campaign to enable us to complete the renovations to our main research building. This renovation is underway, but is only partially funded by a major NSF Academic Research Infrastructure award and university match, and is necessary for our continued success and productivity.

With its specialized niche as an estuarine educational and research center, RTC is growing into a dynamic community of scientists with a mission and momentum. Recent activities have collectively brought a new enthusiasm to the RTC community, resulting in expanding course offerings, increasing use of the newly refitted R/V Questuary, and an upsurge in collaborative science. For more information please check out the RTC web site at ttp://thecity.sfsu.edu/~rtces.

Suisun Ecological Workgroup Update

Eliza Sater, DWR

In the 1995 Bay/Delta Plan, SWRCB directed DWR to convene an interagency workgroup to evaluate the technical basis of the Suisun Marsh water quality objectives and their effects on beneficial uses. Consequently, the Suisun Ecological Workgroup (SEW) was formed in May 1995, to recommend salinity objectives to protect the beneficial uses of the Suisun Marsh. SEW envisioned this evaluation as a two-step process. The first step involved evaluating the impact of various salinity regimes on ecosystem components, such as brackish marsh vegetation, wildlife, waterfowl, and fish. This process, though continuing, was largely completed in March 1998. Findings from these evaluations, which included identification of significant data gaps, recommendations for long-term monitoring programs, special studies, water quality objectives and protective measures for special status species, were presented at an all-day workshop in March.

SEW is now embarking on the second step of the evaluation process. The workgroup is now examining the effect of various salinity regimes on the Marsh ecosystem. SEW approached this task by crafting conceptual models of each ecosystem component and attempting to link them with an ecosystem-based conceptual model. In this way, SEW is attempting to tease apart the effects of salinity, hydrology, wetland management actions and availability of habitat on ecosystem health.

Evaluating the impact of increasing the variability of the salinity regime in the Suisun Marsh is of primary interest to SEW. Proponents suggest that a variable salinity regime may match historic conditions more closely, thus supporting native species and possibly promoting species diversity by decreasing the abundance of nonnative species that can establish competitive dominance. Concern exists, however, that the Marsh has been altered to such an extent that an increase in variability of the salinity regime may not have this beneficial effect and may negatively impact the managed wetlands in the Marsh.

To evaluate these issues, SEW has been comparing the effect of various combinations of salinity regime components. The main components being evaluated are: (1) current Suisun Marsh conditions (X2 standard, Suisun Marsh Salinity Control Gate operation, interior numeric standards for the Marsh); (2) current Suisun Marsh conditions, with actions in the proposed Suisun Marsh Preservation Agreement (SMPA) Amendment Three; (3) X2, SMPA Amendment Three limited to management actions, and limited SMSCG operations; and (4) X2, with limited SMSCG operations and no interior Marsh numeric salinity standards. The group is evaluating model data, simulating flow and salinity in the Suisun Marsh with and without gate operations, as part of this process.

Lack of available data and the confounding question of how to balance competing resource needs continue to complicate SEW's evaluation. Consequently, the workgroup is reconsidering the October 1998 deadline for completion of its final report. SEW may hold a public workshop during the late summer or early fall 1998 to present findings and draft recommendations. For more information on this workshop or the workgroup in general, please contact Eliza Sater at (916) 227-0179 or check out SEW's website at http://iep.water.ca.gov/sew/.

Chinook Salmon Passage at the Suisun Marsh Salinity Control Gates Assessed

Heidi Rooks, DWR

Resource agencies have been concerned that operating the Suisun Marsh Salinity Control Gates (SMSCG) causes a delay or may block adult chinook salmon migrating upstream through Montezuma Slough (Figure 1). A multi-agency SMSCG Steering Group was formed to address this concern, assess the information available, and propose a solution, if needed. The group completed its assessment and proposed a solution which, if all goes well, should be in place with evaluations beginning by September 1998.

The SMSCG Steering Group was formed because two items—the US Army Corps of Engineers permit for the SMSCG and the National Marine Fisheries Service Biological Opinion for winter-run chinook salmon—specify that investigations must be designed to address passage of upstream migrating adults at the SMSCG. According to the Corps permit, mitigation is to be accomplished by modifying the operation or design of the SMSCG (Figure 2).

DWR and DFG, in conjunction with the Steering Group, conducted tagging studies in 1993 and 1994 to determine the success and duration of adult fall-run chinook salmon passing through the SMSCG. These experiments were conducted to determine which feature or operational configuration was responsible for delaying passage (Tillman et al. 1996; Edwards and Urquhart 1996). After considering potential population-level impacts (DWR 1997a), the Steering Group concluded from the studies that operation of the SMSCG delays and blocks the upstream migration of all runs of chinook salmon along this migratory route, at a minimum, for 12 hours each tidal cycle (6 hours two times a day), and delays passage even when just the flashboards are installed and the three radial gates are held open.

The Steering Group agreed that there are two objectives for a solution to the blockage: (1) to provide an opportunity for all races of chinook salmon and steelhead to pass unimpeded (when the flashboards are installed and the gates are operating); and (2) to not compromise the ability of DWR and USBR to meet SWRCB channel water salinity standards.

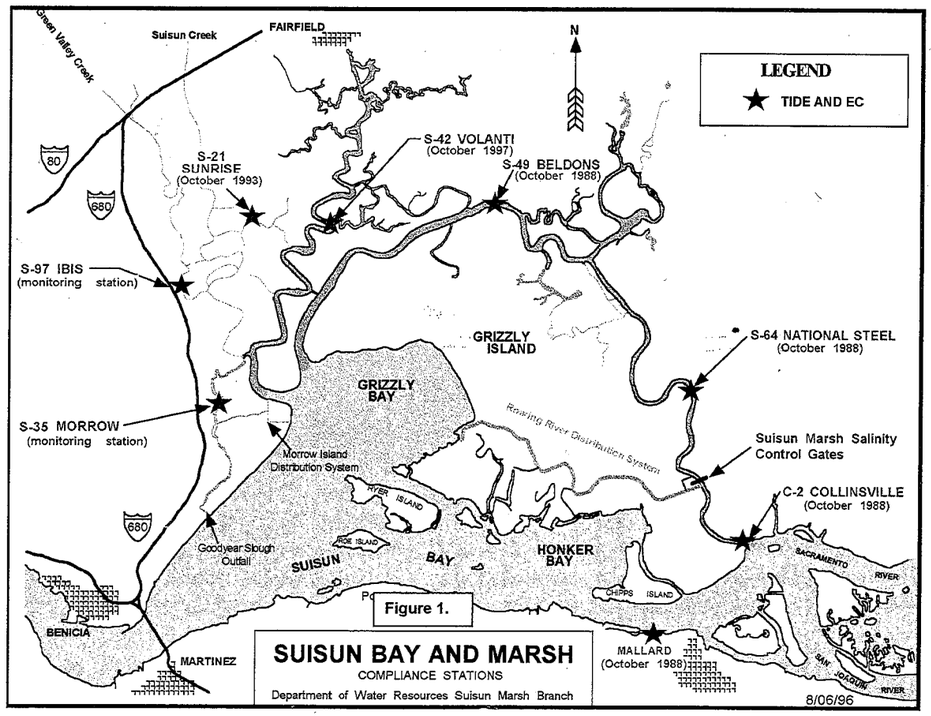

Figure 1.

The group examined a number of options for providing unimpeded passage including: (1) modifying the flashboards with horizontal slots, horizontal holes, and vertical holes; (2) a fish ladder; and (3) modifying gate operations (DWR 1997b). After much evaluation and discussion, the group concluded that the horizontal slot option was likely to succeed, and decided on two slots, each three-feet high, the depths of which were decided based on the best available information. By using spacers to create the slots between existing flashboard sections, there is an opportunity to evaluate the modification without permanently changing the flashboards themselves, making it fairly inexpensive to implement (Figure 3).

The modified flashboards will probably reduce the effectiveness of the SMSCG in controlling salinity, but the extent of this has not been field tested. However, DWR Suisun Marsh Planning staff has evaluated channel water salinity compliance with the different flashboard modifications using the DWR Suisun Marsh Delta Hydrodynamics and Salinity Model. The results over 73 years of hydrology (1922-1994) showed that the effectiveness of the SMSCG would be reduced, however exceedences would be infrequent and minimal (DWR 1998). With the horizontal slot option, the modeled increased exceedences in salinity standards occurred principally in October through February, by no more than 2 milliSiemens/cm.

Monitoring will be used as the basis for an adaptive management process in determining whether this solution will sufficiently meet the objectives of adult salmon passage and salinity compliance. DWR and DFG, in conjunction with the Steering Group, is proposing to monitor adult fall-run chinook movement though the SMSCG during three operational phases: (1) when the gates are not operating (flashboards out and gates held open); (2) during full-bore gate operation; and (3) during full-bore gate operation with the modified flashboard structure installed. The evaluation is proposed for three consecutive control seasons (October through May), with the fish tagging to occur approximately between September 15 and October 31 of each year. The fish-tagging period is limited to the time when fall-run chinook salmon are present in the Suisun Marsh. Once installed, the modified flashboard structure will remain in place for the remainder of the control season, as long as SMSCG operation is needed.

There are a number of tasks to complete in order to begin evaluating the modification of the flashboards by this fall. These include: (1) preparing the appropriate environmental documentation; (2) petitioning SWRCB to temporarily waive, for the duration of the evaluation, salinity compliance in the Marsh in the event that salinities are exceeded during the evaluation; (3) reinitiate consultation with NMFS to resolve this issue in the winter-run Biological Opinion; and finally (4) apply to the Corps for approval of the modification of the flashboards.

For a copy of the Steering Group's summary of findings, please contact Heidi Rooks at the DWR Environmental Services Office at (916) 227-2557.

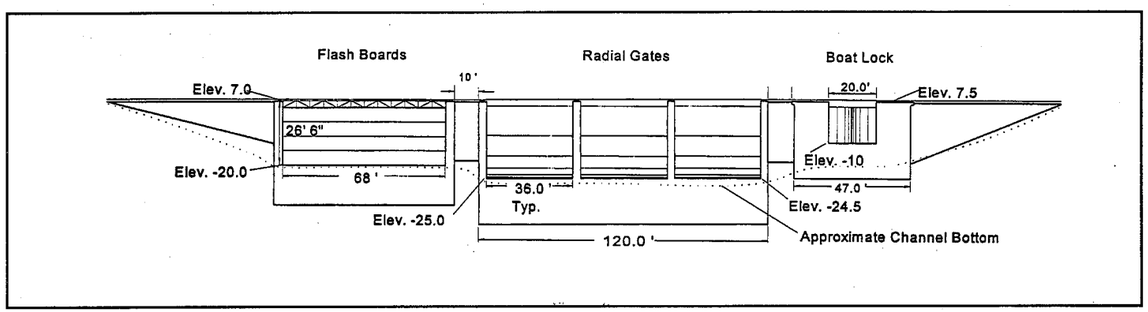

Figure 2
A cross-section view of the Suisun Marsh Salinity Control Gates in Montezuma Slough (as seen from the Collinsville upstream side).

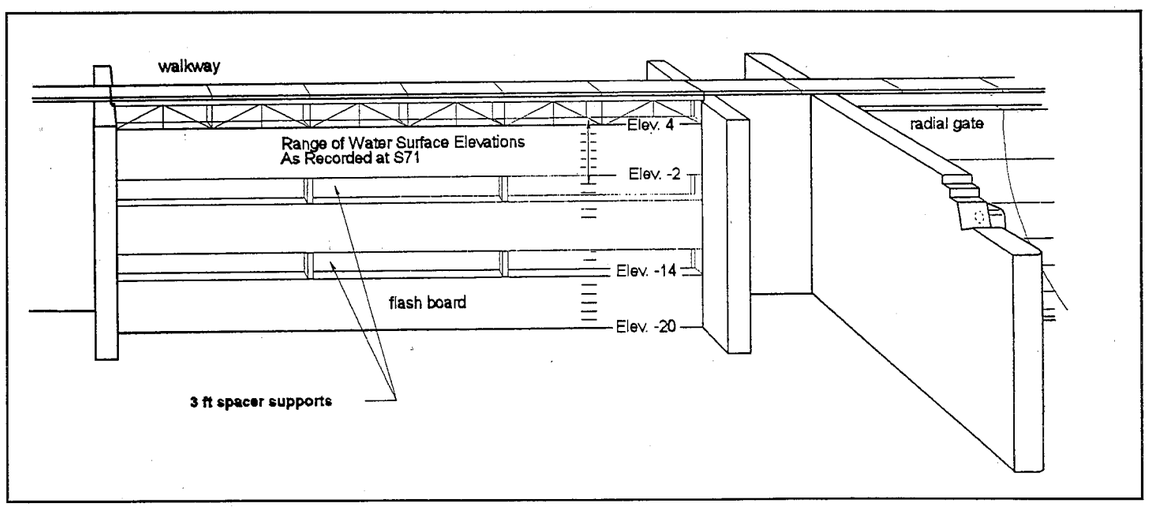

Figure 3
A view of the Suisun Marsh Salinity Control Gates flashboard modification.

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Fall Dissolved Oxygen Conditions in the Stockton Ship Channel for 1997

Stephen P. Hayes and Jeannie S. Lee, DWR

Dissolved oxygen concentrations in the Stockton Ship Channel are closely monitored during the late summer and early fall of each year because levels can drop below 5.0 mg/L in the eastern portion of the channel. The dissolved oxygen depression in this area is apparently due to low San Joaquin River inflows, warm water temperatures, high biochemical oxygen demand (BOD), reduced tidal mixing, and intermittent reverse flow conditions in the San Joaquin River past Stockton. These low dissolved oxygen levels can cause physiological stress to fish and hinder upstream migration of salmon.

As part of a 1969 Memorandum of Understanding between DWR, USFWS, USBR, and DFG, DWR usually closes the head of Old River by installing a temporary rock barrier (the Old River Closure) during periods of projected low fall outflow. The closure increases net flows down the San Joaquin River past Stockton, and helps alleviate dissolved oxygen concerns in the eastern Channel. Water Year 1997[1] was classified as wet, and the closure was not installed because late summer and early fall (August through October) flow conditions in the San Joaquin River appeared to be sufficient to alleviate concerns. Average daily flows in the San Joaquin River past Vernalis approached 2,000 cfs in August and September, and exceeded 2,000 cfs in October and November. These flows exceeded the late summer and early fall average daily flows of 1,000 cfs or less experienced in this area during drought years. In spite of the relatively high average daily flows, intermittent reverse flow conditions past Stockton existed throughout much of fall 1997.

Compliance monitoring of dissolved oxygen levels in the Stockton Ship Channel was conducted by vessel on eight monitoring runs between August 4, 1997 and November 17, 1997.[2] During each of the monitoring runs, 14 sites were sampled from Prisoner's Point in the central delta (Station 1) to the Stockton Turning Basin (Station 14) at the terminus of the channel (Figure 1). Dissolved oxygen and water temperature data were collected for each site at the top and bottom of the water column during ebb slack tide using continuous monitoring in-

1. The Water Year spans October 1 to September 30, and is numbered using the year in which it ends. Thus, Water Year 1997 began on October 1, 1996, and ended on September 30, 1997.
2. WR staff involved in sample collection included Heather Peterson, Katherine Triboli, Collette Zemitis, Scott Waller, Eric Santos, and Lloyd Brenn. USBR staff included Michelle Prouse.