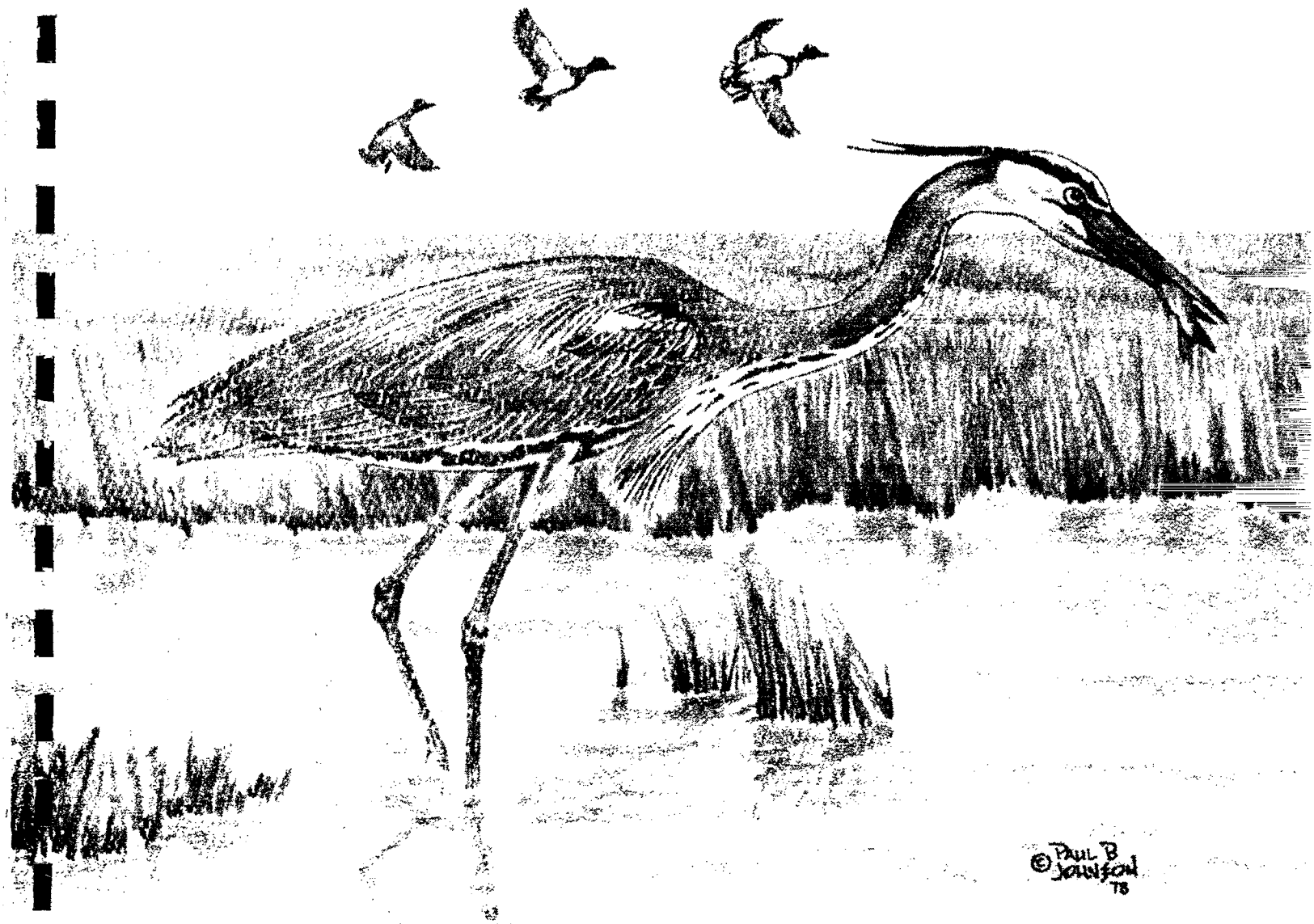
STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

PLAN OF PROTECTION FOR THE SUISUN MARSH
including
ENVIRONMENTAL IMPACT REPORT



Central District
February 1984

C—053612

C-053612

CONTENTS

	Page
FOREWORD	iii
SUMMARY	1
Delta Outflow	1
Physical Facilities	1
Monitoring Program	2
Management Program	2
Environmental Documentation	4
Chapter 1. INTRODUCTION	7
Chapter 2. RELATED STUDIES AND ACTIONS	19
Soil-Water-Salt Relationship in Suisun Marsh	19
Legislative and Administrative Action	20
Waste Water Reuse for Marsh Management	21
Conclusions	22
Recommendations	24
Chapter 3. RESOURCES AND REQUIREMENTS	27
Soils	27
Water Resources	28
Salinity	30
Turbidity	36
Chlorophyll *a*	37
Dissolved Oxygen	38
Biological Resources	38
Vegetation and Flora	39

C—053615

C-053615

Page

Fish 41
Wildlife 42

Rare and Endangered Species 45

Recreation 46

General Water Requirements 47

Water and Soil Salinity Requirements 48

Levee Maintenance Requirements 50

Mosquito Abatement Requirements 51

Chapter 4. PLAN OF PROTECTION ALTERNATIVES 53

Alternative Plans 53

No-Action Plan 53
Nonstructural Plan 53
Overland Supply Plan 56
Combination Plan 59

Alternative Water Sources 61

Sacramento River Basin 61
Solano County Treated Waste Water 67
Contra Costa County Waste Water 70
San Joaquin Valley Agricultural Drainage . . 70

Chapter 5. FACILITIES AND WATER SUPPLY FOR COMBINATION PLAN 73

Facilities 79

Montezuma Slough Control Structure 80

Roaring River Slough Distribution System 89

Grizzly Island Distribution System 93

Potrero Hills Ditch 93

Goodyear Slough Facilities 96

Boynton-Cordelia Ditch 99

Lower Joice Island 103

C—053616

C-053616

Page

Cygnus Area 103

Annie Mason Island 103

Overall Facilities 103

Water Supply 103

Chapter 6. MANAGEMENT 107

Chapter 7. MONITORING PROGRAM 109

Monitoring Program Participation 110

Channel Water Quality 110

Diversion Water Quality 111

Water Level Recorders 111

Soil Water Salinity 111

Plant and Wildlife Survey 114

Reports 114

Chapter 8. IMPLEMENTATION SCHEDULE 117

Chapter 9. ENVIRONMENTAL IMPACT REPORT, PLAN OF PROTECTION, SUISUN MARSH PHYSICAL FACILITIES 123

Environmental Impact Report Summary 123

Purpose of the Plan of Protection 123
Project Description 123
Environmental Impacts 124
Alternatives 125
Area of Controversy 128
Issues to be Resolved 130

Description and Use of the EIR 132

Related Environmental Documentation 133

Water Quality Standards 133
Management Plans 134
Monitoring Program 134
Physical Facilities 134

C—053617

C-053617

	Page
Description of Project Facilities	135
Environmental Setting	135
General Environmental Effects of Proposed Actions	137
Construction	137
Construction Staging	137
Land	140
Water Resources	141
Water Quality	141
Recreation	145
Fish	145
Flora	148
Wildlife	149
Air Quality	151
Scour and Sedimentation	151
Seepage	151
Navigation	152
Esthetics	152
Historical, Archeological, and Cultural Resources	153
Access	153
Energy	153
Utilities	154
Turbidity	154
Socioeconomic Factors	154
Vectors	154
Excavation Spoil and Fill	155
Effects of Individual Facilities	156
Montezuma Slough Control Structure	156
Grizzly Island Distribution System	161
Potrero Hills Ditch	163
Cordelia-Goodyear Ditch and Goodyear Slough Control Structure	164
Boynton-Cordelia Ditch	166
Unavoidable Adverse Environmental Effects and Compensation Measures	168
Aquatic Habitat	169
Marsh and Upland Habitat	169
Alternatives	173
No Action Plan	173
Nonstructural Plan	173
Overland Supply Plan	174

C—053618

C-053618

Page

Relationship Between Local Short Term Uses of the Environment and the Maintenance and Enhancement of Long Term Productivity 174

Significant Environmental Changes, Growth Inducing Impacts 175

Consultation 175

Report Preparation 176

Appendix A CONTRACT ON INITIAL FACILITIES BETWEEN DEPARTMENT OF WATER RESOURCES, DEPARTMENT OF FISH AND GAME, AND SUISUN RESOURCE CONSERVATION DISTRICT

Appendix B MONITORING PROGRAM METHODOLOGY

Appendix C WATER RIGHTS DECISION 1485

Appendix D BIOLOGICAL ASSESSMENT OF THE IMPACTS OF THE SUISUN MARSH MANAGEMENT PLAN (DFG for USBR)

Appendix E SECTION 7 DETERMINATION, SUISUN MARSH MANAGEMENT STUDY, SOLANO COUNTY, CALIFORNIA

Appendix F AQUATIC RESOURCES OF SUISUN MARSH WITH AN ANALYSIS OF THE FISHERY EFFECTS OF A PROPOSED WATER QUALITY MAINTENANCE PLAN (Alan Baracco)

Appendix G CALIFORNIA BLACK RAIL BREEDING SEASON SURVEY IN CENTRAL CALIFORNIA (Timothy D. Manolis)

Appendix H STUDY OF THE SALT MARSH HARVEST MOUSE IN SUISUN BAY, CALIFORNIA (Howard S. Shellhammer)

Appendix I ENDANGERED AND THREATENED WILDLIFE, CALIFORNIA CLAPPER RAIL (Thomas E. Harvey)

Appendix J PROCEDURE FOR DETERMINING MITIGATION FOR CHANNEL ISLAND WATERFOWL FOOD PRODUCTION

Appendix K ENDANGERED AND RARE PLANTS SURVEY (Stephen P. Rae)

Appendix L LETTER ON RECOMMENDED MITIGATION ALTERNATIVE FOR THE SUISUN MARSH PLAN OF PROTECTION

Appendix M RECREATION PLAN

Appendix N FLORA OF THE SUISUN MARSH AREA

C—053619

C-053619

Appendix O SUMMARY OF COMMENTS ON PLAN OF PROTECTION FOR THE SUISUN MARSH INCLUDING DRAFT ENVIRONMENTAL IMPACT REPORT, DATED SEPTEMBER 1980

Page

Figures

A Suisun Marsh Physical Facilities 3

B Suisun Marsh Service Areas 5

1 Suisun Marsh Location Map 9

2 Water Quality Frequency Distribution, Sacramento River at Collinsville (Without CVP and SWP) . . . 13

3 Water Quality Frequency Distribution at Mouth of Suisun Slough (Without CVP and SWP) . . 14

4 Water Quality Frequency Distribution, Sacramento River at Collinsville (With CVP and SWP Operating Under March 1978 SWRCB Draft Standard) 15

5 Water Quality Frequency Distribution at Mouth of Suisun Slough (With CVP and SWP Operating Under March 1978 SWRCB Draft Standard) 16

6 Water Quality Frequency Distribution, Sacramento River at Collinsville (With CVP and SWP Operating Under Basin Plan 2 and 4-Agency Fish Agreement) . 17

7 Water Quality Frequency Distribution at Mouth of Suisun Slough (With CVP and SWP Operating Under Basin Plan 2 and 4-Agency Fish Agreement) . 18

8 Salinity Monitoring Stations 31

9 Salinity Levels at Mean High-High Tide with Delta Outflow Index of 5,800 ft^3/s 32

10 Salinity Levels at Mean High-High Tide with Delta Outflow Index of 14,300 ft^3/s 33

11 Average Monthly Range of Salinity vs Delta Outflow at Station S-42 in Interior Marsh 35

12 Pintails in Central Valley and Suisun Marsh . . . 43

12a Economic Impact of Acreage Taken Out of Production. 57

13 Suisun Marsh Alternative Water Sources 63

C—053620

C-053620

		Page
14	Treated Waste Water Subareas	65
15	Waste Water	69
16	Combination Plan Physical Facilities	75
17	Suisun Marsh Without Management Facilities . . .	76
18	Suisun Marsh With Management Facilities	77
19	Montezuma Slough Control Structure and Roaring River Slough Distribution System Intake .	81
20	Location Map, Montezuma Slough Control Structure .	82
21	Overall Plan, Montezuma Slough Control Structure .	83
22	Slough Closure, Montezuma Slough Control Structure.	84
23	Control Structure (Boat Lock), Montezuma Slough Control Structure	85
24	Control Structure, Montezuma Slough Control Structure	86
25	Roaring River Slough Distribution System	91
26	Roaring River Slough Intake Structure	92
27	Grizzly Island Distribution System	94
28	Potrero Hills Ditch	95
29	Goodyear Slough Facilities	98
30	Vallejo Wastewater Delivery Plan	100
31	Boynton-Cordelia Ditch	101
32	Monitoring Plan	113
33	Implementation Schedule - Suisun Marsh Facilities .	121

Tables

1	Inventory of Water Quality in the Suisun Marsh . .	29
2	Historical Delta Outflow-Associated Electrical Conductivity and Total Dissolved Solid Values for Suisun Marsh and Suisun Bay	34

C—053621

C-053621

		Page
3	Turbidity Measurements in Suisun Marsh and Suisun Bay at Various Delta Outflows	36
4	Chlorophyll Levels in Suisun Marsh and Suisun Bay for Various Outflow Ranges	37
5	Rare and Endangered Species that Inhabit the Suisun Marsh Area	45
6	Summary of Recreation Benefits for Suisun Marsh .	46
7	Soil Salinity Tolerances of Marsh Plant Species .	48
8	Typical Schedule for Operating Montezuma Control Structure as a Tide Gate	88
9	Suisun Marsh Details of Overall Facilities . . .	102
10	Change in Habitat with Marsh Facilities	127

C—053622

C-053622

SUMMARY

This report presents a Plan of Protection to mitigate the effects of the Federal Central Valley Project (CVP) and the State Water Project (SWP) on the Suisun Marsh. The State Water Resources Control Board (SWRCB), in Water Right Decision 1485 of August 18, 1978, set specific water quality standards for the Marsh. The U. S. Bureau of Reclamation (USBR) and the California Department of Water Resources (DWR) were directed to meet the water quality standards by October 1, 1984. Participation of both USBR and DWR is required before the full implementation of the Plan of Protection can be achieved.

The Plan of Protection is a proposal to maintain water quality criteria in the Marsh. Major categories dealt with in the Plan are: Delta outflow, physical facilities, a monitoring program, a management program, and an environmental impact report.

Delta Outflow

Outflow from the Sacramento and San Joaquin rivers, supplemented by project releases, would provide the required quality of water in the Sacramento River at Collinsville for circulation through the Marsh. This plan presumes that the CVP and SWP will jointly share in these project releases.

Physical Facilities

A series of control structures and new or enlarged channels (Figure A), as needed, would distribute quality water available at Collinsville throughout the Marsh. These facilities would move water from east to west and also from north to south. The control structure located near the eastern end of Montezuma Slough would be the foremost facility. Between October and June, in years when meeting the marsh water quality criteria requires water of a better quality than is normally circulating in the sloughs, this structure would tidally pump water from the Sacramento River near Collinsville through Montezuma Slough for further distribution throughout the Marsh by the new and enlarged channels.

The control structures would be channel closures of one or more of the following types:

- Culverts having flap gates and/or slide gates.
- Radial gates.
- Radial gates with boat lock and flashboard opening.
- Boat-lock-type vertical gate "doors".

C—053624

C-053624

The channels would be dredged or "draglined" and would carry water to specific areas to improve quality in interior marsh channels and replace diversions from Suisun, Grizzly, and Honker bays. Fish screens would be installed as part of the diversion facilities for Roaring River Slough and the Grizzly Island Distribution System. Screens may also be required for Goodyear Slough facilities. Figure B shows the areas to be served.

The total cost of the facilities, including planning, right of way, design, construction, and mitigation costs, was estimated at about $118 million in 1982 dollars, plus operation, maintenance, and replacement costs.

The facilities are being constructed in two phases: Initial Facilities and Overall Facilities. The Initial Facilities, which consist of Roaring River Slough, Morrow Island Distribution System, and the Goodyear Slough Outfall, became operational in 1981.

The Overall Facilities include the Initial Facilities plus two control structures, a distribution system, and three conveyance ditches. The Overall Facilities can not be completed by the October 1, 1984, deadline provided in Decision 1485. The estimated earliest possible completion date is October 1988. However, as an alternative it is proposed to construct the facilities in stages, completing construction by about 1998. This will allow DWR to test the performance of units against model predictions to verify the need for and proper design of subsequent units.

DWR believes its participation in implementing the Plan of Protection should be limited to that necessary to mitigate SWP impacts on the Marsh, estimated to be 50 percent of the total cost of the Plan. It is expected that construction of the USBR portion of the facilities will occur when USBR funds and authorization are obtained. The Montezuma Slough Control Structure will be the first unit of the Overall Facilities to be constructed, as originally planned.

Monitoring Program

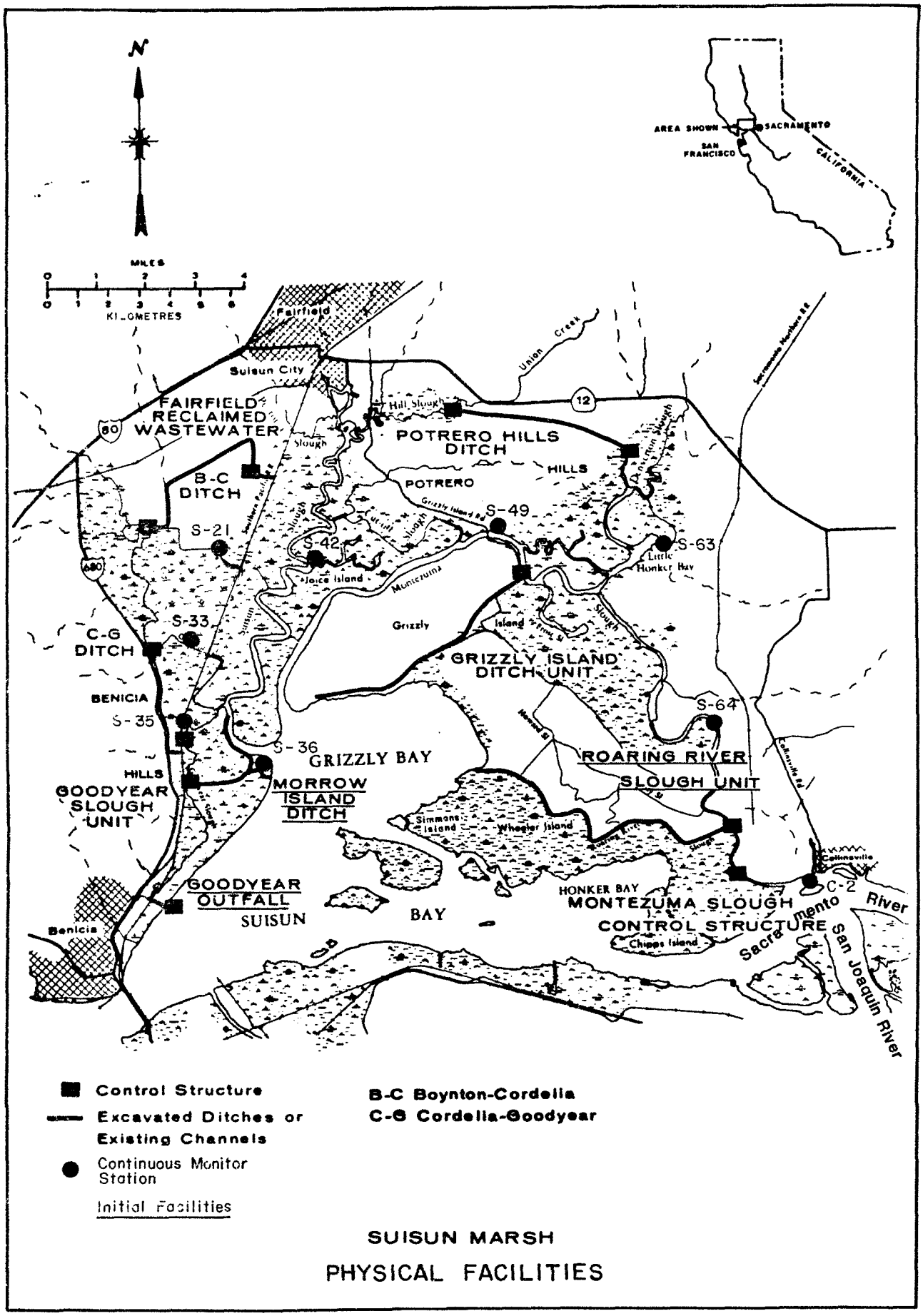
The monitoring program will provide water and soil salinity data from selected locations throughout the Marsh. It will relate to the electrical conductivity of the applied water, soil electrical conductivity data, plant production, and changes in the marsh habitat. It is expected that the basic program will be modified after several years of data collection, as project objectives shown by the modeling program are achieved.

Management Program

While the Plan of Protection will assure that adequate quality water will be available, the overall health of the Marsh

C—053625

C-053625



SUISUN MARSH

PHYSICAL FACILITIES

can be assured only with the cooperation of marsh landowners. To obtain that cooperation, the Suisun Resource Conservation District (SRCD), the Department of Fish and Game (DFG), and the U. S. Soil Conservation Service (SCS) have prepared regulations and a management program for the Marsh as a whole and management plans for each individual private land ownership.

Environmental Documentation

The environmental documentation covers the impacts of all phases of the Plan of Protection. The supplemental outflow for salinity protection was analyzed in the final environmental impact report prepared by the State Water Resources Control Board for Decision 1485, dated August 1978. The impacts of the Initial Facilities were covered in an initial study and a negative declaration prepared by DWR in October 1978.

The environmental impacts of the remaining portions of the Plan of Protection are analyzed in a program environmental impact report (EIR) that appears as Chapter 9 in this plan. DWR prepared a program EIR because the Plan of Protection and the physical facilities will not all be carried out at the same time. The Plan calls for a number of separate actions to be carried out by different agencies to protect existing environmental conditions in the Marsh. The EIR provides detailed analysis of the effects of the access road to the Montezuma Slough Control Structure and of the control structure itself, because those facilities would be constructed in the near future. The details of their construction are well worked out and their impacts are susceptible to full analysis.

The Plan calls for a pause for monitoring and evaluation before other facilities are constructed. The monitoring and evaluation will be used to validate the analysis presented in the EIR and the accuracy of the projections from the computer model. The information will be used to determine whether alterations should be made in any of the physical facilities and possibly to determine whether particular followup facilities will be needed at all. Because the details of these later facilities are subject to change, their impacts have been analyzed in more general terms.

Several other aspects of the Plan of Protection are not yet in final form. Negotiations are still proceeding between the DWR and the USBR concerning USBR's role in the Plan of Protection. Individual land management plans are being developed by the SRCD and SCS. After the plans have been developed, they will be submitted to DFG for approval and to the San Francisco Bay Conservation and Development Commission (BCDC) for endorsement. There may be petitions by DWR to SWRCB concerning water quality requirements.

C—053627

C-053627

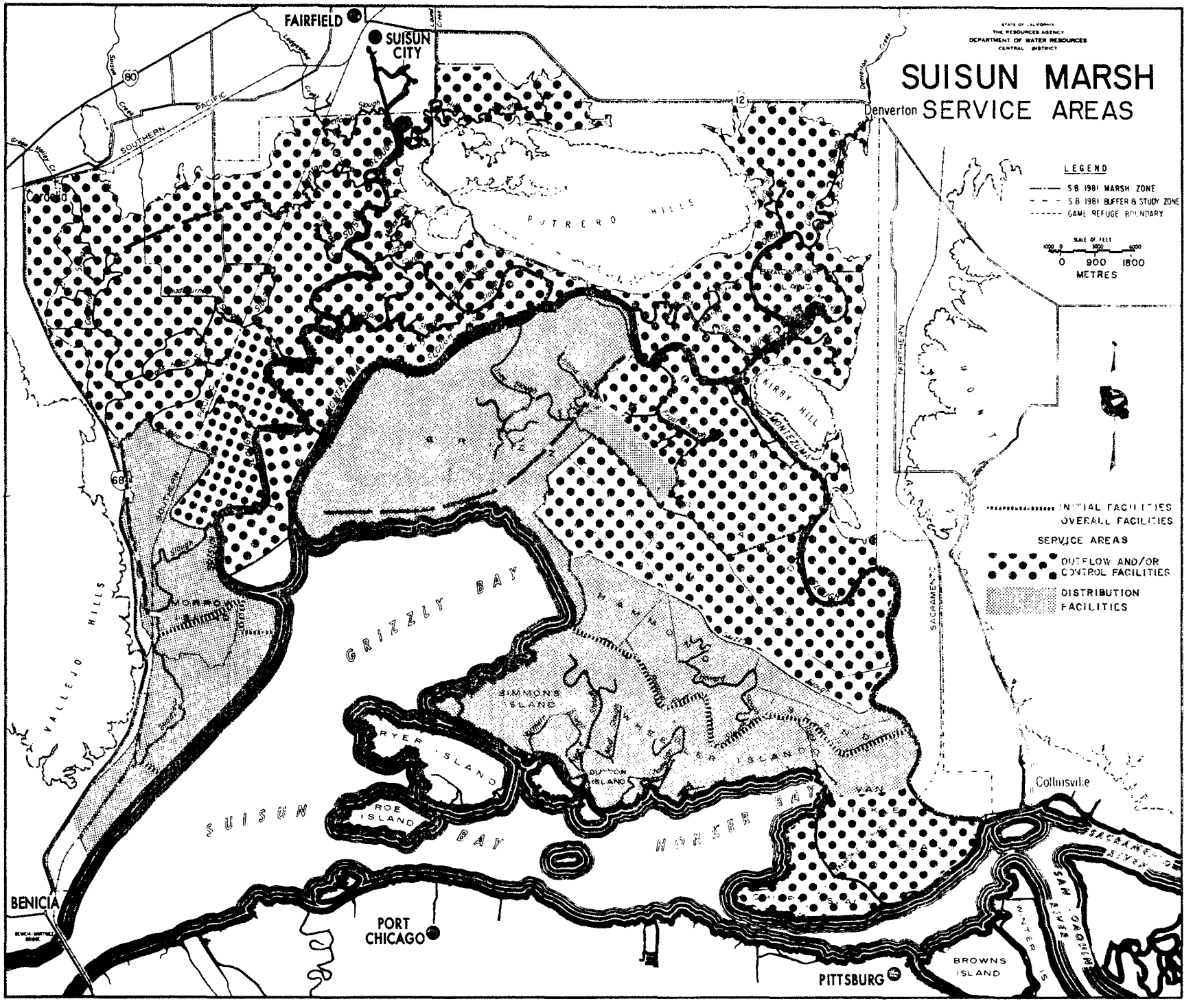


FIGURE B

C-053628

C—053628

This program EIR discusses the possible environmental effects of these various activities as they can be forseen at this time. Where there is a range of reasonable alternatives available at these different decision points, the EIR identifies those alternatives and their likely environmental consequences to the degree that they can be reasonably foreseen at this time.

DWR will review the later activities in the light of the program EIR to determine whether an additional environmental document will need to be prepared. If the later activity would have environmental effects that were not examined in the program EIR, a new initial study would be prepared leading either to an EIR or to a negative declaration focusing on the particular effect that had not been analyzed in the program EIR. If DWR determines that there would be no new significant environmental effect or that there would be no new feasible alternatives or mitigation measures available that would substantially lessen any of the remaining significant effects of the project, DWR could approve the particular component of the plan as being within the scope of the program EIR. In such a circumstance, no new environmental documentation would be required.

With each commitment to a part of the Plan of Protection or its physical facilities, DWR will review the EIR and any supplement and consider adopting mitigation measures or alternatives it determines to be feasible to substantially lessen the significant effects of the overall program or the particular component.

C—053629

C-053629

Lower Joice Island

Water quality in the lower reaches of Montezuma and Suisun sloughs will be such that lower Joice Island will require a 36-inch corrugated steel pipe with gate and flashboard riser to enable the island to flood faster when the water quality is good. The Department of Fish and Game (DFG), U. S. Fish and Wildlife Service (FWS), and SRCD have agreed that this installation will ensure adequate water quality for the lower Joice Island area.

Cygnus Area

In the Cygnus area, predicted salinities in the area of supply are within existing Decision 1485 standards except for the supply for the lower pond on Club 415 (Arnold Ranch Club), which is marginal. DFG, FWS, and SRCD have agreed that installing a 36-inch corrugated steel pipe drain with gate and flashboard riser for this pond will ensure adequate water quality in this area.

Annie Mason Island

Annie Mason Island would be supplied by a diesel pump that would pump from Grizzly Bay at low tide. The pump would operate when water quality on the island required improvement from October through April. Levees about Annie Mason Island are not now in good repair. The pumping equipment will be built and installed when the landowner has improved the island's levee system to provide adequate protection of the island.

Overall Facilities

Details of the Suisun Marsh Overall Facilities are given in Table 9.

Water Supply

Under low flow conditions, an estimated 20 percent of the water pumped through Montezuma Slough Control Structure must be replaced if needed to maintain water quality and salinity standards in the vicinity of Chipps Island. A series of operation studies was made to assess the quantity of replacement water needed. All studies were run for a 57-year period -- 1922 through 1978 -- and year 2000 level of development. Assumptions of facilities, operations, and depletions above the Delta were constant for all studies. Delta Overland Facilities were assumed in and operating to eliminate consideration of the western Delta in-channel water quality control. The four major studies are described below:

Study 1: The interim Marsh standards and not the post-1984 in Decision 1485 were presumed to be in effect. A