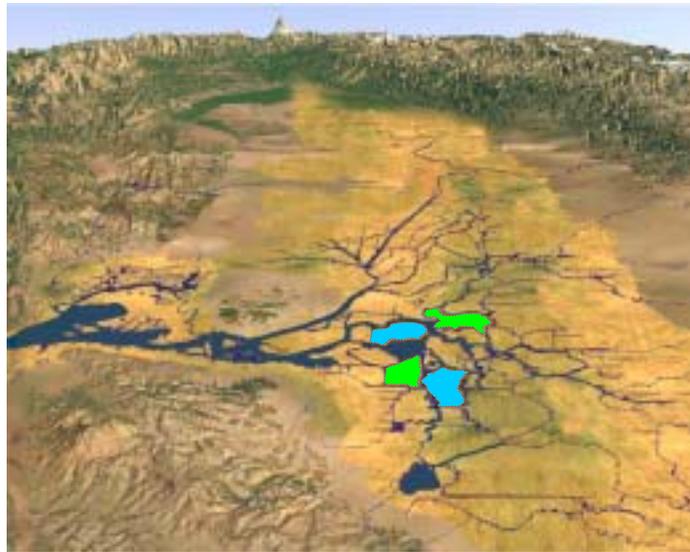


*INTEGRATED STORAGE INVESTIGATIONS*

**IN-DELTA STORAGE PROGRAM  
STATE FEASIBILITY STUDY  
DRAFT ENVIRONMENTAL EVALUATIONS**



Division of Planning and Local Assistance  
Department of Water Resources

**July 2003**



## ORGANIZATION

### FOREWORD

We acknowledge the technical assistance provided by Reclamation in carrying out the role of federal lead agency for the CALFED Integrated Storage Investigations. Reclamation has not yet completed a full review of the State Feasibility Study reports. Reclamation will continue to provide technical assistance through the review of the State Feasibility Study reports and DWR will work with Reclamation to incorporate comments and recommendations in the final reports.

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## Abbreviations

ACHP	Advisory Council on Historic Preservation
AFRP	Anadromous Fish Restoration Program
BA	Biological Assessment
BCDC	San Francisco Bay Conservation and Development Commission
BDAC	Bay-Delta Advisory Council
BMPs	best management practices
°C	degrees Celsius
CC	Clifton Court
CCC	Contra Costa Canal
CCCGP	Contra Costa County General Plan
CCF	Clifton Court Forebay
CCWD	Contra Costa Water District
CDC	California Department of Conservation
CDF	California Department of Forestry and Fire Protection
CDFA	California Department of Food and Agriculture
CEPA	California Environmental Protection Agency
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
cm	centimeter
CNDDDB	California Natural Diversity Database
CNPS	California Native Plant Society
Corps	U.S. Army Corps of Engineers
CSC	California species of concern
CUWA	California Urban Water Agency
CVFFRT	Central Valley Fish Facilities Review Team
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
CVRWQCB	Central Valley Regional Water Quality Control Board
CWA	Clean Water Act
CWHR	California Wildlife Habitat Relationships System
D-	Water Rights Decision
DBW	Department of Boating and Waterways
DCC	Delta Cross Channel
DEIR	Draft Environmental Impact Report
DEIS	Draft Environmental Impact Statement
Delta	Sacramento-San Joaquin Delta
DFG	Department of Fish and Game
DO	dissolved oxygen
DOC	Department of Conservation
DPC	Delta Protection Commission
DSOD	Division of Safety of Dams
DW	Delta Wetlands
DWP	Properties Delta Wetlands Properties
DWR	Department of Water Resources

**ABBREVIATIONS**

ESA	Endangered Species Act
ESA	Environmental Site Assessment
Estuary	Sacramento-San Joaquin Estuary
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
ERP	Ecological Restoration Program
EWA	Environmental Water Account
°F	degrees Fahrenheit
FE	Federal Endangered
FOC	Final Operations Criteria
fps	feet per second
FSC	Federal Species of Concern
FT	Federal Threatened
GGS	giant garter snake
GIS	geographic information system
HEP	Habitat Evaluation Procedures
HCP	Habitat Conservation Plan
HMAC	Habitat Management Advisory Committee
HMP	Habitat Management Plan
HPMP	Historic Property Management Plan
HSI	Habitat Suitability Index
HU	Habitat Units
IEP	Interagency Ecological Program
ISDP	Interim South Delta Program
JSA	Jones and Stokes Associates
LESA	Land Evaluation and Site Assessment
MAF	million acre-feet
mm	millimeter
MOA	memorandum of agreement
MOU	memorandum of understanding
MSL	mean sea level
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOAA	National Oceanic and Atmospheric Administration
NOD	Notice of Determination
NOI	Notice of Intent
NOP	Notice of Preparation
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
OPR	Governor's Office of Planning and Research
PG&E	Pacific Gas and Electric
RAB	riverine aquatic bed
Reclamation	U.S. Bureau of Reclamation
ROD	CALFED Record of Decision
RWQCB	Regional Water Quality Control Board
SACR	Sandhill Crane
SE	state endangered

**ABBREVIATIONS**

SHPO	State Historic Preservation Officer
SJMSCP	San Joaquin County Multi-Species Habitat Conservation and Open Space Plan
SLC	State Lands Commission
SRA	shaded riverine aquatic
SSC	state species of concern
ST	state threatened
SWHA	Swainson's Hawk
SWP	State Water Project
SWRCB	State Water Resources Control Board
TAF	thousand acre-feet
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VELB	valley elderberry longhorn beetle
WQCP	water quality control plan



## Chapter 1.0 Executive Summary

In 2002, DWR staff continued evaluations of the In-Delta Storage Project. The environmental evaluations were based on the recommendations made in the In-Delta Storage Program Planning Study Report on Environmental Evaluations (CALFED 2002b), and were focused in the following resource areas: land use, botanical, wildlife, cultural, aquatic, hazardous materials, and recreation.

During the 2002 public review and CALFED Science review periods, DWR staff received conflicting comments on the impacts of the In-Delta Storage Project on agricultural land and the need for mitigation. Results from the Land Evaluation and Site Assessment indicated that conversion of Webb Tract and Bacon Island from agricultural uses to reservoir storage will result in a significant impact to agricultural land. A LESA evaluation was not completed for Holland Tract and Bouldin Island since the detailed use of the islands under the revised Habitat Management Plan was unclear at the time of the evaluation. The purchase of agricultural easements to mitigate the impacts of converting Webb Tract and Bacon Island to nonagricultural uses could cost up to \$12 Million. Additional work should be done to determine the implications of acquiring 10,003 acres of agricultural easements on the financial feasibility of the In-Delta Storage Project and the implementation of ERP actions in the Delta.

DWR botanists conducted special status plant surveys in spring through fall 2002. The 2002 surveys located 111 occurrences of special status plant taxa on the exterior levees of the project islands, 34 more than were found in the 1988 surveys. No occurrences were found in the interior of any island in 2002. The populations of three special status plant species on the levees increased and one decreased from levels seen in 1988. Botanists also identified a new species not previously found in the Delta. Impacts from levee modifications or placement of additional riprap will occur to 5 special status species. Mitigation for levee modifications/riprap can be incorporated into the Habitat Management Plan.

DWR biologist conducted wildlife surveys and habitat assessments for listed and special-status species to determine the potential impacts and mitigation required under federal and State environmental laws. DWR determined that additional suitable habitat for the giant garter snake was present on Webb Tract, Bacon Island, Bouldin Island, and Holland Tract. Western pond turtles were found on and near all the project islands. The number of nesting Swainson's hawks on or near Webb Tract and Bacon Island increased. Also, greater sandhill cranes were located on all project islands. Crane foraging habitat has increased by 38% from 1988. DWR biologist did

not locate any California black rails on the adjacent in-channel islands. Loggerhead shrikes were located on all project islands, but were more abundant on Holland Tract and Bacon Island. Nesting tricolored blackbirds were not located on the project islands. Wintering tricolored blackbirds were identified on Bacon Island and Webb Tract foraging. Burrowing owls were not found on any of the project islands. Suitable bat foraging and roosting habitat was identified on all project islands, however, active bat roosts were not detected.

DWR developed a revised Habitat Management Plan that includes specific habitat types and amounts to mitigate for the potential impacts to giant garter snake, Swainson's hawks, greater sandhill cranes and the other special-status species. The habitat types include: emergent marsh, permanent pond, canal, cottonwood-willow woodland, great valley willow scrub, herbaceous upland, corn, wheat, alfalfa and other harvested crops. Additionally, a total of 3,900 acres of conservation easement would be required to fully mitigate for impacts to Swainson's hawk foraging habitat. The revised HMP includes mitigation for wetlands and open water impacts.

The Davis-Dolwig Act (Act) declares that recreation and the enhancement of fish and wildlife resources are among the purposes of state water projects and acquisition of real property for such purposes be planned concurrently with the project. The Act applies to water storage projects constructed by the State or by the State in cooperation with the Federal government. DWR's responsibilities under the Act include planning for recreation and for fish and wildlife preservation (mitigation) and enhancement, and acquiring land for such uses. The recreational features mentioned in the Act include campgrounds, picnic areas, water and sanitary facilities, parking areas, viewpoints, boat launching ramps, and any others necessary to make project land and water areas available for use by the public. DWR planning for public recreation use and fish and wildlife preservation and enhancement is to be part of the general project formulation activities and done in close coordination, consultation, and cooperation with Parks, DFG, Department of Boating and Waterways, and all appropriate federal and local agencies. DWR is to give full consideration to the recommendations provided by such other departments and agencies.

Changes to the recreation plan may be made during the Subsequent EIR/EIS and ESA/CESA consultation process and during discussions with State Parks, Boating and Waterways and local agencies. Potential conflicts may exist between the proposed hunting and sandhill crane use on the habitat islands. Boat dock placement should consider the existing special status plant populations on all levees. It should be possible to modify the recreation plan to accommodate both recreation and threatened and endangered species needs

A Historic Properties Management Plan was developed by consultants to mitigate the adverse effects of the DW project on historic properties located on Webb and Holland Tracts and Bouldin and Bacon Islands and to address the management of cultural resources once the proposed project has been implemented. The HPMP expands upon the 1998 Programmatic Agreement Among the U.S. Army Corps of Engineers, California State water Resources Control Board, California State Historic Preservation Officer, Advisory Council on Historic Preservation, and Delta Wetlands Properties Regarding the Implementation of the Delta Wetlands Project and the 2002 In-Delta Storage Program Planning Study on Environmental Evaluations. In May 2002, DW cultural resource consultants conducted limited archaeological shovel testing at historic-era archaeological sites associated with the Rural Historic District found on Bacon Island. The results of this testing resulted in the HPMP recommendation that only six of the ten recorded sites within the Historic District be subject to data recovery efforts, in contrast to the 2002 In-Delta Storage Project proposal that all ten sites receive treatment. Other than the recommendation to reduce the number of sites tested on Bacon Island, the HPMP differs very little from the 2002 In-Delta Storage Project proposal. One minor difference involves the cultural resources on Holland Tract. The HPMP recommendation is limited to monitoring previously recorded archaeological sites on this tract once the DW/In-Delta Storage Project is implemented. While such monitoring is valid and supportable, DWR recommends additional tasks outlined in the 2002 In-Delta Storage Project, specifically re-survey of the Piper Sand soils and the updating of site records prior to implementation of the proposed project.

DWR's Site Assessment Section conducted a Phase II Environmental Site Assessment (ESA) for the In-Delta Storage Program. The purpose of this Phase II ESA was to evaluate the nature and extent of suspected hazardous substance contamination as identified in the modified Phase I ESA for the Site dated December 2001. In September 2002, DWR staff collected a total of 77 soil samples at the Site. High levels of petroleum hydrocarbons, such as oil and grease, were detected at the vehicle and farm equipment maintenance facilities, especially in areas around or near fuel and lubricating oil tanks. Low concentrations of other potential contaminants, such as heavy metals, chlorinated pesticides, and organic solvents were also detected on each property. However, in each instance, their levels never exceeded the Total Threshold Limit Concentrations as established in California regulations.

Based on the results of the Phase II ESA sampling, DWR staff recommends further investigation of the identified "hot spot" areas to better delineate the extent of contamination. Further investigation may include more invasive subsurface soil sampling, surface water and groundwater sampling, and environmental fate studies for each of the contaminants of concern.

DWR staff also recommends that any contaminated soil at or near water supply well sites be removed and properly disposed of, or remediated, depending on the extent of contamination.

Lastly, DWR staff recommends that all measures be taken to indemnify the State from any liability associated with future hazardous substance contamination or remedial actions associated with the natural gas wells that are present throughout the Site. At this time, these gas wells and the parcels on which they are situated may not be part of the land acquisition for the Project. Such measures may include establishing baseline soil and groundwater sampling data for the properties surrounding the gas wells or inserting indemnification clauses in each of the proposed purchase agreements.

Nine listed or sensitive fish species occur in the In-Delta Storage Project area that could be affected by the project. Additional fisheries impact analyses will be needed as changes in reservoir operations are proposed in project development. DWR will coordinate with fishery agencies to determine the appropriate means of achieving endangered species acts compliance

DWR redesigned the fish screens to bring the screens into compliance with current standards that meet the restrictions in the Final Operations Criteria, biological opinions, and incidental take permit. Technical experts from various resource agencies provided suggestions to improve the fish screen design and layout, which were incorporated into the plans.

Preliminary estimates are that levee protection measures could eliminate 80 acres of shallow water habitat from the perimeters of Bacon Island and Webb Tract. Additional analysis will be conducted to determine the specific impacts to shallow water habitat once the levee protection measures and recreation development plans are refined.

The delta smelt diversion criteria in D 1643 results in reduction of project yield. Details of operational runs for fisheries operations are given in Chapter 3 on Operations. Developing current size and distribution estimates for delta smelt abundance is difficult. Predicting the size and distribution of delta smelt abundance well into the future is an area of even more uncertainty.

## Chapter 2.0 Introduction

In-Delta storage investigations were authorized under the CALFED Integrated Storage Investigations Program as defined in the CALFED Bay-Delta Program Programmatic Record of Decision (ROD) and Implementation Memorandum of Understanding (MOU) signed on August 28, 2000, by State and Federal agencies (collectively, the CALFED Agencies). The ROD identified in-Delta storage as one of five surface storage projects (Shasta, Los Vaqueros, In-Delta, Sites Reservoir, and 250-700 thousand acre feet (TAF) of additional storage in the upper San Joaquin River watershed). As a part of the In-Delta Storage Investigations, CALFED Agencies also decided to explore the lease or purchase of the Delta Wetlands (DW) Project, a private proposal by DW Properties Inc. to develop and market a water storage facility in the Sacramento-San Joaquin Delta (Delta). The ROD included an option to initiate a new project if the DW Project proved cost prohibitive or technically infeasible.

The Department of Water Resources and the CALFED Bay-Delta Program, with technical assistance by the U.S. Bureau of Reclamation (Reclamation), conducted a joint planning study in 2001 to evaluate the DW Project and other in-Delta storage options' ability to contribute to CALFED water supply reliability and ecosystem restoration objectives. The study consisted of six technical and financial feasibility evaluations of the DW Project: water supply reliability, impacts on water quality, engineering feasibility, environmental impacts, economic justification, and policy and legal. The main purpose of the investigations was to determine if the DW proposed project was technically and financially feasible. Information from the evaluations were presented in the In-Delta Storage Program Planning Study Summary Report (CALFED 2002a) and supporting technical documents available at <http://www.isi.water.ca.gov/ssi/indelta/reports.shtml>.

Based on the evaluations done through engineering, operations, water quality, environmental and economic studies, and engineering design review by the Independent Board of Consultants, DWR and Reclamation concluded that the project concepts as proposed by DW were generally well planned. However, it was the conclusion of DWR and Reclamation that for ownership by these two agencies, the project as proposed by DW required modifications and additional analyses before it was appropriate to "initiate negotiation with Delta Wetlands owners or other appropriate landowners for acquisition of necessary property" (CALFED ROD, page 44).

In 2002, DWR staff initiated additional evaluations of the modified DW Project, now referred to as the In-Delta Storage Project. The environmental evaluations were based on the recommendations made in the In-Delta Storage Program Planning Study Report on Environmental Evaluations (CALFED 2002b), and were focused in the following resource areas: land use, botanical, wildlife, cultural, aquatic, hazardous materials, and recreation. This report presents the results from the 2002-2003 environmental evaluations and makes recommendations for future work.

## Chapter 3.0 Land Use

### Background

In the In-Delta Storage Program Planning Study Report on Environmental Evaluations (CALFED 2002), DWR staff presented the following information:

- € Summarized land use information from the Draft Environmental Impact Report (DEIR) and Draft Environmental Impact Statement (DEIS) for the DW Project (JSA 1995A), and Final EIS (JSA 2001a);
- € Updated land use information based on DWR Land Use Survey Data from 1995 and 1996; and
- € Recommended additional evaluations to develop land use mitigation to minimize impacts to agricultural land.

As mentioned previously, the In-Delta Storage Program is one of five surface storage projects identified in the CALFED ROD. The ROD contains 14 Implementation Commitments that all CALFED programs must incorporate into their program's implementation. One of the Implementation Commitments focuses on land acquisition. The Land Acquisition Implementation Commitment states, "Successful implementation of the CALFED Program will affect some agricultural lands. As an important feature of the State's environment and economy, agricultural lands will be preserved during the implementation of the Program in a manner consistent with meeting program goals, minimizing impacts to agriculture."

The ROD also contains a list of 31 mitigation measures that will reduce potential effects of implementing CALFED projects on agricultural land. The mitigation measures are to be used during project-specific planning and should be considered and adopted where feasible when conducting second-tier environmental review<sup>1</sup>.

JSA (2001a) identified two significant adverse impacts to agricultural land from the DW Project: conversion of prime farmland and conflicts with land use plans and policies. DW Project did not propose mitigation measures to reduce the impacts on agricultural lands to less than significant levels. The SWRCB issued a Statement of Overriding Considerations in D-1643 and considered the project's value to water supply to outweigh the importance of maintaining agriculture on the islands. In the 2001-2002 Planning Study, DWR staff suggested that some

level of mitigation for agricultural impacts be included in the project in order to be consistent with the commitments in the CALFED ROD.

DWR staff recommended the following steps be taken in the 2002-2003 land use evaluations:

- € Evaluate the use of agricultural easements on surrounding agricultural lands as mitigation by working with Department of Conservation, San Joaquin County, DPC, and Contra Costa County to identify suitable agricultural land and quantities for easements; developing costs for agricultural easements; and, determining specific easement locations compatible with CALFED agencies goals.
- € Evaluate the use of Sherman or Twitchell islands for wildlife and wetland mitigation.
- € Work with Department of Conservation and other CALFED agencies to resolve any remaining Williamson Act issues.

This section presents the outcome of the 2002-2003 land use evaluations.

## Methods

DWR staff completed a Land Evaluation and Site Assessment (LESA) in order to quantify the impacts of the In-Delta Storage Program on agricultural land. The LESA evaluation was completed according to procedures outlined in DOC (1997). The LESA is an optional model lead agencies can use when assessing impacts on agriculture and farmland (Bass and others 1999). The LESA was completed for Webb Tract and Bacon Islands only. We assumed that the conversion of Webb Tract and Bacon Islands from agriculture to reservoir storage would be a permanent conversion by the State of California and/or the federal government. We did not complete a LESA evaluation for Bouldin Island and Holland Tract because the Habitat Management Plan for these islands is currently being revised and the loss of agriculture is unclear. (See Chapter 5.0 for information on the proposed management of Bouldin Island and Holland Tract.)

DWR staff reviewed the Contra Costa County General Plan, San Joaquin County General Plan, Sacramento County General Plan, and contacted the San Joaquin County Planning Department, Sacramento County Environmental Assessment, and the Contra Costa Community Development Department for guidance in setting significance levels and for determining appropriate mitigation ratios. (Webb Tract is located in Contra Costa County and Bacon Island is located in San Joaquin County.)

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<sup>1</sup> The second-tier environmental review for the In-Delta Storage Program is the Subsequent EIR/EIS. If the agencies decide to move forward with the In-Delta Storage Program, work on the Subsequent EIR/EIS is

To determine the feasibility of using agricultural easements for land use mitigation, we contacted the DOC and the Delta Protection Commission (DPC) to obtain information on known areas in the Delta with existing agricultural or conservation easements. The potential costs of agricultural easements were obtained from an environmental organization involved in conservation in the Sacramento-San Joaquin Delta and the East Contra Costa County Habitat Conservation Plan Association.

## **Results**

### **LESA**

The LESA evaluation resulted in a score of 59 for Bacon Island and a score of 55 for Webb Tract. The project's conversion of Bacon Island and Webb Tract from agriculture to reservoir storage is a significant impact according to the CA LESA Model Scoring Thresholds (DOC 1997). The worksheets from the LESA evaluation are in Appendix A.

### **Significance Thresholds and Mitigation Ratios**

The San Joaquin County General Plan lists preserving agricultural land and protecting natural resources as one of its basic values (SJC 2000). San Joaquin County has not established specific mitigation ratios for conversions of agricultural land to nonagricultural uses (Hulse 2003 personal communication; see "Notes"). The mitigation required by San Joaquin County has varied depending on the project location, the type of project and the project size (Hulse 2003 personal communication; see "Notes").

The Contra Costa County General Plan principles include encouraging and enhancing agriculture, and maintaining and promoting a healthy and competitive agricultural economy (CCC 1996). Contra Costa County uses LESA evaluations to determine the significance of agricultural land conversions to urban uses. Mitigation ratios are decided on a case by case basis (Roch 2003 personal communication; see "Notes").

Land conversions within Contra Costa County are subject to a land preservation ordinance, Measure C 1990. Measure C 1990 requires that 65% of county land remain in non-urban use. Non-urban use is defined as rural residences, agricultural structures, public facilities necessary for public welfare, etc. In-Delta Storage would fall under the non-urban use classification. However, since the land will be submerged as a reservoir, we would be removing Webb Tract from the total land in the County and the 65/35 ratio would be unaffected.

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expected to begin in Fiscal Year 2003-2004.

The East Contra Costa County Habitat Conservation Plan Association is developing a Habitat Conservation Plan (HCP) for Eastern Contra Costa County. The HCP will not extend into the legal Delta. The ECCHCPA has not developed a specific mitigation ratio for agricultural land conversions. Millions of local dollars are being set aside for obtaining agricultural easements in Contra Costa County (Kopchick 2003 personal communication; see “Notes”). If In-Delta Storage Project were to use agricultural easements for land use mitigation, it would be consistent with the County’s plans and local interest.

Respectively, Sacramento and Yolo counties have established significance thresholds and mitigation ratios for conversions of agricultural lands to other uses. While none of the In-Delta Storage Project islands are within Sacramento or Yolo counties, the thresholds and ratios can be used as a guide for establish mitigation for In-Delta Storage Project. The Sacramento General Plan sets a significance standard of 50 acres for conversions of agricultural land to other uses (Hack 2003 personal communication; see “Notes”). Sacramento County has not established a standard mitigation ratio or mitigation fees for impacts to agricultural land at this point. However, Sacramento County did require a 1:1 mitigation ratio for conversions of agricultural land to urban uses in the East Franklin Specific Plan Final Environmental Impact Report (SAC 2000). The project proponent protected an equal amount of agricultural land located within a 3 miles radius of the project site in a conservation easement.

Yolo County zoning code requires a 1:1 mitigation ratio for changes from an Agricultural Zoning Classification to a Non-Agricultural Zoning Classifications (Yolo 2003). The zoning code also defines conservation easements, farmland deed restrictions, or other farmland conservation mechanisms as suitable mitigation. Lands identified as mitigation must meet specific criteria including:

- € Have soil quality comparable to impacted land,
- € Have an adequate water supply, and
- € Be located within Yolo County either within a two mile radius of the impacted land or outside the two miles radius depending on certain requirements.

### **Easement Locations and Potential Costs**

DPC reported that 11,717 acres in the Delta Primary Zone were in conservation easements in 2002, or about 2% of the legal Delta (Aramburu 2003). Figure 3-1 shows the lands that are currently owned by DFG, in fee title, or in conservation easements for wildlife management. In 2002, conservation easements near the In-Delta Storage Project islands were found on Holland

Tract<sup>2</sup>, Medford Island, Mandeville Island, Palm Tract, Tyler Island, Terminous Tract, Empire Tract, and Jersey Island (Aramburu 2003). Similar information from Contra Costa County and San Joaquin County was not available at the time of this report. Over 16,000 acres of agricultural land are in production in the Delta portion of Contra Costa County (Jersey, Bradford, Quimby Island, Webb, Orwood, Webb, Byron, Holland and Veale Tracts) (Aramburu 2001). Over 253,000 acres of agricultural land are in production in the San Joaquin County portion of the Delta (DPC 1994). Based on this information, it should be possible to obtain agricultural easements on land surrounding the In-Delta Storage Project islands.

The cost of agricultural easements in the Delta is around \$1200/acre. The Nature Conservancy has purchased easements in San Joaquin County portion of the Delta, and those easements have averaged \$1200/acre (Unkel 2003 personal communication; see “Notes”).

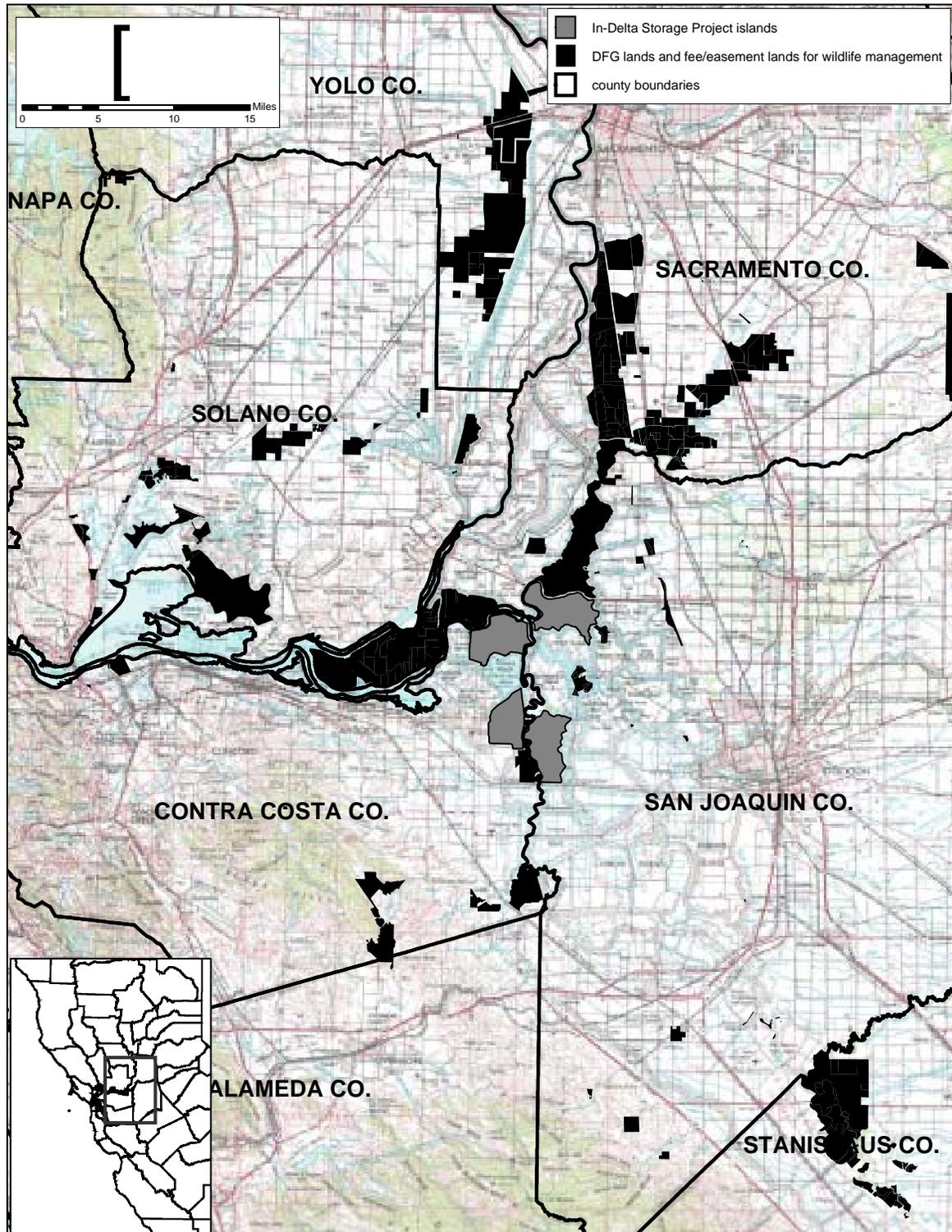


Figure 3-1. Lands owned by DFG, in fee title, or in conservation easements for wildlife management (Clamurro 2003 personal communication; see "Notes")

## Discussion

During the 2002 public review and CALFED Science review periods, DWR staff received conflicting comments on the impacts of the project to agricultural land and the need for mitigation. For example, some reviewers identified potential impacts to agricultural land not previously evaluated. Others disagreed with the statement that the project does not include mitigation to minimize impacts for conversion of agricultural land. While others indicated that no mitigation was needed.

Because of the differences in opinion on whether there are impacts to agricultural land, DWR staff conducted a LESA evaluation of the project. Results from the evaluation indicated that conversion of Webb Tract and Bacon Island from agricultural uses will result in a significant impact to agricultural land. Significant impacts to agricultural land on Webb Tract and Bacon Island were previously identified by JSA (2001). Other impacts to agricultural land included<sup>3</sup>:

- € The conversion of 4,725 acres of prime farmland on Webb Tract and 5,278 acres of prime farmland on Bacon Island to nonagricultural use is considered a significant impact under CEQA.
- € The conversion of Webb Tract from agriculture to water storage conflicts with Contra Costa County's policy to encourage and enhance agriculture, and the DPC's policies that designate agriculture as the primary land use in the Delta.
- € The conversion of Bacon Island from agriculture to water storage conflicts with the DPC's policies that designate agriculture as the primary land use in the Delta<sup>4</sup>.

San Joaquin and Contra Costa counties have not established mitigation ratios for conversions of agricultural land to other uses. Sacramento County has required a 1:1 mitigation ratio for projects, and Yolo County zoning code specifies a 1:1 mitigation ratio. If In-Delta Storage were to provide mitigation for impacts to agricultural land at a 1:1 ratio, over \$12 Million would be required for the easements. CEQA does not require projects to adopt mitigation measures that are infeasible (Guidelines section 15091(a)(3)). When the cost of the mitigation measure would make the project infeasible, "...the agency must support the finding with specific data showing that the additional cost or lost profits are great enough to make it impractical to proceed with the project." (Bass and others 1999). Additional analysis will be necessary in Fiscal

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<sup>3</sup> Impacts to Williamson Act lands are addressed in a subsequent section.

<sup>4</sup> DPC land use plan recommends that water reservoirs that are consistent with other uses in the Delta be permitted (1995). Recommendations are "additional, optional directions for actions for local government, for non-profit groups, State agencies, and others."

Year 2004 to determine whether spending \$12 Million for agricultural easements is feasible for the project.

The following priorities can be used when obtaining agricultural easements for the project:

- € Obtain agricultural easements in the Delta portion of San Joaquin and Contra Costa counties,
- € Obtain agricultural easements any where in the legal Delta,
- € Obtain agricultural easements in San Joaquin and Contra Costa counties outside of the legal Delta.

CALFED (2000) provided mitigation strategies to minimize adverse impacts on agriculture, including focusing easement acquisition on lands in proximity to the impacted area. Higher priority was given to easements within the legal Delta than easements outside the Delta because the problem area identified by CALFED is the legal Delta, Suisun Marsh and Suisun Bay (CALFED 2000). Obtaining agricultural easements outside the legal Delta but within San Joaquin and Contra Costa counties was given lower priority because it was assumed that the land would be further from the affected islands but still within the range of the solution area identified by CALFED.

Additional work should be done to identify potential land for the easements. CALFED's ERP has targeted up to 111,000 acres of Delta land for restoration. Work should be coordinated with ERP to minimize conflicts between the ecological visions for the Central and West Delta Management Zone, the Delta Region, and potential easement locations.

Several possible partnerships could be developed to assist in identifying suitable easement locations. The first partnership could be with the Farmland Conservancy Program. The DOC is developing a mechanism for CALFED agencies to use the Farmland Conservancy Program as a type of mitigation bank. A second option involves partnering with local agencies. The Contra Costa County Agricultural Land Trust is the county arm that implements agricultural easements in Contra Costa County. The Brentwood Land Trust is a private entity that could provide similar assistance. Partnerships with local agencies could facilitate property identification and communication with landowners.

### **San Joaquin County Ordinance**

In June 2002, San Joaquin County adopted a land use ordinance as part of its zoning codes. The ordinance requires that project proponents obtain a use permit before constructing a water storage project of greater than six feet in depth, for storage of 30 days or more in any calendar year, on 500 acres or more of agricultural land in the County. The Delta Wetlands Properties

(DWP), a private enterprise, would be required to apply for such a use permit if it were to construct the Delta Wetlands Project on Bacon Island in the Sacramento-San Joaquin Delta. In January 2002, DWP sued the County in superior Court of California, seeking to have the Court set aside the ordinance. In January 2003, the Court ruled against DWP and found the ordinance valid. DWP filed an appeal of the ruling.

Although the ordinance may affect DWP if it proposes to construct the DW Project, it would not affect DWR or Reclamation's construction of the In-Delta Storage Project. San Joaquin County is organized under the State general law and the County only has those powers granted to it by the legislature. The County must comply with State law unless a statute expressly authorizes control by the County over specific areas. The State generally leaves local land-use control to local rule. However, State law preempts local law when local law duplicates, contradicts, or enters an area fully occupied by general law, either expressly or by legislative implication.

Here, the ordinance to control development of water storage facilities in the Delta enters an area that State law has fully occupied through enactment of the Central Valley Project Act (Water Code Section 11100 et seq.) and the California Water Resources Development Bond Act (Water Codes 12930 et seq.). Under these Acts, DWR has specific authority to construct facilities it determines necessary and desirable to augment water supplies for the State Water Resources Development System, including facilities in the Delta (Water Code Sections 12931 and 12938). Even though local government is not precluded from coordinating efforts with the State, the State's water-needs preempt local laws if the laws conflict. Therefore, in this case, State law fully occupies the area of legislation that the County ordinance affects and DWR is not subject to the ordinance.

### **Williamson Act Requirements**

The California Land Conservation Act of 1965, generally referred to as the Williamson Act, provides for establishment of agricultural preserves through contract between landowners and local government (Government Code Section 51200 et seq.). Under the Act, private landowners may voluntarily restrict their land to agricultural and compatible open-space uses by entering into minimum 10-year rolling term contracts with the county or city that has jurisdiction over the land. In return, restricted parcels are assessed for property taxes at a rate consistent with actual use, rather than potential market value. Williamson Act contracts are automatically renewed every year unless nonrenewed. The Act describes steps that must be followed in order to cancel a

contract. The purpose of the Act is to preserve agricultural and open space lands by discouraging premature and unnecessary conversion to urban uses (DOC 2001).

Webb Tract contains a 139-acre parcel that is under Williamson Act contract. Approximately 4,662 acres of Bacon Island are currently under Williamson Act contracts (JSA 1995A). Public agencies, such as DWR or Reclamation, may acquire land that is under Williamson Act contract when the agency needs to locate a public improvement on the land (Gov. Code Section 51291). Public improvements are defined by the Act and include facilities or interests in real property owned by a public agency. If DWR or Reclamation were to acquire the Delta Wetlands Project for its use, it would be considered a public improvement under the Act. The Act requires that public agencies satisfy specific notification requirements and make specific findings prior to locating a public improvement on such land. If DWR were to consider acquisition of the Delta Wetlands properties, it would need to notify the Director of the Department of Conservation and the local governing body responsible for the administration of the agricultural preserve of the intent to locate a public improvement on the land. The need to make the specified findings under the Act would depend on the use of the reservoirs constructed on the islands.

DWR staff met with Department of Conservation (DOC) staff to discuss the process required if DWR were to acquire these lands that are under Williamson Act contract. DOC staff confirmed that the flooding of Webb Tract and Bacon Island would not be considered a “compatible use” under Section 51293 of the Act as flooding of the islands would not be compatible with or enhance land within the agricultural preserve. Therefore, DWR would need to provide notice and make specified findings before acquiring the Williamson Act land for the water-storage project.

If DWR constructs the water-storage project for the State Water Project, it could be considered a State Water Facility and DWR would be exempt from the requirement to make specified findings prior to locating the project on Williamson Act lands. The Act exempts certain types of projects from the requirement of making findings under Section 51292. Specifically, the Act exempts State Water Facilities, except those constructed for local agencies under the Davis-Grunsky Act (Section 51293(h)). A State Water Facility is defined as “master levees, control structures, channel improvements, and appurtenant facilities in the Sacramento-San Joaquin Delta for water conservation, water supply in the Delta, transfer of water across the Delta, flood and salinity control, and related functions” (Water Code Section 12934(d)(3)). The In-Delta Storage Project that DWR could construct could be for these purposes and would meet the definition. However, if the exemption of Section 51293(h) did not apply, DWR would most likely be able to

make the necessary findings required by the Act, specifically: that the location of the public improvement is not based primarily on a consideration of the lower cost of acquiring land in an agricultural preserve, and that there is no other land within or outside the preserve on which it is reasonably feasible to locate the public improvement (Section 51292).

As mentioned above, prior to possible acquisition of Williamson Act lands for a public improvement, DWR would provide the following information to the Director of DOC and the local governing body:

- € The total number of acres of Williamson Act contract land to be acquired and whether the land is considered prime agricultural land according to Gov. Code Section 51201.
- € The purpose of the acquisition and why the land was identified for acquisition.
- € A description of where the parcels are located.
- € Characteristics of adjacent land (e.g., urban development, Williamson Act, agricultural land.)
- € A vicinity map and a location map.
- € A copy of the contracts covering the land.
- € CEQA documents for the project.
- € The findings required under Gov. Code Section 51292, documentation to support the findings and an explanation of the preliminary consideration of Gov. Code Section 51292 (unless the facilities are exempted).

If DWR were to proceed with actual acquisition of the land, it must notify the Director of DOC of the acquisition and include an explanation of the decision to acquire the land, the findings made under Section 51292, if required, and if information is different from that provided in the prior notice.

## **Recommendations**

- € Determine the implications of acquiring 10,003 acres of agricultural easements on the financial feasibility of the In-Delta Storage Project and the implementation of ERP actions in the Delta.
- € Develop the information required of state agencies under the Williamson Act (notice and findings).
- € Continue discussions on agricultural mitigation options with the DPC, DOC, Contra Costa County and San Joaquin County.

## Chapter 4.0 Special Status Plant Surveys

### Introduction

Delta Wetland's consultants carried out surveys for special status plant species in 1988. Because these surveys were fourteen years old, we determined that additional surveys were needed in order to detect any new populations of sensitive plants and to document occurrences of species that were not designated as special status species at the time of the previous surveys. Based on recommendations from DFG and USFWS, areas along the facing side of in-channel islands adjacent to the study island (not included in the original studies) were added to the survey area. These were areas that might be impacted due to increased recreational boat traffic.

### Methods

#### Determining target species list

A list of special-status species was created from two sources, the California Natural Diversity Database and the US Fish and Wildlife Service, based on USGS quad boundaries. Any species included in the CNDDDB that has a record of occurring in the USGS quadrangles encompassing the project were included on the list. The USFWS list was incorporated into the list. The CNPS database of Rare and Endangered Plants of California was also queried at the quad level, and any species that were found in that database were added as well.

The resulting list was reviewed in consultation with USFWS and DFG personnel, and some species were eliminated due to the lack of suitable habitat on the DW islands. These were species that are known to occur on alkaline clay soils or in vernal pool habitats; neither of these habitats is found on the islands. The result was a conservative list of sensitive species, including CNPS list 4 species that are not covered under CEQA (Table 4-1).

#### Timing of surveys

Many plant species can only be positively identified with flowers. Botanical surveys were scheduled so that the target species would be in flower when staff was searching for them. The CNPS database provides flowering times, which dictated the schedule. The species on our list fell into two distinct flowering periods that required multiple visits: early summer vs. late summer/fall (Table 4-1).

Table 4-1. Special Status Plant Species Potentially Occurring within the Proximity of the Project Area

Scientific name Common name Family	Status* Fed./State CNPS	Distribution in California	Habitat and flowering time
<i>Aster lentus</i> Suisun marsh aster Asteraceae – sunflower family	FSC/-- 1B	San Francisco, San Pablo, and Suisun Bays and the Delta. Counties: Contra Costa, Napa, Sacramento, San Joaquin, Solano	Salt, brackish and freshwater marshes at or above the zone of tidal fluctuation. Elev. <150 m. Blooms May – Nov.
<i>Carex comosa</i> Bristly sedge Cyperaceae – sedge family	--/-- 2	Inner North Coast Ranges, Cascade Range, Great Valley, northern Central Coast, San Francisco Bay area, and elsewhere. Counties: Contra Costa, Lake, Mendocino, San Bernardino, Santa Cruz, San Francisco, Shasta, San Joaquin, Sonoma.	Coastal prairie, marshes and swamps (lake margins), valley and foothill grassland; elev. 0 – 425 m. Blooms May – Sept.
<i>Carex vulpinoidea</i> Fox sedge Cyperaceae – sedge family	--/-- 2	Southeastern Klamath Range, northern Cascade Range, northern Sacramento Valley, and elsewhere. Counties: Butte, Shasta, Siskiyou, Tehama, Trinity.	Marshes and swamps (freshwater), riparian woodland; elev. 30 – 1200 m. Blooms May – June.
<i>Cirsium crassicaule</i> Slough thistle Asteraceae – sunflower family	--/-- 1B	The Delta and San Joaquin Valley. Counties: Kings, Kern, San Joaquin.	Shallow water or saturated soils in chenopod scrub, marshes, swamps, and riparian scrub. Elev. 3 – 100 m. Blooms May – Aug.
<i>Cryptantha hooveri</i> Hoover's cryptantha Boraginaceae -- borage family	--/-- 1B	Northern and central San Joaquin Valley. Counties: Alameda, Contra Costa, Madera, Merced, San Joaquin, Stanislaus.	Sandy soils in valley or foothill grassland. Elev. < 150 m. Blooms Apr. – May.
<i>Eleocharis parvula</i> Small spikerush Cyperaceae – sedge family	--/-- 4	North Coast, Great Basin, Deserts and elsewhere. Counties: Butte, Contra Costa, Glenn, Humboldt, Napa, Orange, Siskiyou, San Luis Obispo, Sonoma, Ventura.	Wet, generally saline flats in marshes and swamps. Elev. < 2530 m. Blooms June – Sept.
<i>Erysimum capitatum</i> ssp. <i>angustatum</i> Contra Costa wall flower Brassicaceae – mustard family	FE/SE 1B	Known only from the Antioch Dunes in the city of Antioch, Contra Costa County.	Interior dunes with sparse herb and shrub cover. Elev. 3 – 20 m. Blooms Mar. – July.

Scientific name Common name Family	Status* Fed./State CNPS	Distribution in California	Habitat and flowering time
<i>Gratiola heterosepala</i> Bogg's Lake hedge-hyssop Scrophulariaceae – figwort family	--/SE 1B	Inner North Coast Ranges, central Sierra Nevada foothills, Sacramento Valley, Modoc Plateau, and elsewhere. Counties: Fresno, Lake, Lassen, Madera, Merced, Modoc, Placer, Sacramento, Shasta, Siskiyou, San Joaquin, Solano, Tehama.	Shallow water along the margins of lakes, marshes, swamps, and vernal pools. Often in clay. Elev. 10 – 2375 m. Blooms Apr. – Aug.
<i>Hibiscus lasiocarpus</i> Rose-mallow Malvaceae – mallow family	--/-- 2	Central and southern Sacramento Valley, deltaic Great Valley, and elsewhere. Counties: Butte, Contra Costa, Colusa, Glenn, Sacramento, San Joaquin, Solano, Sutter, Yolo.	Freshwater marsh, often in riparian areas with slow moving water. Canals, sloughs, ponds, and oxbow lakes. Elev. < 120 m. Blooms June – Sept.
<i>Lathyrus jepsonii</i> var. <i>jepsonii</i> Delta tule-pea Fabaceae -- pea family	FSC/-- 1B	The Delta and San Francisco Bay area. Counties: Alameda, Contra Costa, Napa, Sacramento, Santa Clara, San Joaquin, Solano.	River and canal banks in association with freshwater and brackish marshes and riparian woodlands at or above the zone of tidal influence. Elev. < 4 m. Blooms May – Sept.
<i>Lilaeopsis masonii</i> Mason's lilaeopsis Apiaceae – carrot family	FSC/SR 1B	The Suisun Bay and Delta. Counties: Contra Costa, Napa, Sacramento, San Joaquin, Solano.	On newly deposited or exposed sediments, wood pilings, or sometimes on levee riprap, within the tidal zone. Elev. < 10 m. Blooms Apr. – Nov.
<i>Limosella subulata</i> Delta mudwort Scrophulariaceae – figwort family	--/-- 2	The Delta and elsewhere. Counties: Contra Costa, Sacramento, San Joaquin, Solano.	Edges of riverbanks and sloughs in marsh vegetation, rooted within the zone of tidal fluctuation. Elev. < 3 m. Blooms May – Aug.
<i>Oenothera deltoides</i> ssp. <i>howellii</i> Antioch Dunes evening primrose Onagraceae – primrose family	FE/SE 1B	Known only from the Antioch Dunes in the city of Antioch and from Brannan Island. Counties: Contra Costa, Sacramento.	Interior bluffs and dunes with sparse herb and shrub cover. Elev. < 30 m. Blooms Mar. – Sept.
<i>Potamogeton zosteriformis</i> Eel-grass pondweed Potamogetonaceae – pondweed family	--/-- 2	Southern Inner North Coast Range, Great Valley, Modoc Plateau, and elsewhere. Counties: Contra Costa, Lake, Lassen, Modoc, Shasta.	Ponds, lakes, streams and marshes. Elev. < 1860 m. Blooms June – July.
<i>Sagittaria sanfordii</i> Sanford's arrowhead Alismataceae – arrowhead family	FSC/-- 1B	North Coast, Great Valley, and northern South Coast. Counties: Butte, Del Norte, Fresno, Kern, Merced, Orange, Sacramento, Shasta, San Joaquin, Tehama, Ventura.	Shallow freshwater marshes, ponds, sloughs, streams and ditches. Prefers silty or muddy substrate. Elev. < 610 m. Blooms May – Oct.

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Scientific name Common name Family	Status* Fed./State CNPS	Distribution in California	Habitat and flowering time
<i>Scutellaria galericulata</i> Marsh skullcap Lamiaceae – mint family	--/ 2	High Sierra Nevada, Modoc Plateau, and elsewhere. Counties: El Dorado, Lassen, Modoc, Nevada, Placer, Plumas, Shasta, San Joaquin, Siskiyou.	Meadows, marshes, and seeps (mesic) in lower montane coniferous forest. Occurrences in the Delta (SJ Co.) need further study. Elev. < 2100 m. Blooms June – Sept.
<i>Scutellaria lateriflora</i> Blue skullcap Lamiaceae – mint family	--/ 2	Northern San Joaquin Valley, east of the Sierra Nevada, and elsewhere. Counties: Inyo, San Joaquin.	Mesic meadows, seeps, and freshwater marshes. Elev. < 500 m. blooms July – Sept.
*Listing status code definitions used by the California Native Plant Society (CNPS), the State of California (DFG), and the Federal Government (USFWS) to describe the degree of endangerment and the legal status of sensitive plant taxa:			
CALIFORNIA NATIVE PLANT SOCIETY (CNPS) LISTS			
List 1A: Plants presumed extinct in California List 1B: Plants rare, threatened or endangered in California and elsewhere List 2: Plants rare, threatened or endangered in California, but more common elsewhere. List 3: Plants about which more information is needed. List 4: Plants of limited distribution – a watch list.	STATE LISTING CODES  SE State listed, endangered ST State listed, threatened SR State listed, rare		FEDERAL LISTING CODES  FE Federally listed, endangered FT Federally listed, threatened PE Proposed for federal listing as endangered PT Proposed for federal listing as threatened FSC Federal species of concern (replaces old "candidate" categories C1, C2, C3c) C Federal candidate for listing

## Survey methods

Botanical surveys covered two areas: island interiors that were surveyed on foot or by vehicle, and levee faces and in-channel islands that were surveyed by boat. All survey routes were recorded with a GPS unit or marked on field copies of aerial photographs and later transferred to the GIS database (Figure 4-1 and 4-2). Land surveys were conducted by personnel on foot in areas that were structurally or botanically diverse (such as riparian forests). A canoe was used to survey the marshes around the large ponds on Webb Tract. Surveys in highly disturbed areas that were easily accessible (and therefore were monotonously covered in dense weedy growth) were conducted from slow-moving vehicles.

Surveys of levee faces and in-channel islands were conducted by boat. A small boat with shallow draft was driven slowly along levees or islands while a botanist on-board examined the shoreline. Mason's lilaopsis and Delta mudwort occur in easily visible mudflats, so essentially all populations/stands were located. Each stand was examined at close range by the botanist to determine if Mason's lilaopsis or Delta mudwort was present. California hibiscus and Suisun marsh aster are obvious when in flower, and boat surveys for these species were conducted at a somewhat faster rate. All occurrences of special-status plants were marked with a GPS unit (Corvallis Microtechnology, March II model) by getting as close as possible to the stand. Additional data such as size of populations or patches were also recorded. In instances where a plant population was more or less continuous along the shoreline, the occurrence was recorded as a line rather than a point.

Field surveys were performed using floristic methods as recommended by DFG (2000). All plant species encountered were identified to the extent necessary to determine their rarity and listing status. A plant species list was compiled for all the islands (Appendix B).

## Data management

GPS data recording plant locations and routes were differentially corrected using the GPS software, imported into an ArcView GIS file. The data in this form can be used to create maps or analyze spatial patterns in data. Special status plant occurrences and elderberry stands were mapped (Figures 4-3 through 4-6).

## Levee modification evaluation

A survey of existing riprap was conducted by boat on February 5 and 12, 2003. We assumed that rock was present on a levee stretch if rock showed above the water line at the time of the surveys (between 10 am and 3 pm each day). We were unable to determine how far down the levee slope the rock extended during the surveys. However, DWR staff were told that existing rock extends a few feet below low tide level (Arrich 2003 personal communication; see "Notes"). To determine whether special status

plants could be impacted by the addition of riprap, we compared maps of special status plant locations for Webb Tract and Bacon Island with maps showing areas of likely rock work.

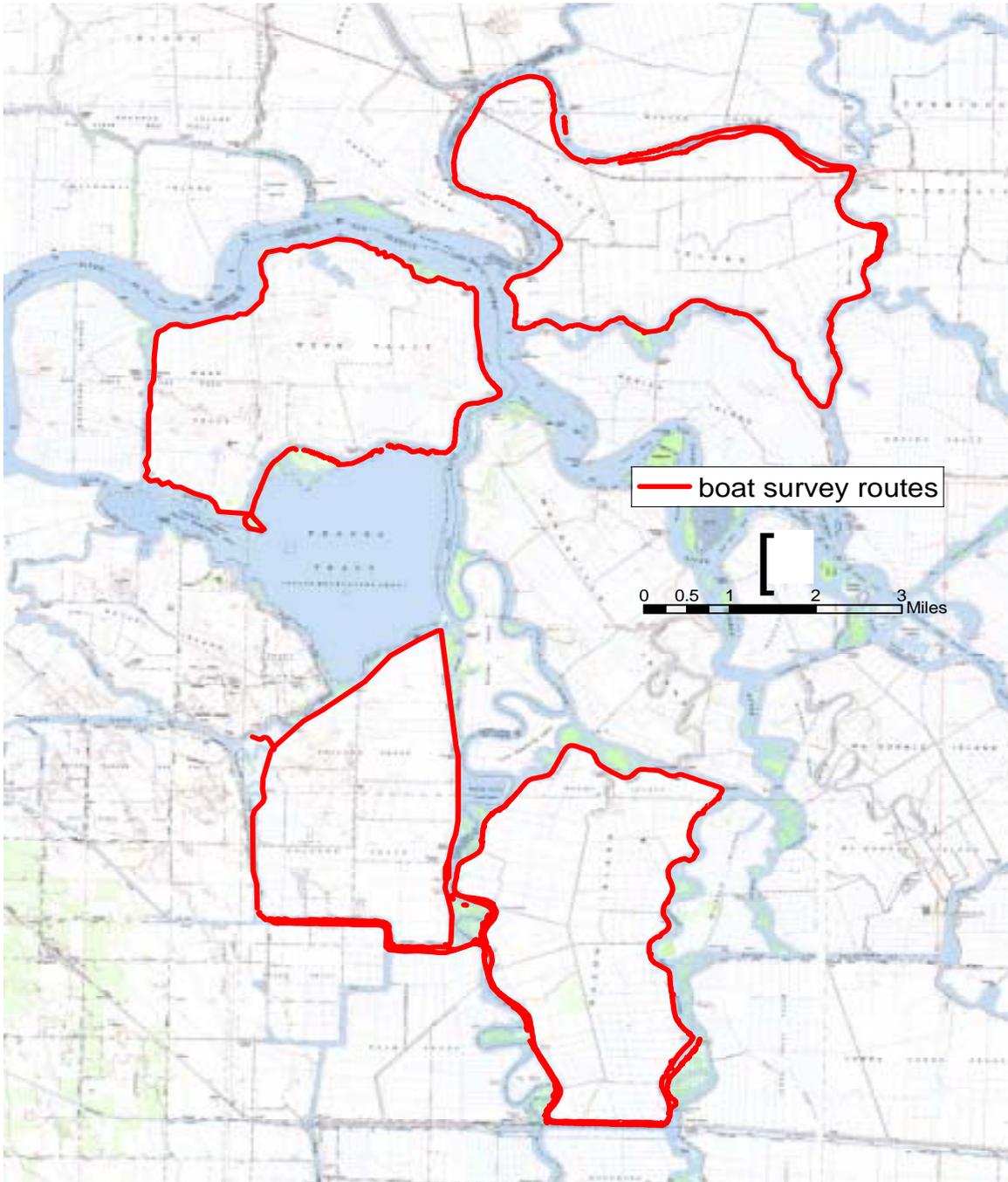


Figure 4-1. Boat survey routes for In-Delta Storage Project 2002 botanical surveys.

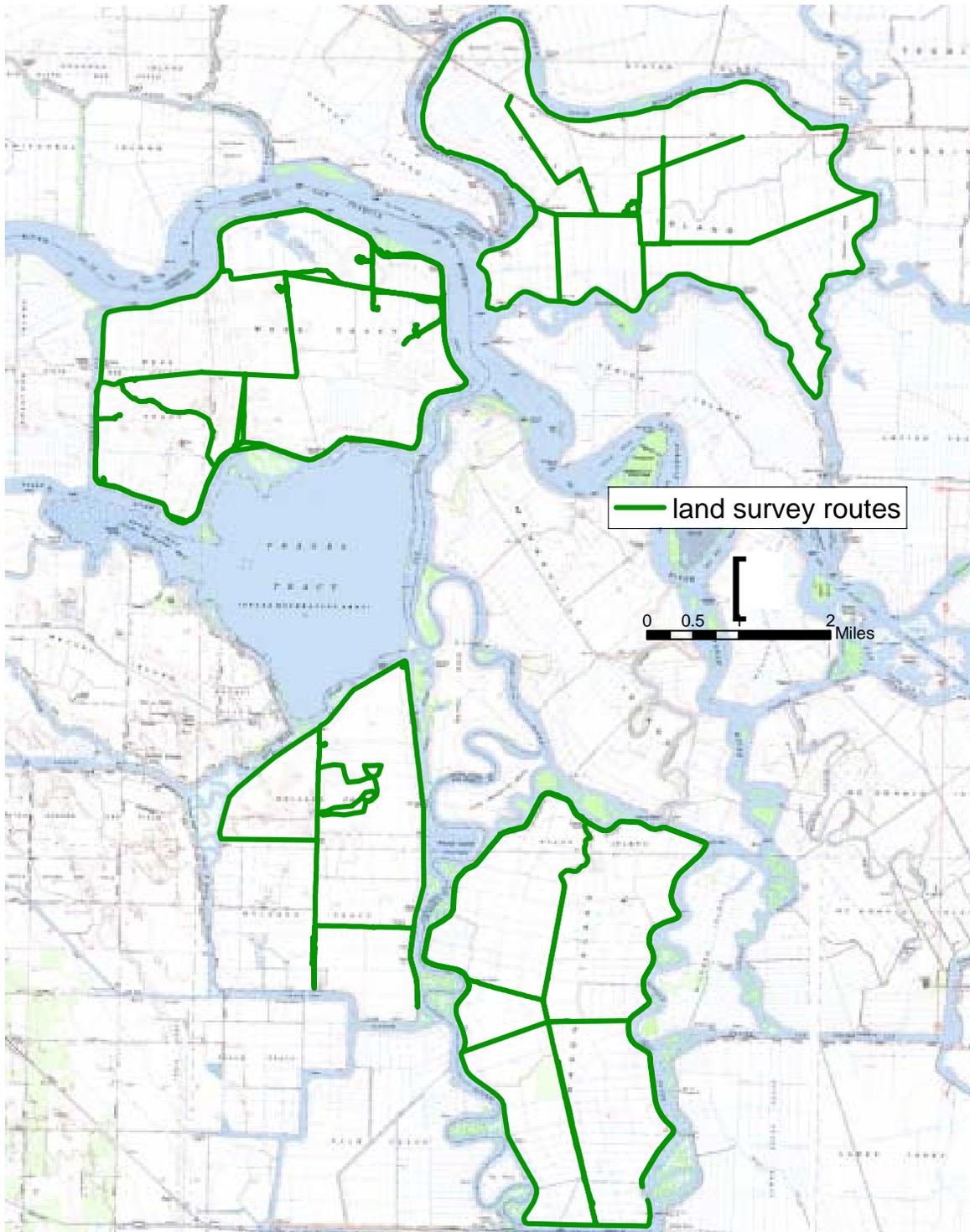


Figure 4-2. Land survey routes for 2002 In-Delta Storage Project botanical surveys.

## Results

A total of 369 occurrences of six sensitive plant species and one occurrence of elderberry were located during field surveys in 2002. The sensitive species found were Delta mudwort (*Limosella subulata*), Delta tule-pea (*Lathyrus jepsonii* var. *jepsonii*), fox sedge (*Carex vulpinoidea*), Mason's lilaeopsis (*Lilaeopsis masonii*), rose-mallow (*Hibiscus lasiocarpus*), and Suisun aster (*Aster lentus*).

The majority of these occurrences (258, or 70%) were on in-channel islands adjacent to the main islands (Table 4-2).

**Table 4-2. Populations of Special Status Plant Species Observed on or adjacent to Project Islands**

Species (Fed/State/CNPS list)	Bacon		Webb		Holland		Bouldin		Total
	On island	Adjacent	On island	Adjacent	On island	Adjacent	On island	Adjacent	
Delta mudwort (--/--/2)	0	2	0	9	0	14	2	3	30
Delta tule-pea (FSC/--/1B)	0	0	1	0	0	1	0	0	2
Fox sedge (--/--/2)	1	0	0	0	0	0	0	0	1
Mason's lilaeopsis (FSC/SR/1B)	10	37	1	17	0	27	1	27	120
Rose-mallow (--/--/2)	13	28	2	8	1	56	2	3	113
Suisun Marsh aster (FSC/-- /1B)	15	0	7	15	6	57	34	5	103

### Blue Elderberry

Blue elderberry shrubs, while not in themselves considered sensitive, provide habitat for the Valley Elderberry Longhorn Beetle, a federally listed endangered species. One stand of elderberry was found during surveys of the islands, on Holland Tract (Figure 4-3).

### Delta Mudwort

Delta mudwort is a CNPS list 2 species. Thirty occurrences of this species were found in 2002. Of these, 14 were on in-channel islands adjacent to Holland Tract, nine were adjacent to Webb Tract, 3 adjacent to Bouldin Island, and 2 adjacent to Bacon Island. Only 2 occurrences of this species were found on a study island proper; these were on Bouldin Island (Figures 4-3 through 4-6).

### **Delta Tule-pea**

There were 2 occurrences of delta tule-pea documented during 2002 field surveys (Figures 4-3 through 4-6). This is a CNPS list 1B species. One was from Webb Tract proper, and another was on an in-channel island adjacent to Holland Tract.

### **Fox Sedge**

Fox sedge is a CNPS list 2 species previously not known to occur in the Delta, and therefore it was not on the original target species list. The floristic survey method employed in this study allowed us to detect this new occurrence and apparent range extension for the species; however the single specimen found on Bacon Island probably represents an isolated occurrence (Figure 4-6). Lawrence Janeway at CSU Chico confirmed the species determination.

### **Mason's Lilaepsis**

Mason's lilaepsis, a State-listed Rare species, was found at 120 separate locations within the study area, 108 of which were on adjacent in-channel islands (Figures 4-3 through 4-6). Bacon Island had ten occurrences of this species on the island proper, with an additional 37 occurrences on the adjacent in-channel islands. Bouldin Island had 27 occurrences of Mason's lilaepsis on the adjacent in-channel islands, and one occurrence on the main island. There were 27 occurrences of the plant on in-channel islands adjacent to Holland Tract and none on the main island. Webb Tract in-channel islands supported 17 occurrences, and there was one occurrence on the main island.

### **Rose-mallow**

Rose-mallow is a CNPS list 2 species. We documented 113 occurrences of this species on and around the study islands, mostly on in-channel islands (Figures 4-3 through 4-6). There were 56 occurrences adjacent to Holland Tract and 23 adjacent to Bacon Island, which also had 13 occurrences on the main island. One occurrence was on the main Holland Tract island. Bouldin Island had 3 occurrences adjacent to the island and 2 on it. Webb Tract had 8 occurrences adjacent to the island and 2 on it.

### **Suisun Aster**

There were 103 occurrences of this CNPS list 1B species located within the study area (Figures 4-3 through 4-6). In contrast to most of the other sensitive plant species encountered, this one was more common on the main islands than on the in-channel islands, usually growing in the riprap on the outer levee slope. There were 34 occurrences on Bouldin Island, 21 on Holland Tract, 15 on Bacon Island, and 7 on Webb Tract. The in-channel islands adjacent to Webb Tract supported 15 occurrences; there were 6 adjacent to Holland Tract and 5 adjacent to Bouldin Island.

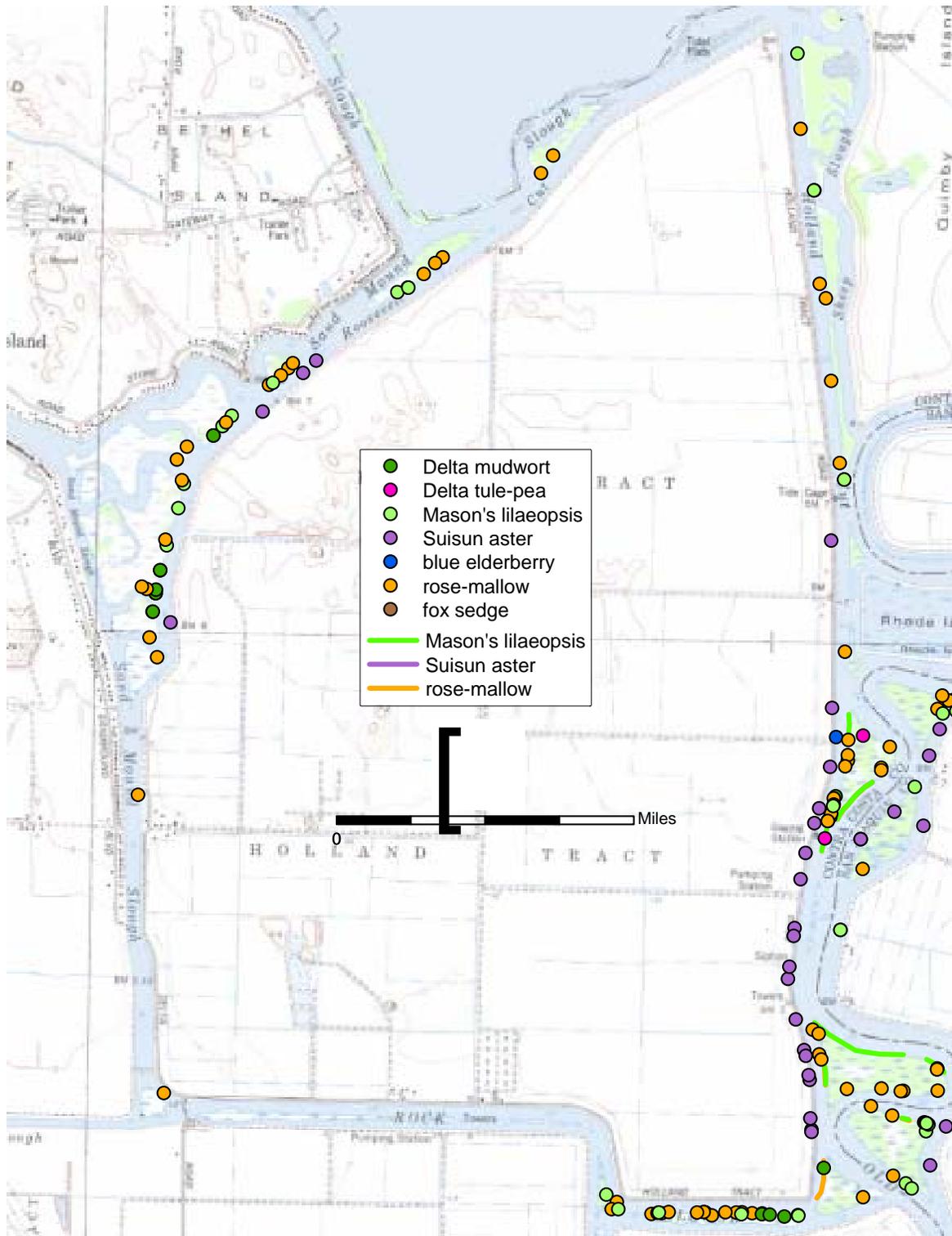


Figure 4-3. Special status plant species found on or adjacent to Holland Tract in 2002.

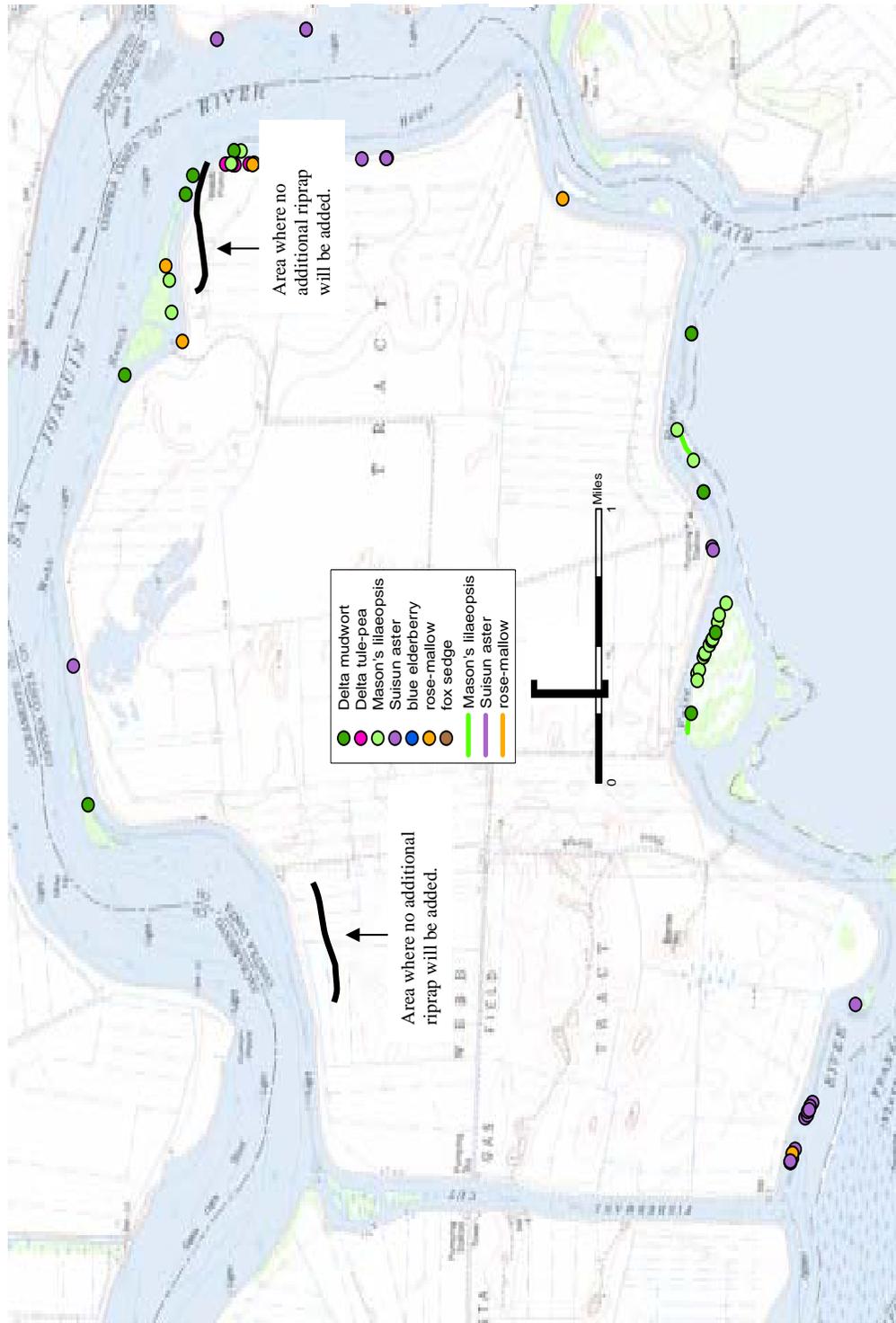


Figure 4-4. Special status plants found on or adjacent to Webb Tract in 2002.

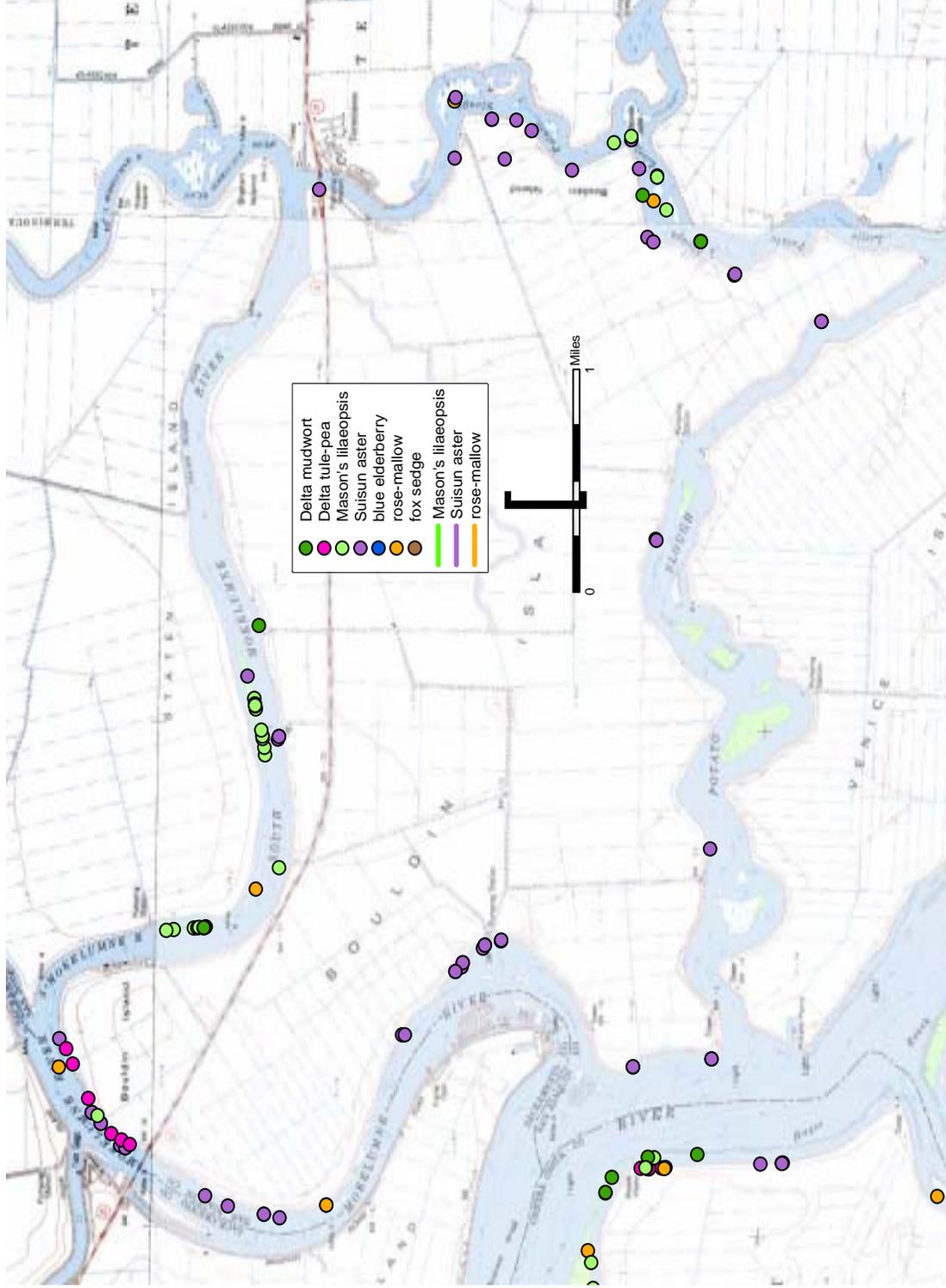


Figure 4-5. Special status plants found on or adjacent to Bouldin Island in 2002.

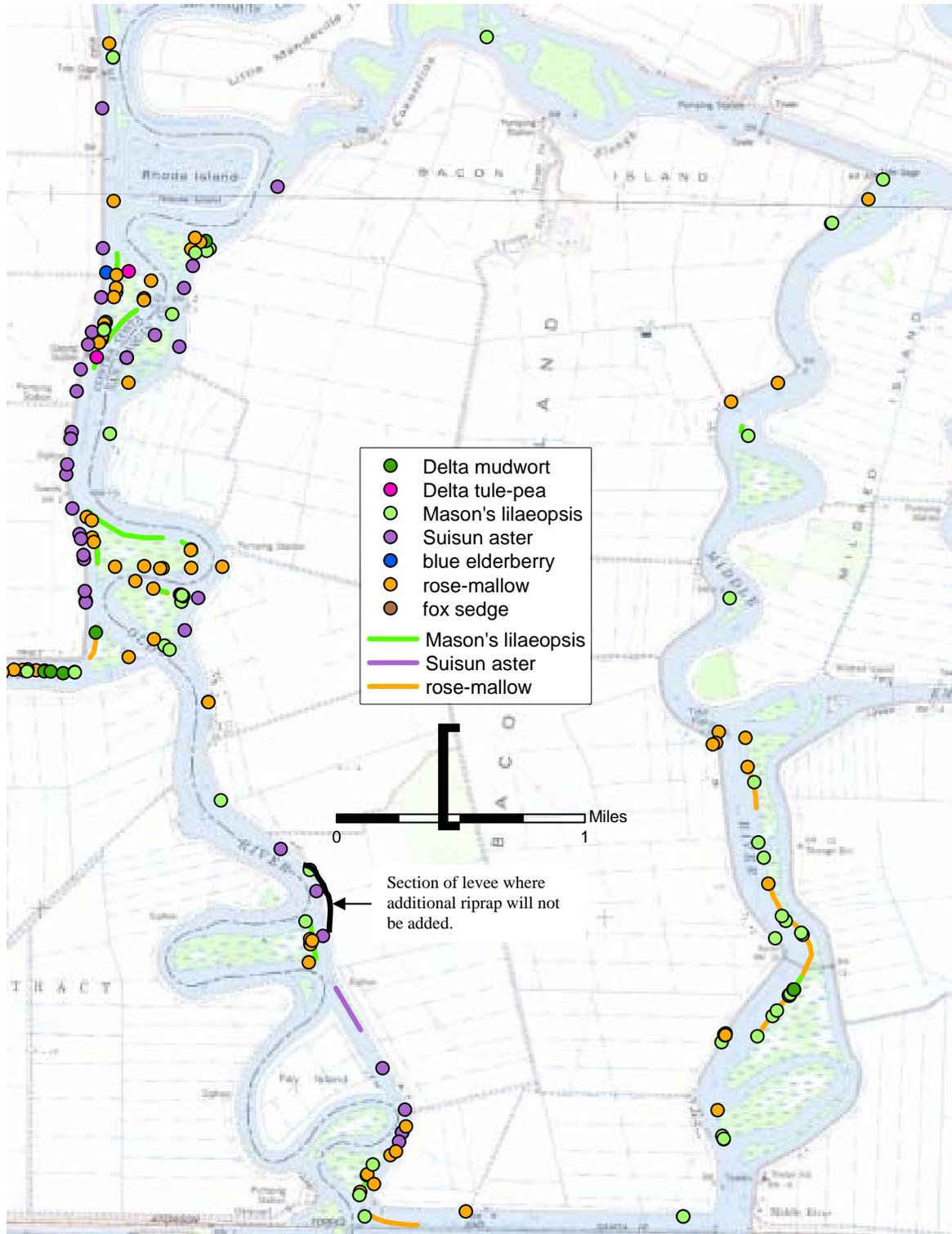


Figure 4-6. Special status plants found on or adjacent to Bacon Island in 2002

## Discussion

### Previous studies comparison

Previous plant surveys conducted on the Project islands did not include in-channel islands, where the majority of sensitive species occurrences were recorded in this survey. Comparing the main islands only, the occurrences found in the current study show an apparent increase in the population of Suisun Marsh Aster: from 6 to 15 occurrences on Bacon, 3 to 7 on Webb, 19 to 21 on Holland, and 8 to 34 on Bouldin. This species is frequently found growing within the riprap on the channel side of levees, and probably the populations fluctuate in response to levee maintenance activities.

The numbers of occurrences of rose-mallow in this study are similar or slightly more frequent on all the islands compared to the previous study. There were 13 occurrences on Bacon Island vs. 10 found previously; 2 on Webb Tract vs. 1 previous occurrence; likewise 2 on Bouldin vs. 1 found in the earlier study, and 1 on Holland Tract in both studies. Delta tule pea was about as abundant as in the previous study, with 1 occurrence on Webb (vs. 1 previously) and 1 on an in-channel island adjacent to Holland Tract. The single occurrence listed on Bouldin Island in the previous study was not documented in the current study. Fewer occurrences of Mason's lilaepsis were found than in the previous study, with only 10 on Bacon (18 previously), 1 on Webb (3 previously) and 1 on Bouldin (5 previously). The apparent decline in Mason's lilaepsis may be due to the transient nature of the habitat occupied by this species. It occupies mud banks and flats within the tidal zone that are subject to erosion and deposition of sediments, as well as various natural and man-made disturbances.

Delta mudwort was found in 2 locations on Bouldin Island in the present study, but was not found in the previous study. It occupies habitats similar to those where Mason's lilaepsis is found, and its populations may fluctuate due to the transient habitat. Fox sedge was found in only one occurrence in the present study, and probably represents an isolated establishment in the Delta of a species that is known to be more common elsewhere in the state.

### In-channel Islands

The addition of in-channel islands to the study area resulted in many more occurrences of sensitive plant species. The in-channel islands are generally without levees or riprap, and much of their area consists of tidally influenced marsh. This provides better habitat for species like Mason's lilaepsis, Delta mudwort, and rose-mallow that prefer tidal marsh to levee riprap. Mason's lilaepsis was found in 108 separate instances on in-channel islands, including 15 instances where the population was more or

less continuous along the shoreline for some distance and was recorded as a line. There were only 12 occurrences of this species found on the islands proper, all small and isolated patches.

Delta mudwort was found 28 times on in-channel islands and only twice on the main islands. Rose-mallow was also much more common on the tidal islands, with 95 occurrences, including 7 that were mapped as more or less continuous populations, as compared with 18 occurrences, most consisting of single plants, found on the main islands.

### **Island Interiors**

As in the previous study, no sensitive plant taxa were found within the levees of any island. Disturbance from farming activities and ditch maintenance has eliminated most native plant species from the island interiors, with the exceptions of some remaining patches of riparian vegetation and marsh around blowout ponds and other features. There is a CNDDDB record of an occurrence of bristly sedge (*Carex comosa*) from one of the ponds on Webb Tract; we surveyed the area but were unable to determine whether this occurrence is still extant.

Sandy soils, potential habitat for Antioch Dunes evening primrose, Contra Costa wallflower, and Hoover's cryptantha, occur on Holland Tract and Webb Tract; however surveys of those sites found little native vegetation due to heavy disturbance from agriculture and grazing.

### **Levee modification evaluation**

Additional riprap will not be added to two areas on Webb Tract and one area of Bacon Island (Figures 4-4 and 4-6). Riprap will be added to all other sections of levee on the reservoir islands. Delta tulle pea, Mason's lilaepsis, rose-mallow, fox sedge, and Suisun aster currently exist on the levees and could be impacted by the additional rock placement.

## **Conclusions**

The current study located 111 occurrences of special status plant taxa on the exterior levees of the project islands, 34 more than were found in the previous study. There were 39 occurrences on Bacon Island and 11 on Webb Tract, the two proposed reservoir islands. Seven occurrences were on Holland Tract, and 39 on Bouldin Island, the two proposed habitat islands. No occurrences were found in the interior of any island. There were 67 occurrences found on in-channel islands adjacent to Bacon Island; 49 adjacent to Webb Tract; 155 adjacent to Holland Tract; and 38 adjacent to Bouldin Island.

Potential impacts to special status plants on in-channel islands have not yet been identified. Special status plants occurring on the exterior levees of the reservoir islands will likely be impacted by levee reinforcement work and addition of riprap. On the habitat islands, levee maintenance requirements may result in some impacts to special status plant populations. Construction and maintenance of recreational

and project facilities could potentially cause impacts to special status plants on the islands. These impacts will require implementation of mitigation measures. Mitigation measures could consist of:

- € Conducting surveys for special status plant species prior to constructing any facilities.
- € Site facilities to avoid impacts to special status plant species.
- € Protecting special status plant species from construction activities and from recreational impacts.

A plan will be developed in consultation with DFG and USFWS to mitigate for unavoidable impacts to special status plant populations. This plan could include such measures as:

- € Protecting and enhancing special status plant habitat on adjacent in-channel islands.
- € Creating new habitat for special status species on in-channel islands or on the shores of the main islands.
- € Transplanting individuals or colonies, or collecting and planting seed of special status plants into appropriate habitat on protected sites.