgiana Slough and the Sacramento River, is evaluating the feasibility of using underwater sound to increase survival of juvenile Sacramento Valley Chinook salmon during their outmigration to the ocean.

PURPOSE

The 1994 study gathered data primarily about:

- effectiveness of the barrier in deterring Chinook salmon smolts from entering Georgiana Slough;
- potential blockage or delays in upstream migration for adult Chinook salmon, striped bass, and other species; and
- delayed effects of barrier exposure (such as increased susceptibility to predation, mortality, etc.) on Chinook smolts and other fish.

During evaluation, a pair of boats towed a 25' x 6' opening net between them (Kodiak trawl) at several locations upstream and downstream of the barrier site. Trawls were conducted four consecutive days each week (two days with the system on and two days with the system off). Collections were coordinated with the release of about 12 million hatchery-reared salmon from the Coleman National Fish Hatchery and the natural fall-run salmon outmigration. Additional releases of tagged and/or marked fish aided the evaluation of the barrier's effectiveness.

Testing began April 5 and ended June 30. Additional tests on adult migration salmon were completed between October and November 15, 1994.

EQUIPMENT

In the river, 21 bright orange marker buoys were anchored about 30 feet apart. Under each buoy, at a depth of about 12 feet, was an underwater speaker-transducer, each driven by an 800 watt amplifier. Originally developed for use by the Navy, the speakers were connected to an onshore computer-controlled sound generation and monitoring system.

The transducers produced a low-frequency cyclic sound signal which was designed to guide the young salmon away from the entrance of Georgiana Slough.

PARTICIPANTS

The project was a multi-agency effort under the auspices of the Interagency Ecological Program. The San Luis and Delta-Mendota Water Authority took the lead with funding from the California Department of Water Resources (DWR) and the U. S. Bureau of Reclamation. Agencies participating in the field work included DWR, the California Department of Fish and Game, U. S. Fish and Wildlife Service, U. S. Geological Survey, and Reclamation Districts 556 and 563. The Boat House Marina provided logistical support.

COST

The 1994 project cost an estimated \$1.6 million. The Department of Water Resources and the Bureau of Reclamation provided the majority of funding from money collected from State and federal water contractors for water delivered from the Delta. The San Luis and Delta-Mendota Water Authority, representing federal water contractors, also provided technical assistance and funding.

FUTURE PLANS

Due to the project's success to date, the Department of Water Resources has applied for permits for a longer term installation in 1995.

REPORTS

A final report is to be released to the public in December 1994. If you would like to receive a copy, or have questions, please contact:

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**FACT SHEET
ON
STATE WATER PROJECT'S
ENVIRONMENTAL PROGRAMS**

A major component of the Department of Water Resources (DWR) mission is to help the State manage its water supplies in an environmentally sound manner. This mission applies to DWR's operation of the State Water Project (SWP) which provides water for urban, agricultural and industrial water users in the Feather River service area, the San Francisco Bay area, the San Joaquin Valley and southern California.

Following are some examples of the SWP's environmental programs which help achieve our overall mission. Details are available from DWR staff on the tour. Approximate costs of some of these activities are indicated. (The programs are not listed in any particular order.)

SWP FUNDED PROGRAMS

- **FISH HATCHERY** - Construct, maintain and fund operation of the Feather River Hatchery to offset the loss of salmonid spawning habitat due to the construction of Oroville Dam.
(Construction costs = \$5.7 million; annual operations costs = \$1 million)

- **FISH PROTECTION FACILITY** - Construct, maintain and fund operation of the Skinner Fish Protective Facility to minimize losses of fish at the intake to the California Aqueduct.
(Construction costs = \$20 million; annual operations costs = \$1.7 million)

- **FISH ENHANCEMENT PROGRAMS** - Implement a 1986 DWR/DFG agreement to offset the direct losses of fish at the intake to the California Aqueduct.
Examples: placing spawning gravel, building fish screens, purchasing fish, etc.

- **FISH STUDIES** - Participate in and partially fund the Interagency Ecological Program to collect and interpret data needed to understand changes in the Bay-Delta system and help sort out the roles of the State and federal water projects in any observed changes.
Examples: fish sampling, water quality sampling, etc.
(Approximate annual costs = \$5 million)

- **ENVIRONMENTAL SENSITIVITY TO MAINTENANCE OF SWP** - Work with fish and wildlife agencies to develop plans for project operations on the Aqueduct right-of-way which allow necessary maintenance but offset or minimize impacts on the wildlife habitat values of the SWP right-of-way.
Examples: substitute selective mowing for burning grasses, schedule work during least disruptive times to habitat, etc.

- **DBEEP**

- **SUISUN MARSH ENHANCEMENT** - Participate with Department of Fish and Game and others to develop and implement a program to maintain valuable brackish water habitat in Suisun Marsh.
(Facilities costs = \$33 million; annual costs = about \$2 million)

PROGRAMS FUNDED FROM OTHER SOURCES

- **URBAN STREAMS** - Administer funding and monitor progress for California's urban streams restoration program.
- **SUPPORT OF SACRAMENTO RIVER FISH** - Provide staff support and leadership for the Upper Sacramento River Anadromous Fisheries and Riparian Habitat Restoration Program and the San Joaquin River Management planning efforts.
- **STREAM FLOW AND WATER QUALITY STUDIES** - In cooperation with the U.S. Geological Survey and local agencies collect much of the stream flow and water quality information needed to assess California's water resources.