Chipps Island Tidal Marsh Restoration Study

Project Information

1. **Proposal Title:**

   Chipps Island Tidal Marsh Restoration Study

2. **Proposal applicants:**

   Trevor Kennedy, Fishery Foundation of California
   Thomas Cannon, HDR Engineering Inc.
   Curt Schmutte, DWR-ESO
   James Grummon, Condor Earth Technology

3. **Corresponding Contact Person:**

   Trevor Kennedy
   Fishery Foundation of California
   5705 Audrey Way Fair Oaks, Ca, 95628
   916 9671518
   cosumnes@home.com

4. **Project Keywords:**

   Environmental Engineering
   Habitat Restoration, Wetland
   Wetlands, Tidal

5. **Type of project:**

   Implementation_Pilot

6. **Does the project involve land acquisition, either in fee or through a conservation easement?**

   Yes

   If yes, is there an existing specific restoration plan for this site?

   No

7. **Topic Area**:

   Shallow Water, Tidal and Marsh Habitat

8. **Type of applicant:**

   Landowner

9. **Location - GIS coordinates:**

Latitude: 38.057

Longitude: -121.913

Datum:

Describe project location using information such as water bodies, river miles, road intersections, landmarks, and size in acres.

Chipps Island, Suisun Marsh/Bay-Delta

10. **Location - Ecozone:**

    2.1 Suisun Bay & Marsh

11. **Location - County:**

    Solano

12. **Location - City:**

    Does your project fall within a city jurisdiction?

    No

13. **Location - Tribal Lands:**

    Does your project fall on or adjacent to tribal lands?

    No

14. **Location - Congressional District:**

    3

15. **Location:**

    California State Senate District Number: 4

    California Assembly District Number: 8

16. **How many years of funding are you requesting?**

    3

17. **Requested Funds:**
    a) Are your overhead rates different depending on whether funds are state or federal?

       No

       If no, list single overhead rate and total requested funds:

Single Overhead Rate: 10

Total Requested Funds: $1,830,043

b) Do you have cost share partners already identified?

Yes

If yes, list partners and amount contributed by each:

DWR-ESO $50,000

Fishery Foundation of California $50,000

c) Do you have potential cost share partners?

No

d) Are you specifically seeking non-federal cost share funds through this solicitation?

No

If the total non-federal cost share funds requested above does not match the total state funds requested in 17a, please explain the difference:

18. **Is this proposal for next-phase funding of an ongoing project funded by CALFED?**

No

Have you previously received funding from CALFED for other projects not listed above?

Yes

If yes, identify project number(s), title(s) and CALFED program.

98-B1009 Cosumnes River Salmonid Barrier Improvement Project ERP

19. **Is this proposal for next-phase funding of an ongoing project funded by CVPIA?**

No

Have you previously received funding from CVPIA for other projects not listed above?

Yes

If yes, identify project number(s), title(s) and CVPIA program.

114200J033-USFWS	**Stanislaus River Juvenile Salmonid distribution study**	**CVPIA Cooperative Agreement**
DCN#11332-1-G006	**Lower Calaveras River Salmon and Steelhead Life History/Limiting Factors Analysis**	**CVPIA-AFRP**

20. **Is this proposal for next-phase funding of an ongoing project funded by an entity other than CALFED or CVPIA?**

No

Please list suggested reviewers for your proposal. (optional)

Erwin van Nieuwenhuyse USBR 916.978.5213

Beth Campbell NMFS 916.930.3611 elizabeth.campbell@noaa.gov

Jim Martin DWR-ESO 916.227.7581 jmartin@water.ca.gov

Randy Baxter CDFG-Bay Delta Division 209.942.7800 rbaxter@delta.dfg.ca.gov

21. **Comments:**

The landowner, the Fishery Foundation of California (FFC), is a private, non-profit fisheries restoration and research group dedicated to providing inovative solutions to complex resource problems. The FFC has the experience and resources to facilitate the completion of the proposed project in a cost effective and professional maner and the will to manage the proposed project indefinitely to ensure that it meets its restoration goals.

Environmental Compliance Checklist

Chipps Island Tidal Marsh Restoration Study

1. **CEQA or NEPA Compliance**
   a) Will this project require compliance with CEQA?

      Yes
   b) Will this project require compliance with NEPA?

      Yes
   c) If neither CEQA or NEPA compliance is required, please explain why compliance is not required for the actions in this proposal.

2. **If the project will require CEQA and/or NEPA compliance, identify the lead agency(ies).** *If not applicable, put "None".*

   CEQA Lead Agency: CA Department of Water Resouces
   NEPA Lead Agency (or co-lead:) U.S.Army Corps of Engineers
   NEPA Co-Lead Agency (if applicable):

3. **Please check which type of CEQA/NEPA documentation is anticipated.**

   CEQA
   -Categorical Exemption
   XNegative Declaration or Mitigated Negative Declaration
   -EIR
   -none

   NEPA
   -Categorical Exclusion
   XEnvironmental Assessment/FONSI
   -EIS
   -none

   If you anticipate relying on either the Categorical Exemption or Categorical Exclusion for this project, please specifically identify the exemption and/or exclusion that you believe covers this project.

4. **CEQA/NEPA Process**
   a) Is the CEQA/NEPA process complete?

      No

      If the CEQA/NEPA process is not complete, please describe the dates for completing draft and/or final CEQA/NEPA documents.

      Draft completion 10/01/2002

   b) If the CEQA/NEPA document has been completed, please list document name(s):

5. **Environmental Permitting and Approvals** (*If a permit is not required, leave both Required? and Obtained? check boxes blank.*)

LOCAL PERMITS AND APPROVALS

Conditional use permit

Variance

Subdivision Map Act

Grading Permit

General Plan Amendment

Specific Plan Approval

Rezone

Williamson Act Contract Cancellation

Other

STATE PERMITS AND APPROVALS

Scientific Collecting Permit	Required
CESA Compliance: 2081	Required
CESA Compliance: NCCP	
1601/03	
CWA 401 certification	Required
Coastal Development Permit	
Reclamation Board Approval	
Notification of DPC or BCDC	Required
Other	

FEDERAL PERMITS AND APPROVALS

ESA Compliance Section 7 Consultation	Required
ESA Compliance Section 10 Permit	
Rivers and Harbors Act	
CWA 404	
Other	

PERMISSION TO ACCESS PROPERTY

Permission to access city, county or other local agency land.
Agency Name:

Permission to access state land.
Agency Name:

Permission to access federal land.
Agency Name:

Permission to access private land.
Landowner Name: ll

6. **Comments.**

Land Use Checklist

Chipps Island Tidal Marsh Restoration Study

1. **Does the project involve land acquisition, either in fee or through a conservation easement?**

   Yes

   If you answered yes to #1, please answer the following questions:

   a) **How many acres will be acquired?**

      Fee: 0
      Easement: 450
      Total: 450

   b) Will existing water rights be acquired?

      Yes

   c) Are any changes to water rights or delivery of water proposed?

      Yes If yes, please describe proposed changes.

      Diked non-tidal duck club flood-up will revert to tidal action.

2. **Will the applicant require access across public or private property that the applicant does not own to accomplish the activities in the proposal?**

   Yes

3. **Do the actions in the proposal involve physical changes in the land use?**

   No

   If you answered no to #3, explain what type of actions are involved in the proposal (i.e., research only, planning only).

   The project area is currently managed as a diked duck club with seasonal and permanent wetlands. The proposed project will create a tidal and muted tidal duck club. No changes in land use will occur.

4. **Comments.**

Conflict of Interest Checklist

Chipps Island Tidal Marsh Restoration Study

Please list below the full names and organizations of all individuals in the following categories:

- Applicants listed in the proposal who wrote the proposal, will be performing the tasks listed in the proposal or who will benefit financially if the proposal is funded.
- Subcontractors listed in the proposal who will perform some tasks listed in the proposal and will benefit financially if the proposal is funded.
- Individuals not listed in the proposal who helped with proposal development, for example by reviewing drafts, or by providing critical suggestions or ideas contained within the proposal.

The information provided on this form will be used to select appropriate and unbiased reviewers for your proposal.

Applicant(s):

Trevor Kennedy, Fishery Foundation of California
Thomas Cannon, HDR Engineering Inc.
Curt Schmutte, DWR-ESO
James Grummon, Condor Earth Technology

Subcontractor(s):

Are specific subcontractors identified in this proposal? No

Helped with proposal development:

Are there persons who helped with proposal development?

Yes

If yes, please list the name(s) and organization(s):

Thomas Cannon HDR Engineering Inc.

Stephen Culberson DWR-ESO

Mike Garello HDR Engineering Inc.

Comments:

Budget Summary

Chipps Island Tidal Marsh Restoration Study

Please provide a detailed budget for each year of requested funds, indicating on the form whether the indirect costs are based on the Federal overhead rate, State overhead rate, or are independent of fund source.

Independent of Fund Source

Year 1												
Task No.	**Task Description**	**Direct Labor Hours**	**Salary** ***(per year)***	**Benefits** ***(per year)***	**Travel**	**Supplies & Expendables**	**Services or Consultants**	**Equipment**	**Other Direct Costs**	**Total Direct Costs**	**Indirect Costs**	**Total Cost**
1(ffc)	Ecological Monitoring Plan	40	1,720	430	0	0	0	0	0	2150.0	215	2365.00
2(ffc)	Pilot Project Design	0	0	0	0	0	0	0	0	0.0	0	0.00
3(ffc)	Baseline Ecological Survey	1922	66,098	16,525	19,965	3,000	0	0	0	105588.0	10,584	116172.00
4(ffc)	Environmental Documentation	60	2,580	645	0	0	0	0	0	3225.0	322	3547.00
5(ffc)	Construction Pilot	0	0	0	0	0	218,361	0	0	218361.0	0	218361.00
6(ffc)	Post Construction Monitoring	0	0	0	0	0	0	0	0	0.0	0	0.00
7(ffc)	Project Coordination and Management	60	2,580	645	0	0	0	0	0	3225.0	323	3548.00
8(ffc)	Cons Easement								270,000	270000.0		270000.00
1(hdr)	Ecological Monitoring Plan	84	3,084	1,357	0	300	0	0	266	5007.0	3,424	8431.00
2(hdr)	Pilot Project Design	1710	51,070	22,471	544	0	19,845	0	5,417	99347.0	56,688	156035.00
3(hdr)	Baseline Ecological Survey	690	19,616	8,631	816	0	77,175	0	2,186	108424.0	21,774	130198.00
4(hdr)	Environmental Documentation	340	11,520	5,069	544	0	0	0	1,077	18210.0	12,787	30997.00
5(hdr)	Construct Pilot	424	9,885	4,349	816	0	13,230	0	1,343	29623.0	10,972	40595.00
6(hdr)	Post Construction Monitoring	0	0	0	0	0	0	0	0	0.0	0	0.00
7(hdr)	Project Coordination and Management	704	28,290	12,448	0	0	0	0	2,230	42968.0	31,402	74370.00
		6034	196443.00	72570.00	22685.00	3300.00	328611.00	0.00	282519.00	906128.00	148491.00	1054619.00

Year 2												
Task No.	**Task Description**	**Direct Labor Hours**	**Salary *(per year)***	**Benefits *(per year)***	**Travel**	**Supplies & Expendables**	**Services or Consultants**	**Equipment**	**Other Direct Costs**	**Total Direct Costs**	**Indirect Costs**	**Total Cost**
1(hdr)	Pilot Construction	444	10,396	4,574	1768	300	33,850	0	478	51366.0	11,540	62906.00
2(hdr)	Project Coordination and Management	43	2,258	993	0	0	0	0	159	3410.0	2,506	5916.00
1(ffc)	Pilot Construction	0	0	0	0	0	436,722	0	0	436722.0	43,672	480394.00
		487	12654.00	5567.00	1768.00	300.00	470572.00	0.00	637.00	491498.00	57718.00	549216.00

Year 3												
Task No.	**Task Description**	**Direct Labor Hours**	**Salary *(per year)***	**Benefits *(per year)***	**Travel**	**Supplies & Expendables**	**Services or Consultants**	**Equipment**	**Other Direct Costs**	**Total Direct Costs**	**Indirect Costs**	**Total Cost**
1(ffc)	Post Construction Monitoring	1922	69,942	17,486	19,965	3,000	0	0	0	110393.0	11,064	121457.00
2(ffc)	Project Coordination and Management	60	2,700	675	0	0	0	0	0	3375.0	338	3713.00
1(hdr)	Post Construction Monitoring	922	28,270	12,439	884	300	4,200	0	1,737	47830.0	34,206	82036.00
2(hdr)	Project Coordination and Management	152	6,952	3,059	0	0	0	0	579	10590.0	8,412	19002.00
		3056	107864.00	33659.00	20849.00	3300.00	4200.00	0.00	2316.00	172188.00	54020.00	226208.00

Grand Total=<u>1830043.00</u>

Comments.

Budget Justification

Chipps Island Tidal Marsh Restoration Study

Direct Labor Hours. Provide estimated hours proposed for each individual.

Fishery Foundation of CA Year 1 Trevor Kennedy - 1096 Rod Rodriguez - 788 Mike van Hattem - 198 Year 3 Trevor Kennedy - 2044 Rod Rodriguez - 1576 Mike van Hattem - 384 HDR Year 1 Ken Myers - 50 Tech - 36 Tom Cannon - 588 Joe Domenicilli - 350 Mike Garello - 882 Valerie Layne - 436 field tech - 248 tech intern - 696 drafter - 428 clerk support - 394 Year 2 Ken Myers - 43 Joe Domenicilli - 36 Mike Garello - 128 Intern - 220 Clerical - 60 Year 3 Ken Myers - 24 Tech - 60 Tom Cannon - 164 Joe Domenicilli - 64 Mike Garello - 76 staff engineer - 94 envirn spec - 196 tech intern - 288 drafter - 48 admin sr. - 60

Salary. Provide estimated rate of compensation proposed for each individual.

Fishery Foundation Year 1 Trevor Kennedy - $43/hr Rod Rodriquez - $22/hr Mike van Hattem - $43/hr Year 3 Trevor Kennedy - $45/hr Rod Rodriguez - $24/hr Mike van Hattem - $45/hr HDR 2002 salaries - 5% year acceleration Ken Myers - $52.50 Tom Cannon - 47.95 Joe Domenicilli - 47.66 Mike Garello - 25.57 Valerie Layne - 36.75 Shelley Hatleberg - 36.75 field biol - 27.30 engineering intern - 20.00 drafter - 24.15 clerk support - 19.00

Benefits. Provide the overall benefit rate applicable to each category of employee proposed in the project.

Fishery Foundation - 25% of salary HDR - 46% of salary

Travel. Provide purpose and estimate costs for all non-local travel.

All travel is locale Bay-Delta travel to Chipps Island.

Supplies & Expendables. Indicate separately the amounts proposed for office, laboratory, computing, and field supplies.

Fishery Foundation Year 1- field equipment $3000 Year 2 Year 3- field equipment $3000 HDR Engineering Year 1 - $300 Year 2 - $300 Year 3 - $300

Services or Consultants. Identify the specific tasks for which these services would be used. Estimate amount of time required and the hourly or daily rate.

Kleinfelder - geotech surveys Condor - surveying and GIS support task 1 - 48 hrs at $92/hr task 2 - 135 hrs at $62/hr task 3 - 32 hrs at $125/hr task 4 - 66 hrs at $125/hr task 5 - 88 hrs at $62/hr task 6 - 76 hrs at $111/hr Dave Fogelman Construction - based on yards material

Equipment. Identify non-expendable personal property having a useful life of more than one (1) year and an acquisition cost of more than $5,000 per unit. If fabrication of equipment is proposed, list parts and materials required for each, and show costs separately from the other items.

No equipment

Project Management. Describe the specific costs associated with insuring accomplishment of a specific project, such as inspection of work in progress, validation of costs, report preparation, giving presentatons, reponse to project specific questions and necessary costs directly associated with specific project oversight.

Fishery Production Year 1 - 60 hrs Year 3 - 60 hrs HDR Year 1 - 704 hrs Year 2 - 43 hrs Year 3 - 152 hrs Year 3

Other Direct Costs. Provide any other direct costs not already covered.

Computers, long-distance phone charges,copying, misc field supplies.

Indirect Costs. Explain what is encompassed in the overhead rate (indirect costs). Overhead should include costs associated with general office requirements such as rent, phones, furniture, general office staff, etc., generally distributed by a predetermined percentage (or surcharge) of specific costs.

Fishery Foundation - 10 % is standard federal rate HDR Engineering - discounted Federal Rate

Executive Summary

Chipps Island Tidal Marsh Restoration Study

As landowners, we propose to obtain a conservation easement and funding to restore 450 acres of diked non-tidal wetlands as part of a larger, phased program of restoration of 950 acres on Chipps Island. This pilot project is proposed as a companion effort to similar projects proposed under the Suisun Charter Implementation Plan (SCIP), currently under development by other applicant agencies (FWS/DFG/DWR/SRCD/BR). Phase 1 of this project includes conducting baseline ecological surveys prior to applying adaptive management strategies to return tidal action to the applicants 450 acres, and development of a restoration plan for the adjoining 500 acres. Adaptive management strategies in this context will focus on evaluation of alternate methods for reintroducing tidal action to previously non-tidal lands. This project will partially fulfill CALFEDs goal for Suisun: restoring 5,000-7,000 acres of tidal marsh by August 2007. This is a pilot study for restoration and research in support of the SCIP. Objectives include: preservation, enhancement, and restoration of critical habitat for species of concern and of ecological processes important to tidal marsh maintenance and function. These objectives will assist recovery of at-risk species. We will use an adaptive management approach combined with appropriate monitoring protocols to evaluate methods for the restoration of tides to previously non-tidal or muted-tidal landscapes, and relate the success of these methods to overall regional recovery planning. We hypothesize that enhancement/restoration of tidal habitats will benefit populations of at-risk species. The expected outcome is an increase in the abundance and distribution of at-risk tidal marsh species. Products will include baseline characterizations of biological, hydrologic, and geomorphologic elements of wetland-associated resources on the island, as well as initial tracking of ecological functioning of these elements and their response to hydrologic change. This project is consistent with CALFEDs ERP/Science Program, and will address ERP Strategic Goals 1-6.

Proposal

Fishery Foundation of California

Chipps Island Tidal Marsh Restoration Study

Trevor Kennedy, Fishery Foundation of California
Thomas Cannon, HDR Engineering Inc.
Curt Schmutte, DWR-ESO
James Grummon, Condor Earth Technology

A. PROJECT DESCRIPTION: PROJECT GOALS AND SCOPE OF WORK

The proposed project is Phase 1 of a program to restore Chipps Island to a fully functional tidal marsh. Phase 1 includes purchase of a conservation easement, baseline ecological surveys, a pilot experiment to convert a non-tidal portion of the island to tidal marsh, and post-construction monitoring of the newly formed tidal marsh. Later phases involve continued long-term monitoring of the pilot experiment and full-scale island restoration.

Chipps Island is located in Suisun Bay and is the southern-most extension of Suisun Marsh into the Bay (see Figure 1). The island encompasses approximately 950 acres with three distinct parts: (1) *North Section* - a 450-acre diked waterfowl hunting area (commonly called duck clubs) with seasonal and permanent non-tidal wetlands; (2) *East Section* - a 250-acre tidal marsh water fowl hunting area with levees that is partially tidal via openings in the levees and culverts; and (3) *West Section* - a 250-acre tidal marsh waterfowl hunting area whose levees have eroded substantially over a period of many years (see Figures 2 and 3). Though diked in the past and less so at present, the entire island is unique in that it has little or no subsidence. All three portions of the island contain permanent sloughs, ponds, and ditches that are remnants of historical agricultural activities on the island.

The proposed project incorporates scientific and engineering components that add value and greater potential for success while focusing on the research/experimental value of restoring tidal marsh and shallow tidewater fish habitat (Chipps Island, North Section).

The island is located in the low salinity (generally 0-10 mg/L) portion of the estuary that is habitat for chinook salmon, delta smelt, splittail, striped bass, and other fishes. The conversion of the present diked marsh portion of the island offers a unique opportunity to show potential value to these fish species from converting Suisun Marsh diked lands to tidal marsh. The island's three distinct habitat areas offer a unique natural laboratory to demonstrate the importance of tidal marsh within and adjacent to Suisun Bay to fish, waterfowl, and native plants. In addition, our proposed pilot restoration experiment to convert the non-tidal component of the island will provide valuable information on how to restore tidal marsh from diked managed waterfowl areas. Our experiment will also attempt to show the potential value of muted tidal marshes as a transition from subsided diked lands to full tidal marsh. The experiment and proposed scientific studies will offer substantial scientific value toward furthering our understanding of tidal marsh ecology and restoration in the Bay-Delta.

The Fishery Foundation of California (Foundation) purchased the 450-acre non-tidal managed waterfowl area in 1996 with the intent of rehabilitating the property to an actively managed muted tidal marsh with permanent ponds and marsh. The original concept was to create a partially tidal permanent marsh that would have waterfowl management, fish habitat, and other ecological values that exceed those of a diked managed duck club. The Foundation has sought funding for this restoration effort on previous occasions with CALFED using the

PSP process. Reviews of the earlier proposals indicated the project lacked several features that if corrected would improve the potential value and benefits of the proposed project. One of the criticisms was that the property was already functioning non-tidal marsh habitat and that conversion to tidal habitat was unnecessary. Another criticism was the lack of scientific basis and experimental foundation to the project. The primary difference in this and the previous proposals is that we are now focusing on the research/experimental value for tidal marsh and shallow tidewater fish habitat restoration rather than seasonal non-tidal (diked) marsh habitat. We have also added scientific and engineering components that add value and greater success potential to the project.

Without funding, the Foundation will not be able to achieve its goal of managing the property as a tidal marsh. To maintain ownership and management control of the property, it will be necessarily to continue to maintain island levees, thus retaining the islands as a non-tidal seasonal wetland. Without funding, it will also be necessary to sell the property as a waterfowl hunting area to recoup the original investment. We would prefer to obtain a conservation easement and the necessary funding to restore the island to a tidal wetland, and thus continue our commitment to restoring the fish populations of the Bay-Delta per our charter.

To further the scientific value of the project, the Foundation proposes to participate with other stakeholders including the Suisun Marsh Resource Conservation District (SRCD), the California Department of Water Resources Suisun Marsh Program, and the US Fish and Wildlife Service in the Suisun Marsh Charter Program (Charter Program). The Foundation proposes that the project become a component of the Charter Program and to help that program meet its objectives. **The proposed study would be the initial contribution of the Charter Program to fulfilling CALFED's goal of restoring 5,000-7,000 acres of tidal marsh in Suisun Marsh within seven years.**

CALFED Charter Program: "**The goal of the CALFED Charter program is to develop a regional plan that balances implementation of the CALFED Program, Suisun Marsh Preservation Agreement, and other management and restoration programs within Suisun Marsh in a manner responsive to the concerns of stakeholders and based upon voluntary participation by private land owners.**" **(http://iep.water.ca.gov/suisun/charter/calfedCharter.html)**

The Foundation has solicited HDR Engineering and others as partners to help conduct the first phase of island restoration including (1) a detailed study plan for environmental monitoring on the island, (2) an engineering and environmental design of a pilot tidal marsh project, (3) environmental documentation of the proposed pilot experiment, (4) construction of a pilot experiment tidal marsh restoration project on the Foundation property, and (5) one year of post-construction monitoring on the island to evaluate environmental changes induced by the pilot experiment. The Foundation solicits funding from CALFED for these six tasks as well as a conservation easement on the non-tidal portion of the island owned by the Foundation.

1. Problem

The San Francisco Bay Estuary (Estuary) tidal marsh has been reduced from 540,000 acres in 1850 to 45,000 acres in 1985 (SFEP 1993). Suisun Marsh and Bay included 68,000 acres of which 90% was historically diked and drained for agricultural use. Much of these diked lands have been converted to manage waterfowl hunting clubs. The loss of tidal marsh has contributed directly to the decline of estuarine resident and anadromous fish of the Central Valley (CALFED 2000). One of the many goals for restoring the San Francisco Bay-Delta ecosystem is to restore tidal marshes in the Bay and Delta. To achieve these goals there are many scientific, cultural, and socioeconomic hurdles to overcome, chief among these being how to convert existing non-tidal land uses to tidal wetlands. Not only are there scientific questions, but also engineering uncertainties. The proposed Chipps Island Study addresses both scientific and engineering needs.

One of the problems with restoration of tidal marsh in the Bay-Delta is that many diked lands have subsided. Simply breaching levees creates open water embayment rather than marsh because water depths are too great for marsh plant development. A muted or microtidal marsh is a transition that allows partial tidal flow onto diked wetlands through culverts or gates. The proposed project includes one element that creates aspects of a muted tidal marsh. By controlling outflow through weirs in the levees, water can be retained on the land, whereas under full tidal exchange, water (and much of the sediment) would drain completely on ebb tides. Retaining the water will allow more of the sediment to settle and more rapidly raise the marsh elevation by accelerating accretion. Normally as the land elevation rises with sedimentation and becomes suitable for plants, the settling rate (accretion) of sediment declines. By continuing to raise the water level in the marsh by controlling (muting) draining we hope to show that we can continue the relatively high sedimentation rates and thus reduce the time to full tidal marsh restoration. Our project will test this theory by opening approximately one-half of the Foundation property to tidal action and controlling water levels with weirs. By raising water levels and by controlling the flow out of the experimental marsh we hope to again accelerate deposition and the raising of the marsh level. On the other half of the Foundation property we propose to convert non-tidal marsh to full tidal marsh, where we expect to see a lesser rate of sedimentation or even equilibrium because water levels will not be held artificially high. Through comparison of the two restoration approaches, we hope to show that partial restoration of tidal function on non-tidal marsh will provide habitat value for native species while accelerating sedimentation and the restoration of a fully functional tidal marsh.

North Section of Chipps Island

The experiment will also focus on the effects of the muting process on the development of plant and animal communities. One potential problem is that the muted marsh transition may favor non-native invasive species (NIS). The proposed study will provide information as to what factors control non-natives by providing a wide range of habitat and inundation

conditions across the four study areas. Specifically, we will compare marsh plant and animal community development under full and muted tidal restoration strategies.

Retaining water may also lead to greater stranding and predation on fish residents of the marsh such as young chinook salmon. A key element of the study will be to compare fish use of restored tidal marsh and the two existing tidal marsh portions of the island.

Goals and Objectives

The primary goal of this project is to restore tidal marsh habitat in a portion of Suisun Marsh. This project's contribution toward this goal will be restoration of 420 acres of diked marsh to tidal marsh, and possible enhancement of tidal marsh on the other 520 acres of Chipps Island. Ancillary objectives of this project include:

- Develop an engineering design that provides a cost-effective means of restoring tidal marsh in diked lands of Suisun Marsh.
- Demonstrate that restoration of tidal marsh creates habitat for important Bay-Delta fish species as well as waterfowl, plants, and wildlife.
- Demonstrate that a muted tidal marsh may be an effective intermediate step between a diked marsh and a fully restored tidal marsh.
- Determine whether a muted tidal marsh has beneficial or detrimental effects on important fish, bird, or plant species and NIS.

2. Justification

Project Type

This proposal is for research on tidal marshes and a pilot experiment to restore tidal marsh in accordance with the Suisun Marsh Charter Implementation Plan (SCIP). The pilot experiment will directly compare two restoration approaches to convert diked non-tidal land to tidal marsh. The pilot experiment will also demonstrate the feasibility, practicality, and cost effectiveness of various approaches outlined in the SCIP. The research element of the project will also contribute to the ecological and engineering science of tidal wetland restoration in the Bay-Delta.

Conceptual Models and Hypotheses

Looking South Across Chipps Island, Towards Pittsburg

Conceptual Model/Hypothesis #1: Restoration of diked lands to tidal marsh will provide habitat for at-risk plant, bird, and fish species. Species such as the Suisun Song Sparrow, chinook salmon, splittail, and delta smelt will benefit from additional tidal marsh. Waterfowl will also benefit from the year-round marsh habitat in areas of diked duck clubs. There are 51 at-risk species in Suisun Marsh that would benefit from restored tidal marsh (CDFG 1998). Tidal marsh provides open water and

wetlands that provide habitat for waterfowl and fish that would otherwise not exist year round in managed non-tidal marshes. The tidal marsh channels provide for the exchange of water, nutrients, and sediment needed by marshes to sustain the plant and animal communities. Estuarine and anadromous fish rear and feed within the channels of tidal marshes. Marsh channels typically have a high amount of shallow shaded habitat that provides food and protection from predators. Such habitat may also provide important spawning habitat for delta smelt and splittail. The extensive "bull-rush" habitat of tidal marshes also offers habitat for many bird species that otherwise would not exist in managed non-tidal marshes (Goals Project 1999). The proposed project will document in its initial phase differences in the plant and animal communities and habitat types in tidal and non-tidal marshes within Chipps Island. It will also document the changes that occur upon restoring tidal action to the two experimental areas within the existing non-tidal marshes of the Foundation property.

Conceptual Model/Hypothesis #2: Converting a diked duck club to muted tidal marsh will lead to rapid sedimentation and eventually a succession of marsh plant communities after a period of open water. Using notched levees to increase water elevation under tidal exchange will accelerate sedimentation, which will reduce the restoration time to full tidal marsh for subsided lands and artificially raise the elevation of a non-subsided marsh. Allowing water to stand on the land with each tidal cycle greatly enhances the amount of sediment that drops out with each new influx of sediment-laden bay water. Continuing to raise the water level as a restored subsided marsh fills maintains a high rate of sedimentation. The proposed muted tidal marsh experiment on the Foundation property will directly test this model by artificially raising the water level with a combination of existing levees and newly constructed levees that mute the tidal flow on the island. The amount of sedimentation in this area will be directly compared to the sedimentation rate on the other portion of the property that will be opened to full tidal exchange, as well as in the two tidal marsh control areas of the island where no changes will be made.

Conceptual Model/Hypothesis #3: A muted tidal marsh with open water areas and mud flats may provide more waterfowl and fish habitat than a fully restored tidal marsh that has a narrow network of first- and second-order drainage networks that fill and drain with each tidal cycle. Restricted tidal circulation may also lead to abnormal function including the creation of habitat that supports non-native species. Retaining water on the tidal marsh by muting the tidal outflow of the marsh will retain open water areas as well as sediment. These open water areas may be more valuable and more heavily used by waterfowl. Mudflats and pans (ponds) form in muted tidal marsh that would otherwise convert to tules under full tidal exchange. These mudflats and pans increase the diversity of habitat and provide for a wider array of native and non-native plant and animal species. The open water may also provide more fish habitat, although such habitat may benefit non-native species at the expense of native species that are better adapted to the closed tule marsh system. The proposed study will provide four areas to compare the effects of muting. The two experimental areas on the Foundation property provide for direct comparison between the two extremes: a full tidal marsh and a muted tidal marsh. The two control areas have limited tidal exchange that will provide conditions between the extremes on the experimental property.

Chipps Island Levee North Section

Conceptual Model/Hypothesis #4: A continuous band of tidal marsh along the southern shore of Suisun Marsh is necessary to provide a fully functional tidal marsh including a corridor for wildlife and fish that migrate through the Bay-Delta. Chipps Island provides a key link in this corridor as the island is the boundary between the Bay and Delta and it encompasses a major portion of the corridor along the southern edge of Suisun Marsh. The island also makes up most of the eastern boundary of Suisun Bay/Honker Bay. The proposed project is designed to help determine the importance of this tidal marsh corridor. As part of the overall Suisun Marsh Charter Program that is restoring tidal marsh along the periphery of Suisun Marsh and margins of Suisun Bay, the project will directly address this conceptual model.

Conceptual Model/Hypothesis #5: Levees or shoreline berms may be necessary to protect some tidal marsh from excessive erosion (Josselyn and Atwater 1982). For example, remnant berms of historic levees along the south shore of Chipps Island protect the existing tidal marsh from excessive wave erosion from boat traffic in the ship channel just south of the island. In areas where protection is limited, the edge of the marsh appears to be receding. Levees may also provide habitat for riparian vegetation and shoreline SRA habitat. Non-native species such as peppergrass (*Lepidium latifolium*) and giant reed (*Arundo donax*), that out-compete native species and attract non-native predators may also be an unwanted consequence of retaining levee habitat. The proposed project will help to determine if levee habitat can be used to retain important ecological habitats for at-risk species within the Suisun Marsh system. One element of the pilot study is construction of approximately 800 feet of levee with 10-to-1 slope that would accommodate riparian vegetation.

"Even after several decades of experience, however, wetland restoration and enhancement remains controversial." "Several factors compromised the success of early wetland projects. One of the major factors was poor project design. Lack of clear or realistic objectives frequently made it difficult to determine whether a wetland project was a success or failure. " *(Goals Project 1999)*

Uncertainties

The research and pilot experiment along with the associated planning and environmental documentation elements of this proposal address many of the uncertainties facing tidal marsh restoration in the Bay-Delta. In particular the project is designed to address uncertainties of the SCIP. One area of uncertainty is how to restore tidal wetlands from existing non-tidal leveed lands such as the managed waterfowl hunting areas of Suisun Marsh. Another area of uncertainty is how restoration will affect habitat and populations of at-risk fish species including chinook salmon, delta smelt, and splittail. Of special interest is how these species will respond to the interim restoration stages of muted tidal marshes. In addressing many uncertainties the proposed project has many elements including research, monitoring, a pilot experiment, and eventual full-scale restoration of

Chipps Island. With these elements, the project incorporates the full extent of the Adaptive Management process outlined by CALFED.

Initial tasks include baseline surveys and planning. Baseline surveys are necessary to fully understand how Chipps Island is functioning under its present condition and to gain needed information to design and implement the pilot study as well as full restoration for the island. The baseline information is also necessary to assess the effects of changes induced by the pilot experiment. The research and the pilot experiments address many important ecological and engineering questions that contribute to the uncertainties of tidal marsh restoration.

3. Approach

"One of the important lessons learned from past restoration and enhancement projects is the significance of complete site information. Each potential project site must be rigorously evaluated to determine its suitability for the proposed project. The major factors to assess include the site's historical and current conditions and its water and sediment supplies." *(Goals Project 1999)*

The proposed project is phase one of a long-term program to restore Chipps Island to a fully functional tidal marsh: Phase 1 includes three essential elements: (1) conservation easement acquisition; (2) baseline surveys; and (3) pilot experiment and post-construction monitoring. The conservation easement on the Foundation property is necessary to allow conversion of the non-tidal marsh portion of the island to the two types of tidal marsh prescribed in the experiment. Baseline surveys of the entire island are needed to define the existing conditions. Baseline monitoring is proposed not just on the Foundation property, but also on the two adjoining tidal marsh properties because they will serve as the reference sites for the experiment. They also serve to show the consequence of long-term restoration of simple breaching of diked managed waterfowl areas. Phase 1 includes a pilot experiment including construction and post construction evaluation. Phase 1 would extend for three years. Phase 2 will begin at the end of the third year and will consist of full-scale restoration of Chipps Island based on the research conducted in Phase 1. Table 1 describes prescribed tasks for Phase 1 of the proposed project:

4. Feasibility

Estuarine Fishes and Associated Invertebrates Focus Team for Goals Project – Restore large, continuous patches (> 200 acres) of low tidal marsh in area, particularly within the Suisun Bay subregion, where suitable land elevations exist near important rearing sites (i.e., shallow water areas of Suisun, Honker, and Grizzly bays) for juvenile fish (e.g., Delta smelt, Chinook salmon, etc.). *(Appendix C in Goals Project, 1999)*

Chipps Island is uniquely suited for a proposed pilot experiment to restore tidal marsh and to test various means and approaches (e.g., muted or full tidal). The island is also uniquely located to study the response of many of the at-risk species of the Bay-Delta. The experimental area is owned by the Foundation, which requires only a conservation easement to convert the property from a managed waterfowl area to a tidal marsh. The Foundation is also a non-profit organization that is dedicated to preserving and enhancing ecosystem values in the Bay-Delta particularly fish and fish habitat. Weather

should not be a factor. Some elements of the monitoring will require ESA permits (e.g., seining and fyke netting). Stakeholder support for the project exists through established forums in which the project will fully participate. The Foundation has been an active participant in the past in these forums (i.e., the SRCA).

5. Performance Measures

Performance measures for the project include the following:

- Complete and adequate designs and specs for the pilot experiment.
- Completeness of monitoring and survey data reports
- Completed and accepted environmental documentation and supporting stakeholder involvement
- Baseline information on the project site for comparison of post-project conditions.
- Subsequent success of the experiment in providing information on fish and wildlife response to new habitat, the effectiveness of the engineering design, and public acceptance and response to the project.
- The Ecological Monitoring Plan (Task 1) will be the performance evaluation plan.

6. Data Handling and Storage

Given the limited nature of data collected, most data will be stored in spreadsheet format and original hardcopy data sheets and forms. Some survey data such as that for riparian vegetation will also be presented and stored in map inventory form showing locations of individual elements (e.g., existing NIS) identified by GPS and recorded in a GIS database.

7. Expected Products/Outcomes

- **Survey Data Reports -** Each survey described above will provide survey data reports within one month of completing the surveys.
- **GIS Database -** Survey and habitat data will be stored in a GIS database that is Microsoft Access compatible.
- **Conceptual Design Report and Plans and Specs -** The Conceptual Design and Design and Specifications will be provided to document the project engineering tasks.
- **Meeting Notes –** Notes and summaries will be prepared for all meetings and workshops.
- **Monthly Progress Reports –** Progress reports will be prepared monthly documenting performance, accomplishments, and schedule and budget status.
- **Survey Report -** A survey report will be prepared that presents the results of the surveys and data analyses.

- **Environmental Assessment and Initial Study (with Biological Assessments) –** Environmental documentation will be presented in the form of an EA/IS with associated BA's.

8. Work Schedule

The table below presents the work schedule.

Work Schedule		
Task	**Start Date**	**End Date**
1. Monitoring Plan	September 1, 2002	September 30, 2002
2. Pilot Design	September 1, 2002	November 30, 2002
3. Environmental Documentation	September 1, 2002	October 31, 2002
4. Baseline Monitoring	November 1, 2002	November 1, 2003
5. Pilot Construction	April 1, 2003	September 30, 2004
6. Post Construction Monitoring	September 30, 2004	August 31, 2005
7. Project Management	September 1, 2002	August 31, 2005

Tasks 2 and 5 have two options involving the degree of experimentation of the pilot project. Option one does not include construction of experimental levees and Option 2 includes construction of experimental levees. The payment schedule for each task would be invoiced monthly for each task minus 10% that is invoiced later after completion of the task. For example, project management would be invoiced for $1/36^{th}$ of the contract amount for that task each month minus 10% of the total to be withheld until completion of the task, which in the case of project management would be the last deliverable.

B. APPLICABILITY TO CALFED ERP AND SCIENCE PROGRAM GOALS AND IMPLEMENTATION PLAN AND CVPIA PRIORITIES

1. ERP, Science Program, and CVPIA Priorities; and 2. Relationship to Other Ecosystem Restoration Projects

Suisun Marsh Charter Program (2001): **Upon acquisition (of a restoration site), we will conduct pre-restoration surveys to provide a baseline and aid with preparation of environmental compliance documents. We will use existing agency protocols wherever possible and expand upon existing DWR and DFG efforts in Suisun. A consultant with extensive experience in the field of tidal marsh restoration will be contracted to perform a hydrologic evaluation and topographic survey and to develop a conceptual model restoration plan for the acquired area(s). We will use all available expertise in successful tidal marsh restoration within the five agencies to review and provide comments on the restoration plan and ensure that the project follows the SCIP. We will also pursue acquisition of additional acreage, up to 1,000 acres total for this project.**

SRCD and DWR will be the lead for obtaining local participation, which will be actively solicited through outreach efforts and environmental compliance procedures. We will work with the neighboring landowners to develop a plan which is mutually beneficial and does not place them at increased risk from either flood flows or reduced water quality.

The primary goals and objectives of the Chipps Island Project are those of the Suisun Marsh Charter, whose primary goal is to restore 5,000-7,000 acres of tidal wetlands within seven years and 30,000-35,000 acres in the long term. The proposed project will lead to the restoration of 950 acres of tidal wetlands within the seven-year period. The proposed project is also designed to meet multiple goals and objectives of the CALFED Charter Program, but also the overall CALFED Program for the Bay Region as outlined in the PSP and Draft Stage 1 Implementation Plan. The specific goal of the Foundation's proposed project is to complete restoration of Chipps Island so that it reaches its potential as habitat for Bay-Delta fishes and wildlife. Objectives include (1) obtaining scientific and engineering knowledge related to marsh restoration that will help in restoring Chipps Island and other Bay-Delta marshes, and (2) restoring Chipps Island. The project also addresses the following specific objectives of the CALFED Ecosystem Restoration Program:

- Restore wetlands in critical areas.
- Help to understand performance of wetland restoration efforts on a local and regional scale.
- Restore shallow water, slough, and riparian habitats with minimal constraints.
- Improve understanding of how at-risk species such as chinook salmon, delta smelt, and splittail react to changes in salinity habitat (i.e. X2).
- Conduct local monitoring and tie to regional monitoring of distributions and abundance of at risk species.

- Conduct needed research into plant-animal habitat relationships, non-native invasive species habitat requirements, and methodologies for monitoring/research on habitats and plant/animal species, as well as tidal marsh restoration.

A more specific goal of the Chipps Island Restoration Study is to restore tidal wetlands to a major portion of the southern margin of Suisun Marsh and the eastern edge of Honker Bay. The diked marsh of the Foundation will initially be used to study conversion to tidal wetland, and then eventually restored to tidal marsh. The project goal also includes restoring full tidal marsh function to the two adjacent properties that have become at least partially tidal from levee breaching if such improvements are determined ecologically and economically feasible as well as cost effective based on the proposed and other studies.

In Suisun Marsh, tidal marsh should be restored in a continuous band from the confluence of Montezuma Slough and the Sacramento/San Joaquin rivers to the Marsh's western edge. A broad band of tidal marsh should be restored along the southern edge of Suisun Marsh and around Honker Bay, in large part to improve fish habitat. Achieving the Goals will depend largely on the willingness of private duck club owners to convert managed marsh to tidal marsh. *(Goals Project 1999)*

The three areas on the island have distinctly different geomorphologic characteristics that influence the ultimate form of the habitat restored. The Foundation's diked marsh and the two adjacent managed areas have areas of partial subsidence and varying internal elevation from past management including agriculture and managed seasonal non-tidal wetlands (duck club/waterfowl management). Slough connections, internal circulation, ditches, mudflats, ponds, shorelines, and levee form and function all differ, as do habitat and animal and plant communities. Tidally driven hydrodynamics differ between the three areas with the non-levee area having what appears to be some semblance of a "natural" tidal channel configuration and function. The two more recent managed areas have differing potential hydrodynamic characteristics because of levee design and function, and relative aspect and relationship with the surrounding Bay (the western boundary of the island forms the eastern boundary of Honkers Bay). The outer shoreline habitat and their function relative to the Bay also differ on at least three sides of the island. Because the island is within the varying salinity reach of the estuary, each area may also differ in salinity conditions. The location within the estuary where salinity is approximately 2000 EC units (often referred to as the X2 location) tends to be east of the island in drier years and west of the island in wet years. Therefore habitat function and the animal and plant communities can vary from season to season and year to year. These unique characteristics provide an opportunity to study the nature of native and non-native biological communities in different environmental and habitat conditions (Strategic Goals 1 and 5).

The pilot project would focus on restoring tidal marsh within the existing "diked club" of the 450-acre Foundation property. We propose the pilot project to be the first step toward full tidal action on the property. The Foundation property has been partially tidal from failed levees over the past several years and has developed early-stage muted tidal marsh habitat over much of the property. The pilot project would be a demonstration/research project to determine how the property could be managed to enhance established muted ponds while proving benefit to waterfowl and fishes. It is our intent to determine if marsh habitat values

can be enhanced while creating (or in some cases retaining) significant marsh shallow water fish habitat on the island. Specifically, we hope to determine if the existing muted tidal ponds on the property can be retained without significant risk or reductions in habitat value of seasonal use by juvenile at-risk fish species such as delta smelt, splittail, and chinook salmon.

The project would also focus on research and restoration of shallow water tidal habitats and their potential value to fish communities and populations particularly chinook salmon, delta smelt, and splittail. All three species are often abundant at least seasonally in waters within and around Chipps Island. The island has potentially important spawning and rearing habitat for splittail and delta smelt, and has seasonally important fry and fingerling rearing habitat for juvenile chinook salmon.

The proposed project will also focus on restoration and monitoring strategies for riparian habitat (Strategic Goal 4). All three areas of the island retain various types of riparian habitat and varying degrees of corridor continuousness. On the managed areas, levees offer significant potential for riparian habitat. Our proposed initial surveys of the island will include riparian vegetation mapping including plant type and condition, as well as soil type and site characteristics (elevation, slope, etc.). We propose to relate fish use and distribution to riparian conditions to determine the importance of various riparian configurations to fish and well as wildlife species. We also will identify limiting factors to riparian habitat including water and soil salinity and non-native invasive plants. The proposed pilot study includes restoration of riparian shoreline habitat on the inner and outer slopes of the new constructed levees.

The proposed project will also address prevention, control, and reduction of impacts of non-native invasive species (NIS). The tidal aquatic habitat that exists on the Fishery Foundation portion of the island at present has considerable area of NIS aquatic plant species. The extent of NID plant and animal (fish and crabs) species on the island and their potential role in island restoration will be evaluated. Our proposed studies include research into the relationship between inundation, salinity, and other habitat needs of the NIS. The existing diversity of island habitat provides a unique laboratory for studying the distribution and habitat requirements of the NIS. The proposed pilot study and eventual full-scale restoration offer additional opportunities to study the response of NIS to habitat changes. The proposed studies would provide potential new insights into methodologies for monitoring NIS, which is a special priority of the CALFED Program for the Bay Region (Strategic Goal 5, non-native vegetation management).

The proposed project will also include a task to tie existing monitoring data on Bay-Delta fishes to information collected on and adjacent to the island by the proposed monitoring/research study. Existing data available from the Interagency Ecological Program Environmental Monitoring Program, the Central Valley Bay-Delta Branch of the California Department of Fish and Game, and the Delta Juvenile Fish Monitoring Program of the US Fish and Wildlife Service, Stockton

Resident Fish Project Work Team:
Determine habitat uses and requirements of all life stages of resident aquatic species as needed to allow effective restoration of aquatic habitats in the Delta and Suisun Bay.

Office will be synthesized to show regional distributions in time and space of at-risk species relative to Chipps Island. Chipps Island is unique in that there is extensive monitoring data available over the past 40 plus years from adjacent Bay waters including the extensive Chipps Island Trawl Survey of the US Fish and Wildlife Service Stockton Office.

The monitoring program will provide valuable information to many Bay-Delta programs on fish including the Resident Fish Project Work Team (PWT) of the Interagency Ecological Program (IEP). We plan to work closely and solicit the input of this PWT during the three-year study. Members of the PWT are also studying other wetland restoration areas within the Bay-Delta and information on Chipps Island will be shared in PWT meeting, workshops, IEP annual meetings, and through peer-reviewed scientific literature. In addition the Foundation and the proposed Chipps Island Project will work closely with estuary scientific programs to further scientific knowledge of the Bay-Delta. One such program is the Suisun Ecological Workgroup (SEW), an ad-hoc multi-agency/organization work group whose goal is to review the scientific basis for the current salinity standards in Suisun Marsh and make recommendations for comprehensive brackish marsh standards. Table 2 lists specific goals and objectives.

4. Previous Recipients of CALFED Program or CVPIA Funding

The FFC received funding for the Cosumnes River Salmonid Barrier Improvement Project, #98-B1009, which is eliminating barriers to upstream migration at three points in the Cosumnes River. The FFC has completed improvements on the lowermost barrier and is scheduled to complete the remaining improvements in the summer of 2002. The FFC received funding from the CVPIA Cooperative Agreement #114200J033-USFWS.to document the spatial and temporal distribution of salmonids through direct observation on the Stanislaus River. Field surveys have been completed as of August 2001. A draft final report will be submitted for review in September 2001. The FFC received funding from the AFRP for the Lower Calaveras River Salmon and Steelhead Life History/Limiting Factors Analysis Project (FWS Agreement DCN # 11332-1-G006). Work is expected to begin in the Fall of 2001.

5. System-Wide Ecosystem Benefits

The proposed project would provide restoration or enhancement of approximately 1000 acres of tidal wetlands on the southern edge of Suisun Marsh at the boundary between the Bay and Delta. The project would provide system-wide benefits in the form of a key element of the ecological corridor of tidal marsh that extends from San Pablo Bay into the lower Sacramento and San Joaquin Rivers. Perhaps most important will be the projects contribution to research into the function of a tidal marsh and how to effectively convert non-tidal diked waterfowl hunting lands into muted or full tidal wetlands. The project will also provide valuable information on the role of tidal marshes in the life history and population dynamics of chinook salmon and other anadromous fish, and especially on the question of the importance of estuarine rearing to Central Valley salmon populations.

6. Additional Information for Proposals Containing Land Acquisition.

The proposed 450-acre experimental area of the island is currently owned and managed by the Foundation as a diked duck club with seasonal and permanent non-tidal wetlands. The Foundation is willing to sell an easement for the property at 30% of the fair market value or approximately $600/acre. The proposed project is consistent with the Suisun Resources Conservation District (SRCD) goal to restore 1500 acres of tidal marsh habitat within its zone of influence. The Foundation and its cooperators will work closely with the SCRD throughout the project phases to ensure that they are allowed input during each phase. Chipps Island is an essential element for a continuous band of tidal marsh along the southern shore of Suisun Marsh and is necessary to provide a fully functional tidal marsh including a corridor for wildlife and fish that migrate through the Bay-Delta. Chipps Island provides a key link in this corridor as it is on the boundary of the Bay and Delta and would encompass a major portion of the corridor along the southern edge of Suisun Marsh. The island also makes up most of the eastern boundary of Suisun Bay/Honker Bay. Acquisition and restoration of Chipps island provides a unique opportunity to meet CALFED goals and objectives.

C. QUALIFICATIONS

Project Organization

The project team includes the scientists and stakeholders of the Foundation and scientists and engineers of HDR Engineering Inc. of Folsom, California and Condor Earth Technologies Inc. of Sonora, California. The management team includes management support and one staff person from DWR-ESO to provide direct liaison with the Suisun Marsh Program. Figure 4 shows the project team organization.

HDR

The HDR project team includes staff from HDR's Sacramento and other offices, and consists of fisheries biologists, terrestrial biologists, environmental engineers, and civil engineers from the following HDR programs:

- **Riparian Engineering –** multidisciplinary team that evaluates all impacts to a waterway's riparian zone and designs solutions to reduce those impacts. The team specializes in developing innovative approaches to bank stabilization, improving riparian and Shaded Riverine Aquatic habitat, increased flood flow conveyance, and aesthetics. Members of this team are presently working on the Site-5 Levee Project on the lower American River near Watt Avenue.
- **Wetlands Restoration –** a multidisciplinary team that has design and constructed wetlands and restoration projects. By incorporating methods from bioengineering, river engineering, and environmental sciences, the team's restoration techniques represents a holistic approach that focuses on balancing the needs of all users. Members of this team are actively involved in the channel restoration projects on the lower Tuolumne River

under contract to the Turlock Irrigation District. The team has restored several urban creek watersheds for the City of Anchorage, Alaska.

- **Hydraulic Evaluation –** Understanding the hydraulics and hydrology of a restoration site is an integral part of designing effective solutions. HDR has developed is broad capabilities in understanding hydraulics and hydrology. Members of the design team are hydraulic engineers and modelers who determine forces and sediment transport a various design flows and creek configurations. They use models including HEC-2 and HEC-RAS to design appropriate levee shorelines with low-tech, low-cost stabilization materials such as fiber logs, vegetated geogrids, and native materials to dissipate energy and protect shorelines from excessive scour. Example projects include the levee design for Site-5 on the LAR and the Theodore River in south-central Alaska where root wad revetments were used to protect a road and bridge.
- **Environmental Resources Management –** The ERM program is a multi-disciplinary team of scientists and planners who focus on monitoring and assessment of biological, chemical, and social impacts of development. Experience includes environmental monitoring, assessment, and documentation for the following recent projects:
- **Design and Construction –** The cornerstone of HDR's team is its design and construction capabilities, most notably their ability to produce clear plans and specifications for restoration and stabilization projects. HDR tailors plans and specifications for each construction venue. Tuolumne River restoration and American River Site-5 were recent projects with designs and specifications. Design and construction supervision experience includes the Lake Natoma Crossing (Bridge) recently completed in Folsom.

Qualifications and experience of key HDR staff are provided below.

Tom Cannon - Project Manager, Estuarine Ecologist, and Project Biostatistician--

Tom has a B.S. in Fisheries and master's degrees in Biology and Biostatistics. He is an aquatic ecologist and habitat assessment specialist with an extensive background in estuarine habitat assessment. He has been a key participant in the CALFED program since its inception in 1995, having contributed to the Ecosystem Restoration Program Plan, the Multi-species Conservation Strategy, EIR/EIS, Upper Yuba River Studies Program, and Stage 1 Implementation Plan. His experience in the Bay-Delta began as technical director of PG&E power plant studies at Antioch and Pittsburg in the late 1970's, where he studied fish distribution and fish habitat use in Suisun Bay marshes. He was a consultant to NMFS on the importance of the Bay-Delta as a nursery area for juvenile chinook salmon. He also served on the State Water Resources Control Board's Striped Bass Assessment Committee. He was also a consultant to the State Water Contractors and California Urban Water Contractors on Bay-Delta issues. He is presently project manager for a tidal wetlands restoration project at Kimball Island in the western Delta. Other experience includes working with the AFRP and IEP PWT's. Tom also has extensive CEQA, NEPA, ESA, and permitting process experience. He was the aquatic scientist and fisheries task leader the Montezuma Wetlands Project EIR/EIS and the Delta Wetlands Project EIR/EIS.

Mike Garello - Environmental Engineer--

Mike has a B.S. in Environmental Resources Engineering. Mr. Garello's experience has focused on water resources engineering and environmental studies including hydrologic/hydraulic analysis and modeling, pumping station designs, and water quality investigations. He was project engineer for preparation of Design Documentation Report for bank stabilization at Site 5 of the Lower American River. He performed hydraulic analysis of existing and project conditions using HEC-RAS. He performed channel stability analysis and geomorphic analysis. The design incorporated biotechnical engineering components to improve existing splittial and salmonid habitat values. He provided engineering design support for the restoration of about six miles of the Tuolumne River, which included restoring spawning and riparian habitats, and bioengineered bank protection.

Joe Domenichelli, P.E. - Senior Design Engineer--

Joe has over 20 years of experience in water resource engineering. He specializes in designing water conveyance and flood control facilities. He has been the engineer of record on several levee improvement projects, channel and pipeline conveyance systems and most recently a large river restoration project. His capabilities cover a wide range of computer modeling analysis including COE HEC models, water distribution modeling, scour analysis, as well as hydrology and hydraulic studies. During work experience in hydroelectric generation, he provided analysis and preliminary designs for fish barriers, screens and ladders, as well as preparation of permitting and environmental documentation for these projects. He has worked with landowners and the Department of Fish and Game on restoration work on a stream located in the coastal mountains for the protection of steelhead trout. On the most recent Tuolumne River Restoration Project, Joe has design restoration features to enhance the habitat for migrating chinook salmon, as well as the design of innovative facilities for irrigation diversion using an infiltration gallery below the riverbed. Other related work has included fish passage design for salmon crossing through large highway under-crossings on the Calaveras River, and fish flow design analysis for a bypass weir in the Santa Clara valley.

Valerie Layne - Task Leader for Terrestrial Monitoring--

Valerie has a B. S. in Botany and a M. A. in Biological Sciences. She specializes in botanical and avian field surveys, and vegetation monitoring of wetland mitigation projects. She has over 12 years of experience as a field biologist working in the marshes of San Francisco Bay. As Staff Biologist for the San Francisco Bay Bird Observatory, Valerie conducted long-term monitoring studies of colonial waterbird populations on the bay, and participated in the San Francisco Bay Area Wetlands Ecosystem Goals Project on the “Other Baylands Birds” Focus Team. She recently completed the field vegetation mapping of approximately 11 miles of coastline for the South Coastal Trail on the Anchorage Coastal Wildlife Refuge in Anchorage, Alaska, using GPS and aerial photos. Communities mapped included floating bog and tidal salt marsh. Her capabilities include small mammal trapping and bird banding. She also has 5 years of experience with CEQA review and regulatory permitting, and designing planting plans for creek restoration projects.

Condor Earth Technology

James Grummon - GIS, Data Management, and Field Data Collection

Mr. Grummon works with Condor's GIS group and field data collection group to design and implement practical field data collection and data management solutions for clients. He has over 25 years of experience in GIS, data management and field data collection. Mr. Grummon is expert in assessing GIS requirements, and has designed and implemented GIS/GPS efforts for large and domestic infrastructure projects. In addition to management and consulting activities, Mr. Grummon maintains hands-on capability in Arc/Info®, ArcView®, ArcPad®, PenMap® and a variety of 3-D mapping applications.

Fishery Foundation of California

Established in 1985, the Fishery Foundation of California is a charitable, non-profit corporation based in Concord CA that is dedicated to increasing California's fishery resources. The Foundation has been funded by a number of state agencies, corporations, foundations, and individuals to carry out fisheries research and restoration efforts. The Foundation undertakes a wide array of salmon restoration and research projects that include: restoring and enhancing several tributaries of the Eel River in Northern California to improve habitat for salmon and steelhead; addressing fish barriers by removal and enhancement on the lower Cosumnes River in the Sacramento Valley (under CALFED funding); and managing 420 acres in the Suisun Marsh to test innovative management strategies to improve habitat and nursery areas for salmon. The Executive Director is Patricia Duran; Project Manager is Trevor Kennedy. Staff assigned to the project includes:

Trevor Kennedy--

Trevor Kennedy has a B.S. in fisheries from Humboldt State University. He has participated in and managed fishery restoration and research projects in the Central Valley for five years. He has extensive experience relevant to the proposed project. He developed and implemented measures to improve fish passage on the Cosumnes River via the Cosumnes River Salmonid Passage Improvement Project and has developed methodologies to determine spatial and temporal densities and distribution of juvenile chinook salmon and steelhead within the Stanislaus River by direct observation. He has also contributed to the present understanding of how juvenile fish utilize floodplain habitats within the Cosumnes River and is working with the AFRP to determine habitat preferences, residence time, and the degree of stranding of juvenile chinook salmon within the Cosumnes River Preserve. He is currently conducting research on how newly restored tidal marsh habitats on Kimball Island are utilized by native and non-native fish.

Michael van Hattem--

Michael van Hattem received his bachelor's degree from Humboldt State University in 1997 and is presently completing his master's degree from San Jose State University. Mr. Van Hattem has extensive expertise in the research, ecology and conservation of California flora

and fauna making him a valuable addition to the research team. His experience includes MAPS station management, exotic species control, population monitoring, construction monitoring, breeding surveys, and species capture using various techniques. He has been responsible for MAPS station design, coordination, and training from 1995-1998. He has conducted focused raptor research throughout California from 1995-present. He holds a federal bird marking and salvage permit #20431-AX, 10 (a)(1)(A) permits for special status amphibians and invertebrates, and is sub-permitted to capture and band raptors. Mr. Van Hattem is presently the wildlife biologist for Lawrence Livermore National Laboratory. Responsible for a wide array of resource protection and compliance-based issues. Pre-construction diurnal/nocturnal surveys for special status threatened and endangered species at Site 200 & Site 300 in accordance with EIS/EIR and implementation of Mitigation Monitoring and Reporting Program (MMRP) and Section 7 Consultation with USFWS. Provide input to Environmental Evaluations Group (EEG) staff on biological aspects of the National Environmental Policy Act (NEPA) as well as interface with project managers and staff regarding CDF&G and USFWS sensitive species issues. In addition, have initiated long-term raptor research projects at both Site 200 and Site 300 with white-tailed kites, burrowing owls and California red-legged frogs. Other duties include: exotic species control, prescribed burn biological monitoring, population monitoring, project management, species capture with various techniques, client briefings, literature review and research, mitigation implementation, educational programs, and biological support for Sandia National Laboratory, California.

California Department of Water Resources

Steven Culberson--

Steven Culberson, Environmental Scientist with the Department of Water Resources, is proposed as a Tidal Marsh Geomorphologist and Invasive Species Control Specialist for the project team. Steve holds a Ph.D. in Ecology from U.C. Davis, where he recently completed studies on the interaction of physical and biological determinants of tidal marsh vegetation. Steve also holds a M.S. in Aquacultural Engineering and has experience in fisheries biological resource use and management. Steve has recently aided the CALFED Science Program in modeling efforts aimed at identifying opportunities for enhancement of native fish species, including the Sacramento splittail and Delta smelt. Steve has participated in the San Francisco Estuary Institute's Regional Wetlands Monitoring Program (recently partially funded by CALFED) as a member of the Plant Focus Team. Dr. Culberson is currently working as a restoration planner in the Suisun Marsh Branch Monitoring and Compliance Section at DWR.

D. COST

2. Cost-Sharing

Cost sharing occurs in the form of in-kind services from the Foundation and DWR-ESO. These services involve the commitment of staff to the project management of the project. In addition, the Foundation is committed to conducting a limited amount of pre-project

monitoring on its property during the coming year to provide some fish baseline for existing non-tidal marsh habitat.

E. LOCAL INVOLVEMENT

The Foundation will coordinate with and encourage participation from the SRCD through all phases of the proposed project. The SRCD has been involved with all pre project scoping activities including several site visits and is not opposed to the project as it is proposed. The entire project will be conducted from within the Charter Program.

F. COMPLIANCE WITH STANDARD TERMS AND CONDITIONS

The Foundation has reviewed the standard State and Federal contract terms in attachments D and E and will comply with all terms.

G. LITERATURE CITED

- California Department of Water Resources. 2001. Comprehensive Review Suisun Marsh Monitoring Data
- 1985-1995. Environmental Services Office, March 2001.
- CALFED 2000. Ecosystem Restoration Program Plan Volume I: Ecosystem Restoration Program Plan vision for Natural floodplains and flood processes. July 2000
- Goals Project. 1999. Baylands Ecosystem Habitat Goals. A report of habitat recommendations prepared by the San Francisco Bay Area Wetlands Ecosystem Goals Project. U. S. Environmental Protection Agency, San Francisco, Calif./S.F. Bay Regional Water Quality Control Board, Oakland, Calif.
- Goals Project. 2000. Baylands Ecosystem Species and Community Profiles: Life histories and environmental requirements of key plants, fish and wildlife. Prepared by the San Francisco Bay Area Wetlands Ecosystem Goals Project. P.R.Olofson, editor. San Francisco Bay Regional Water Quality Control Board, Oakland, Calif.
- Josselyn, M.N., and Atwater, B.F. 1982. Physical and biological constraints on mans use of the shore zone of the San Francisco Bay Estuary. Pages 57-84 in W. J. Kockelman, et al., ed. San Francisco Bay: Use and Protection. Pacific Division, Amer. Assoc. Advance. Sci., San Francisco, Calif.

Table 1 - Scope of Work	
Task Description	**Deliverables**
TASK 1 - ECOLOGICAL MONITORING PLAN. Working with the Suisun Ecological Workgroup (SEW), HDR will develop an ecological monitoring plan. We propose to use protocols developed by SEW in a draft survey plan and then take that plan to the SEW for their input. The Monitoring Plan will then be distributed to ESA agencies for their approval and any necessary permits for monitoring and survey sampling activities. The Monitoring Plan will include pre-pilot project monitoring within the two reference sites and post-construction monitoring in the reference sites and experimental areas. QA/QC and data handling procedures will be developed as a part of the Monitoring Plan.	Draft and final copies of the Ecological Monitoring Plan.
TASK 2 - PILOT PROJECT DESIGN. Objectives of the pilot experiment design include the evaluation and development of design parameters to be applied in tidal marsh restoration efforts throughout the Suisun area. This objective may be accomplished by understanding the ecological and physical conditions of Chipps Island and by evaluating the effect of two restoration techniques over a 3-year period. These techniques include: (1) remove existing levees on Chipps Island and allow the natural development of a full tidal marsh; and (2) reconstruct a series of levees and hydraulic control structures on a portion of Chipps Island to facilitate the restoration of Chipps Island by constructing a muted tidal marsh. The pilot study will be designed to utilize both restoration techniques and monitor effects of management and non-management scenarios on target species. A list of target species and potential design parameters will be developed during the first course of baseline studies and sampling. This evaluation, along with other hydraulic and hydrologic studies will provide the information needed to engineer and construct the pilot project design. Design will go through a series of iterations, which will allow resource agencies and stakeholders the opportunity to provide design input. The first iteration involves preparation of a predesign report. This report will outline pertinent findings concluded from the baseline studies and will present all technical information supporting the basis of design and selection of design parameters. A conceptual model of the proposed pilot project will also be included within the pre-design report. Plans and specifications will then be developed prior to pilot construction. Plans and specifications will be submitted as 60%, 100%, and Final drafts.	■ Predesign report. ■ 60 percent plans and specifications. ■ 100 percent plans and specifications. ■ Final plans and specifications.
TASK 3 - BASELINE ECOLOGICAL SURVEY. The Baseline Survey will be conducted at the two reference sites and the experimental site during the first year of the project. In addition, the Foundation proposes to conduct an in-kind fish survey this upcoming winter/spring to document fish use upon winter flooding of the Foundation's diked duck club. Baseline ecological surveys performed during the first year of the project are presented in the subtasks below. For each survey described below, HDR will provide quarterly survey data reports within one month of completing the surveys. Taxonomic information from larval fish collected will be provided within three months of completing surveys. Survey and habitat data will be stored in a GIS database that is Microsoft Access compatible. In addition, a survey report will be prepared annually that presents the results of the previous year's surveys results and analyses. Comparisons will be made to prior studies and monitoring (e.g., with DWR 2001). Survey data will be presented as catch per unit effort. Survey type and sampling location and habitat-location type will summarize by sampling period, season, and year, and by species and life stage. Differences in catch per unit effort variables will be related to habitat conditions (factors) using graphical displays and standard multivariate statistical analysis.	■ Final Survey Report containing executive summary, and chapters from Subtasks 3.1 to 3.6. ■ GIS database.

Table 1 - Scope of Work

Task Description	Deliverables
Subtask 3.1 - Fish and Aquatic Invertebrates Survey. The purpose of the Baseline Chipps Island Fish Survey is to monitor fish use of tidal marsh habitat within Chipps Island's existing tidal marshes and on the experimental site prior to construction. A seasonal (quarterly) survey over one full calendar year is proposed for the control areas during the first year. Fish sampling would include an array of gear and sampling methods that would cover various habitat types, species, and life stages expected at Chipps Island. Gear and sampling methodology will be consistent with other studies being conducted by the Interagency Ecological Program in the Bay-Delta. Light traps and plankton nets will be employed to capture larval and juvenile fish, as well as macroinvertebrates. Ceramic tiles will be strategically placed to sample for demersal-adhesive fish eggs (splittail and delta smelt). Seines, trawls, and fyke nets will be deployed to capture juvenile and adult fish. Habitat conditions monitored would include depth, velocity, substrate, cover, temperature, turbidity, salinity, and channel configuration. Fish use would be related to habitat conditions using multivariate statistical analysis techniques that treat fish as the dependent variables and habitat conditions as independent variables or covariates. A multivariate analysis of these data would show the independent features in the data usually as different combinations of variables that explain the underlying variance in the data. Conceptual models will be developed of fish use of the tidal marsh based on the baseline surveys in the control areas. Models will be developed for key fish species and life stages, and fish communities. Models will relate fish use by species and life stage to study factors. A fish community model will relate communities such as native and non-native shallow-water fish communities to habitat conditions on the island.	Fish and Aquatic Invertebrates Survey Chapter for inclusion into the Final Survey Report.

- **3.1.1 - Basic Study Design:** The survey incorporates a stratified random statistical design that will support factor analysis and regression and multivariate statistical analysis techniques. The design focuses on relating the distribution of an array of dependent fish occurrence variables with an array of independent fish habitat variables. The design will support various multivariate analysis techniques such as principal components analysis that will help determine the independent features in the relationships among the fish and habitat conditions variables. The study design will also facilitate habitat and habitat use mapping in GIS. Habitat layers will be built for habitat and habitat use for displaying data and conducting analyses of habitat relationships. Basic study design for surveys in the reference areas:

  Quarterly (e.g., January, April, July, October).

  Once per quarter on neap tidal cycle and once per quarter on spring tidal cycle.

  Two sites in natural tidal channel areas – one in first-order and one in second-order channel.

  Two adjacent channel sites outside of island.

  Two shallow shoreline sites outside of island on south and north sides of island.

  Two sites in manmade sloughs within island.

  Two sites in ponds/pans within island.

  Two sites at island breach inlet/outlets.

Table 1 - Scope of Work

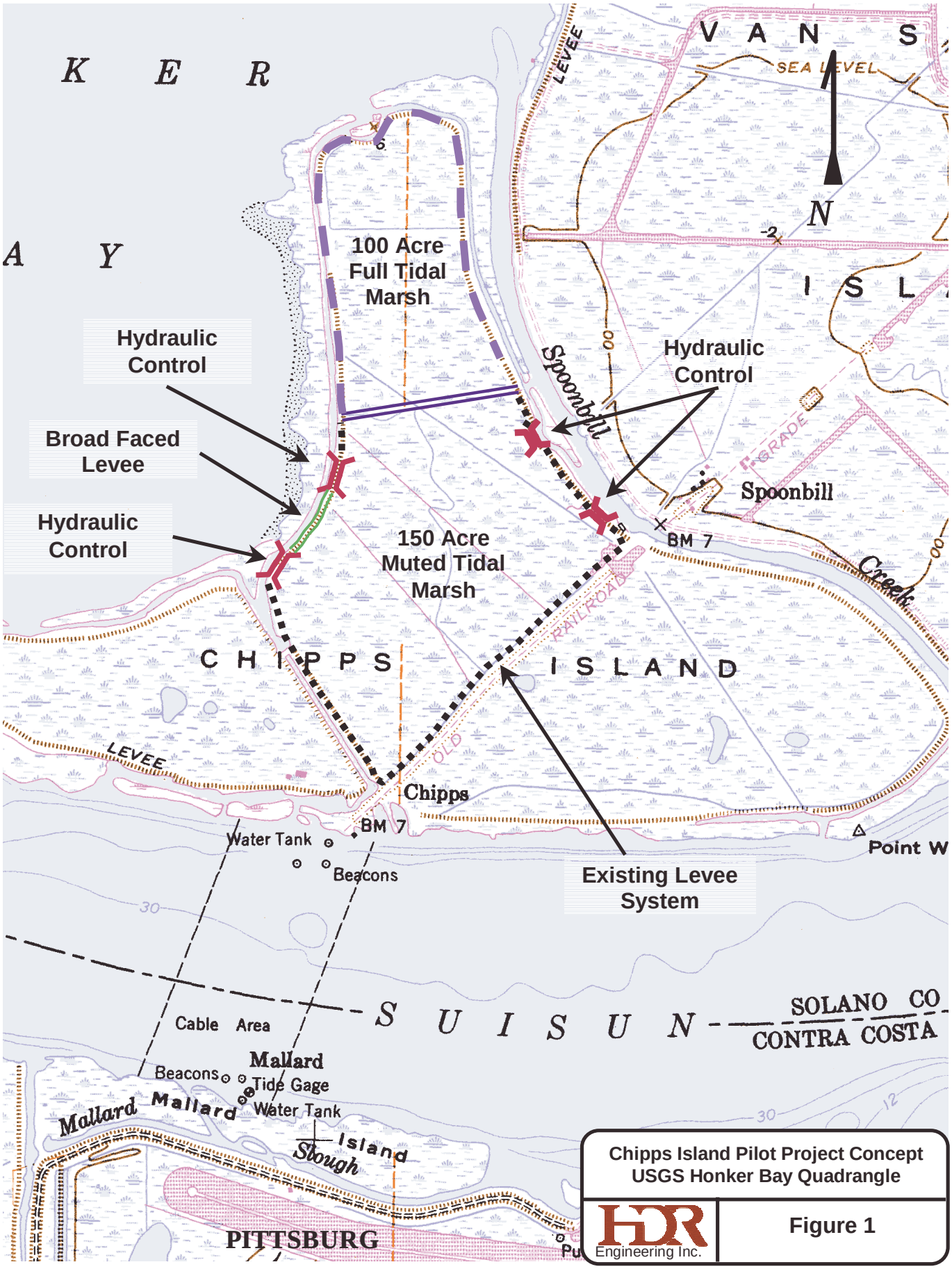
Task Description	Deliverables
■ **3.1.2. Habitat Measurements (Reference Areas).** A one-time depth and substrate survey will be conducted in aquatic habitats in the existing tidal marsh control areas on the island. A GIS database developed layer of depths at mean tidal conditions will be developed from that database. Data will be recorded at up to 10-meter intervals along the thalweg axis of all island channels. Quarterly surveys of conductivity, water temperature, pH, and turbidity will be conducted and GIS layers developed for each parameter for a spring and a neap tide. Parameters will be measured at or near peak ebb and flood tides at up to 10-meter intervals in all island channels. Aquatic macrophytes will be mapped quarterly in channels within and adjacent to the island. Benthic and epibenthic invertebrates will be sampled with ½ meter drop nets sampled quarterly at one of each of the six sample site types identified in A3 above. Samples will be processed and macroinvertebrates identified to major groups and key species. Additional data on macroinvertebrates will be available from Fish Egg and Larvae surveys identified below. Light traps will be sampled quarterly at six sample sites identified above. Fish larvae and juveniles will be identified to family and key genera/species if reasonably possible.	
■ **3.1.2. - Fish Sampling (Reference Areas):** Demersal fish egg sampling will be accomplished with gangs of ten 6-inch or 8-inch glazed ceramic tiles, with about 1 m between adjacent tiles will be placed at four sites within the island: two in high-velocity inlet locations and two in interior channels. The tiles will be in place during the spawning season, which is usually February to May. The period can be adjusted based on IEP Real-Time Monitoring Program result. Tiles will be sampled (observed and/or scraped) periodically during the sampling season. Adhered eggs will be identified and counted. Identification will be to family if possible. Standard IEP otter trawls will be sampled at the three channel sample sites identified above. Fish juveniles and adults will be identified to species if possible. A subsample of lengths will be taken. Standard IEP gill nets (100-ft variable mesh) will be sampled at three channel sample sites identified above. Fish juveniles and adults will be identified to species if possible. A subsample of lengths will be taken. Standard IEP beach seines (50 or 100-ft 1/8th-3/16th inch mesh) will be sampled at sample sites near those identified above. Seine sites will depend on sufficient open shoreline or shallow water for seining. Fish juveniles and adults will be identified to species if possible. A subsample of lengths will be taken. Standard fyke net sets will be deployed at channel and breach opening sampling stations identified above. Fykes will be set to sample with the tides. On outgoing tides nets will face the tide and visa versa. Fish juveniles and adults will be identified to species if possible. A subsample of lengths will be taken. Large predatory fish collected in sampling surveys will be sacrificed, stomachs dissected, and contents analyzed. Expected predatory fish include largemouth bass, channel catfish, white and black crappie, pikeminnow, and striped bass. A maximum of 25 of each species will be sacrificed each quarterly sampling period.	
Subtask 3.2 - Vegetation Map. A vegetation map of the entire site will be prepared prior to construction. Rare plant surveys will be conducted, focusing on Special Status Species such as the Suisun Thistle and Soft Bird's Beak. Survey objectives include: (1) preparation of a comprehensive vegetation map for the entire site; (2) documentation of any Special Status plant species occurrence, such as the Suisun Thistle and Soft Bird's Beak; (3) a baseline against which to compare the recruitment of vegetation, including Special Status plant species, and NIS post construction; and (4) document and track the occurrence of NIS.	Vegetation Chapter for inclusion into Final Survey Report, which will also include vegetation map.

Table 1 - Scope of Work	
Task Description	**Deliverables**
Subtask 3.3 - Small Mammal Survey (Wildlife). A small mammal survey will be conducted in the two control properties and on the experimental property prior to construction. This survey will allow us to determine use of the site by rodents such as Calif. vole, salt marsh harvest mouse, etc. Survey objectives include: (1) determining the usage of the project site by small mammals; (2) documenting the presence of Special Status Species such as Salt Marsh Harvest Mouse; and (3) providing a baseline against which to compare change in usage by small mammals over the experiment period.	Small Mammal Survey Chapter for inclusion into Final Survey Report.
Subtask 3.4 - Bird Surveys. Surveys for waterfowl, shorebirds, rails and passerines will be conducted on the two reference sites and the experimental property prior to construction. Focused surveys will be conducted for Calif. Clapper Rail, Calif. Black Rail, Suisun Song Sparrow and Salt Marsh Yellowthroat. Survey objective include: (1) determining the use of the sites by waterfowl, shorebirds, rails and passerines; (2) documenting the presence of Special Status Species such as CA Clapper Rail, CA Black Rail, Suisun Song Sparrow and Salt Marsh Yellowthroat; and (3) providing a baseline against which to compare use by birds post construction.	Bird Survey Chapter for inclusion into Final Survey Report.
Subtask 3.5 - Hydrology Survey. Hydrology and drainage patterns on the island will be mapped in GIS including the following features: (1) existing and historical water control structures; (2) remnant tidal marsh channels and any historical channels that can still be identified; and (3) historical drainage patterns.	Hydrology Survey Chapter for inclusion into Final Survey Report.
Subtask 3.6 - Site Conditions Survey. Features important to the island tidal marsh restoration will be mapped for the control and experimental areas: (1) current and historical land use; (2) natural and unnatural disturbances; (3) levee construction and failure; (4) topography; (5) soils; and (6) sediment.	Site Condition Survey Chapter for inclusion into Final Survey Report.
Subtask 3.7 - Quality Assurance/Quality Control (QA/QC). Monitoring and survey data will include standard QA/QC protocols for data entry. Data entry from hard copy data sheets will be double entered to ensure accuracy. Data entry from electronic media used in the field (e.g., GPS) will be checked periodically in the field as data are being collected. Project principal investigators will review data tables, analyses, and interpretation for accuracy and appropriateness.	
TASK 4 - ENVIRONMENTAL DOCUMENTATION. Environmental documentation will be completed for the pilot experiment immediately upon startup. This will include a combined Environmental Assessment (NEPA) and Initial Study (CEQA), and basic elements of Biological Assessments for state and federal ESA. We anticipate that such documentation would involve a Negative Declaration with CDFG being the lead agency for the Streambed Alteration Permit and the US Army Corps of Engineers for the 404 permits. Because the project would be constructed under existing wetland permit limitation for the Foundation's diked seasonal wetland property, a Negative Declaration should be adequate for the project's environmental documentation. Consultation would occur with the NMFS on steelhead and Essential Fish Habitat and with the USFWS on special status plants and animals. The NEPA-CEQA process would be tiered to the CALFED and CVPIA environmental documentation.	■ Combined Environmental Assessment and Initial Study (NEPA/CEQA). ■ Negative Declaration.

Table 1 - Scope of Work	
Task Description	**Deliverables**
TASK 5 - CONSTRUCT PILOT EXPERIMENT. After the final design documents have been reviewed by local stakeholders and resource agencies, the pilot project will be constructed. The FFC will construct the pilot project design in collaboration with Dave Fogleman Construction. HDR will provide construction management services throughout the construction phase of the project. This will ensure that the pilot project will be constructed as designed and to typical industry standards.	
TASK 6 - POST-CONSTRUCTION MONITORING AND ANALYSES. Post construction monitoring will take place for one year after construction has been completed. The purpose of the post construction monitoring will be to measure the effects of the pilot experiment not only on the experimental Foundation property but also on adjacent habitats and the existing tidal marsh (control areas). Monitoring survey designs will be similar to the pre-construction monitoring except the design will include monitoring in both portions of the experimental area. Comparisons will be made directly among the four survey areas: the two control tidal marsh areas, the muted tidal marsh experimental area, and the full-tidal experimental area. Details of the sampling survey design will be developed and reviewed with the SEW prior to commencing monitoring.	
Task 7 - Project Coordination and Management. This task incorporates project coordination and information management. The project would be coordinated directly with the Suisun Marsh Charter Implementation Plan (SCIP). The proposed project would be an integral component of the SCIP, and as such, would work closely with the Suisun Marsh Program (DWR-ESO) who propose to dedicate approximately 600 man hours per year of in-kind project management and technical coordination services to this project. In addition the project would work closely with the Suisun Ecological Workgroup (SEW) on the technical aspects of the project. Our intent is to communicate progress and results of the study through existing or planned future infrastructure (e.g., web sites, newsletters, and scientific papers) in addition to project reports.	■ Meeting Agenda and Minutes ■ Project Guide ■ Monthly Status Reports

Table 2 - Specific Goals and Objectives	
Objectives	**Strategic Goals**
1. Restoration of Sacramento splittail and delta smelt	■ Strategic Goal 1 - At-risk species assessments. ■ Strategic Goal 4 - Habitats.
2. Life histories and restoration or habitat requirements of at-risk species	Strategic Goal 1 - At-risk species assessments.
3. Changes in species abundances on a landscape basis	■ Strategic Goal 1 - At-risk species assessments. ■ Strategic Goal 4 - Habitats.
4. Responses of striped bass, centrarchid predators, zooplanktons, non-native bivalves, mitten crabs or aquatic macroflora to different restoration actions	Strategic Goal 5 - Non-native invasive species.
5. Performance measures.	■ Strategic Goal 1 - At-risk species. ■ Strategic Goal 2 - Ecosystem processes and biotic communities. ■ Strategic Goal 4 - Habitats.
6. Finding solutions to the constraints to restoring ecosystems of inundated islands by advancing process understanding of Delta ecosystems.	
7. Factors that determine recruitment of desired species vs. undesired species in breached systems with different geomorphology or elevation	■ Strategic Goal 1 - At-risk species assessments. ■ Strategic Goal 5 - Non-native invasive species.
8. Interconnections between inflow regimes, tidally-driven hydrodynamics, sediment processes, channel form and elevation in inundated islands and channels and how they affect the ecological outcomes.	Strategic Goal 2 - Ecosystem processes and biotic communities.
9. Nature of native and non-native biological communities in different Delta environments	■ Strategic Goal 1 - At-risk species assessments. ■ Strategic Goal 5 - Non-native invasive species.
10. Pilot monitoring/assessment programs, and pilot scale testing of performance measures are needed at several scales to document performance of wetland habitat restoration, advance understanding of optimal restoration approaches and coordinate restoration at the regional scale	Strategic Goal 4 - Habitats.
11. Priority will be given to efforts that derive questions important to status of species, communities and species recovery, and propose to use the existing data to begin to frame answers to those questions	Strategic Goal 1 - At-risk species.
12. Develop pilot programs for monitoring of zooplankton from tidal marshes to open water	Strategic Goal 2 - Decline in productivity.

Table 2 - Specific Goals and Objectives	
Objectives	**Strategic Goals**
13. Monitor and improve understanding of zooplankton and juvenile fish distribution and abundance (species composition, density, size distribution, condition factor) in the Bay proper and various types of shallow water habitats, including marsh plain channels and larger order sloughs of tidal marshes	Strategic Goal 2 - Decline in productivity.
1. Determine the extent of intermarsh movements by at-risk species within marshes in the San Francisco estuary and how dispersal and colonization movements are related to marsh size, shape, position, habitat characteristics, and population dynamics	■ Strategic Goal 1 - At-risk species assessments. ■ Strategic Goal 6.



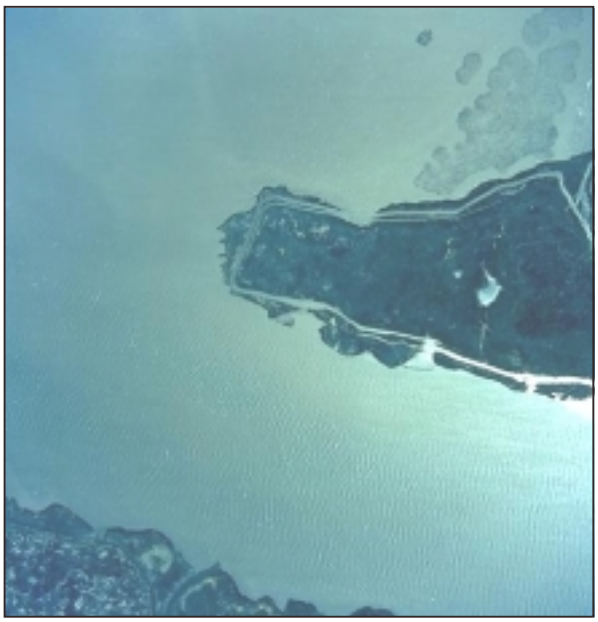
Chipps Island Pilot Project Concept
USGS Honker Bay Quadrangle

HDR Engineering Inc.

Figure 1

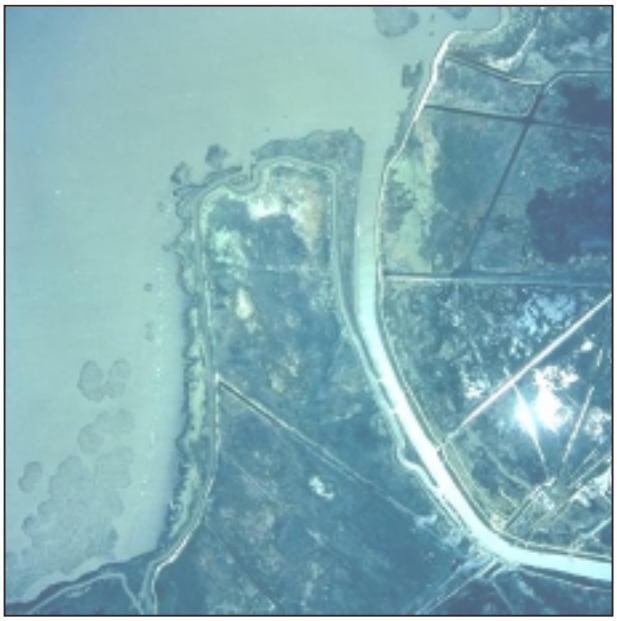
Figure 2 - Aerial Photos of Chipps Island

South Eastern Portion of Chipps Island at the Mouth of Spoonbill Slough



Western Chipps Island

Note: *Shoreline areas that have receded from erosion and mudflats north of island in Honker Bay.*



Northern Portion of Chipps Island under Ownership of the Foundation

Picture above shows south shore of ***west end of Chipps Island****, in area where only remnants of the original levee are present. The shoreline is actively eroding. Pilings in background were placed to block access to slough system that can be seen in Western Chipps Island aerial figure above.*

Figure 3 - Suisun Marsh Areas Classified as Tidal Marsh

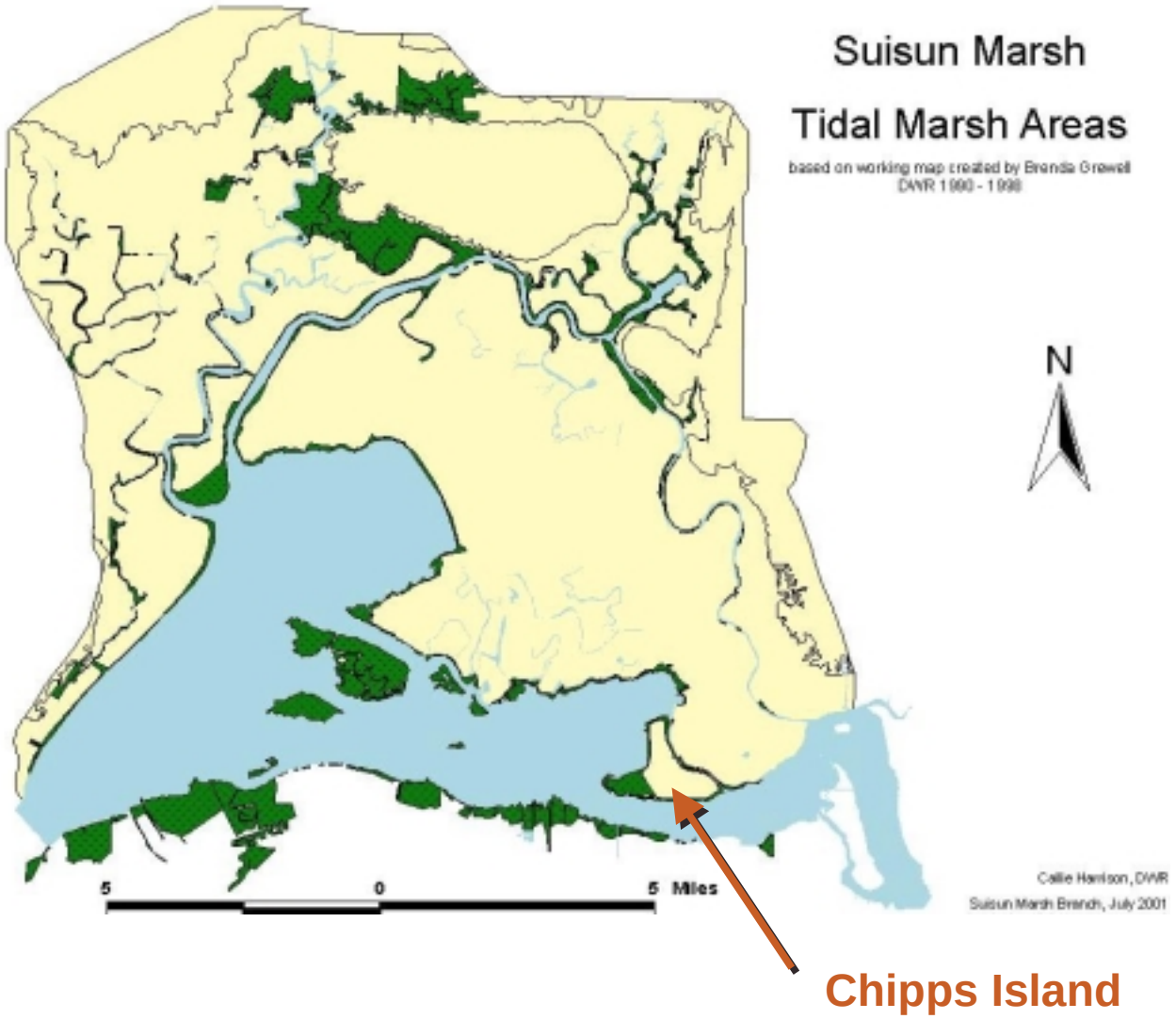
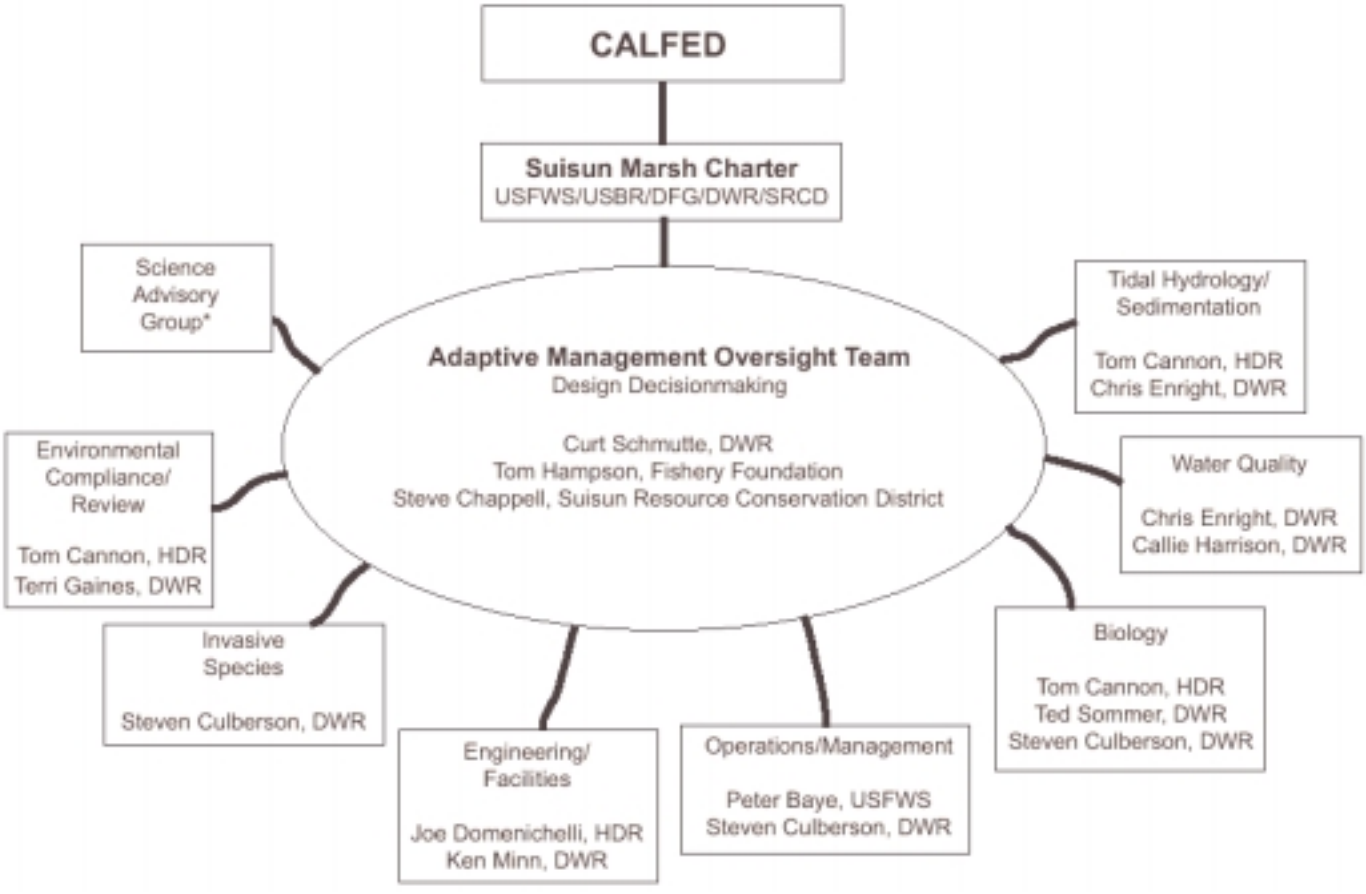


Figure 4 - Project Team Organization



*Science Advisory Group Members

Jeffery Mount, UCD (Geomorphology)
Peter Moyle, UCD (Fisheries)
John Eadie, UCD (Waterfowl)
Ted Foin, UCD (Ecosystem Processes)
Peter Baye, USFWS (Resources Management