Hill Slough West Habitat Restoration Demonstration Project, Phase III

Project Information

1. **Proposal Title:**

   Hill Slough West Habitat Restoration Demonstration Project, Phase III

2. **Proposal applicants:**

   Laura Briden, California Department of Fish and Game
   Michelle Orr, Philip Williams and Associates

3. **Corresponding Contact Person:**

   Gina Van Klompenburg
   California Department of Fish and Game
   4001 N. Wilson Way Stockton, CA 95205
   209 942-6072
   gklompen@delta.dfg.ca.gov

4. **Project Keywords:**

   Habitat Restoration, Estuarine shallow water
   Monitoring
   Wetlands, Tidal

5. **Type of project:**

   Implementation_Pilot

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

   No

7. **Topic Area**:

   Shallow Water, Tidal and Marsh Habitat

8. **Type of applicant:**

   Joint Venture

9. **Location - GIS coordinates:**

   Latitude: 38.238

   Longitude: -122.025

   Datum:

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

The Hill Slough West Habitat Restoration Demonstration Project is a 200 acre area located west of Grizzly Island Road and immediately south of Highway 12 on the Hill Slough Wildlife Area in the northeastern Suisun Marsh. The project area is approximately two miles east of Suisun City in Solano County.

10. **Location - Ecozone:**

    2.1 Suisun Bay & Marsh

11. **Location - County:**

    Solano

12. **Location - City:**

    Does your project fall within a city jurisdiction?

    Yes

    If yes, please list the city: Suisun City

13. **Location - Tribal Lands:**

    Does your project fall on or adjacent to tribal lands?

    No

14. **Location - Congressional District:**

    California, 7th

15. **Location:**

    California State Senate District Number: 4

    California Assembly District Number: 8

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

    3 years

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

       Yes

       If yes, list the different overhead rates and total requested funds:

State Overhead Rate:	15.00
Total State Funds:	$5,618,335
Federal Overhead Rate:	13.9
Total Federal Funds:	5,564,593

b) Do you have cost share partners already identified?

No

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?**

Yes

If yes, identify project number(s), title(s) and CALFED program (e.g., ERP, Watershed, WUE, Drinking Water):

98-F07	**Hill Slough West Habitat Restoration Demonstration Project, Phase I**	**ERP**
2001-E201	**Hill Slough West Habitat Restoration Demonstration Project, Phase II**	**ERP**

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

No

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?

No

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)

21. **Comments:**

Environmental Compliance Checklist

Hill Slough West Habitat Restoration Demonstration Project, Phase III

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: California Department of Fish and Game
   NEPA Lead Agency (or co-lead:) US Army Corps of Engineers
   NEPA Co-Lead Agency (if applicable): None

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.

      The environmental compliance phase of the project will begin when the CALFED contract with DFG is complete. Environmetal Documents are expected to be complete nine months after the contract is complete.

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	Required
General Plan Amendment	
Specific Plan Approval	
Rezone	
Williamson Act Contract Cancellation	
Other	

STATE PERMITS AND APPROVALS

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

FEDERAL PERMITS AND APPROVALS

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

6. **Comments.**

Land Use Checklist

Hill Slough West Habitat Restoration Demonstration Project, Phase III

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

   No

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

   No

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

   Yes

   If you answered yes to #3, please answer the following questions:

   a) How many acres of land will be subject to a land use change under the proposal?

      200 acres

   b) Describe what changes will occur on the land involved in the proposal.

      The project area will be converted from a managed wetland to a tidal wetland.

   c) List current and proposed land use, zoning and general plan designations of the area subject to a land use change under the proposal.

Category	Current	Proposed (if no change, specify "none")
Land Use	**Marsh**	**none**
Zoning	**Park**	**none**
General Plan Designation	**Park with specified uses**	**none**

   d) Is the land currently under a Williamson Act contract?

      No

   e) Is the land mapped as Prime Farmland, Farmland of Statewide Importance, Unique Farmland or Farmland of Local Importance under the California Department of Conservation's Farmland Mapping and Monitoring Program?

      No

   f) Describe what entity or organization will manage the property and provide operations and maintenance services.

      The Department of Fish and Game will continue to manage the property as part of the Hill Slough Wildlife Area.

4. Comments.

Conflict of Interest Checklist

Hill Slough West Habitat Restoration Demonstration Project, Phase III

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):

Laura Briden, California Department of Fish and Game
Michelle Orr, Philip Williams and Associates

Subcontractor(s):

Are specific subcontractors identified in this proposal? Yes

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

Dr. Ted Winfield	**Ted Winfield and Associates**
Dr. Lisa Stallings	**Life Science!**
Ed Hultgren	**Hultgren-Tillis Engineers**
Andy Leahy	
John Northmore Roberts	**John Northmore Roberts & Associates**

Helped with proposal development:

Are there persons who helped with proposal development?

No

Comments:

Budget Summary

Hill Slough West Habitat Restoration Demonstration Project, Phase III

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.

State Funds

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	Baseline Monitoring	8024	109828	16896	6500	18967	65800	60000	22178	300169.0	67885	368054.00
2	Design Resolution	0	0	0	0	0	92113	0	0	92113.0	13817	105930.00
3	Final Design	0	0	0	0	0	252534	0	0	252534.0	37880	290414.00
4	Construction	0	0	0	0	0	0	0	0	0.0	0	0.00
5	Project Management	1048	28668	5734	100	500	18320	0	744	54066.0	15360	69426.00
		9072	138496.00	22630.00	6600.00	19467.00	428767.00	60000.00	22922.00	698882.00	134942.00	833824.00

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	Baseline Monitoring	8024	115319	17740	6825	18967	67950	0	21287	248088.0	61516	309604.00
4	Construction	800	6840	547	1000	500	1729067	0	4720	1742674.0	261521	2004195.00
5	Project Management	1048	30101	6021	105	525	9160	0	781	46693.0	14616	61309.00
		9872	152260.00	24308.00	7930.00	19992.00	1806177.00	0.00	26788.00	2037455.00	337653.00	2375108.00

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	Baseline Monitoring	8024	121085	18627	7160	19915	70208	0	24452	261447.0	64421	325868.00
4	Construction	800	7182	574	1050	525	1729067	0	4956	1743354.0	261503	2004857.00
5	Project Management	1048	31606	6322	110	551	9610	0	820	49019.0	15346	64365.00
		9872	159873.00	25523.00	8320.00	20991.00	1808885.00	0.00	30228.00	2053820.00	341270.00	2395090.00

Grand Total=5604022.00

Comments.
Note: Due to differences in budget formats, the total in Form VI Budget Summary is different from that of the requested amount. The requested funds of $5,618,335 is the correct amount requested for the proposal. The proposal budget also allowed for an annual 5 percent increase in costs, for which the form does not allow.

Budget Justification

Hill Slough West Habitat Restoration Demonstration Project, Phase III

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

Senior Fisheries Biologist - Supervisor = 288 hours Associate Wildlife Biologist = 3,712 hours Research Analyst I - GIS = 240 hours Biologist (Botany) = 240 hours Wildlife Biologist = 2,240 hours Fisheries Biologist = 4,320 hours Fish Habitat Assistant = 1,440 hours Lab Assistant = 600 hours Fish and Wildlife Scientific Aide = 17,336 hours

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

Senior Fisheries Biologist- Supervisor = $5,585/month Associate Wildlife Biologist = $4,969/month Research Analyst I - GIS = $4,155/month Biologist (Botany) = $3,722/month Fisheries Biologist = $3,722/month Wildlife Biologist = $3,722/month Fish Habitat Assistant = $3,389/month Lab Assistant = $2,489/month Fish and Wildlife Scientific Aide = $10.30-$11.87/hour

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

All Permanent Classes = 20% All Temporary Classes (Fish and Wildlife Scientific Aide is the only temporary class listed here) = 8%

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

The project site is located outside of the 50-mile "local" radius for Stockton DFG employees. Therefore, all state travel reimbursement rules apply. These rules include: reimbursement for meals if work hours begin before 6am or end after 7pm; reimbursement for mileage in a private vehicle; reimbursement for parking expenses; and reimbursement for lodging if necessary. Travel will not only need to be covered for the above listed positions, but also for general fund positions also working on the project. For the proposed 3-year contract, travel expenses will total $22,800.

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

Office = $5,700 Laboratory = $17,475 Computing = $0 Field Supplies = $36,725

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.

DFG Office of Spill Prevention and Response - Aquatic Bioassessment Lab will be conducting the benthic invertebrate identification for Task 1. The Aquatic Bioassessment Lab charges per sample ($300/sample). Over 3 years of monitoring 432 samples will be processed for a total of $129,600. Construction, Task 4 A contractor will be selected through the public bid process. The estimated cost of construction is $3,391,900. DESCRIPTION COST 1. Mobilization, Site Preparation, & Demobilization $150,000 2. Breaches (2 total) [1] $52,500 3. Starter Channel Excavation [2] $98,000 4. Levee Lowering [3] $66,800 5. East Levee Improvements [4] $370,000 6. South Levee Improvements [4] $210,000 7. Culvert Removal $20,000 8. Import Fill [5] $822,400 9. Slope Protection $420,000 10. Mosquito Minimization A. Disking [6] $50,000 B. Ditch

removal/creation $5,000 11. Disking for Re-vegetation $50,000 12. Alluvial Area Planting A. Clearing & Grubbing $20,000 B. Revegetation $60,000 13. Public Use Facilities A. Fill [4] $20,000 B. Parking Lot & Path $110,000 C. Observations Decks $48,000 D. Miscellaneous (culvert, signs) $40,000 14. PG&E Facility Improvements $150,000 Sub-Total $2,762,700 Contingency (20 %) $553,000 Estimated Total Cost $3,315,700 OPTIONAL ITEM 15. Seasonally Ponded Depressions A. Clearing & Grubbing $20,000 B. Grading $43,500 Sub-Total $63,500 Contingency (20 %) $12,700 Estimated Total Cost of optional item $76,200 NOTES: 1. Includes removal of one culvert, and soil excavation and disposal. 2. Includes soil excavation, loading, transport and drying. 3. Includes excavation of levee and sidecasting. No reuse of excavated material. 4. Includes soil loading, on-site transport, placement and compaction. 5. Includes soil supply, delivery and stockpiling onsite. 6. Includes cost of mobilization/demobilization for disking. Hill Slough West Habitat Restoration Demonstration Project, Phase III Scope of Work for Philip Williams & Associates Team PHILIP WILLIAMS & ASSOCIATES, PWA HYDROLOGY, GEOMORPHOLOGY AND ENGINEERING DESIGN Task 1: Baseline Monitoring PWA will assist with reference site selection, refinement of the monitoring plan and specification of exact monitoring locations based on the sites selected. PWA will measure baseline hydrologic and geomorphic conditions at the site and two reference sites. This will include survey of initial site elevations, channel cross-sections (breach cross-sections will be added after restoration), tide monitoring, and installation of sediment monitoring stations. A benchmark network will be established for elevation control. PWA and DFG staff will survey vegetation-elevation transects, as well as elevation-only transects. Transect and cross section endpoints will be surveyed and staked for future use. Sediment monitoring stations will be installed for future use in assessing sediment thicknesses and changes in elevation. Levees and the site as a whole will be assessed for signs of erosion. PWA will prepare a monitoring report describing the monitoring locations, methods, and results. PWA will subcontract for an aerial photography company to take aerial photographs and create orthophoto images of the three sites the summer before breaching. Task 2: Design Resolution PWA will conduct the preliminary levee design, evaluate sources of fill, and coordinate with subconsultants regarding the preliminary planting plan, seasonally-ponded depressions, and geotechnical components of the design resolution task, including review of work products. The preliminary levee design will include refinement of the levee design height criteria and specification of slope protection criteria for the levees. PWA will refine the design criteria for height, width, and cross-section shape. We will refine County and FEMA requirements for flood protection. We will meet with County staff, as necessary. We will survey Pond 3 levees to identify the overtopping elevations for Pond 3 and possibly survey other elevations related to Grizzly Island Road flooding. We will establish performance criteria for levee slope protection. The design calls for biotechnical slope protection. This is a relatively new slope protection method and will require some non-traditional analyses. PWA will perform wave setup and runup analysis for various levee cross-section shapes and heights. We will evaluate the erosion protection offered by various approaches to biotechnical stabilization. We will use this information to design the levee cross-section. PWA will evaluate onsite and offsite fill options and costs. The design will be modified to balance the effects of on-site borrow with reducing the costs of fill. Task 3: Final Design In the final design phase, PWA will detail the design elements for contractor bid and construction. The major design elements are two breaches in the outboard levee, starter channels, levee lowering in some areas, levee improvements and slope protection in other areas, planting of the alluvial areas, public access trails, observation platforms, and parking. Additional site investigations, testing and analyses will be performed as needed to design project elements. PWA will detail grading design elements and coordinate all other components of the design: geotechnical services, the planting plan, structures, and the seasonal wetland creation (if included based on the results of Task 2). PWA will detail grading design elements including levee construction, breaching, starter channel excavation and creation of seasonally-ponded

depressions. PWA will also detail selected public access features including the trail, unpaved parking lot and interpretive signage. As part of the design process, limited ground surveying will be performed as needed to supplement the aerial survey. For the design of levee slope protection, we will refine analyses to evaluate wave erosion and the energy dissipation capacity of vegetation. PWA will coordinate with HTE for the geotechnical parts of the design and investigate potential borrow sources for imported fill material. PWA will coordinate with Andrew Leahy regarding the pedestrian boardwalk and observation platforms, coordinating input from the geotechnical investigation. PWA will coordinate with Ted Winfield and LS! regarding the final planting plan and final design of seasonal wetlands. PWA will present the final design on construction documents consisting of drawings (eight drawings), specifications and an engineers estimate. Construction documents will be suitable for pubic bidding of the construction contract. The PWA team will prepare technical specifications and assist DFG with the public bid and contractor selection. PWA staff will conduct quality assurance and control (QA/QC) of all design documents. This will include PWA drawings, as well as those prepared by Andrew Leahy and LS!. For quality assurance, we will review design input from all team members. Michelle Orr and Philip Williams will remain involved in QA/QC review. Task 4: Construction The construction process will include contractor selection through the public bid process, implementation by the contractor, and observation and construction support by the project team. Although DFG will be the lead on the public bid process, PWA will assist DFG staff through the public bid process. PWA will attend the pre-bid conference and assist DFG with bid addenda preparation. The selected contractor will implement the final design. DFG will be the lead on construction oversight and provide daily observation and recording. PWA will make periodic site visits at key milestones during construction (construction oversight), and provide construction support services, such as review of submittals, response to questions, and design clarifications. PWA will coordinate with other team members involved in construction oversight: HTE, LS!, Andrew Leahy, and Ted Winfield. Task 5: Project Management And Administration PWA will contract with DFG and prepare sub-contracts for the subconsultants. Aerial photography services will be bid according to DFG requirements for soliciting DVBE participation. PWA will solicit bids and select the aerial photography contractor. PWA will prepare quarterly and annual progress reports of PWA team services. PWA will attend up to 12 meetings with DFG and/or CALFED staff. TED WINFIELD BIOLOGY Task 1: Baseline Monitoring Ted Winfield will review the final monitoring procedures/plan, review written materials, and possibly write portions of the revised plan. He will participate in field reconnaissance survey Task 2: Design Resolution Ted Winfield will coordinate with LS! to assess the feasibility of creating seasonally ponded wetland habitat. This would include identification of the area(s) at the site where the depressions would be constructed and ensure continuity with project goals and objectives. Ted Winfield will look in the region for natural occurring seasonally ponded wetland areas and at the soils associated with those features. Task 3: Final Design Ted Winfield will evaluate soils for planting, including soil sample analysis and possibility of soil amendments. He will specify planting species, locate the appropriate nursery to grow the plants, determine the number of plants that would need to be grown, produce the final planting plan and planting specifications, locations, and installation requirements. Task 4: Construction Ted Winfield will respond to questions on planting and seasonal wetlands design. LIFESCIENCE! SEASONAL WETLANDS Task 2: Design Resolution LifeScience! (LS!) will conduct a feasibility assessment for creation of seasonally ponded wetland habitat. LS! will evaluate soils in the area under consideration for seasonal wetland creation using both backhoe and hand dug pits. The Solano County Soil Survey shows Sycamore silty clay loam, saline mapped on the project site area. This soil series has a buried saline soil at a depth ranging from 20 to 36 inches. The presence and depth of this buried soil will be noted. Soil samples will be collected at the surface and 12 inches depth from 5 locations. The samples will be sent to a laboratory for salinity analysis. LS! will assess the soils at the project site, availability of

inoculum (propagule source) for the created wetlands, and the requirements of Mosquito Abatement for the feasibility of constructing seasonally ponded depressions at the project site. Optional: If it is determined that it is feasible to create seasonally ponded depressions on the site, a reference site will be identified and a reconnaissance level survey of seasonal wetlands will be performed by LS!. Ted Winfield will describe plant communities at the reference site. LS! will quantify natural pool depths, side slopes, and dimensions at several sites in the area. These data will be used to prepare a preliminary design construction report for seasonal wetlands at the project site. Task 3: Final Design If it is determined that it is feasible to create seasonally ponded depressions on the site, LS! will prepare a detailed construction plan for the depressions. This plan will include a construction schedule, equipment to be used, construction techniques, haul routes and location of stockpiles, and estimate of construction costs. Task 4: Construction If seasonal wetlands are included in the design, LS! will assist with up to two days of site construction oversight during grading for the seasonal wetlands. HULTGREN-TILLIS ENGINEERS GEOTECHNICAL SERVICES Task 2: Design Resolution HTE will provide consultation to PWA on the preliminary levee design. Task 3: Final Design Hultgren - Tillis Engineers scope of services will include exploring subsurface conditions along the planned levee alignments and in planned borrow areas. Exploration will consist of both sample borings and cone penetrometer tests (CPTs). Hultgren - Tillis Engineers field engineer will log the borings and obtain soil samples for further visual classification and laboratory testing. Selected soil samples will be submitted for laboratory testing, including moisture content, dry density, Atterberg limits, triaxial strength testing, and consolidation testing. Using the results of the field investigation and laboratory testing, Hultgren - Tillis Engineers will perform geotechnical engineering analysis in order to develop conclusions and recommendations regarding the following: 1. Subsurface conditions including depth to groundwater, if encountered; 2. Potential for liquefaction and fault rupture; 3. Stable configurations for the new levee embankments; 4. Estimates of embankment settlement; 5. Suitability of borrow materials; 6. Site preparation and grading criteria for new levees. Hultgren - Tillis Engineers will summarize their conclusions and recommendations in a written report along with a site plan, boring logs, and results of laboratory testing. They will provide continuing consultation to PWA during final design of the levees. Task 4: Construction Hultgren - Tillis Engineers will check site preparation beneath levee alignments, observe and test placement and compaction of levee embankment fill. Bulk samples will be tested for reference compaction curves and field density tests will be performed to check the degree of compaction. Material quality, moisture conditioning and lift thicknesses will be routinely checked. Hultgren - Tillis Engineers will provide geotechnical engineering consultation as needed during construction. AERIAL PHOTOGRAPHY Photograph existing conditions: Refresh control point targets, fly site at low tide, create ortho-photo (i.e. rectified) at a scale of 1:9600 and electronic deliverable map with resolution of 0.5 ft/pixel. Detail existing/baseline conditions with stereo photos: Fly and take stereo photos of site at a scale of 1:2400, giving 10 stereo pairs that will be useful for identifying changes in vegetation height for the purpose of vegetation zone classification. May not be necessary, depending on faith in the digital photo above and the extent of ground truthing surveys. Photograph baseline conditions of Hill Slough Restoration and reference sites: Fly post-breach photo of Hill Slough (either ortho-rectified or stereo pairs) and photo 2 reference sites (1 natural marsh, 1 levied area). Reference site photos to be corrected by using quad maps (simplified rubber-sheet) ANDREW LEAHY STRUCTURAL DESIGN Task 3: Final Design Design pedestrian boardwalk and observation platforms. Task 4: Construction Andrew Leahy will assist with up to five days of construction oversight during construction of the boardwalks and observations decks. JOHN NORTHMORE ROBERTS PUBLIC USE Task 3: Final Design Provide consultation regarding public access facilities, particularly aesthetics of the observation platforms. PWA Hours per Task (Includes PWA subconsultant hours) Task 1 = 440 hours Task 2 = 562 hours Task 3 = 1992 hours Task 4 = 684 hours Task 5 = 320 hours PWA

STANDARD BILLING RATES 2002 2003* 2004* President $ 200 210 221 Vice President $ 175 184 193 Principal $ 160 168 176 Director $ 140 147 154 Sr. Associates $ 130 137 143 Associate $ 110 116 121 Hydrologist 2 $ 90 95 99 Hydrologist 1 $ 80 84 88 Graphics/CADD $ 85 89 94 Desktop Publish. $ 75 79 83 Technicians $ 55 58 61 Clerical $ 50 53 55 * 5% escalation per year

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.

(2) 4x4 Trucks with towing capabilities at $30,000 each. Two trucks will need to be dedicated to this project full time for baseline monitoring and construction monitoring. To obtain these trucks, DFG has two options. The first option, proposed here, is to buy the trucks so they are property of DFG. This option will all DFG to dedicate these trucks to this project for the next 3 years as well as have them available for post project monitoring in Phase IV of the project (future CALFED proposal). The second option available to DFG is to attempt to rent the 4x4 trucks from the General Services Administration (GSA). We have been told by GSA that the trucks we require to complete the proposed work are nearly impossible to obtain. If we were able to obtain two of these trucks from GSA, the charges would be $475/month plus $0.32 per mile. For rent alone, the trucks would cost $34,200 for this 3-year contract. Due to the likelihood of obtaining two 4x4 trucks from GSA, and the associated cost, we propose that CALFED fund $60,000 now for DFG to buy the trucks. This will aid DFG in completing the work proposed here and negate the need for DFG to ask for further vehicle funds in the amount of $34,000 for post project monitoring in Phase IV.

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.

Fifty percent of an Associate Wildlife Biologists time will be devoted to project management for the 3-year contract. This person will coordinate and integrate the project components, track budgets, prepare reports, and attend meetings related to Suisun Marsh issues. The cost of this positions time is $108,752 for 3 years. The Associate Biologists time was included in the direct labor hours.

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

Training = $9,000 Boat Operations = $21,000 (includes fuel, maintenance, repairs, and insurance) Vehicle Operations = $52,604 (calculated at $0.31 per mile; includes fuel, maintenance, repairs, and insurance on all vehicles used on the project, not just the two trucks we propose being dedicated to the project. During the height of sampling, 6-7 vehicles may be used on the project.)

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.

Overhead is charged on the entire contract at the rate of 15%. Overhead in this proposal is an indirect cost that is dedicated solely to centralized DFG administration. Overhead in the amount of $723,806 is budgeted for this project. The Central Valley Bay-Delta Branch has a specific charge called a General Expense that covers items such as rent, utilities, phones, uniform

allowance, facilities operations, branch administration, and postage. The General Expense is $14,500 per Personnel Year (PY). For this project, General Expenses will total $90,464.

Executive Summary

Hill Slough West Habitat Restoration Demonstration Project, Phase III

The Hill Slough West Habitat Restoration Demonstration Project is a proposal to restore tidal action to approximately 200 acres of seasonal and permanent wetlands in northeastern Suisun Marsh. The project is located west of Grizzly Island Road on the Hill Slough Wildlife Area in the northeastern Suisun Marsh approximately two miles east of Suisun City in Solano County. Implementation will be carried out in four phases: Phase I, now complete, developed a restoration and monitoring plan with the aid of a Technical Advisory Committee (TAC). Phase II, funded by CALFED through the 2001 PSP, will complete project environmental compliance and permitting. Phase III of the project, contained in this proposal, is a collaborative effort between the California Department of Fish and Game (DFG) and Philip Williams and Associates (PWA). During Phase III, PWA and DFG will complete construction level designs, pre-project monitoring to gather baseline conditions, and project construction. The proposed Phase III actions will create a hydrologic and topographic foundation for the development of suitable habitat tidal marsh and lowland alluvial habitat. The fourth phase of the project will be post project monitoring, maintenance, and adaptive management. The completed project will create a brackish tidal marsh and the associated upland ecotone. This proposal aids in fulfilling two of the Draft Stage 1 PSP priorities outlined in Section 3 of the PSP: BR-1 Restore wetlands in critical areas throughout the bay, either via new projects or improvements that add to or help sustain existing projects. BR-2 Restore Uplands in key areas of Suisun Marsh and San Pablo Bay.

Proposal

California Department of Fish and Game

Hill Slough West Habitat Restoration Demonstration Project, Phase III

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Hill Slough West
Habitat Restoration
Demonstration Project, Phase III

1.0 Project Description

The Hill Slough West Habitat Restoration Demonstration Project is a proposal to restore tidal action to approximately 200 acres of seasonal and permanent wetlands in northeastern Suisun Marsh. Implementation will be carried out in four phases: Phase I, now complete, developed a restoration and monitoring plan with the aid of a Technical Advisory Committee (TAC). Phase II, funded by CALFED through the 2001 PSP, will complete project environmental compliance and permitting. Phase III of the project, contained in this proposal, is a collaborative effort between the California Department of Fish and Game (DFG) and Philip Williams and Associates (PWA). During Phase III, PWA and DFG will complete construction level designs, pre-project monitoring to gather baseline conditions, and project construction. The fourth phase of the project will be post project monitoring, maintenance, and adaptive management. The completed project will create a brackish tidal marsh and the associated upland ecotone.

1.1 Problem

1.1.1 History of Wetland Loss

From the mid-1870s to the early 1900s approximately 90 percent of the tidal wetland habitat in the Suisun Marsh was diked and converted to uses such as farms and managed wetlands. The loss of the tidal access has hindered the ecological processes and functions critical for sustaining a healthy aquatic ecosystem. These changes have created a lack of support for the Bay-Delta aquatic foodweb contributing to unhealthy fish populations. The loss of emergent tidal wetlands and channels has led to a reduction in the amount of potential rearing habitat for chinook salmon, delta smelt, and splittail. Reduction and fragmentation of marsh habitats has resulted in reduced populations of California clapper rail, salt marsh harvest mouse, and rare plants dependent on high tidal marsh and adjacent upland transition.

The Hill Slough West property has been no exception to this trend of land conversion. The restoration site is a former tidal marsh and lowland alluvial habitat along the northern margin of Suisun Marsh. It was diked and partially drained over 60 years ago, causing significant habitat modifications. By diking and draining, the site has been converted from tidal wetlands to a leveed, managed wetland. The site has subsided over time, and little of the original marshplain and tidal channel topography remains. The loss of natural tidal flows and topographic features has made the site uninhabitable by many Suisun Marsh species.

The Hill Slough West Habitat Restoration Demonstration Project is a 200 acre area located west of Grizzly Island Road on Hill Slough Wildlife Area in the northeastern Suisun Marsh approximately two miles east of Suisun City in Solano County. The project area has an internal levee that allows the northern portion to have been grazed and the southern portion to be managed as a permanent wetland. The site is accessible to the public.

1.1.2 Past Studies and Solutions

Suisun Marsh Plan of Protection: The Suisun Marsh Plan of Protection was drafted in the 1970s. The fish and wildlife element of the Plan involved a comprehensive review and inventory of the ecological attributes of the Suisun Marsh and identified problems facing marsh

preservation. This document identifies tidal marsh restoration as an implementation measure to protect wildlife and its habitat in the Suisun Marsh.

San Francisco Bay Area Wetlands Ecosystem Goals Project: The restoration approach proposed here is consistent with the San Francisco Bay Area Wetlands Ecosystem Goals Project (Goals Project, 1999), a collaborative planning effort with significant input from numerous regional wetland and restoration scientists. The Organizing Principles in the Goals Project are as follows:

The preferred approach to implementation of the goals should be the restoration of natural, self-sustaining systems that can adjust to changes in physical processes, with minimum ongoing human intervention.

Restoration planning and design should be based on expected regimes and variability of physical processes, including hydrology, sediment, salinity, water quality, and biogeochemistry.

1.1.4 Goal, Objectives, and Hypothesis

The goal of the project is to restore brackish tidal marsh and associated upland ecotone at the site to benefit endangered as well as other migratory and resident species. The following objectives were defined during Phase I:

- Create tidal brackish marsh habitat consisting of sinuous tidal channels and low, middle and high marsh habitats; establish vegetation similar to local tidal brackish marshes
- Convert upland non-native grassland habitat to lowland alluvial habitat consisting of native perennial grass and native moist grassland species
- Restore self-sustaining habitats, minimizing the need for active operation and maintenance
- Provide for public access that is compatible with protection of resource values and regional and local public access policies

We hypothesize that the proposed restoration, ongoing maintenance, and adaptive management as outlined in the Hill Slough West Restoration and Management Plan, will allow us to meet the above objectives. That is, the proposed Phase III actions will create a hydrologic and topographic foundation for the development of suitable tidal marsh and lowland alluvial habitat. We will monitor site performance and test the hypothesis in Phase IV.

1.2 Justification

1.2.1 Conceptual Model

The restoration design is based on a conceptual model of tidal wetland evolution in diked, subsided sites, as presented in the CALFED Tidal Wetland White Paper. The approach is to grade a restoration template upon which natural physical, vegetative, and biological succession processes can act to gradually regenerate a self-sustaining marsh ecosystem. Limited plantings are planned in non-tidal areas to assist the establishment of native vegetation species. The existing site conditions, restoration design, and conceptual model of expected site evolution are described fully in the Hill Slough West Restoration and Management Plan (PWA et al. 2001) and summarized below. Figures of the site and restoration plan are included in Appendix A. The Restoration and Management Plan is available through PWA's web site (www.pwa-ltd.com).

The site is currently diked, drained, and much of the site has subsided up to approximately 1 m below natural tidal marsh elevations. The site slopes gently from the deepest areas in the south of the site, up to supratidal elevations in the north. The restoration design for Hill Slough

includes breaching the outboard levee in two locations, grading "starter" channels inside the site to remove non-erosive soils in channel locations, and improving flood protection levees, and possibly grading shallow seasonally ponded depressions in the supra-tidal areas.

Once tides are restored to the site, we expect rapid vegetative colonization within the high intertidal areas. Since Hill Slough West is gently sloped and only shallowly subsided, large areas are at suitable elevations for rapid initial colonization -- a broad band across the site and narrow bands along the site perimeter. After the initial period of colonization, vegetation is expected to expand more slowly through extension of rhizomes, lower into the tidal zone. Colonization is expected to occur to depths as low as mean tide level and below (Josselyn, 1983; Simenstad et al, 2000; PWA et al. 2001). The majority of the site is at or above these minimum vegetation colonization elevations and is expected to vegetate over a period of decades. Estuarine deposition will raise ground elevations throughout the tidally-inundated part of the site, helping vegetation establish in low areas. Once vegetation is established, ongoing deposition and in situ biomass production are expected to raise the marshplain toward natural marsh elevations, typically at approximately mean higher high water (Atwater et al. 1979). For a sustainable, vegetated marsh to maintain itself over a long timeframe (centuries), vertical growth of the marsh must be greater than sea-level rise. Concurrent with formation of the marshplain, the starter channels will become more defined and relatively fixed in location as vegetation colonizes their edges. The tidal drainage network is expected to evolve over time towards a mature, well-defined system. Natural wetland habitat values are expected to improve as the site evolves.

As habitat values improve, fish and wildlife species are expected to colonize the site. Once the site is tidally inundated, colonization of benthic invertebrates is expected, providing a food base for other marsh species. With this food base, and developing habitats, fish and wildlife species are then expected to colonize the site from surrounding managed and tidal marshes.

The proposed project addresses uncertainties related to shallow water, sedimentation, tidal and freshwater marsh habitats identified by CALFED. By allowing natural regeneration, implementing an extensive monitoring program, and controlling invasive, non-native species we will better understand the tidal wetland regeneration process, the spread of invasive species, and colonization of marsh species on restored areas. We will also be able to assess the effectiveness of our modeling techniques in predicting hydrology and sedimentation for the completed restoration project.

One uncertainty is the rate of sedimentation that can be expected following restoration. Sedimentation rates are relatively high in the North Bay and low in the Delta (Simenstad et al. 1999). Little is known, however, about rates of intertidal sedimentation in Suisun Marsh. It is possible that marsh elevation building may be slow, even after the site is vegetated. PWA et al. (2001) developed a calibrated sedimentation model to predict likely sedimentation rates. Proposed post-project sedimentation monitoring will yield observations that can be used to refine future predictions of restored site evolution.

1.2.2 Project Type

The restoration of the Hill Slough West site is a demonstration project designed to assess the applicability of restoration methodology used in other projects in Bay Region for use in the Suisun Marsh. The approach for the Hill Slough West site has been used elsewhere in the Bay Region in projects such as Martinez Regional Shoreline Marsh Enhancement, Sonoma Baylands Marsh Restoration, Cooley Landing Salt Pond Restoration, and Crissy Field Marsh Restoration. However, this approach has yet to be used in the Suisun Marsh. The Hill Slough West Habitat Restoration Demonstration Project will help determine the feasibility of this approach for

restoration projects in the Suisun Marsh. The Hill Slough West Habitat Restoration Demonstration Project will also aid in assessing the accuracy of habitat development predictions.

1.3 Approach

1.3.1 Project Approach and Phasing

There are four phases for completion of the restoration project:

Phase I is complete. Phase I consisted of preparation of the preliminary Hill Slough West Restoration and Management Plan and the project monitoring plan. These documents were prepared by PWA with input from DFG and a Technical Advisory Committee. The design calls for restoration of tidal inundation to the diked part of the site. Restored tides, in combination with other design features, are expected to create tidal brackish marsh, tidal channel, and moist grasslands habitat.

Phase II will prepare the necessary environmental documentation and permits as required by CEQA; coordinate with USFWS on NEPA and ESA; obtain permits for construction of the project as required from San Francisco Bay Conservation and Development Commission; U.S. Army Corps of Engineers; and coordinate with Caltrans, State Water Resources Control Board, SRCD, PG&E, and Solano County Mosquito Abatement. Presence / absence surveys will be conducted for listed species that may impact this permitting process. All species surveys will be conducted according to USFWS protocols specific to the Suisun Marsh. Pre-project surveys on the restoration site for salt marsh harvest mouse will be conducted by DFG as required by the Suisun Marsh Plan of Protection. Phase II has been funded by CALFED and will begin once a contract is in place.

Phase III of the project, contained in this proposal, will consist of completion of construction level design, pre-project monitoring to gather baseline conditions, and project construction. Task 1. Pre-design: will resolve remaining design issues. Task 2. Pre-project monitoring: will further develop the monitoring plan for peer review and select appropriate reference sites according to the monitoring plan. Once approved, monitoring will begin for baseline conditions for physical processes, fisheries, benthic invertebrate, wildlife, and vegetative composition and cover. Task 3. Final Design: will include geotechnical, civil / structural engineering, planting plan, engineers estimates, and final design drawings. Task 4. Construction: will include bid solicitation and contractor selection, construction and construction support, and construction observation.

Phase IV of the project will be post project monitoring, maintenance, and adaptive management.

1.3.2 Project Team

The project applicants have extensive experience in the ecology of Suisun Marsh and the design of tidal wetland restorations in San Francisco Bay. DFG and PWA worked together in Phase I of the Hill Slough West Restoration project to develop the Restoration and Management Plan and the Monitoring Plan. PWA, consultants in hydrology, will provide design engineering services, including design resolution, final design, and construction support. The design will be a collaborative effort by an interdisciplinary project team led by PWA. The team will include Ted Winfield for biological services and planting design, Lisa Stallings of LifeScience! for seasonal wetland design, Hultgren-Tillis Engineers (HTE) for geotechnical engineering, Andrew Leahy for structure design of the pedestrian boardwalks, and John Northmore Roberts for public access consultation. Ted Winfield and John Northmore Roberts were also part of the Phase I team and their continued involvement along with PWA will ensure design continuity and efficient project progress. The construction contractor will be selected through a public bid process.

1.3.3 Study Design and Scope of Work

Phase III is composed of five main tasks: design resolution, final design, baseline monitoring, construction, and project management.

Task 1: Baseline Monitoring

Baseline monitoring will be conducted on three sites. These sites include the restoration site, a similarly degraded reference site that will not be restored, and a mature tidal marsh reference site. Using these two reference sites will allow the evolution of the restoration site to be placed on a "time scale" with the degraded reference site being the start point and the mature reference site being the endpoint. Baseline monitoring of all three of these sites will allow for the greatest understanding of change in the system allowing principal investigators to use comparisons to discern the effects of the restoration action as an experimental treatment. DFG has already identified candidate reference sites, several of which are on land owned and managed by DFG. DFG and PWA will gather information and conduct field reconnaissance for final selection of the two reference sites.

The restoration site and both reference sites will be monitored for physical processes, vegetative composition and cover, benthic invertebrates, fish diversity and abundance, avian diversity and abundance, and special status species surveys.

Physical Monitoring

The monitoring plan is designed to assess the rates and patterns of marshplain development and tidal channel formation, and to identify the presence of any physical conditions that may be impeding site evolution. Such conditions could include restricted tidal exchange (not considered likely), limited sedimentation, wind-wave induced marsh erosion, or erosion-resistant soils slowing channel formation. PWA will measure baseline hydrologic and geomorphic conditions at the site and two reference sites. This will include survey of initial site elevations, channel cross-sections (breach cross-sections will be added after restoration), tide monitoring, and installation of sediment monitoring stations. A benchmark network will be established for elevation control. PWA and DFG staff will survey vegetation-elevation transects, as well as elevation-only transects. Transect and cross section endpoints will be surveyed and staked for future use. Sediment monitoring stations will be installed for future use in assessing sediment thicknesses and changes in elevation. Levees and the site as a whole will be assessed for signs of erosion. PWA will subcontract for an aerial photography company to take aerial photographs and create orthophoto images of the three sites the summer before breaching.

Biological Monitoring

DFG will complete most of the biological monitoring. Principal investigators will write a final monitoring plan with input from Mr. Ted Winfield, for peer review.

Vegetation Monitoring

Establishment of vegetation in the tidal marsh will be measured at two scales: species-level and overall coverage. The first will involve measurement of vegetation cover at selected or random points at different elevation zones in the intertidal zone (local scale). Data obtained at each sample point will include cover by species, canopy height by species, elevation of each sample point, soil salinity and texture, and soil organic matter. The second scale will cover the entire Hill Slough marsh area as a sampling unit and vegetation cover of the intertidal zone. This scale will be measured using aerial photography. As vegetation associations become visible on the photographs, they will be mapped and documented along with overall percent cover.

Benthic Invertebrates

The benthic monitoring element is designed to document the distribution, diversity and abundance of benthic (bottom-dwelling) organisms in the developing restored tidal marsh habitat in Hill Slough West. Samples collected during this phase of the project will be used as a baseline reference to determine success of the newly constructed tidal wetland. Samples will be collected from a mature tidal marsh reference site, a degraded reference site, and from the interior of Hill Slough West. Samples shall be collected from various habitat types within the mature tidal marsh reference site, the degraded reference site, and from Hill Slough. Habitat types within the reference sites may include primary channel, secondary channel (or back slough areas), shallow open habitat and shallow vegetated habitat. Habitat types within Hill Slough after construction that will be sampled include tidal channel and adjacent mudflat areas. From each habitat type four grab samples will be taken using a small boat equipped with a Ponar dredge (area of 0.5 m^2) or similar sampling device. Each sample collected will be sieved through a 0.5 mm (U.S. Standard 30) screen and the materials collected will be immediately preserved in 10% buffered formalin. After 48 hours the samples will be transferred into 70% ethanol for storage until sample analysis can be completed. Samples will be sorted, enumerated and identified to the lowest possible taxon. Sampling for benthic invertebrates will be done quarterly.

Fisheries

The designed monitoring will investigate the following questions:

- What is the introduced vs. native fish species composition and abundance within various habitats near Hill Slough West?
- What are the relationships between key environmental factors and target fish species near Hill Slough West?

Limited fish studies in Suisun Marsh sloughs (1-4 m deep) have characterized changes in abundance and distribution of native and introduced fishes (Moyle et. al 1986; Meng and Moyle, 1994). In addition, some studies in other regions also indicate the significant value of shallow water environment for the abundance and distribution of some fish populations (Miranda and Hodges 2000; Mueter and Nocross 1999; Rozas and Zimmerman 2000; Johnson and Jennings 1998). However, there is no information regarding fisheries monitoring in the different types of shallow water habitats near Hill Slough West Restoration Site.

Sites selected will be near Hill Slough West project site and will include Hill Slough and Suisun Slough. Specific habitat types to be sampled will include open water, emergent vegetation, submerged vegetation, riprap, and sandy or mud beach. A stratified random sampling method in the above habitats will be used for fish data collection during at least two neap tides per month from February to November.

The following measures of species abundance and composition will be compared between sampling sites: The Catch-Per-Unit-Effort (CPUE) as indices of relative abundance for each species, total CPUE of all species combined at each site, species diversity (estimated by the complement of Simpson's index, according to Mueter and Norcross 1999), and relative density (CPUE, fish m^{-2}) of all introduced and native fishes at different sampling sites. Data will be collected using multiple gear types (including otter trawl, minnow seine, electrofishing, and blocknet) developed by other related studies and modified for specific habitats as this project needs. Sampling will be done monthly during February to November.

The relationship between fish communities and environmental factors has been evaluated in wetlands of the San Francisco Estuary in studies which indicate that physical attributes and submerged vegetation are strongly associated with the spatial distribution of fishes (Grimaldo et. al unpublished data). This monitoring effort will provide more detailed information on how some key environmental factors are related to target fish species (delta smelt, splittail and chinook salmon) abundance and distribution. Environmental factors, including temperature, dissolved oxygen, turbidity and specific conductance, will be measured at each type of habitat (open water, emergent vegetation, submerged vegetation, riprap, and sandy or mud beach) during each sampling period using Hydrolab DataSonde 4a Multiprobes. The density of vegetation will be measured on a visual scale using various point intercept methods (Higgins et. al1996).

Fish data (mean length and CPUE) will be collected using purse seine (delta smelt, salmon smolts and salmon fry), gill nets (splittail), push nets (delta smelt and splittail), beach seine (salmon smolts and salmon fry, delta smelt and splittail). In testing the effects of various types of vegetation, alternate gear types and sampling methods may need to be used due to the difficulties of sampling in vegetation. We also plan to use other techniques including fyke traps, lift nets, throw cage, mini-fyke and block traps, and cast nets (developed for fish sampling in tidal marshes by Kathy Hieb and Tom Greiner) in this proposed work. Samples will be collected weekly from February to June.

Avian

Several different types of survey approaches will be used to monitor bird use of the restored tidal marsh and upland habitats. These survey approaches include general field surveys designed to provide general information about the use of the restored site by most groups of birds; waterfowl surveys to document waterfowl use in the fall and winter with possible nesting surveys in the spring; and shorebird surveys to document shorebird use of in the fall, winter and spring.

Generalized bird surveys will be conducted in the tidal marsh, transition, and upland areas using protocols developed by Point Reyes Bird Observatory (PRBO). Survey areas, each 100-m by 300-m will be established in each habitat type (tidal mudflats, lower intertidal marsh [low and middle marsh], higher intertidal marsh [high marsh], transition and upland [moist grasslands]). At least two such survey areas will be randomly located in each habitat type. All birds observed in the survey area will be recorded and enumerated and its activity noted. General bird surveys will be conducted over a three-day period during the fall migration (September-October), winter (December-January), and spring migration (March-April) periods.

Specific waterfowl surveys will be conducted during the fall migration (September-October), winter (December-January), and spring migration (March-April) during periods of high tide to provide counts of waterfowl using the restored tidal marsh system. Surveys will be conducted over a three-day period at high tide at least once during each period. Counts will be made from the surrounding levees and species identified and enumerated.

Specific shorebird surveys will be conducted during the fall migration (September-October), winter (December-January), and spring migration (March-April) during periods of low tide to provide counts of shorebirds using the restored tidal marsh. One-day surveys for shorebirds will be conducted at least once during each period.

Special Status Species Surveys

Rails

Surveys for California clapper rails (*Rallus longirostris obsoletus*) and California black rail (*Laterallus jamaicensis coturniculus*) will be conducted using acceptable U.S. Fish and Wildlife

Service protocols. These surveys must be supervised by individual(s) authorized to conduct such surveys for the California clapper rail. Surveys will be used to detect presence of rail breeding activity and activity centers. Methodology will be consistent with the proposal developed by the California Department of Fish and Game to monitor rails in the Suisun Marsh.

Salt Marsh Harvest Mouse

The project site is known to support the endangered salt marsh harvest mouse (*Reithrodontomys raviventris*). Introduction of tidal flooding to the site will flood a portion of existing salt marsh harvest mouse habitat, but the remaining habitat for the salt marsh harvest mouse is expected to expand and new habitat to develop on the tidal marsh plain. The monitoring program will utilizing Sherman live traps to locate salt marsh harvest mice in all habitat types, including upland refuge areas.

Stratified random samples will be established in all wetland and upland refuge areas (Zetterquist 1977, Shellhammer et. al. 1982, 1985) for the salt marsh harvest mouse. The traps will be operated for four consecutive nights and all captured animals identified to species following Shellhammer's (1984) identification methodology. Two hundred Sherman traps will be established in several randomly selected trap lines that will be sampled for two weeks between mid-June to September.

A radio telemetry study will be used to determine home range and habitat use (Fahrig 1985) in order to provide the best information to protect the species during levee breaching.

Task 2: Design Resolution

The purpose of this task is to resolve the outstanding design items identified during preliminary design, such as feasibility assessment for the seasonally-ponded depressions, slope protection criteria for the levees, levee design criteria, and refinement of the planting plan. We will confirm design criteria for new levees (crest height and width), and establish performance criteria for the levee slope protection. DFG will continue coordination with PG&E regarding proposed infrastructure protection and access improvements.

LifeScience! (LS!) will conduct a feasibility assessment for creation of seasonally ponded wetland habitat. LS! will evaluate soils in the area under consideration for seasonal wetland creation using both backhoe and hand dug pits. The Solano County Soil Survey shows Sycamore silty clay loam, saline mapped on the project site area. This soil series has a buried saline soil at a depth ranging from 20 to 36 inches. The presence and depth of this buried soil will be noted. Soil samples will be collected at the surface and 12 inches depth from 5 locations. The samples will be sent to a laboratory for salinity analysis. LS! will assess the soils at the project site, availability of inoculum (propagule source) for the created wetlands, and the requirements of Mosquito Abatement for the feasibility of constructing seasonally ponded depressions at the project site. If it is determined that it is feasible to create seasonally ponded depressions on the site, a reference site will be identified and a reconnaissance level survey of seasonal wetlands will be performed by LS!. Ted Winfield will describe plant communities at the reference site. LS! will quantify natural pool depths, side slopes, and dimensions at several sites in the area. These data will be used to prepare a preliminary design construction report for seasonal wetlands at the project site.

Task 3: Final Design

In the final design phase, design elements will be detailed for construction-ready documents. The major design elements are two breaches in the outboard levee, starter channels, levee lowering in some areas, levee improvements and slope protection in other areas, planting of the

alluvial areas, public access trails, observation platforms, and parking. Additional site investigations, testing and analyses will be performed as needed to design project elements. The final design will be shown on construction documents consisting of drawings, specifications and an engineer's estimate. Construction documents will be suitable for pubic bidding of the construction contract. The PWA team will prepare technical specifications and DFG will provide other standard documents for public bid construction contracts.

As part of final design process, a geotechnical investigation will be performed to assess soil conditions for the new levee. Soil borings will be installed along the new levee alignment, and surface samples will be from the existing levee. Soil samples will be laboratory tested for typical geotechnical parameters. Testing results will be used to make design recommendations for the new levee. Soils analysis will address slope stability, expected settlement and suitability of onsite soils as engineered fill. In addition, we will investigate potential borrow sources for imported fill material.

Following the geotechnical analysis, we will detail grading design elements including levee construction, breaching, starter channel excavation and creation of seasonally-ponded depressions. As part of the design process, limited ground surveying will be performed as needed to supplement the aerial survey. For the design of levee slope protection, we will perform analysis to evaluate wave erosion and the energy dissipation capacity of vegetation.

The structural engineer will design the pedestrian boardwalk and observation platforms, using input from the geotechnical investigation. The project team will also detail other public access features including the trail, unpaved parking lot and interpretive signage.

The planting plans will specify the planting species, locations and installation requirements. We will evaluate the suitability of onsite soils for planting, and specify soil amendments, if needed. Surface soil samples will be collected and analyzed to evaluate suitability for planting.

If it is determined that it is feasible to create seasonally ponded depressions on the site, LS! will prepare a detailed construction plan for the depressions. This plan will include a construction schedule, equipment to be used, construction techniques, haul routes and location of stockpiles, and estimate of construction costs.

Task 4: Construction.

The construction process will include contractor selection through the public bid process, implementation by the contractor, and observation and construction support by the project team.

The bidding process will include public advertisement, a pre-bid conference, response to bidder's questions through bid addenda, bid opening and contractor selection. DFG will be the lead on the public bid process. PWA will attend the pre-bid conference and assist DFG with bid addenda preparation.

The selected contractor will implement the final design. We anticipate that construction will be phased so that interior site grading and construction is performed prior to levee lowering and breaching. As an exception, a portion of levee may be lowered early in construction to generate onsite fill material.

DFG will be the lead on construction oversight and provide daily observation and recording. PWA will make periodic site visits at key milestones during construction, and provide construction support services, such as review of submittals, response to questions, and design clarifications. HTE will also be onsite part-time during levee construction for testing and

observation. The selected contractor will be responsible for surveying before and after the project to verify compliance with the design and to estimate construction quantities for payment.

Task 5: Project Management

The project management task will help to insure that the work outlined in this proposal is completed successfully and on schedule. DFG will assign one Associate Wildlife Biologist, at 50% time, to manage this project. The position will handle administrative portions of the project such as: budget tracking, contract oversight, report preparation, presentations, and personnel issues. The position will also coordinate and integrate the various components of the proposed work by working with the principal investigators on the project. Project management will also include the project manager attending interagency meetings dealing with Suisun Marsh issues.

1.4 Feasibility

1.4.1 Approach

In Phase III, we have created a realistic schedule based on PWA's prior experience with similar projects. We also have taken care to assemble a team qualified to complete the project in the allotted time.

1.4.2 Environmental Compliance

The primary objective of Phase II is to complete environmental compliance and permitting of the project. Tasks to be completed during Phase II will be to: meet the requirements of CEQA; coordinate with USFWS on NEPA and ESA; obtain permits for construction of the project as required from the San Francisco Bay Conservation and Development Commission; U.S. Army Corps of Engineers; and coordinate with CalTrans, State Water Resources Control Board, SRCD, PG&E, Solano County Mosquito Abatement, and Solano County. An EA/IS will be prepared and a Negative Declaration and FONSI are expected. Phase II was funded by CALFED through the 2001 PSP. As the project has wide support from DFG, USFWS, and local groups, no delays are expected in the environmental compliance process. Work on environmental compliance and permitting will begin after contracting is complete.

1.4.3 Landowner Support

The California Department of Fish and Game, one of the project proponents, owns the proposed project site. Any reference site used in monitoring is expected to also be on DFG lands in the Suisun Marsh. Therefore, permission for access will not be necessary.

1.5 Performance Measures

Project performance measures will include: rate of marshplain evolution, tidal channel density, species composition and overall coverage of vegetation, fish species composition and abundance, species composition of birds, population of seasonal bird use, and presence of special status species. Project performance will be measured and evaluated during post-project monitoring (Phase IV). Details of the performance measure and project expectations by year will be provided in the Hill Slough West Monitoring Plan, expected in early Fall 2001. It is important to measure performance of the restoration to increase the likelihood that long-term habitat goals will be met through adaptive management. Since the site is not a mitigation site, however, it need not strictly conform to a particular set of standards.

1.6 Data Handling and Storage

Physical monitoring data will be stored in Excel workbooks on CD and presented in tabular and graphical form in project reports. Results of the geotechnical investigation and

recommendations will be presented in a project report. An electronic copy (in Microsoft Word) will also be stored on CD. *Biological monitoring data* will be compiled and stored by Ms. Laurie Briden, Senior Biologist -Supervisor with the California Department of Fish and Game. Progress and data will be made accessible through the IEP webpage. For the *final design*, a hard copy of final construction drawings (24" x 36" mylars) will be kept on file. In addition, an electronic copy of construction drawings (in AutoCAD release 2000) and technical specifications (in Microsoft Word) will be stored on CD.

1.7 Expected Products / Outcomes

The expected outcome is a successfully restored tidal wetland site with established baseline conditions for use in monitoring future project performance. Specific deliverables include:

Task 1: Baseline Monitoring Report
Task 2: Seasonally Ponded Depressions Feasibility Assessment Report
Design Resolution Memorandum(s)
Task 3: Geotechnical Report
Design drawings
Specifications
Task 4: Construction Bid
Pre- and post-construction survey
Interpretive program
Task 5: Quarterly contracting reports

1.8 Work Schedule

Year 1: Baseline monitoring begins and continues throughout the year. Design resolution completed within the first six months followed by Final Design for the next six months.

Year 2: Baseline monitoring continues. Construction company contracted. The first phase of construction begins after California clapper rail breeding season, approximately August 31st, through the beginning of the rainy season. Selected construction activities may begin sooner if they can occur without disturbing any clapper rail breeding activities. If construction is able to begin sooner, public bid and contractor selection will be moved forward.

Year 3: Baseline monitoring continues. The second phase of construction begins after California clapper rail breeding season, approximately August 31st, through the beginning of the rainy season. As in the first phase, selected construction activities may begin sooner if they can occur without disturbing any clapper rail breeding activities. Construction completed.

Assuming contracting is complete by October 2002, the following schedule would apply:

Year 1

Task	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	Baseline Monitoring											
2	Design Resolution											
3							Final Design					
4												
5	Project Management*					*			*			**

Year 2

Task	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	Baseline Monitoring											
2												
3												
4									Bid and contractor selection		Construction	
5	Project Management*					*			*			**

Year 3

Task	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	Baseline Monitoring											
2												
3												
4											Construction	
5	Project Management*					*			*			**

*Quarterly Reports; **Annual Reports

2.0 Applicability to CALFED ERP and Science Program Goals and Implementation Plan and CVPIA Priorities

2.1 ERP, Science Program and CVPIA Priorities

This proposal aids in fulfilling two of the Draft Stage 1 PSP priorities outlined in Section 3 of the PSP:

BR-1 Restore wetlands in critical areas throughout the bay, either via new projects or improvements that add to or help sustain existing projects.

BR-2 Restore Uplands in key areas of Suisun Marsh and San Pablo Bay.

The proposed project provides an excellent opportunity for restoration of tidal wetland, upland and transition areas in the Suisun Marsh. The 200 acre project site consists of elevations suitable for tidal marsh transitioning into an upland area. Both wetland and upland restoration components are included in the restoration plan for the Hill Slough West Habitat Restoration Demonstration Project.

2.2 Relationship to Other Ecosystem Restoration Projects

The proposal dovetails with long-term wetland goals set for the Central Valley and Delta by the North American Central Valley Habitat Joint Venture program. The project is also consistent with long-term wetland goals developed by the San Francisco Bay Wetlands Ecosystem Goals Project, which recommends restoration of tidal marsh in the Hill Slough area. The project also dovetails with tidal wetlands recovery efforts of the USFWS and is consistent with the visions, implementation objectives, and targets for CALFED's ERP.

This restoration plan is also the first step in developing a larger scale, more contiguous restoration effort that could eventually join Hill Slough, Peytonia Slough, Joice Island, and Rush Ranch. Completion of this project will provide a base line for habitat restoration costs for

restoring tidal wetlands in the Suisun Marsh. Aiding projects such as the Suisun Marsh Land Acquisition and Habitat Restoration Project.

2.3 Requests for Next-Phase Funding

Two previous phases of the Hill Slough West Habitat Restoration Demonstration Project have been funded by CALFED. Projects 98-F07 Hill Slough West Habitat Restoration Demonstration Project, Phase I and 2001-E201 Hill Slough West Habitat Restoration Demonstration Project, Phase II were both funded through the CALFED PSP process. Please see Attachment A for a summary of project status of these phases.

Phases I and II have provided restoration planning and environmental compliance facilitating project implementation in Phase III.

2.4 Previous Recipients of CALFED Program or CVPIA funding

The CALFED Program has provided funding for the following projects from Ms. Laurie Briden of DFG:

98-F07 Hill Slough West Habitat Restoration Demonstration Project, Phase I
2001-E201 Hill Slough West Habitat Restoration Demonstration Project, Phase II

A summary of project status for these phases can be found in Attachment A.

PWA is a co-applicant for the following CALFED or CVPIA projects:

CALFED Project Number	**CALFED Project Name**	**Project Status**
ERP-96-M10	Research to Predict Evolution of Restored Diked Wetlands (BREACH 1)	Project preliminary report complete. Project is 93% complete. PWA progress: 95% complete.
ERP-98-C01	Twitchell Island Subsidence Study	Project in progress. PWA deliverables 95% complete.
ERP-99-B13	Understanding Tidal Marsh Restoration Processes and Patterns (BREACH 2)	Biological and sediment monitoring has begun. PWA progress: Site inventory and site selection complete.

In addition, PWA has received funding for the following projects for which we were not a co-applicant: Tidal Wetlands White Paper -- Hydrology Sections; Hamilton Wetlands Restoration Planning (ERP-98-C03); Hill Slough West Habitat Restoration Demonstration Project – PHASE 1 (ERP-98-F08 C1004); Petaluma Marsh Expansion Project - Marin County (ERP-98-F13 C1016); Yuba Tools -- Collaborative Watershed Management for Flood Control (ERP- 99-B131); Non-Structural Alternative at the San Joaquin River National Wildlife Refuge -- Refinement for Habitat Enhancement (Proposal 2001-D202).

2.5 System-Wide Ecosystem Benefits

This project will benefit the system by aiding in connecting tidal wetland habitats in the north central Suisun Marsh to Hill Slough. Additionally, this project will aid in reversing the stressor of water management activity. Past water management activities, specifically diking, has resulted in increased depth and duration of flooding in high marsh zone beyond the range of natural variability and seasonality.

3.0 Qualifications

The DFG has extensive experience in developing and managing fish and wildlife habitat on numerous wildlife areas throughout the State, managing approximately 15,000 acres in the Suisun Marsh.

A Technical Advisory Team (TAC) has been used in formulating the restoration plan and will continue to be called upon for project input. The TAC is composed of experienced botanists and wildlife interpreters, specialists in the science of restoration, a local environmental group, and agency scientists involved in Suisun Marsh research. Mr. Bob Garrison is the DFG's statewide coordinator of interpretive services. Ms. Sandy Morey is the DFG's endangered plant program coordinator. Mr. Carl Wilcox is a DFG expert in environmental review and regional fish, wildlife, and wetlands planning. Ms. Brenda Grewell is a plant/wetland ecologist with 14 years professional experience in California wetlands, including 10 years working with endangered plant and avian species and tidal wetland communities in Suisun Marsh, and is a doctoral student in Ecology with the UC Davis Department of Wildlife, Fish, and Conservation Biology. Mr. Peter Baye of the U.S. Fish and Wildlife Service, Mr. Steve Chappell of the Suisun Resource Conservation District, and Ms. Terri Gaines of the Department of Water Resources also serve on the Advisory Committee.

3.1 Summary of Qualifications of Principal Participants

Laurie Briden (B.A., Environmental Biology, Calif. State Univ. Fresno) is a Senior Biologist Supervisor for Central Valley Bay-Delta Branch of DFG. As part of the Water Project Planning and Ecosystem Restoration Program, she is the lead for studies on impacts to wildlife of actions proposed for the State Water Project; the lead for planning the wildlife monitoring program at the Prospect Island Restoration Project; and is in charge of monitoring the Grizzly Slough mitigation and restoration project for DWR. She is the DFG representative on the Suisun Marsh Technical Committee and the Ecological Coordination Advisory Team, and is a member of the CALFED Integrated Storage Investigation examining surface water storage and conveyance components. She is responsible for conducting impact analyses for existing and proposed water development plans by DWR in the Sacramento-San Joaquin Delta.

Frank G. Wernette (B.S., Wildlife Management, Calif. State Univ. Humboldt) is an Environmental Program Manager at the Central Valley Bay-Delta Branch of DFG. As the supervisor of the Water Project Planning and Ecosystem Restoration Program, he is currently responsible for the evaluation of proposed State Water Project water storage and conveyance projects throughout the State with an emphasis on the Sacramento-San Joaquin Delta. Oversees analysis of fish and wildlife impacts associated with water project development. Currently is assisting the CALFED Bay-Delta Program in developing the comprehensive Ecosystem Restoration Program Plan for CALFED. Acts as DFG's technical lead in assessing fish and wildlife impacts of the Delta Wetlands Project and developing appropriate mitigation measures. Previously (1980-1990), he was the DFG representative on the Suisun Marsh Technical Committee. He performed wildlife habitat monitoring studies in the Suisun Marsh and provided wildlife input to the committee for planning and implementing the Suisun Marsh Plan of Protection. He provided technical wildlife input to the principal DFG negotiators working on the Suisun Marsh Preservation Agreement. From 1975–1980, he was the Region 2 Wildlife Biologist, with a primary focus on wildlife and habitat issues in the Sacramento-San Joaquin Delta.

Dr. Philip Williams, P.E. and President of Philip Williams & Associates, Ltd. (PWA), has nearly 30 years of experience in a wide range of national and international hydrologic and

engineering hydraulics topics. Dr. Williams has completed hundreds of tidal, seasonal, and riparian wetland restorations plans and analyses, primarily in the San Francisco Bay-Estuary. Dr. Williams designed several of the first tidal wetland restorations in San Francisco Bay and has conducted long-term monitoring of many San Francisco Bay tidal wetlands over the past 20 years. His design credits include the Sonoma Baylands tidal wetland restoration project in San Pablo Bay, which received the U.S. Army Corps of Engineers 1998 Civil Works Honor Award. Dr. Williams was Project Director for the Hill Slough West Restoration Projects Phase I and the CALFED-funded BREACH project with University of Washington.

Mr. Robert Battalio, P.E., Principal in charge of design engineering at PWA, has over 16 years experience with coastal engineering, preparation of construction documents, and project management. His training and work experience is focused in the coastal and estuarine areas, wetland and creek restoration design, and waterfront civil engineering projects. He recently supervised final design of the Martinez Regional Shoreline Enhancement Project (tidal wetland restoration) and is currently supervising final design of the CALFED-funded Redwood Landfill tidal wetland restoration on the Petaluma River.

Michelle Orr, P.E. and Senior Associate with PWA, is a civil engineer specializing in tidal wetland restoration, estuarine hydrodynamics and sediment transport, wetland geomorphology, and coastal and riverine flood management planning. Ms. Orr was PWA Project Manager for the Hill Slough West Restoration Project Phase I and for the CALFED-funded BREACH project with University of Washington. She prepared the hydrology and restoration history sections of the CALFED Tidal Wetland White Paper. Ms. Orr has managed PWA's contributions to several large tidal wetland restoration planning and implementation projects, primarily in the San Francisco Estuary, including the Hamilton Airfield Wetland Restoration and Bair Island Tidal Wetland Restoration.

Dr. Ted Winfield, of Ted Winfield & Associates, has been an ecological services consultant since 1972. He specializes in wetland ecology and has completed numerous wetland restoration and enhancement projects. He worked with PWA on Phase I of the Hill Slough West Restoration Project. **Dr. Lisa Stallings,** President of Life Science!, has a Ph.D. in Soil Science and over ten years of field experience working on a wide range of wetland projects. Dr. Stallings specializes in the characterization and creation vernal pools and seasonal wetlands. She has been the project manager on large vernal pool creation projects in Butte County and recently assisted with seasonal wetland design and creation at Outer Bair Island. She is presently working on the seasonal wetland design with PWA for the Hamilton Air Force Base and on the design and construction of vernal pools for the Montezuma Wetlands project in Collinsville. **Mr. Edwin Hultgren** has 30 years of experience as a consulting geotechnical engineer. He has performed and directed investigations for a variety of civil works projects, including dikes, levees, roads, docks, harbors, and bridges. Over the past twelve years, Mr. Hultgren has undertaken numerous investigations of levee stability and settlement and load-deformation performance of levees in the Sacramento – San Joaquin River Delta and Suisun Marsh. He has worked with PWA on the levee design for marsh restoration at the Redwood Landfill in Petaluma Marsh. **Mr. Andrew Leahy**, consulting civil engineer, will perform the structural design analysis. Mr. Leahy has over twenty years of experience in engineering designs and environmental analyses with a focus on stream restoration, wetlands enhancement, and environmental mitigation. **John Northmore Roberts** is the founder and principal of John Northmore Roberts & Associates, a landscape architecture and environmental planning firm established in 1984. One of his specialties is the design of public access and interpretive facilities in concert with restored marshes and other

natural systems. He teaches at U.C. Berkeley and has lectured widely. He designed the public access features in Phase I of the Hill Slough West Restoration Project.

3.2 Scientific Portions of the Project

3.2.1 Physical Monitoring

Mr. James Kulpa, Director of Field Services at PWA, will coordinate physical monitoring and surveying. Mr. Kulpa will mobilize PWA field staff and equipment, oversee the collection of physical field data, and perform quality control procedures during the reduction of field data. Mr. Kulpa will act under the supervision of the PWA Project Directors and Project Manager and with primary assistance from Mr. Nicholas Garrity, PWA Staff Hydrologist.

3.2.2 Biological Monitoring

3.2.2.1 Consulting and Design Resolution

Dr. Ted P. Winfield, Ph.D. and President of Ted Winfield & Associates, will serve as a technical advisor for the overall biological monitoring. Dr. Winfield is a wetland ecology expert and provided the biology components for Phase I of the Hill Slough West wetland restoration project as a subconsultant to PWA. Dr. Winfield will assist in implementing the monitoring plan, evaluating the feasibility of creating seasonally-ponded depressions, and designing the planting plan during final design.

3.2.2.2 Fisheries Monitoring

Mr. Kevin Fleming, Senior Fisheries Biologist – Supervisor with DFG, will coordinate fisheries monitoring and evaluation. Mr. Fleming will supervise project staff, review technical reports, and evaluate and implement adaptive management actions. Mr. Fleming will report to the Project Manager Ms. Laurie Briden quarterly regarding any management actions taken.

Dr. Qin qin Liu, Associate Fisheries Biologist, will act as the lead biologist for the fisheries monitoring. As the lead biologist, Dr. Liu will coordinate DFG resources and personnel in the field, implement quality control measures, and prepare reports.

3.2.2.3 Vegetation Monitoring

Ms. Laurie Briden, Senior Wildlife Biologist – Supervisor of the DFG, will head the vegetation monitoring effort. A lead botanist will be hired to oversee field surveys, GIS work, and quality control measures.

3.2.2.4 Benthic Invertebrates Monitoring

Mr. Curtis Hagen, Wildlife Habitat Assistant will act as lead for all field sampling of benthic invertebrates. Samples will be sent to the DFG Water Pollution Control Laboratory, Aquatic Bioassessment Unit. Sample identification will be supervised by Mr. James Harrington.

3.2.2.5 Avian and Rail Monitoring

Ms. Laurie Briden will supervise the avian monitoring program. Wildlife Biologist, Gina Van Klompenburg, will act as the lead biologist will coordinating DFG resources and personnel in the field, implementing quality control measures, and preparing reports.

3.2.2.6 Salt Marsh Harvest Mouse Monitoring

Ms. Laureen Barthman-Thompson, Associate Wildlife Biologist with DFG, will lead salt marsh harvest mouse monitoring. Ms. Barthman-Thompson will supervise field studies, implementation of quality control measures, and prepare reports.

4.0 Cost

We are requesting a total of $4,790,219 for Phase III of the project. The cost by task is as follows:

Task	Cost Estimate
1. Baseline Monitoring	$1,011,421
2. Design Resolution	$105,930
3. Final Design	$290,414
4. Construction	$4,008,933
Construction Oversight = $108,248	
Construction (contractor) = $3,900,685	
5. Project Management	$201,637
Total	**$5,618,335**

If creation of the seasonally ponded depressions is not feasible and not included, the total cost estimate reduces to $5,564,593.

4.1 Cost Sharing

Cost sharing in the amount of $282,315 will be provided in personnel time by DFG. DFG will provide a Senior Wildlife Biologist Supervisor at 10% time, an Associate Fisheries Biologist at 50% time, a Wildlife Biologist at 65% time, and a Fish Habitat Assistant at 15% time for the proposed three-year contract.

5.0 Local Involvement

Public involvement will be addressed as part of Phase II of the project. During the environmental documentation and permitting phase of the project, public scoping meetings and workshops will be held. Phase II has been funded by CALFED and is awaiting contract.

Several groups have already been contacted during Phase I of the project. The Suisun Resource Conservation District Executive Director, Mr. Steve Chappell, is a member of the TAC and has expressed his support for the project. A presentation was also made to the SRCD Board. The Solano County Divisions of Mosquito Abatement, Roads, and Flood Control were contacted and expressed no opposition to the project. The Suisun City Flood Control Division was contacted and also expressed no opposition to the project.

6.0 Compliance with Standard Terms and Conditions

DFG will sign the contract with CALFED with PWA acting as a subcontractor to DFG. DFG will require no specific deviations from contractual terms and conditions are required for implementation of Phase III of the plan at this time. Should this project move forward, all terms and contracts will be written and submitted to CALFED for approval.

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ATTACHMENT A

Summary of Hill Slough West Habitat Restoration Demonstration Project, Phases I and II

Project Description: The Hill Slough West Habitat Restoration Demonstration Project is a proposal to restore tidal action to approximately 200 acres of seasonal and permanent wetlands in the northeastern Suisun Marsh (Figures 1, 2, 3, and 4). The property is located at the Hill Slough Wildlife Area which is owned and managed by the California Department of Fish and Game (DFG). Implementation of the plan will be carried out in four phases.

Hypothesis: Project actions will create a hydrologic and topographic foundation for the development of suitable habitat tidal marsh and lowland alluvial habitat.

Conceptual Model: The restoration design is based on a conceptual model of tidal wetland evolution in diked, subsided sites, as presented in the CALFED Tidal Wetland White Paper. The approach is to grade a restoration template upon which natural physical, vegetative, and biological succession processes can act to gradually regenerate a self-sustaining marsh ecosystem. Limited plantings are planned in non-tidal areas to assist the establishment of native vegetation species.

The site is currently diked, drained, and much of the site has subsided up to approximately 1 m below natural tidal marsh elevations. The site slopes gently from the deepest areas in the south of the site, up to supratidal elevations in the north. The restoration design for Hill Slough includes breaching the outboard levee in two locations, grading "starter" channels inside the site to remove non-erosive soils in channel locations, and improving flood protection levees, and possibly grading shallow seasonally ponded depressions in the supra-tidal areas.

Once tides are restored to the site, we expect rapid vegetative colonization within the high intertidal areas. Since Hill Slough West is gently sloped and only shallowly subsided, large areas are at suitable elevations for rapid initial colonization -- a broad band across the site and narrow bands along the site perimeter. After the initial period of colonization, vegetation is expected to expand more slowly through extension of rhizomes, lower into the tidal zone. Colonization is expected to occur to depths as low as mean tide level and below (Josselyn, 1983; Simenstad et al, 2000; PWA et al. 2001). The majority of the site is at or above these minimum vegetation colonization elevations and is expected to vegetate over a period of decades. Estuarine deposition will raise ground elevations throughout the tidally-inundated part of the site, helping vegetation establish in low areas. Once vegetation is established, ongoing deposition and in situ biomass production are expected to raise the marshplain toward natural marsh elevations, typically at approximately mean higher high water (Atwater et al. 1979). For a sustainable, vegetated marsh to maintain itself over a long timeframe (centuries), vertical growth of the marsh must be greater than sea-level rise. Concurrent with formation of the marshplain, the starter channels will become more defined and relatively fixed in location as vegetation colonizes their edges. The tidal drainage network is expected to evolve over time towards a mature, well-defined system. Natural wetland habitat values are expected to improve as the site evolves.

As habitat values improve, fish and wildlife species are expected to colonize the site. Once the site is tidally inundated, colonization of benthic invertebrates is expected, providing a food base for other marsh species. With this food base, and developing habitats, fish and wildlife species are then expected to colonize the site from surrounding managed and tidal marshes, creating an area much like the site prior to being leveed.

Adaptive Management: The Hill Slough West Habitat Restoration Demonstration Project is a Pilot / Demonstration Project in the adaptive management framework. One of the three main objectives of the monitoring plan is to identify any adaptive management actions that may be

warranted to support the development of marsh habitat on the site. The monitoring program articulates a set of project performance expectations by year. Adaptive management measures will be considered if these performance measures are not met. The monitoring plan addresses adaptive management actions related to extent of tidal drainage, planting success, and mosquito production. On a related topic, the plan also addresses maintenance actions for levee repair, maintenance of public and private access structures, removal of trash, and control of undesirable non-native species. The plan specifically includes the monitoring elements required to make key adaptive management and maintenance decisions, and to gauge their success.

Current Status: Phase I is complete. Phase I consisted of preparation of the Hill Slough West Preliminary Restoration and Management Plan and the Monitoring Plan. These documents have been prepared by PWA with input from DFG and a Technical Advisory Committee. The design calls for restoration of tidal inundation to the diked part of the site. Restored tides, in combination with other design features, are expected to create tidal brackish marsh, tidal channel, and moist grasslands habitat.

Phase II will prepare the necessary environmental documentation and permits as required by CEQA; coordinate with USFWS on NEPA and ESA; obtain permits for construction of the project as required from San Francisco Bay Conservation and Development Commission; U.S. Army Corps of Engineers; and coordinate with Caltrans, State Water Resources Control Board, SRCD, PG&E, and Solano County Mosquito Abatement. Presence / absence surveys will be conducted for listed species that may impact this permitting process. All species surveys will be conducted according to USFWS protocols specific to the Suisun Marsh. Pre-project surveys on the restoration site for salt marsh harvest mouse will be conducted by DFG as required by the Suisun Marsh Plan of Protection. Phase II has been funded by CALFED and will begin once a contract is in place.

Fiscal Status: The Phase I contract ended on October 1, 2001. Work for Phase I has been completed but not all invoices have been received. To date, approximately $160,000 has been charged on the $200,000 contract.

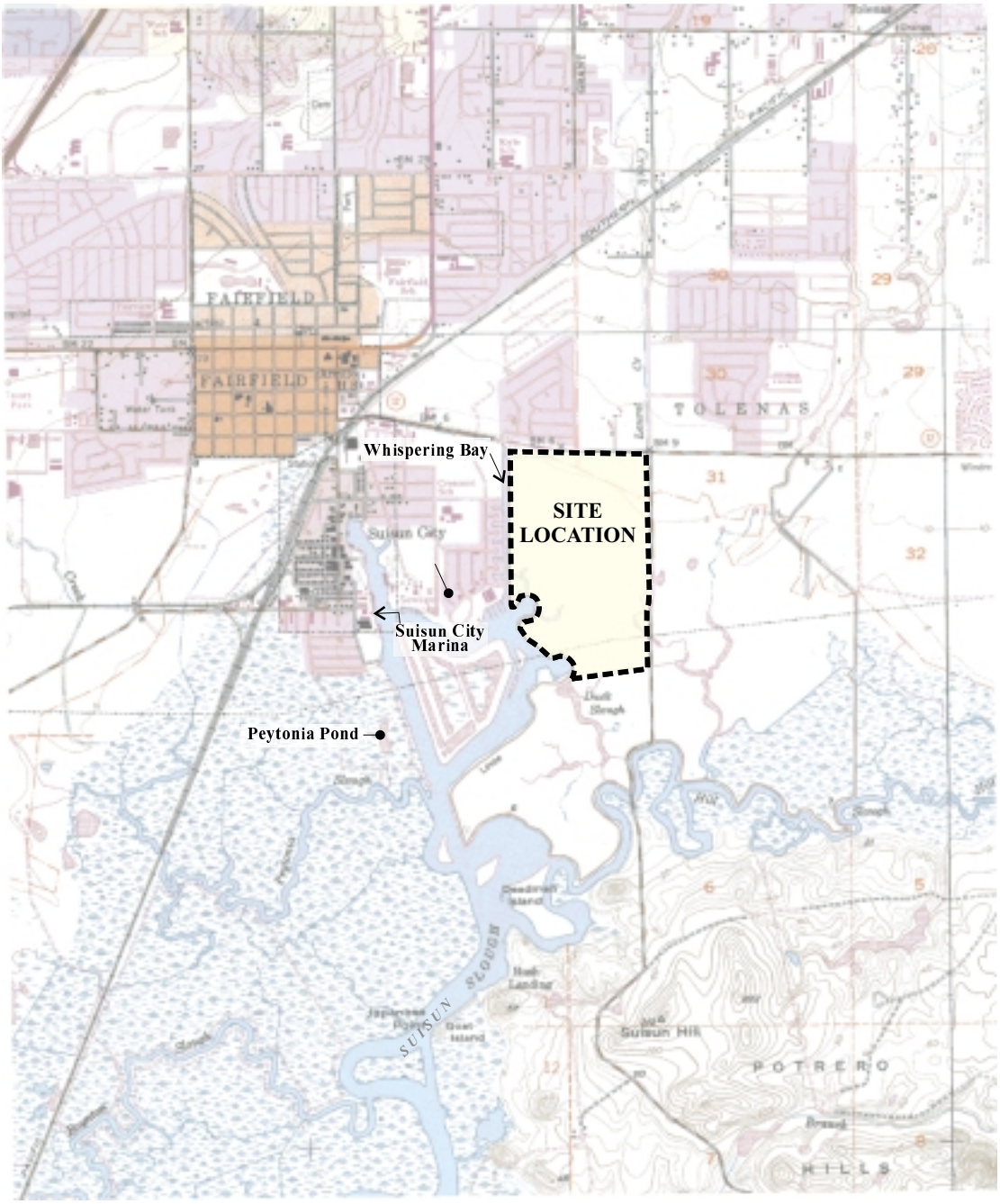
Monitoring Program: The 10-year monitoring program has three main objectives: (1) to measure the evolution of key biological and physical characteristics as the site evolves; (2) to identify any adaptive management actions that may be warranted; and (3) to identify the need for any maintenance actions. The Hill Slough Monitoring Plan is currently in progress, expected to be complete in early Fall 2001. For Phase III (this proposal), baseline monitoring will be conducted. Baseline monitoring will be conducted on three sites. These sites include the restoration site, a similarly degraded reference site that will not be restored, and a mature tidal marsh reference site. Using these two reference sites will allow the evolution of the restoration site to be placed on a “time scale” with the degraded reference site being the start point and the mature reference site being the endpoint. Baseline monitoring of all three of these sites will allow for the greatest understanding of change in the system allowing principal investigators to use comparisons to discern the effects of the restoration action as an experimental treatment. DFG has already identified candidate reference sites, several of which are on land owned and managed by DFG. DFG and PWA will gather information and conduct field reconnaissance for final selection of the two reference sites.

Phase III, baseline monitoring will allow for refinement of the monitoring plan for Phase IV, post-project monitoring.

figure 1

Hill Slough West

Regional Location Map



1422-4 loc map

PWA

figure 2

Hill Slough West

Existing Conditions

culvert

PG&E transmission tower

levees

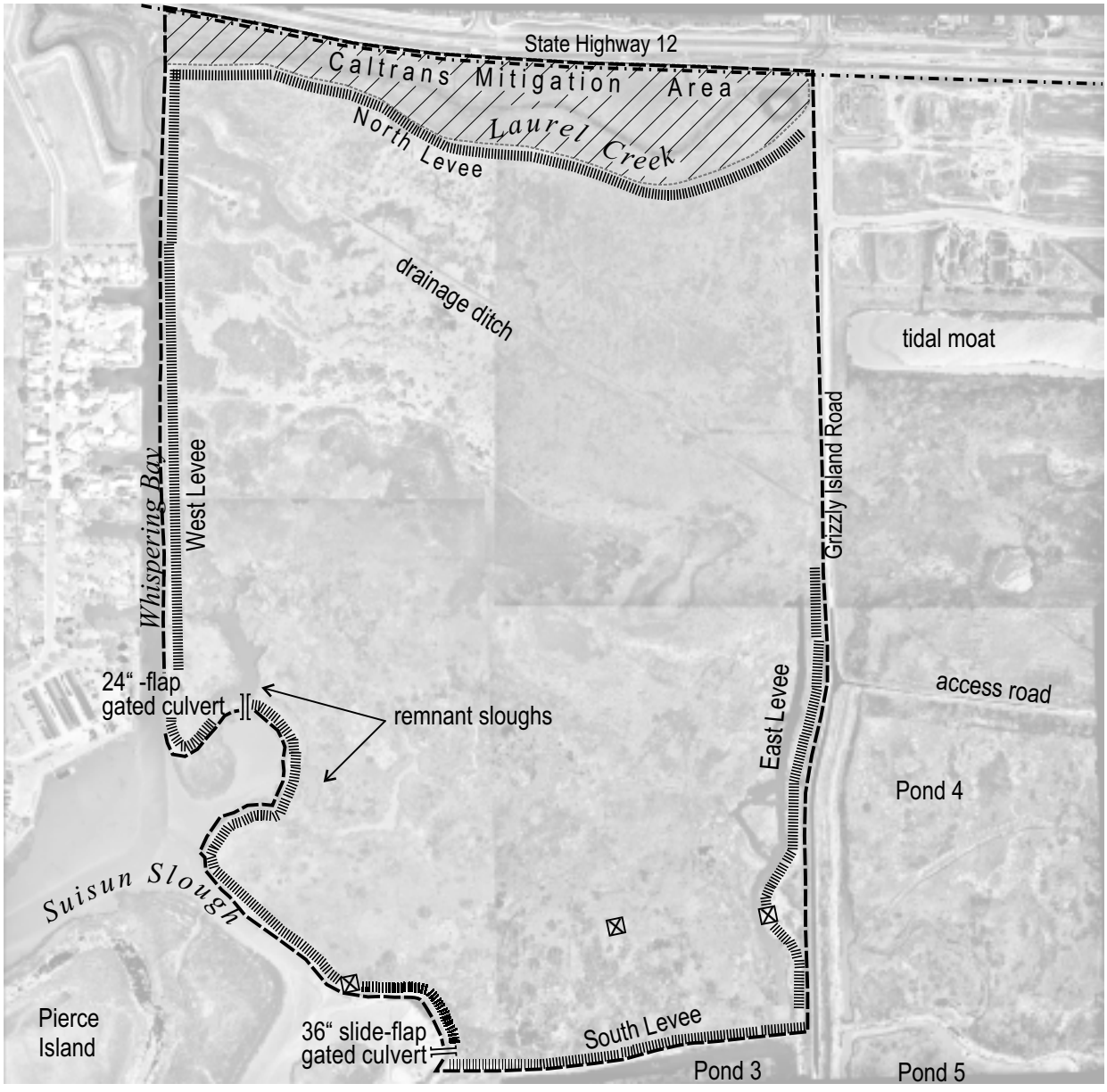
underground jet fuel line (approximate location)

site boundary

N

0 500 1,000

feet (approximate)



PWA

1422 Ex cond.cdr

figure 3

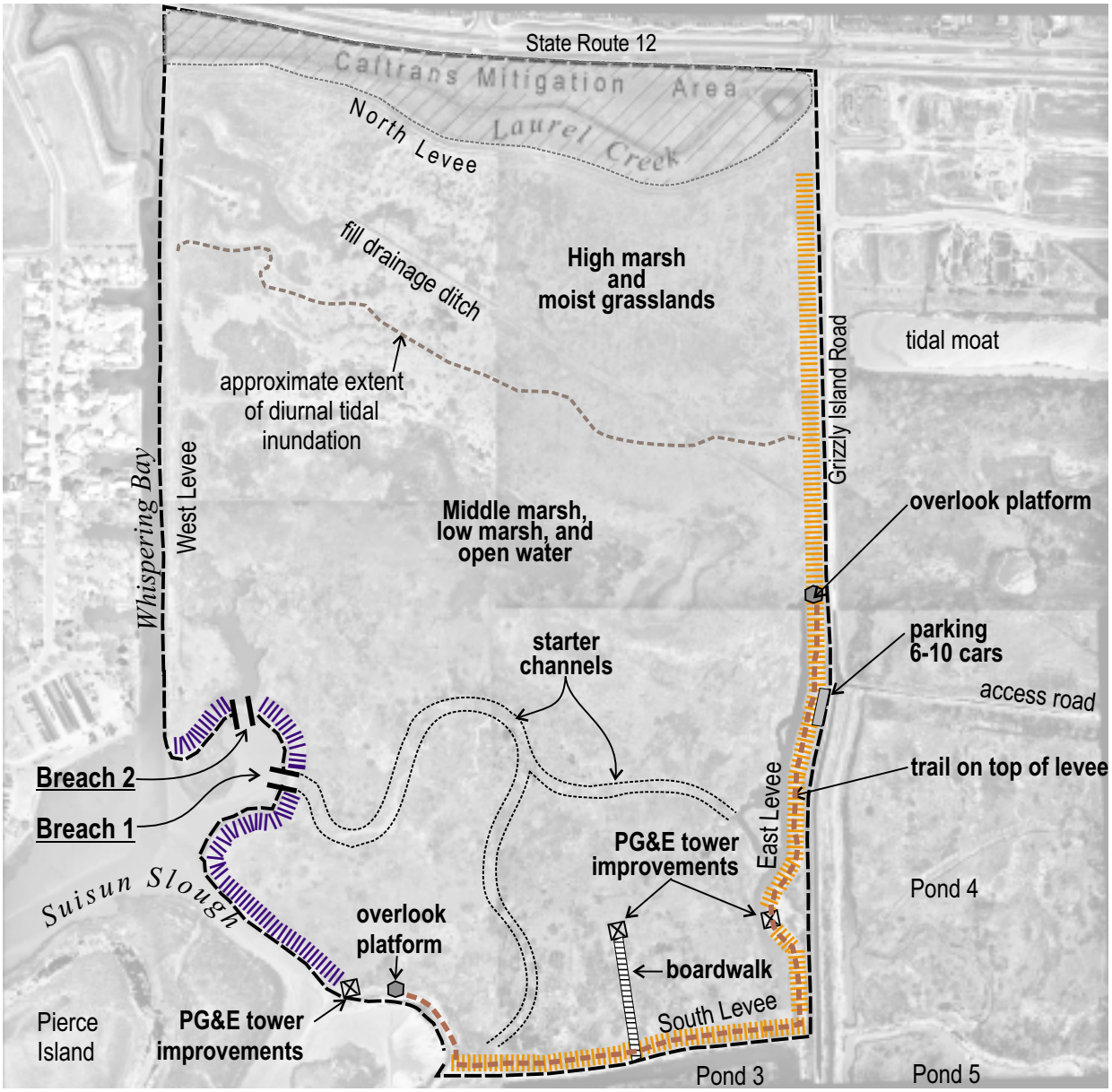
Hill Slough West
Restoration Plan

LEGEND

- raise / build levee
- lower levee
- PG&E transmission tower
- site boundary

N

0 500 1,000
feet
(approximate)



PWA

1422 Rest Plan.cdr

Figure 4. Aerial View of Hill Slough West

Photograph: Michelle Orr (2000)