Control Season 1999-2000 Progress Report

Implementation of
Suisun Marsh Mitigation Activities

in compliance with Term 10 of
State Water Resources Control Board
Decision 1641

Suisun Marsh Branch
Environmental Services Office
Department of Water Resources

October 2000

CONTENTS

LIST OF FIGURES & TABLES

LIST OF ACRONYMS

CALFED	CALFED Bay-Delta Program
CVP	Federal Central Valley Project
D-1641	Water Rights Decision 1641
DFG	Department of Fish and Game
DSM2 PWT	Delta Simulation Model-2 Project Work Team
DWR	Department of Water Resources
DWRDSM1	Delta Simulation Model-1
ECAT	Environmental Coordination Advisory Team
ERP	Environmental Restoration Project
IEP	Interagency Ecological Program
MWD	Metropolitan Water District of Southern California
NMFS	National Marine Fisheries Services
SEW	Suisun Ecological Workgroup
SMHM	Salt Marsh Harvest Mouse
SMPA	Suisun Marsh Preservation Agreement
SMSCG	Suisun Marsh Salinity Control Gates
SRCD	Suisun Resource Conservation District
SWP	State Water Project
SWRCB	State Water Resources Control Board
TECHCOMM	Suisun Marsh Technical Advisory Committee
UCD	University of California Davis
USACE	U. S. Army Corps of Engineers
USBR	U. S. Bureau of Reclamation
USFWS	U. S. Fish and Wildlife Service
USGS	U. S. Geological Survey

INTRODUCTION

In compliance with Term 10 of State Water Resources Control Board (SWRCB) Decision 1641, this is a progress report of mitigation by the Department of Water Resources (DWR) and the U.S. Bureau of Reclamation (USBR) during control season 1999-2000 (June 1999-May 2000) to offset the impacts of the State Water Project (SWP) and the Federal Central Valley Project (CVP) on Suisun Marsh channel water salinity. Figure 1 is an overview of the Marsh indicating locations of compliance and monitoring stations.

PLANNING

Suisun Marsh Preservation Agreement Activities

USBR, DWR, DFG, and SRCD began negotiating to update the Suisun Marsh Preservation Agreement in July 1995. The parties have agreed that: (1) the additional large scale facilities proposed in the Plan of Protection are *not* necessary for salinity control in the Suisun Marsh (effectiveness of the Suisun Marsh Salinity Control Gates in conjunction with the additional outflows specified in the 1995 Bay/Delta Plan); and (2) supplemental actions are needed to achieve the objectives of the SMPA.

Amendment Three Actions

1. Meet Channel Water Salinity Standards in Order 95-6 (now Decision 1641).
2. Convert S-35 and S-97 from Compliance Stations to Monitoring Stations.
3. Set Criteria for September Operation of the Salinity Control Gates.
4. Implement a Water Manager Program.
5. Update Existing Management Plans.
6. Implement a Joint-Use Facilities Program.
7. Establish Managed Wetland Improvement Cost-Share Funds.
8. Provide Portable Diversion Pumps with Fish Screens.
9. Provide Portable Drainage Pumps.
10. Realign and Stabilize Roaring River Distribution System Turnouts.
11. Establish a Drought Response Fund.

Environmental Review and Consultation Status

1. Informal ESA consultation completed with NMFS in 1998. Project description modified to include adult salmon passage study at SMSCG.
2. DFG rendered draft Biological Opinion (June 1998).
3. Draft CEQA/NEPA document distributed for public comment (June 1998)

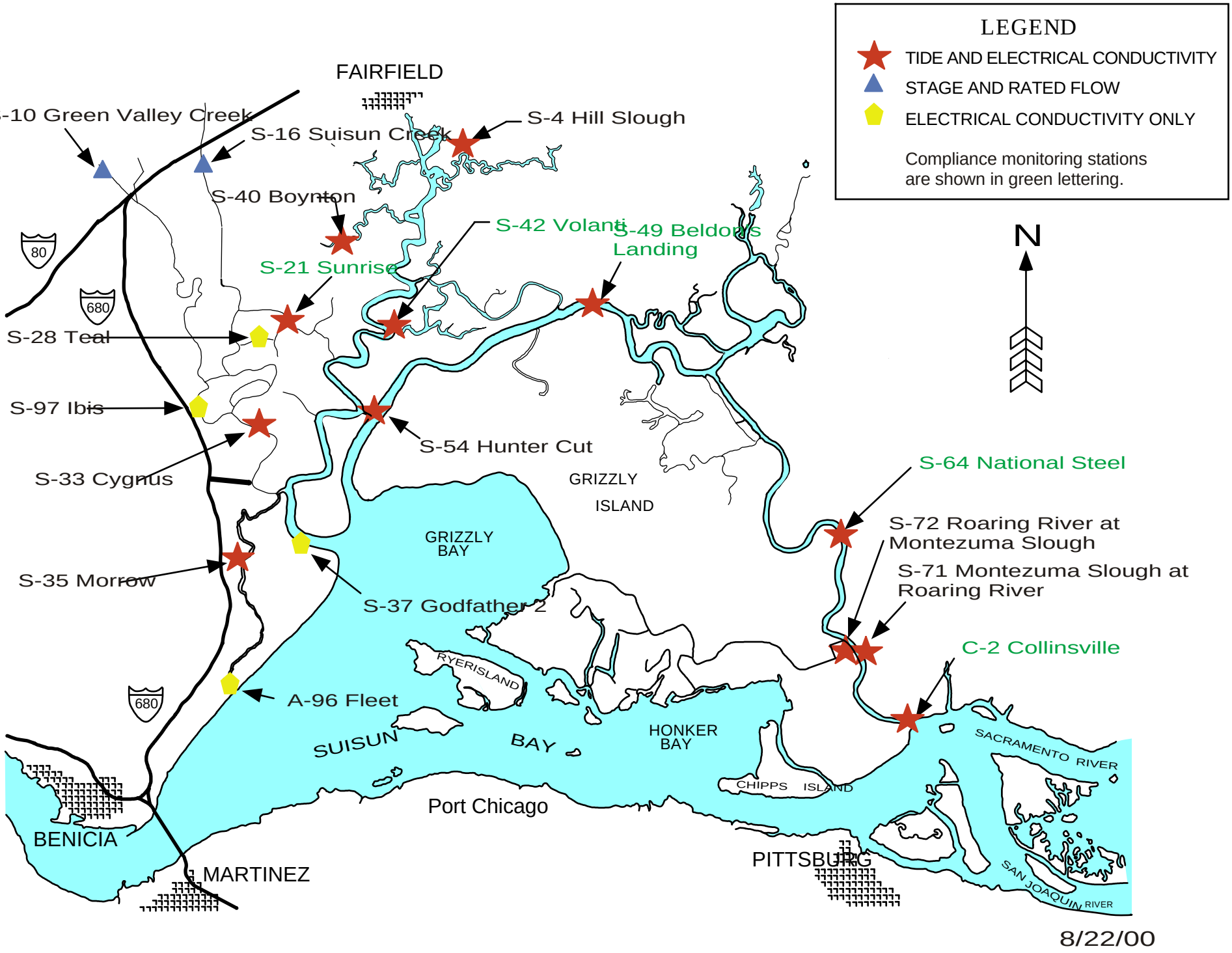


Figure 1. Suisun Marsh continuous compliance monitoring and other monitoring stations.

4. Final Biological Assessment submitted to the USFWS (October 1999).
5. Consolidated formal ESA consultations for Amendment Three and the renewal of the SRCD/DFG Regional General Permit for maintenance activities because RGP required for implementing Amendment Three actions.
6. USBR and USACE jointly initiated formal ESA consultation (October 1999).
7. USFWS is delinquent is rendering a draft Biological Opinion (due Feb. 2000).
8. USFWS wants 7 measures added to avoid a "Jeopardy Opinion" (July 2000).
9. SMPA Negotiation Team will consider the measures in September. Technical Team digesting measures to prepare briefing packet for Negotiation Team.

Amendment Three Implementation

The SMPA parties plan to implement Amendment Three after the USFWS renders its final Biological Opinion (perhaps by the end of 2000).

SMPA Environmental Coordination Advisory Team

The Suisun Marsh Preservation Agreement Environmental Coordination Advisory Team (ECAT) was convened to ensure compliance with conditions, mitigation, and monitoring responsibilities specified in the Suisun Marsh Preservation Agreement. ECAT includes staff from DWR, USBR, DFG Grizzly Island, DFG Central Valley Bay-Delta Branch, and SRCD. USFWS, National Marine Fisheries Service (NMFS), and USACE staff have participated on the ECAT in an advisory role. ECAT documents compliance with Biological Opinion measures and permit terms, and provides reports to the SMPA Coordinators.

ECAT met monthly during 1999. Topics discussed included, but were not limited to, SMPA Amendment Three and Section 7 Consultation, Morrow Island Fish Screen Alternatives, Suisun Marsh monitoring efforts, and property acquisition for tidal restoration. Monitoring plans for the Marsh-wide vegetation survey, Island Slough, and salt marsh harvest mouse were developed and approved through ECAT.

Individual Ownership Cost Share Program

The Individual Ownership Cost Share Program is a component of the SMPA designed to assist individual landowners with water management on privately owned land within the Suisun Marsh. Funded projects include replacing, lowering, and/or enlarging drainage structures, and the purchase of pumps to assist drainage. The program began in 1987 with a 50 percent reimbursement by DWR and USBR. Participation in the program, however, has greatly increased since 1994 when the SMPA Coordinators increased retroactively the DWR and USBR reimbursement to 75 percent.

Three applications for water management projects were submitted and paid for during 1998. The total cost of these improvements was $53,482 of which $40,111 was paid to SRCD and distributed to the landowners. DWR and USBR received and SRCD paid seven additional 1998 applications. DWR and USBR have paid a total of $1,203,825 since the program began in 1987.

In addition, DWR and USBR added an additional $57,802 to the Individual Ownership Cost Share Fund to account for inflation as specified in the original SMPA. SRCD anticipates that the remaining Individual Ownership Management Plans funds will be exhausted with projects completed by October 2000.

CALFED Proposal for Tidal Wetland Restoration

In May 2000, ECAT submitted a CALFED proposal titled *Suisun Marsh Property Acquisition and Habitat Restoration* in response to the Ecosystem Restoration Programs request for proposals for fiscal year 2001 funding. A component of this proposal is a pilot program to implement the results of the CALFED Suisun Marsh Levee Breach Study.

This proposal requests $536,750 to be cost-shared with existing SMPA mitigation funds for acquisition of a seasonally managed parcel meeting specified criteria, pre-project monitoring, and a hydrologic investigation. The activities included in this proposal include phases 1 and 2 of a five phase project for tidal restoration of seasonally managed parcels in the Suisun Marsh.

Suisun Ecological Workgroup

In the *Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary, May 1995*, the SWRCB directed DWR to convene an interagency work group 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, with the purpose of recommending salinity objectives protective of the beneficial uses of the Suisun Marsh. Staff from the SWRCB, SRCD, DWR, DFG, USBR, and USFWS became the active-working participants.

In 1996, SEW became a Project Work Team under the Interagency Ecological Program. The purpose of this was to encourage other technical experts working on related topics in the Estuary to provide input to SEW and to facilitate interagency review of SEW's work. SEW established a website to post meeting summaries, work plans and products through the Interagency Ecological Program (IEP) web site at http://iep.water.ca.gov/suisun_eco_workgroup/.

Activities during 1999 focused primarily on completing the final report. Since SEW is an IEP Work Team, the final report was reviewed by IEP. SEW received

no comments from this review. The Final Report is undergoing minor revisions and will be submitted to SWRCB by October 2000. The SWRCB is expected to hold public meetings to receive comments on the final report following receipt of the report.

A draft of the final report is currently posted on the web site and will be replaced by the finalized report when completed.

Modeling Support

Suisun Marsh Planning Support for the CALFED Levee Investigation Team

The CALFED Bay-Delta program established the Suisun Marsh Levee Investigation Team (Team) to gather information on the costs and benefits of including Suisun Marsh Levees in the CALFED program, especially as they relate to CALFED Water Quality, Water Supply Reliability, and ERP goals. The Suisun Marsh Planning Section supported the Team with application of the DWRDSM1 Suisun Marsh Version model to evaluate hydrodynamics and salinity impacts of controlled and uncontrolled levee breaches in the Suisun Marsh.

Suisun Marsh Planning Participation in the IEP DSM2 Project Work Team

The Interagency Ecological Program Delta Simulation Model 2 Project Work Team (IEP DSM2 PWT) is nearing completion of a multi-agency cooperative effort to recalibrate the DSM2 model. PWT activities to date have included:

- collection of new Bay-Delta channel geometry data;
- collection of flow data at strategic delta locations;
- model testing and sensitivity analysis;
- preparation of calibration protocols; and
- active virtual participation (via email, internet, and conference calls) in calibration activities among participants.

Geometry data is available to the public at http://www.iep.water.ca.gov/dsm2pwt/geometry/. Flow data is available at http://iep.water.ca.gov/dss/. Calibration preparation includes facilities for running the model and organizing complex outputs. PWT participation in the calibration is facilitated by a web site (http://www.iep.water.ca.gov/dsm2pwt/) and an email reflector (dsm2@osp.water.ca.gov). The web site contains near real-time access to daily calibration run output, and a facility for interactive comments on each calibration run. The team is using morning conference calls to discuss current calibration output and decide on next steps.

Participants in the calibration effort include staff from DWR Environmental Services Office, DWR Planning, DWR Operations and Maintenance, USBR, U.S.

Geological Survey (USGS), UC Berkeley, Stanford, Contra Costa Water District, and MWD. The process the PWT in completing is unique -- a virtual interagency collaboration on calibration of a complex hydrodynamics and water quality model. The potential benefits are great both in terms of creating an accurate model, and generating trust and understanding about the cooperative process that created it. The PWT is working toward a September 2000 deadline for completing the calibration.

The DSM2 PWT intends to complete an enhanced calibration for both the DSM2 hydrodynamics and water quality model. A complete documentation of the PWT process will be generated. The team will also prepare a user guidelines paper on model accuracy and error bounds under various modes and time/space scales of application. The guidelines are intended to provide model users and decision-makers an indicator of model efficacy for different kinds of modeling analysis.

Suisun Marsh Technical Advisory Committee

During 1999, DWR staff facilitated four Suisun Marsh Technical Advisory Committee (TECHCOMM) meetings. Meetings are scheduled quarterly to increase staff time and resource efficiency. Representatives from federal, state, and local agencies attended the meetings. Meeting announcements and summaries were distributed to more than 60 people, including SWRCB staff. Since October 1999, TECHCOMM meeting agenda and minutes are posted on the Internet at http://www.iep.water.ca.gov/suisun/.

OPERATION AND MAINTENANCE

Suisun Marsh Salinity Control Gate Operation

Generally, the SMSCG are operated from October 1 through May 31 as needed to meet salinity standards, otherwise they are placed in an open position to minimize fish concerns related to predation and impedance. Over the years, the SMSCG operation and installation or removal of the flashboards has varied due to salinity conditions, fisheries agency requests for sensitive species concerns, or special studies and repairs.

The 1998-1999 SWRCB Annual Report discussed the first half of the control season for the SMSCG. Since Marsh conditions were relatively fresh from November 13, 1998 through May 1999, operation of the SMSCG during the second half of the control season was minimal. Although gate operations were not needed to control salinity during the second half of the 1998-99 control season, the modified flashboards were installed for data collection purposes until complete removal on April 7, 1999.

In order to measure current velocity through preliminary flashboard modifications, the gates were placed in a closed position for a several hours on February 3, 1999. The velocity test was conducted to determine a relationship between velocity and stage under tidal flow conditions through the modified flashboards for modeling and fish passage analysis.

During the 1999-2000 control season (i.e. October 1999 through May 2000), the SMSCG were operated from September 1, 1999 - March 28, 2000. From September 1 - November 9, 1999, SMSCG operation was tailored to the adult salmon passage study conducted jointly by DWR, USBR, DFG, SRCD, and NMFS.

Similar to the 1998-1999 period, the 1999-2000 operational data from during and after the fish passage study continues to be scrutinized; however, to a lesser degree than the 1998-1999 period since that data provided some insight to the opening/closing problems of the gates. The investigation continues this year with the hope that some possible resolution(s) would be recommended based on the 1998 and 1999 SMSCG operational data.

Upon completion of the 1999 Fall fish passage study, the SMSCG were operated from November 10, 1999 - March 28, 2000, to meet salinity standards as a good faith effort by DWR, despite SWRCB approval of variance on the standards during the three years of fish passage tests. The gates were operated with the modified flashboards installed since this configuration was specified in the fish passage study and as a means to gather more salinity data under the flashboards modification condition.

At the end of the fish passage test, mean high tide salinity conditions at all Marsh compliance sites ranged from 16.0 to 17.0 milliSiemens per centimeter (mS/cm), eastern to western, respectively. The need to operate the SMSCG was apparent to lower and control salinity throughout the Marsh. Within 1 to 2 days, SMSCG operations lowered mean high tide salinity at all eastern compliance sites (i.e. S49, S64, and C-2) by about 1 mS/cm per day and continued to drop daily to the end of November. Western Marsh compliance sites (i.e. S42 and S21) mean high tide salinity were also lowered from SMSCG operations; however, the response time took about 3 to 5 days due to the greater distance of the sites from the SMSCG facility.

From December 10, 1999 - January 16, 2000, salinity conditions in the Marsh were under control; however, the gates were held in the open position with modified flashboards installed to provide an additional 300 cubic feet per second (cfs) outflow for water quality concerns in the Delta.

Despite lessening water quality concerns in January for the Marsh, the gates were once again operated from January 17 - February 29, 2000 with the modified flashboards installed. This operation was required since monitoring was needed

for the Marsh stations due to the intermittent precipitation and more stringent monthly mean high tide standard (i.e. 8.0 mS/cm) from February through March.

On March 28, 2000, DWR suspended gate operation and removed the flashboards for the remainder of the control season since no water quality concerns were anticipated.

Morrow Island Distribution System Maintenance

In Summer of 1999, the Department completed the structural maintenance of the Morrow Island Distribution System by widening the north M-Line ditch levee road and restoring the C-Line outfall.

Modifications of the C-line outfall consisted of straightening the wing-walls which support the outfall culverts and flapgates. Siltation has been problematic and continues to plague the facility. A plan to permanently correct the problem is being developed and implemented.

Planning, impact analysis, and permit acquisition for the installation of the MIDS intake fish screens continued. The fish screens are required as mitigation for the project and serve to protect sensitive fisheries in the area. Discussions have focused on the most appropriate fish screen configuration(s) for the facility and surrounding managed wetlands.

Roaring River Distribution System Maintenance

The Roaring River Distribution System (RRDS) was completed and became operational in 1980. Fish screens were installed and tested on two intake culverts in 1980, and on the remaining six culverts in 1983. In 1997, the slide gates on the eight intake culverts were automated to maintain the USFWS 0.2 feet per second fish screen criteria.

During summer 1999, maintenance was conducted on sections of the levees to restore the entire RRDS levee system to the original design specifications. All the environmental clearances required to begin the maintenance were obtained by June 1999. The contractor began maintenance work on the levees on July 14th, completed work on August 31st, and a notice of Completion was sent to the regulatory agencies on September 13, 1999. Repairs consisted of:

- installing Geofoam at two levee sites;
- raising the levees to their original design heights;
- widening the levee roads to a constant width of 15 feet;
- placing aggregate base on most of the north and south levee roads; and,
- placing rip-rap at erosion prone banks.

SUISUN MARSH LEVEES

CALFED Suisun Marsh Levee Investigation Team

The CALFED Framework Agreement has directed a program for levee subventions and special projects in the Suisun Marsh following on the Team's results and recommendations. The new program will be carried out in coordination with CALFED Ecosystem Restoration Program goals for tidal wetland establishment and preservation of managed wetlands.

The Team completed a draft report in June 2000. The report includes a chapter on modeling that summarizes the approach, assumptions, and results of simulating levee breach scenarios in the Suisun Marsh. The draft report and graphical results can be viewed at www.iep.water.ca.gov/suisun/CALFEDlevee.

The levee breach scenarios were designed to answer the following two questions:

- Should Suisun Marsh Levees be included in the CALFED Levee Program?
- If Suisun Marsh levees are included in the program, are there opportunities for water quality improvement and ecosystem restoration?

The Team will continue working, with Suisun Marsh Planning support, on several activities including:

- continue to develop information using models about the impact of tidal marsh restoration on Bay-Delta hydrodynamics and salinity;
- continue outreach and information sharing with Suisun Marsh landowners;
- continue to seek peer review of modeling results through participation in the CALFED Science Conference, and Bay Delta Modeling Forum review.

Sunrise Club Levee Breach/Wave Wash Protection

A levee breach occurred at Sunrise Club (Club 405) during August 1999. The breach occurred along Frank Horan Slough on Club 405's southern levee. The location of Sunrise Club is illustrated in Figure 1.

The levee breach resulted in the complete flooding of Club 405 and exposed the interior of the club's levees to tidal action and wave erosion. The breach also affected tide and salinity conditions at Compliance Monitoring Station S-21 through tidal damping. Station S-21 is located on Chadbourne Slough just east of Club 405, as shown in Figure 1.

Wave protection, consisting of sandbags and plastic sheeting, was used by Club 405 to help protect the interior of the club's levees from erosion. The California Division of Forestry (CDF) installed wave protection materials along the inside slope of the club's levees near Station S-21 during February 2000. The wave protection near Station S-21 was requested by the Department's Suisun Marsh Branch to protect the station during a period of extreme high tides and high winds. The wave protection work by CDF was completed under the supervision of the Department's Division of Flood Management.

Multiple attempts were made by Club 405 to close the Frank Horan Slough levee breach. The breach was successful closed during August 2000.

MONITORING

Comprehensive Review of Suisun Marsh Monitoring Data

The Suisun Marsh Preservation Agreement and the Suisun Marsh Monitoring Agreement were signed in 1987 and outlined a monitoring program for data collection in the Suisun Marsh. Monitoring was conducted from water year 1985 through 1995. These agreements also stipulated that the monitoring data and the effectiveness of the agreements were to be reviewed every five years. This review was not completed in 1992, and a "Comprehensive Review" of all the monitoring data began in 1996. The monitoring program included channel water salinity, water quality, and pond stage data from managed wetlands in the Marsh, vegetation monitoring, and wildlife surveys. Data analysis and review of the draft report are complete and the final report is expected to be released in the fall of 2000.

Water Quality Monitoring and Compliance

Suisun Marsh channel water salinity standards were specified in SWRCB Order WR 98-9 for seven compliance stations. Four of these, National Steel (S-64), Beldons Landing (S-49), Volanti (S-42) and Sunrise (S-21), are located within the Marsh. A fifth, Collinsville (C-2), is located in the western Delta. DWR requested that the two remaining sites, Morrow Island (S-35) and Ibis (S-97), located in the western Marsh, be converted to monitoring stations due to the small degree of control the state water project has on salinity levels at these locations[1].

Salinity levels remained well below standards throughout the compliance period (October 1, 1998 through May 31, 1999) due mostly to sustained relatively high Delta outflow. See DWR's annual report to the State Water Resources Control

[1] State Water Resources Control Board Order 1641 dated December 29, 1999 granted an exemption from the compliance monitoring requirement for these stations. Both remain active, however, as water salinity monitoring stations.

Board titled Suisun Marsh Monitoring Program Data Summary: 1999 Water Year for details.

Water-Quality Monitoring for the SMSCG Salmon Passage Study

Separate, but coordinated water-quality monitoring efforts were conducted by DFG and DWR during the Fall 1999 SMSCG study. DFG and DWR salmon tagging field crews took water-quality measurements once every 3 hours just downstream of the SMCSG, at the salmon release site, and at the salmon collection site.

DWR carried out additional water quality monitoring which consisted of:

- three water-quality profile measurement sessions along Montezuma Slough between the Sacramento River and Nurse Slough; and,
- "continuous" water-quality measurements at Suisun Marsh Monitoring Stations S-71 (Montezuma Slough at Roaring River) and S-64 (National Steel).

The purpose of all monitoring efforts was to generally determine if dissolved oxygen and water temperature conditions in Montezuma Slough could affect the movement of salmon in Montezuma Slough during the study period. The methods and results of DFG's and DWR's monitoring efforts are summarized below.

Salmon Tagging Field Crew Water-Quality Monitoring

DFG and DWR salmon tagging field crews took water quality measurements at 3 hour intervals for about 14 hours per day on September 14-15, September 30 – October 2, and October 18-22, 1999. Crews used a Yellow Springs Instruments Model 85 handheld system and took all measurements in the center of the channel from a boat. Crews measured dissolved oxygen, water temperature, and specific conductance one meter below the water surface after the instrument reached ambient water temperatures. Water clarity was measured by secchi depth from 9 am to 3 pm.

Results from this portion of the study are not yet available. Final results are expected in February 2001.

Water Quality Profiling

Water-quality profiling was conducted along Montezuma Slough on September 24, 1999, October 4, 1999, and October 20, 1999. Each profiling session coincided with an individual study/gate operation phase.

Somewhat depressed dissolved oxygen concentrations were detected during the October 20, 1999 profiling session at several stations along the Grizzly Island Wildlife Area, downstream of the SMSCG. The cause of the depressed dissolved oxygen concentrations is unknown but may be related to the discharge of drainage water from managed wetlands into Montezuma Slough.

Continuous Water-Quality Measurements at Monitoring Stations S-71 and S-64

Measurements for specific electrical conductivity, temperature, and dissolved oxygen were taken on a 15-minute, around-the-clock basis at Suisun Marsh Monitoring Stations S-71 and S-64 during the 1999 study. The monitoring stations are located along Montezuma Slough, as illustrated in Figure 2.

Somewhat depressed dissolved oxygen concentrations were detected in Montezuma Slough at Monitoring Station S-71 during several days that the YSI 6600 was deployed at the station. Depressed dissolved oxygen concentrations were also detected at Monitoring Station S-64 from about October 15, 1999 until the end of dissolved oxygen monitoring operations at the station on November 3, 1999.

Monitoring Station Maintenance, Repair, and Enhancements

Routine maintenance, repair, and Enhancement activities for Suisun Marsh monitoring stations during water year 1998-99 included:

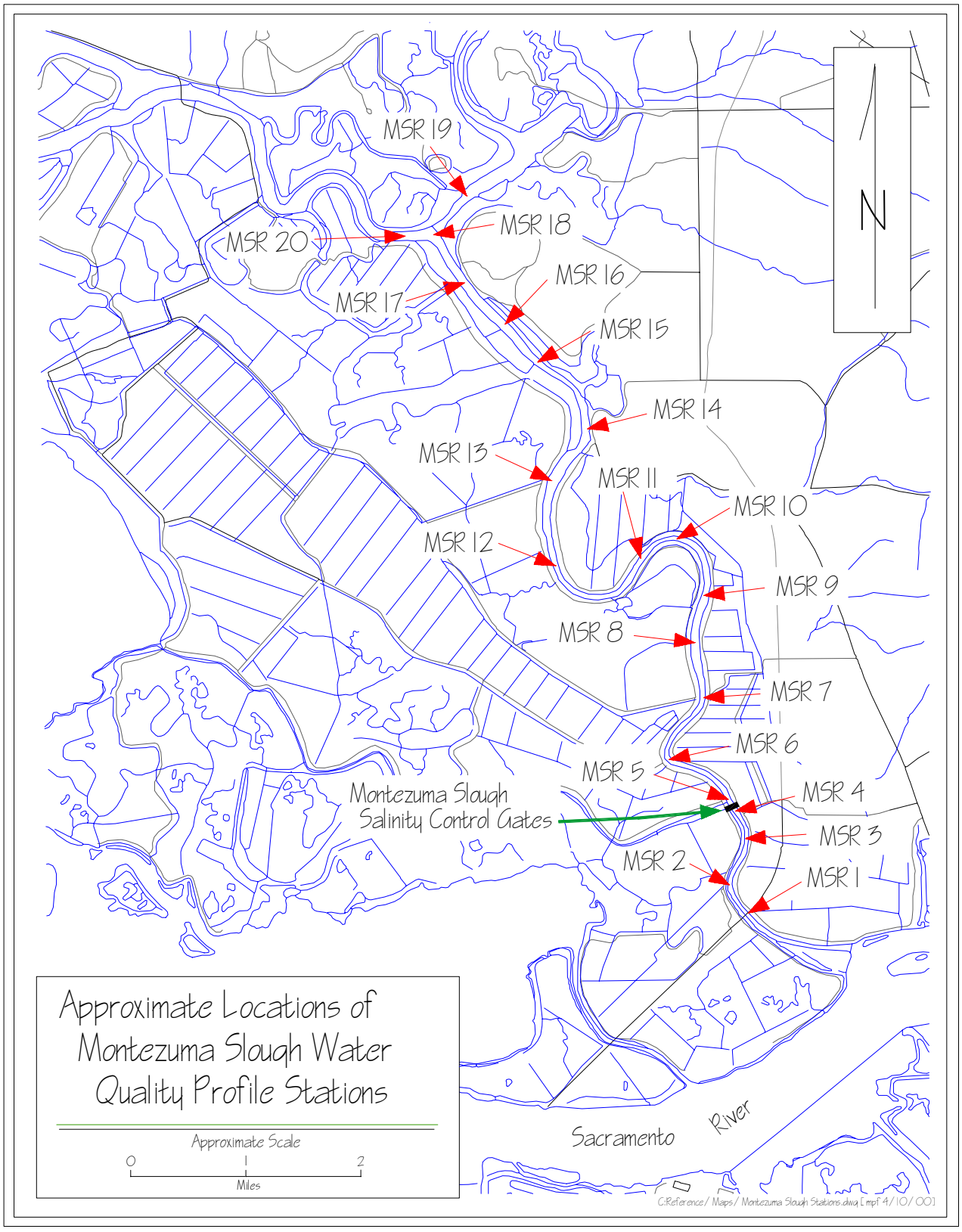
- flushing of tide wells to remove accumulated sediments;
- clearing/trimming of encroaching vegetation;
- repairing and resetting of staff gauges; and,
- replacement of expanded polystyrene probe floats with open-cell type plastic floats to protect fish from possible ingestion hazards.

Additional routine activities included minor repairs to monitoring stations and monitoring equipment.

Non-routine maintenance and repair activities included:

- reinforcement and modification of walkway and building supports for Compliance Monitoring Station S-64 (National Steel);

Figure 2. Montezuma Slough water quality profile monitoring stations



- walkway reconstruction and partial removal of the stilling well at Special Monitoring Station S-97 (Ibis);
- stilling well repair at Compliance Monitoring Station C-2 (Collinsville) ;
- installation of a new data logger housing at Special Monitoring Station S-37 (Godfather II); and,
- installation of new platform decking at Compliance Monitoring Station S-49 (Beldons).

Other monitoring station maintenance-related efforts in the marsh included:

- removal of inactive pond stage recording equipment and soil moisture sampling probes from the marsh; and,
- removal of discontinued special monitoring stations S-20 (Hollywood), A-52 (Morrow Drain), A-60 (Mallard), and A-68 (Grizzly King Intake).

Vegetation Monitoring

Under the SMPA, the DWR and USBR are required to conduct a vegetation survey of the Marsh every three years. In April 1999, a new vegetation methodology, developed by the Department of Fish and Game, was recommended by the SMPA Environmental Coordination Advisory Team and approved by the SMPA coordinators. The accepted survey methodology contained in *The Vegetation Survey for the Suisun Marsh, A New Methodology* is designed to document annual changes in preferred habitat for the salt marsh harvest mouse, and gather vegetation data in such a way that it can be used for a variety of other purposes. The vegetation mapping methodology follows a standardized protocol used by the National Park Service and USGS.

Aerial photos of the Marsh were taken in June 1999. In July 1999, DFG began photo interpretation and GIS scanning and registration. Between August and October 1999, DFG conducted vegetation sampling at randomly selected vegetation plots throughout the Marsh. A final report and vegetation map will be available by November 2000.

Wildlife Monitoring

Salt Marsh Harvest Mouse Monitoring on Conservation Areas

To meet the permit requirements of the U.S. Fish and Wildlife Service Biological Opinion for the Suisun Marsh Plan of Protection (USFWS 1981), eight areas, totaling about 1300 acres, have been set aside as SMHM Conservation Areas, and approximately 400 acres of wetland (including 100 acres of SMHM habitat) were constructed at Island Slough on Grizzly Island. In 1998, the signatories to the SMPA formed ECAT to assure future compliance with permit and monitoring requirements. The regulatory agencies, ACOE and USFWS, are regular

participants at the monthly ECAT meetings. In 1999, to meet the goal of 2,500 acres of SMHM habitat, DFG proposed to ECAT the addition of six new SMHM Conservation Areas totaling approximately 1,400 acres. The USFWS has yet to approve the six new Conservation Areas.

Regular monitoring of the SMHM Conservation Areas began in 1998, when the eight original Conservation Areas were surveyed. During 1999, the following areas were surveyed for SMHM: five of the original Conservation Areas; the six proposed Conservation Areas; and the SMHM habitat at Island Slough. SMHM were found at all surveyed areas, often in very high numbers.

Suisun Marsh Waterfowl Feeding Ecology Study

The objective of the waterfowl feeding ecology study is to determine what foods mallards, northern pintail, and green winged teal are eating in Suisun Marsh. During the winters of 1997 and 1998, 223 feeding birds were collected, and their esophagi removed for analysis. Mud core samples were also collected from feeding sites to assess availability of plant and invertebrate foods. In addition, hunters from public and private areas of the marsh contributed over 750 esphagi for the study.

Laboratory analysis of the samples is in progress at UC Davis. Over 500 esophagi have been sorted, dried, weighed, and analyzed. It is expected that the remaining samples will be analyzed in the next few months. A final report is expected by spring 2001.

Aquatic Monitoring

During 1999, DWR contracted with University of California Davis (UCD) and DFG to conduct fisheries monitoring in Suisun Marsh. The monitoring was conducted to meet USACE and San Francisco Bay Conservation and Development Commission permit requirements for construction and operation of the SMSCG, and the NMFS 1993 Biological Opinion for Operation of CVP and the SWP.

The results from the UCD fish sampling and DFG juvenile striped bass sampling, in general, have not led to definitive findings on SMSCG impacts. (Impacts to salmon have been identified through other studies and actions taken to minimize salmon impacts are discussed in subsequent sections.) It has not been possible to directly assess the impact of the SMSCG on general fish abundance and striped bass resources, since the “control” or “background” condition for such an assessment (*i.e.,* no gates) no longer exists. The data analyses addressed the question indirectly by comparing data collected prior to gate installation with that collected after gate installation in 1988. Because the overall decline in Suisun Marsh fish abundance began before installation of the SMSCG, the decline seems independent of SMSCG operation.

UCD has sampled for fish in Suisun Marsh since 1979, with DWR and USBR funding. During 1999, sampling continued as in previous years, except that larval sampling ended about 5 weeks early due to delta smelt take restrictions. Results from 1999 sampling indicate that population levels continue to fluctuate at lower levels than seen in the early 1980's. Since 1988, introduced species have dominated the fisheries community. In 1999, delta smelt and longfin smelt numbers were the highest since 1984 and 1982, respectively. The presence of eggs and larvae of delta smelt and longfin smelt indicates that these species used the Marsh for rearing and possibly spawning in 1994-1999. Splittail larva were only captured in 1995,1996 and 1998.

DFG has monitored *Neomysis mercedi* densities and chlorophyll *a* concentration, an indicator of phytoplankton abundance, in the Marsh since the late 1970's. In 1998, *N. mercedis* samples were collected each month, although chlorophyll samples were not collected until May of that year. *N. mercedis* has been declining in Suisun Marsh since the 1970's, with the most dramatic decreases evident after 1991. Densities of *N. mercedis* were low throughout 1998. Food limitation, caused by reduced phytoplankton abundance, is the most probable cause for the decline. Overall, chlorophyll *a* concentration has decreased in Suisun Marsh since 1987. The decline has been attributed to the presence of *Potamocorbula amurensis* and to decreases in freshwater flows during drought years. Chlorophyll concentrations increased somewhat in 1998 over levels measured in 1996 and 1997. Construction and operation of the SMSCG does not appear to have further decreased chlorophyll *a* levels. Results from 1999 sampling will be available in late 2000.

DFG researchers also conduct sampling for juvenile striped bass (defined as schools of fish with mean length from 17.8 mm to 38.1 mm) in Suisun Marsh. In 1998, abundance in Montezuma Slough was the second lowest measured to date. A gradual decrease in the average abundance has been observed in the Delta and Montezuma Slough since sampling began in 1959. Since the decrease has been relatively constant over the last 30 years, it is unlikely that changes in abundance were due to installation and operation of SMSCG.

MITIGATION AND FULLFILLMENT OF PERMIT CONDITIONS

$3.2 Million Mitigation Funds to Department of Fish and Game

In January 2000, DWR transferred $3,265,562 to the California Department of Fish and Game in fulfillment of acquisition, development, operation and maintenance of mitigation lands as described in Article 3C of *The Suisun Marsh Mitigation Agreement* (signed in 1987). The $1,589,000 July 1985 dollars for Acquisition and Development reported in Table 1 of the *Mitigation Agreement* were adjusted for inflation using average annual Engineering News Record Construction Cost Indexes as shown in Attachments A, B, and C. The $568,000

July 1985 dollars also reported in Table 1 for Operation and Maintenance were adjusted for inflation using the USBR Water Service Operations and Maintenance Cost Trends.

These funds were placed in DFG sub-accounts and will be used only for multi-species restoration efforts in the Suisun Marsh recommended by the SMPA ECAT and approved by the Suisun Mash Coordinators.

SMSCG Flashboard Modification Study

The second year of the SMSCG Flashboard Modification Study was conducted in the Fall of 1999. The purpose of the study is to evaluate the effectiveness of the two three-foot by sixty-eight foot horizontal slots at providing passage for adult salmon and to determine the effect of the slots on salinities in the Marsh.

From September 1 - November 9, 1999, SMSCG operation was tailored to the adult salmon passage study conducted jointly by DWR, USBR, DFG, SRCD, and NMFS. The operations were timed to coincide with the release of tagged adult salmon over three different phases:

- Phase I: September 1 - 26, 1999. Gates operating tidally and modified flashboards installed.
- Phase II: September 27 - October 14, 1999. Gates operating tidally and original flashboards installed.
- Phase III: October 15 - November 9, 1999. All three gates held open and flashboards removed from the main channel.

Results from the 1998 and 1999 study periods are still being analyzed by the SMSCG Steering Group. Preliminary results indicate that the slots are not improving adult salmon passage and may, in fact, be hindering it. Consequently, the SMSCG Steering Group decided to spend the rest of 2000 completing the data analyses so that future actions can have the benefit of a thorough analysis of the data collected to date. A report discussing the analyses of 1993, 1994, 1998 and 1999 data and any recommendations for future studies is expected in February 2001.

Morrow Island Distribution System Maintenance Project

The Department of Water Resources has fulfilled most of the permit conditions required for the Morrow Island Distribution System maintenance project which included:

- the trapping and relocation of salt marsh harvest mice from the project's impact zones to DFG land;

- purchase, development, management and monitoring of 57 acres of salt marsh harvest mouse habitat (seasonal wetlands);
- the restoration of the impact zones in seasonal wetlands and the distribution ditches;
- the installation of a fish screen at the distribution system's intake; and
- replacement of habitat associated with the live eucalyptus trees removed from the north levee of the system during the dredging of the upper reach of M-Line ditch.

Trapping and relocation of SMHM was completed in 1997, the first project year. Fifty-seven acres of mitigation land was delineated from previously purchased lands at Island Slough, near Grizzly Island in 1997-98. A management and monitoring plan for the mitigation area has been developed and restoration was initiated in 1999-2000. The south levee water-side slopes were seeded with natives in 1998; although the slopes have revegetated, little of the native seed out-competed the weedy species that grew back quickly. The spoil areas (impacted seasonal wetlands), are returning to their pre-project condition; pickleweed and other associated brackish-water plants have become re-established in the impact zone, but we have not yet obtained the desired percent ground cover.

DWR is planning to install fish screens on the system's intake and other associated diversions using a modified screening plan that will afford more protection to sensitive fish species, while insuring that the affected landowners are able to efficiently manage their seasonal wetlands. All fish screens are scheduled to be installed by Fall 2001. Finally, DWR has not yet replaced the few trees that were removed to dredge the system, as eucalyptus trees are non-natives and may be detrimental to small birds. An alternative has not yet been identified, but DWR plans to complete the vegetation replacement by Fall 2001 as well.

Salt Marsh Harvest Mouse Habitat Restoration (57 acres)

On April 13,1999 the Suisun Marsh ECAT team agreed that the 57 acre mitigation site for the MIDS would be placed on DFG’s Island Slough Unit of the Grizzly Island Wildlife Area. The Mitigation Development, Management and Monitoring Plan for 57 Acres at Island Slough has been developed and is being implemented.

The physical construction (water control structures and levee coring) of the project was completed Spring 2000 and will allow water management for SMHM to be done independently from the waterfowl management areas.

SMHM surveys began Summer 2000 and have documented them at the site. These surveys will continue every year until SMHM have been found to be using

the site for a minimum of three years. Vegetation surveys are being conducted specifically to determine whether the vegetation success criteria have been met.

The completion date for this mitigation site is estimated for Summer 2004.

Morrow Island Distribution System Fish Screen and Alternatives

On July 2, 1997 the USACE issued a permit (No. 20698N) to perform maintenance on the MIDS. Permit conditions required installation of a fish screen on the Goodyear Slough diversion structure of the MIDS. In early 1999, DWR began developing design alternatives for the MIDS fish screen. Design alternatives were presented and discussed at the SMPA ECAT. Under consultation with the U.S. Fish and Wildlife Service and U.S. Army Corps of Engineers, DWR and USBR developed a "Hybrid Proposal" for meeting the permit condition. The Hybrid Proposal consists of the following:

- installation of 2 12-foot conical screens and 1-48 inch drain at the MIDS intake facility;
- installation of 5 12-foot conical screens distributed along Goodyear and Suisun Sloughs;
- addition of 1-36 inch turnout along C-line;
- addition of 1-36 inch combination turnout and drain along M-line; and
- new Operations Agreement for the MIDS.

Actions to be conducted on the MIDS would be completed by DWR. These include all of the activities except the five distributed conical screens on Goodyear and Suisun Slough. The five conical screens would be placed on individual ownerships serviced by MIDS. Installation of these screens would be conducted by the Suisun Resource Conservation District (SRCD) under a proposed contract with the Department.

Final design for the screens should be completed by fall 2000, and environmental permits obtained by spring 2001. Construction activities on the MIDS are anticipated to begin in May 2001 and be completed by October 2001. Installation of the five distributed conical fish screens should begin in April 2001 and finish by October 2001.

REPORTS

Suisun Marsh Annual Data Summary Reports (1997, 1998 & 1999)

Results for water year 1997 monitoring in the Marsh were published in December 1999. A draft report for 1998 water year monitoring was also completed in 1999. A final report is scheduled for completion in September 2000. The water year 1999 Annual Data Summary Report is scheduled to be completed by the end of

2000. The annual data summary reports include data from water quality monitoring stations, salt marsh harvest mouse surveys, and waterfowl surveys conducted in the Marsh. Also included is a discussion of maintenance activities conducted on DWR facilities in the Marsh.

Beginning in water year 1997, the report format has been revised from previous years, removing most of the background information, such as legislative history and general Suisun Marsh hydrology and placing it in a separate document entitled *Suisun Marsh Monitoring Program Reference Guide*. The *Reference Guide* provides comprehensive background information on the DWR Suisun Marsh monitoring program. This document is referenced in the *Annual Data Summary* report. Both reports are available on the Internet at: http://iep.water.ca.gov/suisun/curr-report/, or by request.

Suisun Marsh Salinity Control Gates Fisheries Monitoring Annual Report

The Suisun Marsh Salinity Control Gates Fisheries Monitoring Annual Reports for water years 1996 and 1997 were completed in August and November 1999, respectively. In lieu of a 1998 report, data from water year 1998 were incorporated into the aquatic resources chapter of The Comprehensive Review of Suisun Marsh Monitoring Data. The Comprehensive Review of Suisun Marsh Monitoring Data is expected to be released in late 2000.

SEW Final Report

SEW completed a Final Report in response to the directives in the State Water Resources Control Board (SWRCB) 1995 Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (1995 Bay/Delta Plan). The SEW Final Report includes recommendations for water quality objectives (narrative and numerical) to improve conditions for the Beneficial Uses (Wildlife Habitat, Rare, Threatened and Endangered Species, Estuarine Habitat, etc.) in Suisun Marsh. In addition, the workgroup prepared a set of recommendations for future research and monitoring in the Marsh.

The Final Report presents each subcommittees' set of recommendations. Ultimately SEW chose not to develop a single workgroup recommendation, due to the divergent views of the various subcommittees. In addition to subcommittee recommendations, the report contains discussions of the areas of agreement and disagreement between each subcommittee. This was the most thorough way to document the range of issues discussed at SEW meetings and to document common ground. The report also contains recommendations for comprehensive monitoring and research needs for Suisun Marsh. SEW submitted the list to the CALFED Comprehensive Monitoring Assessment and Research Program.

Since SEW is an IEP Work Team, the final report was reviewed by IEP. SEW received no comments from this review. The Final Report is undergoing minor revisions and will be sent to SWRCB by October 2000. It is expected that SWRCB will hold public meetings to receive comments on the SEW report after the report is submitted. The report will be available to the public at http://iep.water.ca.gov/suisun_eco_workgroup/ by November 2000.

Biological Assessment for Amendment Three to the Suisun Marsh Preservation Agreement

As described above in Suisun Marsh Preservation Agreement Activities, the Suisun Marsh Preservation Agreement parties (DWR, USBR, DFG, SRCD) prepared and forwarded a biological assessment for the Suisun Marsh Preservation Agreement as Modified by Amendment Three to the USFWS in October 1999. This action completed the requirements for Section 7 Consultation under the Federal Endangered Species Act. Additional documentation was prepared by SRCD and DFG and forwarded to the USFWS.

The USFWS was due to complete consultation and issue a draft biological opinion in February 2000. As of this date, the USFWS has not issued a draft opinion for the joint consultation.

SUISUN MARSH EXPENDITURE HISTORY

Suisun Marsh expenditures and reimbursements administered by DWR for calendar years 1968 through June 2000 are summarized in Table 1 and Figure 3. From 1968 through June 2000, DWR disbursed over $96 million of SWP funds for planning, design, environmental documentation, construction, maintenance, monitoring, mitigation and permit compliance in support of implementing the Plan of Protection for the Suisun Marsh and the Suisun Marsh Preservation Agreement, and meeting standards set by the SWRCB. USBR has reimbursed DWR about $35.5 million (36.9%), and the California General Fund has reimbursed about $9.5 million (9.8%). These figures do not include up-front payments made by USBR for staff and other direct costs, as well as, about $5.7 million in USBR interest payments during 1988 and 1989.

Annual figures are reported in Table 1 for DWR up-front payments, USBR reimbursements, General Fund reimbursements, and DWR' s cumulative expenditure balance.

Table 1. Suisun Marsh expenditures and reimbursements administered by DWR

CalendarYear	DWR Upfront Payment	USBR Reimbursement	General Fund Reimbursement	Cumulative DWR Expenditure Balance (CXB) [1/]
1968	$10,571	$0	$0	$10,571
1969	$34,182	$0	$0	$44,753
1970	$23,343	$0	$0	$68,096
1971	$1,042	$0	$0	$69,138
1972	$47	$0	$0	$69,185
1973	$0	$0	$0	$69,185
1974	$0	$0	$0	$69,185
1975	$2,709	$0	$0	$71,894
1976	$32,961	$0	$0	$104,855
1977	$37,475	$0	$0	$142,331
1978	$350,831	$0	$0	$493,162
1979	$3,660,096	$0	$0	$4,153,258
1980	$5,005,759	$0	$0	$9,159,017
1981	$2,964,977	$0	$0	$12,123,995
1982	$2,955,702	$2,500,000	$0	$12,579,697
1983	$2,754,091	$0	$0	$15,333,788
1984	$2,418,345	$0	$0	$17,752,133
1985	$2,332,776	$0	$0	$20,084,909
1986	$6,495,323	$0	$0	$26,580,232
1987	$13,600,701	$0	$0	$40,180,933
1988	$7,456,364	$17,368,725 [9/]	$0	$30,268,572
1989	$2,341,843	$1,219,691 [10/]	$9,478,000 [2/]	$21,912,724
1990	$3,030,016	$695,450	$0	$24,247,290
1991	$6,222,531	$2,925,429	$0	$27,544,392
1992	$2,737,242	$1,174,655	$0	$29,106,978
1993	$2,979,254	$238,130	$0	$31,848,102
1994	$3,192,211	$1,962,549	$0	$33,077,764
1995	$2,721,213	$647,138	$0	$35,151,839
1996	$3,391,135	$1,482,396	$0	$37,060,579
1997	$3,631,829	$1,520,219	$0	$39,172,188
1998	$5,342,834	$1,107,501	$0	$43,407,521
1999	$8,792,037	$2,696,200	$0	$49,503,358
2000	$1,712,494 [7,8/]	$0	$0	$51,215,852
Total	**$96,231,935** [3/]	**$35,538,083** [3,4/]	**$9,478,000** [5/]	**$51,215,852** [6/]

1/ CXB = (Previous Year's CXB + DWR Upfront Payment) - (USBR + General Fund Reimbursements)
2/ Under State Assembly Bill 1442, the General Fund paid 20% of DWR's Upfront Payment through June 1988, amounting to $9,478,000. This payment includes $6,643,600 for our Recreation project purpose share of 14%.
3/ Does *not* include USBR upfront payments for staff and other direct costs.
4/ USBR has paid 36.9% of the total DWR Upfront Payment.
5/ General Fund has paid 9.8% of the total DWR Upfront Payment.
6/ DWR has paid 53.2% of the total DWR Upfront Payment.
7/ Includes January through June 2000
8/ For year 2000, figures will be included when available.
9/ USBR paid an additional $5,111,831 as interest in 1988 not shown in the table.
10/ USBR paid an additional $607,175 as interest in 1989 not shown in the table.

Figure 3. Cumulative DWR Suisun Marsh expenditures and reimbursements through June 2000