Summary Information

San Francisco Estuary Institute

Implementation of a wetlands monitoring system suitable for assessing ecosystem response to restoration actions

Amount sought: $1,774,680

Duration: 36 months

Lead investigator: Dr. Joshuah Collins, San Francisco Estuary Institute

Short Description

The CWMV consists of a state−wide Core Team of agencies, NGOs and academics who advise multi−disciplinary Regional Teams to develop and implement a three−tiered approach to comprehensive wetlands monitoring. The three tiers of the CWMV are (1) habitat inventories; (2) rapid quantitative monitoring; and (3) intensive scientific study. The approach provides the most−cost−effective applications of science across the broadest array and largest number of restoration projects to report the distribution and abundance of wetlands, net changes in wetland acreage, and the condition of restoration projects relative to their performance standards, key ecological services, and ambient conditions.

Executive Summary

Executive Summary

Implementation of A Wetlands Monitoring System Suitable for Assessing Ecosystem Response to Restoration Actions

The San Francisco Estuary Institute, on behalf of its partners in the California Wetlands Monitoring Venture (CWMV), proposes to extend the CWMV to the ERP. The CWMV consists of a state−wide Core Team of agencies, NGOs and academics who advise multi−disciplinary Regional Teams to develop and implement a three−tiered approach to comprehensive wetlands monitoring that meets the needs of local, regional, state, and federal wetland managers for fundamental information about the distribution, abundance, and condition of wetlands throughout California. The three tiers of the CWMV are (1) habitat inventories; (2) rapid quantitative monitoring; and (3) intensive scientific study. The approach provides the most−cost−effective applications of science across the broadest array

and largest number of restoration projects to report the distribution and abundance of wetlands, net changes in wetland acreage, and the condition of restoration projects relative to their performance standards, key ecological services, and ambient conditions.

The CWMV incorporates the California Wetlands and Riparian Inventories into Tier 1, the California Rapid Assessment Method for Wetlands (CRAM) into Tier 2, and standards for intensive data collection, such as the protocols of the state Vegetation Classification and Mapping Program, as applied in the Delta Regional Ecosystem Restoration Plan, into Tier 3. Sources of Tier−3 protocols include the Pacific Estuarine Ecosystem Indicator Research consortium of UC Davis and UC Santa Barbara, the South Bay Salt Pond Restoration Project, the Integrated Regional Wetlands Monitoring Pilot of the Science Program of the CBDA, and the Landscape Disturbance Indicators Development consortium of USEPA.

To extend the CWMV into the ERP, the proposed work would:

1. Broaden the state−wide Core Team to include ERP representation;

2. Extend the Wetlands and Riparian Inventory updates into selected ERP watersheds;

3. Extend the Wetland Tracker information system to the ERP;

4. Train multi−disciplinary regional teams to use CRAM on behalf of the ERP;

5. Use CRAM to evaluate ERP projects selected by the Core Advisory Team;

6. Report on the ecosystem response of multiple ERP restoration projects based on CRAM.

Application of the three−tiered monitoring approach would enable the ERP to influence and benefit from ongoing efforts at the state and national level to improve the efficacy of wetlands monitoring science for assessing the cumulative benefits and ecosystem responses to wetland and riparian habitat restoration projects. The proposed work is entirely consistent with the priorities of the ERP at this time and is designed to increase the capabilities of the ERP to evaluate its progress toward ERP goals of native species recovery, protection and restoration of functional habitats, and rehabilitation of natural processes through local partners.

Proposal Text

A. Project Description

1. Problem, Goals, and Objectives

Large amounts of public and private funds are being invested in ERP projects to restore and manage wetlands in California. However, wetland managers and the concerned public cannot always evaluate these investments because monitoring is too expensive, or the monitoring methods are inconsistent, such that projects cannot be compared to each other or over time. Furthermore, most monitoring results are not readily available to analysts and decision makers, and there tends to be little assurance of data quality. A new approach is needed to provide consistent and affordable information about wetland restoration projects of the ERP.

The proposed approach to comprehensive wetland monitoring is based on the tiered framework of the Coastal Research and Monitoring Strategy of USEPA, NOAA, Department of Agriculture, and USGS (CRMS Working Group 2000), as adopted by the California Wetlands Monitoring Venture (CWMV) (Appendix 1). The framework organizes monitoring and research into three interconnected tiers of technical activities:

Tier 1. Inventory, mapping, and databases to profile wetland landscapes and track local projects;

Tier 2: Rapid assessment of regional ambient conditions and stressor gradients, and evaluation of restoration and mitigation projects;

Tier 3: Intensive monitoring at selected sites to validate Tier 1 and Tier 2 assessment tools; address questions identified by Tiers 1 and 2 activities, address project-specific science needs not met by Tier 1 or 2 assessments, and to develop Tier 3 tools such as standard intensive monitoring protocols.

At this time, Tier 1 of the CWMV incorporates the State Wetlands Inventory, State Riparian Inventory, State Vegetation Classification System, National Wetlands Inventory (NWI), and the Wetland Tracker information system. The CWMV has worked closely with the State Vegetation Mapping Project and the State Riparian Joint Venture to produce standard protocols for mapping wetland vegetation and riparian habitats (http://www.wrmp.org/documents.html#protocols). The inventory of tidal wetlands has been used as the sample frame for the San Francisco Estuary Intensification Project of EMAP-Estuaries. SFEI, as a member of the CWMV, is the Bay Area partner for both NWI of the USFWS and the National Hydrologic Dataset (NHD) (http://nhd.usgs.gov/) of USGS, and is updating NWI around San Francisco Bay as the sample frame for probabilistic ambient monitoring using CRAM. SFEI produces the Wetland Tracker information system (http://www.wrmp.org/projectsintro.html) to manage public information about wetland projects and ecosystems in the Bay Area.

Tier 2 consists of the California Rapid Assessment Method for Wetlands (CRAM) (http://www.wrmp.org/cram.html). CRAM is designed to fill the existing gap in available

monitoring methods by providing comparable rapid assessments of wetland condition across all regions and types of wetlands in California. CRAM is designed for routine use in local, regional, and statewide programs to monitor wetlands. It provides a consistent approach without neglecting characteristic differences in wetland form or function between regions or between types of wetlands. It provides cost-effective monitoring and assessment at different scales, ranging from individual wetland projects to watersheds, regions within the state, and to the state as a whole. The use of CRAM will, over time, help wetland managers and scientists quantify the relative influence of anthropogenic stress, management actions, and natural disturbance on the spatial and temporal variability in wetland ecosystems. This information can then be used in the design and management of wetland projects.

The CWMV has turned to existing research and intensive wetland monitoring efforts as sources of Tier 3 tools. These are mainly indicators and associated protocols that can be used to standardize intensive monitoring efforts across wetland programs and projects. Members of the CWMV Core and Regional Teams serve as Principal Investigators in these Tier 3 projects, including the Integrated Regional Wetlands Monitoring Pilot of the CBDA, special studies of the Regional Monitoring Program for Trace Substances and the Wetlands Regional Monitoring Program at SFEI, the Pacific Estuarine Ecosystem Indicator Research Consortium of UC Davis and UC Santa Barbara, the South Bay Salt Pond Restoration Project, and USWFWS endangered species recovery plans. Existing Tier 3 protocols area available through the Bay Area Regional Wetlands Monitoring Program at SFEI (http://www.wrmp.org/documents.html#protocols).

To extend the CWMV into the ERP, the proposed work would:

1. Broaden the state-wide Core Team to include ERP representation;
2. Extend the Wetlands and Riparian Inventories into selected ERP watersheds;
3. Extend the Wetland Tracker information system to the ERP;
4. Train multi-disciplinary regional teams to use CRAM on behalf of the ERP;
5. Use CRAM to evaluate ERP projects selected by the Core Advisory Team;
6. Report on the ecosystem response of multiple ERP projects based on CRAM.

2. Justification

There is a growing body of scientific literature and practical experience in wetland monitoring that has been used to fashion an appropriate approach to assessing the health of ERP wetlands. Several authors have reviewed methods of wetland assessment (Margules and Usher, 1981, Westman, 1985, Lonard and Clairain, 1986, Jain *et al*., 1993, Stein and Ambrose, 1998, Bartoldus, 1999). Most methods differ more in the details of data collection than in overall approach. In general, the most useful approaches focus on the visible, physical structure, and/or biologic condition of wetlands. The indicators of structure and condition are derived from intensive studies that show relationships between the indicators, high-priority functions or beneficial uses of wetlands, and anthropomorphic stress, such that the indicators can be used to assess the

effects of management actions on wetland condition.

Existing methods have been used to assess wetlands at a variety of spatial scales, from habitat patches within local project sites, to landscapes, regions within states, and regions of the US. Methods that are designed to assess large areas, such as the Synoptic Approach (Leibowitz *et al*., 1992), typically produce coarser and more general results than site-specific methods, such as either the Hydrogeomorphic Method (HGM; Smith *et al*., 1995) or the Index of Biotic Integrity (IBI; Karr, 1981). Each scale of assessment provides different information about the extent and condition of wetlands. Furthermore, assessments at different scales can be used for cross-validation, thereby increasing confidence in the approach.

Existing methods also differ in the amount of effort and expertise they require. Methods such as the Wetland Rapid Assessment Procedure (WRAP; Miller and Gunsalus, 1997) and the Descriptive Approach (USACOE, 1995), are extremely rapid, whereas the Habitat Evaluation Procedure (HEP; USFWS, 1980), the New Jersey Watershed Method (Zampella *et al*., 1994), and the Bay Area Watersheds Science Approach (WSA version 3.0, Collins *et al*., 1998), are much more demanding of time and expertise.

None of the existing methods can be applied equally well to all kinds of wetlands throughout the ERP. The HGM and the IBI are the most widely applied approaches in the US. While they are intended to be rapid, they require more time and resources than are often available, and both have a somewhat limited range of applicability. For example, IBIs are developed separately for different attributes of wetlands, such as vegetation and fish, and for different types of habitats, such as wadeable streams. HGM guidebooks are similarly restricted to one type of habitat, such as vernal pools or riverine wetlands, and they are typically restricted to a narrowly defined bioregion. Some guidebooks are restricted to individual watersheds. For the southern California coastal bight and for the San Francisco Bay Area, trial applications of both the WRAP and the Ohio Rapid Assessment Method (ORAM; Mack, 2001) indicated that significant modifications of these methods would be required for their use in California, and lead to increased interest in developing a rapid method specifically for California wetlands.

The proposed monitoring strategy was developed according to a set of underlying conceptual models and assumptions about rapid assessment, the management framework of wetlands, and factors affecting wetland condition, including interactions between natural disturbance, anthropogenic stress, and wetland functions or conditions; and spatial arrangements between wetland conditions and their anthropogenic causes. These models and assumptions are explicitly stated in this section in order to clarify the thought process that governed the development of the strategy.

Rapid Assessment

Rapid Assessment methods, in general, are based on the assumption that the ecological condition of wetlands will vary along a gradient of anthropogenic stress, such as restoration age or hydro-modification, and that the resultant condition can be evaluated

based on a core set of field indicators. CRAM was created to meet three criteria characteristic of wetland rapid assessment methods (Fennessey *et al*. 2003).

1. *The method measures* ***existing*** *condition* (see Section 2.0 above) as the ability of a wetland to support and maintain its complexity and capacity for self-organization with respect to species composition, physico-chemical characteristics, and functional processes, relative to ideal, historical, or existing wetlands of a similar class without human alteration. The method does not assess the site, or AA, relative to past conditions, or relative to planned, or anticipated future, conditions.
2. *The method is truly rapid.* A method is considered rapid if it requires two people no more than one half day of fieldwork plus one half day of subsequent data analysis.
3. *The method is a site assessment* based on field conditions and not just inferred from surrounding landscape characteristics, existing reports, opinions, or the potential to perform certain wetland functions.

Management Framework

The management framework for CRAM is the Pressure-State-Response model of adaptive management (Holling, 1978, Bormann *et al*., 1994), which states that human operations, such as agriculture and recreation, can be sources of stress or pressure affecting the overall functions of wetlands. When managers understand these effects, they can respond by adjusting their actions to mediate the stress. Wetland protection depends on monitoring to understand the relationships between wetland stress, functional state, and management actions. The managers' questions and the targets that they set for wetland protection drive relevant monitoring efforts, and the results of the monitoring drive the managers' actions (Figure 1).

Scientific Foundation for CRAM: Interactions Between Wetland Condition, Disturbance, and Stress

The condition of a wetland reflects the suite of hydrologic, biologic (biotic), and physical functions and processes that are occurring. These functions are typically the result of a wetland's position in the landscape (i.e. its geomorphic setting), its source of water, and the dynamics of water movement through the wetland (Brinson, 1993). CRAM is based on four basic assumptions about the functional interactions between these physical and biotic processes that govern wetland condition. CRAM assumes that (1) the functions, beneficial uses, and services provided by a wetland are mainly determined by the quantity and quality of water supplies and sediment supplies that are either processed within the wetland or that are exchanged between the wetland and its environment; (2) that the supplies of water and sediment are ultimately controlled by climate, geology, and land use; (3) that geology and climate govern natural disturbance, whereas land use accounts for anthropogenic stress; and that (4) these controlling factors are significantly mediated by vegetation (Figure 2).

Figure 1: The 3-tiered monitoring approach as part of an overall adaptive management framework for assessing wetlands for the ERP.

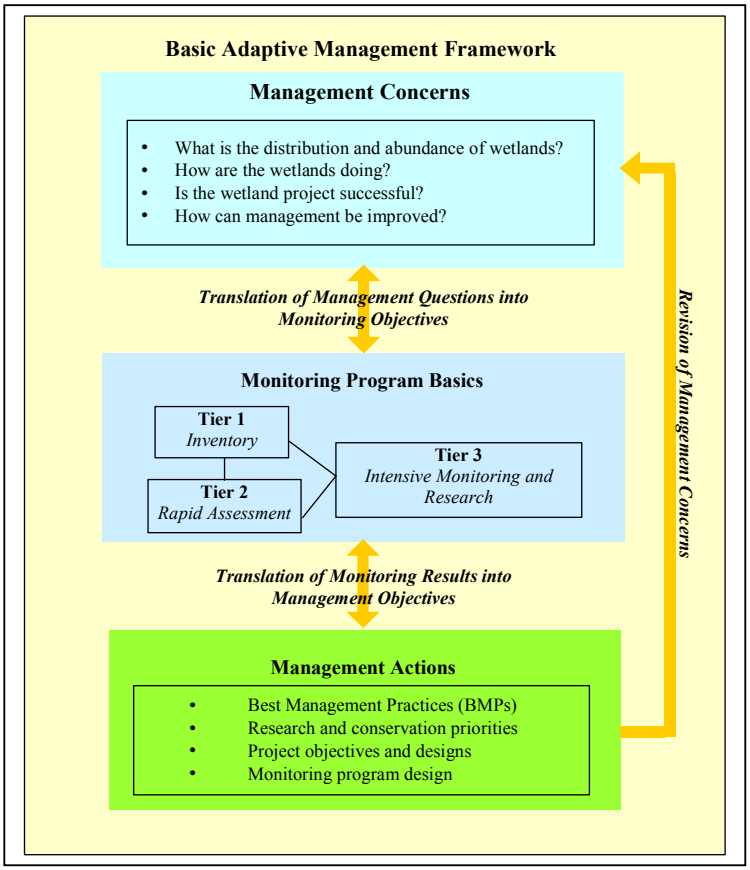
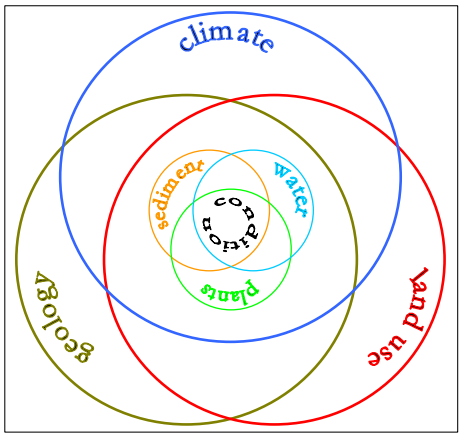
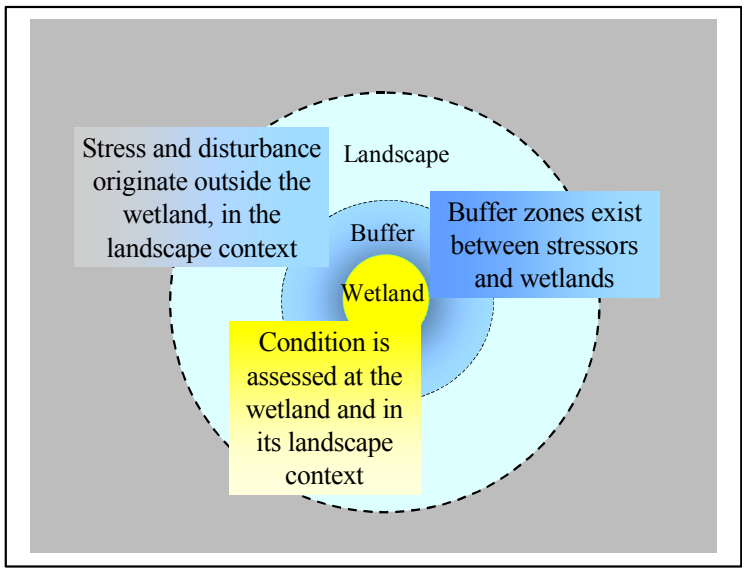


Figure 2: Spatial hierarchy of factors that control the condition of a wetland. Conditions are ultimately controlled by climate, geology, and land use.



The interactions of stressors, buffers, and condition can also be organized in to a spatial hierarchy (Figure 3). Stress often originates outside the wetland, in the surrounding landscape or encompassing watershed. Buffers around the wetland can intercept and otherwise mediate stress that affects conditions within the wetland.

Figure 3: Spatial hierarchy of stressors, buffers, and wetland condition



In California, the key stressors tend to be habitat conversion or loss, hydro-modification, pollution, and biological invasions (USEPA, 1999). CRAM is designed to separately assess functional condition and anthropogenic stress. The purpose of this design is to allow assessors to identify the likely causes of the observed conditions, and thus to recommend management actions. If the causes are not readily apparent, then Tier 3 efforts might be recommended to determine the causes and to what extent they can be managed. If the causes are deemed natural, then management actions may not be warranted.

Universal Attributes, Metrics, and Stressors

The attributes and metrics developed for the CRAM reflect the common, visible characteristics of all wetlands in all regions of California (Table 2). Each metric is represented by a set of narrative descriptions of mutually exclusive alternative states. The sets of narrative statements reflect a gradient in the condition of the wetland and are related to the degree of stress affecting it. The scores for the metrics are expected to correlate with the suite of key ecological services typically performed by wetlands in California (Table 3). Wetland stressors are identified using a stressor checklist. The stressor checklist enables wetland managers to identify which stressors, if any, are most likely to account for observed conditions within and among wetlands.

Table 2: CRAM Site Attributes and Metrics

Attributes		Metrics
Buffer and Landscape Context		Connectivity
		Percent of AA with Buffer
		Average Width of Buffer
		Buffer Condition
Hydrology		Water Source
		Hydroperiod
		Hydrologic Connectivity
Structure	**Physical**	Physical Patch Richness
		Topographic Complexity
	Biotic	Organic Matter Accumulation
		Biotic Patch Richness
		Vertical Biotic Structure
		Interspersion and Zonation
		Percent Invasive Plant Species
		Native Plant Species Richness

The CRAM will yield numerical scores for each metric and attribute of a wetland site, and these scores will be combined into one overall score for each site during each assessment period. During FY 2005, the Core Team and Regional Teams will focus on the process of scaling and weighting the metrics and attributes to generate site scores. The expected outcome is a set of CRAM modules that enable wetland managers to assess wetlands of each class relative to ambient conditions and project-specific objectives for each metric and attribute, and to identify stressors that are most likely to account for the scores (Figure 4).

Figure 4: Basic hierarchy of CRAM, showing spatial scales of application from individual metrics and attributes within a site, to sites as a whole, to populations of sites within or across wetland classes, within or among watersheds.

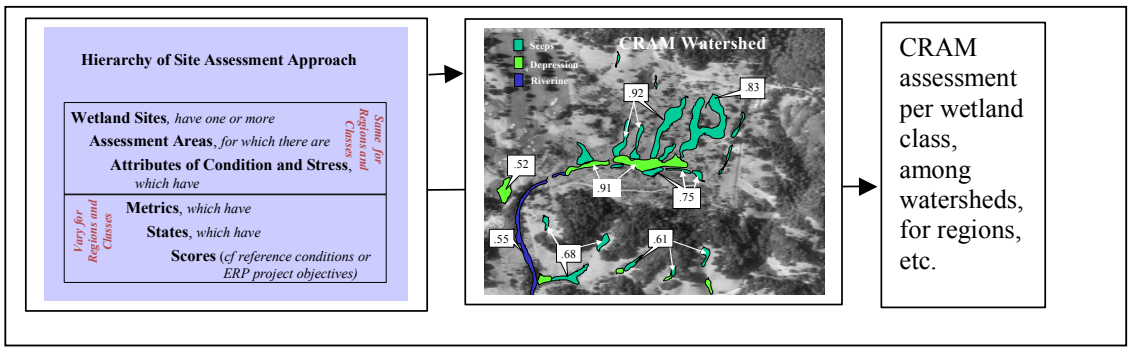


Table 3: Relationship Between CRAM Attributes, Metrics, and Key Wetland Functions

CRAM ATTRIBUTES AND METRICS												
WETLAND FUNCTIONS	Buffer and Landscape Context	Hydrology			Physical Structure		Biotic Structure					
	Buffer and Connectivity Metrics	Water Source	Hydroperiod	Hydrologic Connectivity	Physical Patch Richness	Topographic Complexity	Organic Matter Accumulation	Biotic Patch Richness	Vertical Structure	Interspersion and Zonation	Percent Invasive Plant Species	Native Plant Species Richness
Surface water storage			X	X	X	X				X		
Subsurface storage		X	X	X		X						
Moderation of groundwater flow	X	X						X			X	X
Dissipation of energy					X	X		X		X		
Cycling of nutrients	X		X	X	X	X	X	X				
Removal of elements and compounds	X		X	X		X	X			X		
Water filtration			X	X	X	X	X	X		X		
Export of organic carbon			X	X			X	X	X	X		
Food web support	X	X	X	X	X	X	X	X	X	X	X	X

Wetland Typology

In determining the wetland typology for the CRAM, the Core Team considered the expected influences of landscape context and local geomorphic setting on wetland functions and stressors, as well as the practical problems in wetland classification. The Core Team also considered the need for consistency with NWI and the State Wetland Inventory, which will serve as the sample frame for ambient monitoring using CRAM. The CRAM typology consists of seven major classes of wetlands (Table 4). It is designed to enable wetland scientists to classify wetlands using standard 1:24,000 scale topographic maps, geologic maps, soils maps, aerial imagery, local knowledge, and a minimum of ground-truthing.

Table 4: CRAM Wetland Typology.

CRAM Wetland Classes
Riverine Wetlands
Depressional Wetlands
Vernal Pools
Seeps, Springs, and Slope Wetlands
Lacustrine Wetlands
Coastal Lagoon Wetlands
Estuarine Wetlands

The conceptual framework for the CRAM can change as the results of CRAM-based assessments are analyzed. The most likely changes will occur to the weights used to scale the relative contribution of each metric and attribute to the overall scores. If the weightings are changed, previous assessments can be recalculated, such that the data record for any site or group of sites can be sustained. Any such modification of the CRAM must be authorized by the Core Team.

3. Previously Funded Monitoring

The CWMV has been funded to Develop CRAM through cooperative agreements between the USEPA and the San Francisco Estuary Institute (SFEI), Southern California Costal Water Resources Project (SCCWRP), and the California Coastal Commission (CC). Additional funding for the Wetland Tracker information system has been provided in the past to SFEI from the USEPA, David and Lucile Packard Foundation, the Rose Foundation, and the San Francisco Foundation. Work on NWI and NHD in relationship to the CWMV has been funded by USEPA, USFWS-NWI, USGS, and local agencies in Southern and Northern California.

The CWMV development process calls for verification of CRAM along stressor gradients, followed by calibration and validation of CRAM. Most verification has been completed, and showed that CRAM can distinguish between high-, medium, and low-quality habitats for each wetland class, site-specific stressors can be identified at the scale of site condition metrics and attributes, and observer bias can be adequately controlled through training (Collins et al. 2003; Sutula et al. in press). Calibration involves weighting metrics and attributes to maximize their correlation to site-specific tier 3 data. At this time, The CWMV is funded through 2005 to calibrate CRAM for estuarine wetlands, coastal lagoons, riparian systems, and depressional wetlands (including vernal pool complexes), relative to Tier 3 data for vegetation, benthic macroinvertebrates, fishes, amphibians, and birds. Pilot implementation in three coastal watersheds, including the Napa Watershed, is also funded for 2005. SFEI is currently funded through USEPA and NOAA to extend the Wetland Tracker into Suisun Marsh, and to begin developing comparable information systems for Central and South Coast regions.

By the middle of FY 2006, with regard to the domain of the ERP, the CWMV will have:

- ✓ Calibrated CRAM for most if not all wetland classes based on Tier 3 data for natural wetland and riparian habitats and restoration projects;
- ✓ Developed capability within the Wetland Tracker information system to manage and distribute CRAM results;
- ✓ Developed software for CRAM field application using tablet PCs and/or PDAs;
- ✓ Drafted a CRAM training manual;
- ✓ Updated NWI for most if not all USGS quadrangles for the SF Estuary margin downstream of the Delta;
- ✓ Demonstrated CRAM at the watershed scale within at least one Bay Area Watershed; and

- ✓ Tested the riparian habitat mapping protocol in one or more Bay Area watersheds.

4. Approach and Scope of Work

Task 1: Project Management

The project would be managed through SFEI. The project manager will oversee the budget, any subcontracting, and the schedule of reporting. The project manager will work closely with the other PIs to assure that all needed coordination is accomplished.

The first task of the project manager will be to broaden the state-wide Core Team to include ERP representation by a dedicated The Core Team (Appendix 1) does not at this time include any direct link to the ERP. Representation of the ERP in the Core Team is essential to make sure that extension of the CWMV to the ERP is as useful to the ERP as possible. The ERP representative(s) will need to guide selection of ERP projects for assessment, review and approve the selection of any additional sites for reference conditions and ambient monitoring, advice and review procedures for data management and dissemination, and review any reports of findings. The Core Team has been meeting twice each year or as needed. It is expected that the CWMV PIs and project managers will meet more frequently with the ERP, until its involvement in the Core Team is fully realized.

Task 2: Extend the Wetlands and Riparian Inventories and Wetland Tracker into selected ERP watersheds.

The State Wetland Inventory (SWI) is being achieved by the NWI of the USFWS through the office of the State Wetlands Coordinator with regional academic support teams. Production of the SWI focuses on NWI gaps, which includes various parts of the ERP domain. One critical gap encompasses the Bay Area watersheds draining to the San Francisco Estuary downstream of the Delta. The Gap is being filled in part through funding from USEPA to SFEI for NWI updates at the immediate margins of San Francisco Bay. It is proposed that ERP would fund completion of NWI for the remaining portion of the Bay Area watersheds. Less work has been completed for the State Riparian Inventory. The ability of the State Vegetation Map to resolve riparian habitat consistent with the definition developed by the Riparian Habitat Joint Venture (RHJV) is scheduled for testing by the RJV during FY 2005. If the test is positive, then the forthcoming State Vegetation Maps for Napa Watershed and Petaluma Watershed will provide partial coverage of riparian systems for the updated NWI for the Bay Area. It is proposed that the ERP would fund completion of the riparian habitat map for the remaining portion of the Bay Area watersheds not covered by the State Vegetation Map. All mapping of wetlands and riparian habitats would strictly follow the protocols of the NWI and RHJV, as already applied to the CWMV by SFEI.

The Wetland Tracker uses web-based technology to manage and disseminate through online text queries and interactive maps basic information about wetlands and riparian habitats and restoration projects. Projects are displayed in the context of other habitat patches, topography, and hydrography. Attribute information for each project includes its size, the areas of component habitats, responsible parties and management

objectives, etc. At this time, and without further funding, the Wetland Tracker will only include projects and habitats within the historical limits of the tides downstream of the Delta. During FY 2005, a process for updating the Wetland Tracker through the CWA 404 permitting process will be implemented through the San Francisco District of the USCOE and Region 2 Water Board.

It is proposed that the ERP would fund extension of the Wetland Tracker into the watersheds draining to the SF Estuary downstream of the Delta, using the updated NWI and Riparian Habitat Inventory as base maps. It is also proposed that the CWMV, with ERP direct involvement, would begin transferring the Wetland Tracker to other regions of the ERP domain. Technical transfer would involve review and selection of administrative and technical bases for Wetland Tracker systems, and application of the CWA 404 update procedure to other regulatory agencies upstream of the Bay Area.

Task 3: Train multi-disciplinary regional teams to use CRAM on behalf of the ERP

A hallmark of the CRAM is its application through region teams of experts representing different key disciplines of wetland science. CRAM involves expert interpretation of field conditions, and this is greatly improved through regional expertise. The costs of logistics is also reduced by employing regional teams that can minimize travel times to sites and understand the particulars of local access. While a Regional Team exists for the Bay Area, one or more new Regional Teams will be required to extend the CRAM upstream of the Delta. These new Teams would be established through the Core Team, with direct input by the ERP. Criteria for selecting Regional Team members have been drafted and applied elsewhere, but may need to be revised based on ERP review.

Task 4: Use CRAM to evaluate ERP projects selected by the Core Advisory Team

It is anticipated that by the time of ERP funding, the CRAM will have been calibrated for all classes of wetlands within the ERP domain, except perhaps alpine systems. This means that the ERP will have more opportunities to apply CRAM than funding or time will allow, based on this proposal. The ERP, with its Core Team partners, will need to prioritize CRAM applications for the Regional Team(s). It is proposed that applications of CRAM through this proposal will focus on ERP projects within the SF Estuary, including the Delta, plus projects within the watersheds of the North Bay and Suisun Marsh. This will enable ERP to apply CRAM where it would be best supported by NWI, the Riparian Inventory, and the Wetland Tracker information system. CRAM application could begin immediately for tidal wetland projects downstream of the Delta because they will already be fully supported based on existing CWMV funding. This strategy affords a special opportunity to link CRAM to the Integrated Regional Wetlands Monitoring pilot (IRWM) of the CBDA. IRWM is being planned for extension into more tidal marsh sites in 2006-08. It is also being planned that these same sites will be assessed using CRAM, to test its efficacy as an extrapolation tool to extend the value of IRWM to many more sites than affordable through such Tier 3 science.

Task 5: Report on the ecosystem response of multiple ERP projects based on CRAM.

The results of the proposed work could be summarized in many ways, including for example, as the effect of ERP projects on the distribution, abundance, and connectivity of habitat types and patches relative to stressors, the distribution of ERP project scores by metric and attribute relative to ambient conditions and project objectives, and the expected increase in ecological services based on functions associated with each habitat type. The PIs will work with the ERP through the Core Team to fashion reports that meet the ERP needs for assessing restoration projects, and for elucidating the emergent understanding of ERP projects in the context of watersheds and wetland ecosystems. It is anticipated that, in addition to progress reports, an annual report of findings will be produced for each of the three years of the proposed work.

5. Feasibility

Success of the proposed work will depend on completion of the calibration efforts for CRAM, as currently funded. No risk is perceived for the ERP. The proposed fieldwork need only involve ERP projects for which access will have already been permitted for related activities. In the case of some wetland types or locations, non-take permits for access to critical habitat for endangered species may be required. This will be facilitated by the flexible timing within a year for CRAM application.

6. Expected Outcomes and Products

Extension of the CWMV to the ERP through this proposal will yield the first-ever comprehensive assessment of wetland condition at the watershed scale within California. Important interim products will include updates of NWI, riparian habitat maps, and development of the Wetland Tracker information system on the watershed template for North Bay and Suisun. These online products will be announced through the email lists and web sites of the participating agencies and NGOs. ERP projects will be assessed in the context of all other wetlands, riparian systems, and ecological restoration projects for North Bay, Suisun Marsh, and the attending local watersheds. The results will be retrievable, and the ecosystem context will be visible, through the Wetland Tracker. The PIs expect to present the technical findings of the project at conferences and symposia, especially of the SF Estuary Project and CBDA Science Program, and through publication in peer-reviewed technical journals.

7. Data Handling, Storage, and Dissemination

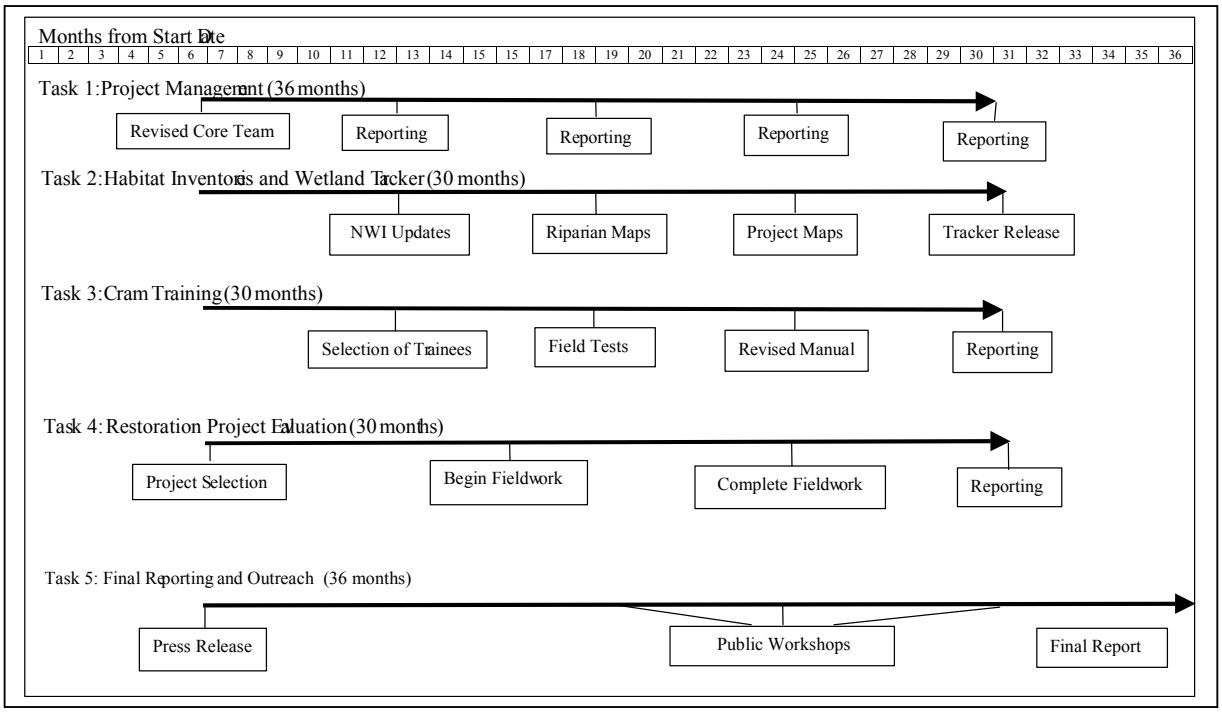
The CWMV has developed a database in Access to manage CRAM results. The CWMV is funded through USEPA to adapt the CRAM database to the Wetland Tracker. Some of the tools for this adaptation are provided through the existing data management obligations of SFEI to IRWM of the CBDA. Furthermore, SFEI is a node on the information management system for the Surface Water Ambient Monitoring Program (SWAMP), which is scheduled to adopt CRAM. Working linkages between IRWM, SWAMP, and the CWMV therefore already exist through SFEI. The proposed work would strengthen these relationships and employ them to support the ERP.

8. Public Involvement and Outreach

Press releases and other public announcements directed to local and regional agencies about the project plans and products as they are completed will be prepared by SFEI. The primary means of outreach about the project will be the Wetland Tracker and the web sites of the Core Team members. As the watershed–based assessments of wetland condition are nearing completion, demonstrations and workshops can be planned to report findings to special interest groups, such as watershed stewardship organization, volunteer monitoring organizations, and the Watershed Program of the CBDA.

9. Work Schedule

This would be a three-year project that can start at any month. The following schedule outlines the timing of the major tasks, their interdependence, and major milestones.



B. Applicability to CALFED Bay-Delta Program ERP Goals, Draft Stage 1 Implementation Plan, and CVPIA Priorities

1. ERP and CVPIA Priorities

The proposed work addresses Strategic Goal 4 of the ERP Draft Stage 1 Implementation Plan: "Protect and/or restore functional habitat types in the estuary and its watersheds for ecological and public values..." The CVPIA priorities addressed through this proposal are parallel to those in the Stage 1 ERP Implementation Plan. By extending the three-tiered CRAM assessment framework of inventory, rapid assessment, and carefully stratified, probabilistic intensive sampling and assessment of representative

wetlands and riparian habitats into ERP, we intend to provide the basis for applying the set of indicators recently developed under CRAM and use them to determine wetland condition, stressors, and response to restoration actions. Furthermore, our approach of intensive probabilistic monitoring design (Tier 3) of representative habitat types will provide the necessary data for model validation and enable ERP mangers to derive causal relationships between wetland and riparian habitat structure and function and restoration actions.

2. Relationship to Other Ecosystem Restoration Actions, Monitoring Programs, or System-wide Ecosystem Benefits

The CRAM is built on the long-term implementation plan of the California Wetlands Inventory administered jointly by the Resources Agency, the State Coastal Conservancy, and the Department of Fish and Game, as an integral part of the National Wetlands Inventory of USFWS. The Surface Water Ambient Monitoring Program and the statewide Surface Water Monitoring Strategy are poised to adopt CRAM as part of wetland and riparian habitat status and trends assessment and reporting requirements under CWA Section 305(b) and Water Quality Attainment Strategy evaluations. Information produced from our proposed work will also inform restoration actions the CBDA Watershed Program has funded in recent years, thereby creating a common indicator set between ERP and the Watershed Program suitable for long-term multi-project and landscape-level performance evaluations. The technical transfer element in our proposed work will give multidisciplinary regional teams and watershed stewardship groups the appropriate tools to extend project performance monitoring into the foreseeable future. Data generated through this project will become part of the SWAMP database and the emerging California Environmental Information Exchange Network (CEDEN), administered by CalEPA and the Department of Water Resources.

Part C: Qualifications

Joshua N. Collins, Ph.D., Environmental Scientist
Dr. Collins received his Ph.D. in Entomological Sciences at the University of California at Berkeley and has done post-doctoral studies in Geography and Ecology at the University of California at Berkeley and Davis. Dr. Collins is a landscape ecologist and regional ecological planner with special expertise in the evolution and natural maintenance of streams and wetlands. Dr. Collins has been a professional ecologist in the Public Utilities Industry and a consulting ecologist in private practice for design and review of stream and wetland restoration projects. Since Dr. Collins joined the staff of SFEI in 1993, he has been the principal author and lead scientist for the Bay Area Wetlands Monitoring Plan, the Bay Area Watersheds Science Plan, the Bay Area EcoAtlas, and the Bay Area Regional Wetlands Ecosystem Goals Project. Dr. Collins oversees the SFEI Wetlands Science Program and GIS laboratory.

Rainer Hoenicke, Ph.D., Environmental Scientist
Dr. Hoenicke is a systems ecologist and has spent a good part of his career on making science relevant to decision-makers. He received his B.S. in Agricultural Sciences from the University of Bonn, Germany, and his Ph.D. in Ecology from the University of California at Davis. After completing a postdoctoral fellowship at Moss Landing Marine

Laboratories, he coordinated field logistics for EPA's National Acid Precipitation Program and subsequently helped expand the National Estuary Program to Southern California at the Los Angeles Regional Water Quality Control Board. He served as lead scientist for the Santa Monica Bay Restoration Project until he first joined the San Francisco Estuary Institute in 1994. After a two-year stint in the Office of the California Resources Secretary, A Wetlands Monitoring System to Assess Restoration Actions where he spearheaded the development of a comprehensive landscape assessment program and the use of scientific criteria in making conservation investment decisions, he returned to the Institute in 2004.

Michael D. May, IT Manager
Mr. May received his M.A. in Geography and B.A. in Environmental Science from the University of California at Berkeley. Since joining the Institute in 1991, he has analyzed data from a variety of monitoring projects and developed new ways to depict and communicate monitoring results. He served as editor of the first three editions of the annual *Pulse of the Estuary* report, a readable summary of contaminant monitoring results presented in an environmental management context. Mr. May currently oversees the well-being of the Institute's computer systems and coordinates initiatives to apply computer technology to the compilation and dissemination of environmental information.

Eric Stein, Ph.D.
Dr. Eric Stein is head of SCCWRP's Watershed Department, where he oversees a variety of projects related to stormwater and mass emissions monitoring, watershed and water quality model development, and assessment of wetlands and other aquatic resources. Dr. Stein received his Bachelors degree in Biology in 1987, Masters degree in Science Education in 1988, and Doctorate degree in Environmental Science and Engineering in 1995, all from UCLA.

Martha Sutula, Ph.D.
Martha Sutula is an ecologist specializing in the biogeochemistry of coastal aquatic ecosystems. She received her B.S. in Chemistry from Purdue University in 1987, her Masters in Public Health at Tulane University in 1993, and her Ph.D. in Coastal Sciences from Louisiana State University in 1999. Martha joined SCCWRP in April 2001. Her current research interests include the ecology and restoration of southern California coastal wetlands and watersheds.

Section D.

3: Long-term funding strategy

Through training multi-disciplinary regional teams to use CRAM on behalf of the ERP, we will enable local and regional teams to apply for funding past the ERP project period from a variety of funding sources, among the SWAMP, DFG's Resource Assessment Program, and the RHJV.

E. Compliance with Standard Terms and Conditions

We have reviewed the standard ERP grant agreements as described in the PSP attachments and consider the standard terms acceptable.

G. Literature Cited

Bartoldus, C.C., 1999. A comprehensive review of wetland assessment procedures: a guide for wetland practitioners. Environmental Concern Inc, St. Michaels, MD

Bormann, B.T., P.G. Cunningham, M.H. Brooks, V.W. Manning, and M.W. Collopy. 1993. Adaptive ecosystem management in the Pacific northwest. US Department of Agriculture, US Forest Service General Technical Report PNW-GTR-341. 22pp.

Brinson, M.M. 1993. A Hydrogeomorphic Classification for Wetlands. U.S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg, MS, USA. Technical Report WRP-DE-4.

Collins, J.N. San Francisco Estuary Institute. 1998. Bay Area Watersheds Science Approach. Version 3. The role of watershed science to support environmental planning and resource protection. Oakland, CA. 36 pp.

Fennessy, M.S, A.D. Jacobs, and M.E. Kentula, 2003. Review of Rapid Methods for Assessing Wetland Condition. EPA/620/R-04/009. National Health and Environmental Effects Research Laboratory, Office of Research and Development, Research Triangle Park, North Carolina.

Fennessy, M.S, A.D. Jacobs, and M.E. Kentula. 2003. Review of Rapid Methods for Assessing Wetland Condition. EPA National Health and Environmental Effects Research Laboratory, Office of Research and Development, Research Triangle Park, NC.

Holling, C.S. 1978. Adaptive environmental assessment and management. John Wiley & Sons. New York.

Jain, R.K., Urban, L.V., Stacey, G.S., & Balbach, H.E. 1993. Environmental Assessment. New York: McGraw Hill.

Karr, J.R. 1981. Assessment of biotic integrity using fish communities. *Fisheries* 6:21-27.

Leibowitz, S. G., B. Abbruzzese, P. R. Adamus, L. E. Hughes, and J. T. Irish. 1992. A synoptic approach to cumulative impact assessment: A proposed methodology. US Environmental Protection Agency, Environmental Research Laboratory, Corvallis, Oregon. EPA/600/R-92/167.

Lonard, R.I. and E.J. Clairain, Jr. 1986. Identification of methodologies for the assessment of wetland functions and values. IN Kusler, J.A. and P. Riexinger (eds). *Proc. of the National Wetland Assessment Symposium*. pp. 66-72.

Margules, C. and M. B. Usher. 1981. Criteria Used In Assessing Wildlife Conservation Potential: A Review. *Biological Conservation* 21:79-109.

Smith, D. R., Ammann, A., Bartoldus, C., and Brinson, M. M. 1995. An approach for assessing wetland functions using hydrogeomorphic classification, reference wetlands, and functional indices, *Technical Report WRP-DE-9*, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS. NTIS No. AD A307 121.

Stein, E.D. and R.F. Ambrose. 1998. A Rapid Impact Assessment Method for Use in a Regulatory Context. *Wetlands*, Vol. 18(3).

Sutula, M., E. Stein, J.N. Collins, and A. E. Fetscher. In press. Key Considerations for Development of a Wetlands Rapid Assessment Method: California's Experience. JARVA.

U.S. Army Corps of Engineers (USACOE). 1995. *The highway methodology workbook supplement. Wetlands functions and values: A descriptive approach*. U.S. Army Corps of Engineers, New England Division, NENEP-360-1-30a. 32pp.

U.S. Fish and Wildlife Service (USFWS). 1981. *Habitat Evaluation Procedure (HEP) Manual*, Washington DC.

Westman,W. E. 1985. *Ecology, impact assessment, and environmental planning*. John Wiley and Sons, New York.

Zampella, R. A., R. G. Lathrop, J. A. Bognar, L. J. Craig, and K. J. Laidig. 1994. A watershed-based wetland assessment method for the New Jersey Pinelands. Pinelands Commission, New Lisbon, NJ.

Appendix 1: Rosters for the State-Wide Core Team and Regional Teams of the CWMV

State-Wide Core Team					
Richard Ambrose	UCLA	Robert Burton	Moss Landing Marine Lab	Aaron Allen	USACOE-LA District
Ross Clark	CCC	Andree Breaux	RWQCB-Region 2	Betty Fetscher	SCCWRP
Cristina Grosso	SFEI	Dan Martel	USACOE-SF District	John Callaway	USF
Ruben Guieb	SWRCB	Raymond Jay	RWQCB-Region 4	Chris Potter	CRA
Josh Collins	SFEI	Martha Sutula	SCCWRP	Eric Stein	SCCWRP
Bobby Jo Close	CCC	Don Stevens	OSU	Paul Jones	US EPA
John Dixon	CCC	Carl Wilcox	CDFG		
South Coast Team					
Elaine Blok	USFWS	Nils Warnock	PRBO	Louisa Squires	SCVWD
Steve Culberson	CDWR	Lorraine Parsons	USNPS	Dan Martel	USACOE – SF District
Giselle Downard	USFWS	Joe Didonato	EBRPD	Paul Jones	USEPA - Region 9
Jules Evens	Avocet Research	Andree Breaux	RWQCB - Region 2	Karl Malamud-Roam	CMVCA
Tom Gardali	PRBO	John Callaway	USF	Nadav Nur	PRBO
Tom Kucera	Kucera Associates	Letitia Genier	SFEI	Molly Martindale	USACOE – SF District
Bay Area Team					
Erik Larsen	URS Corp.	Bryant Chesney	NOAA	Sabrina Drill	UC Extension
Dave Lawhead	CDFG	Dick Zembal	OCWD	Shirley Birosik	RWQCB - Region 4
David Pritchett	WRP SB Task Force	Doug Gibson	SELC	Corrice Farrar	USACOE- LA District
David Zoutendyk	USFWS	Ryan Henry	PCR	Bob Thiel	WRP SB Task Force
Kelly Schmoker	RMC	Mary Loquvam	LASGRWC	Darcy Aston	WRP SB Task Force

Bruce Posthumus	RWQCB-Region 9	Lorraine Rubin	Ventura County	Mike Porter	RWQCB-Region 9
Karen Bane	SCC	Mary Anne Skorpanich	OC PFRD	Rosi Dagit	RCDSMM
Liz Chattin	Ventura County	Ruben Ramirez	Cadre Environmental	Spencer MacNeill	Aspen Environmental
Wanda Smith	RWQCB - Region 8	Mike Kleinfelter	independent consultant	Ruben Ramirez	Cadre Environmental
Jae Chung	ACOE				
Central Coast Team					
Rob Burton	Moss Landing Marine Laboratory	Susie Worcester	CSU Monterey Bay	Chris Berry	City of Santa Cruz
Ross Clark	CA Coastal Commission	Alyson Aquino	Cal Poly, Forestry Department, Grad. Student	Kim Hayes	Elkhorn Slough Foundation
Bobby Jo Close	Central Coast CRAM/Wetland Working Group	Chris Coburn	Monterey Bay National Marine Sanctuary	Matt Johnson	County of Santa Cruz, Planning
Rebecca Ellin	CCWGIS/Wetland Working Group	Kevin Contreras	Elkhorn Slough Foundation	Ann Kitajima	Morro Bay National Estuary Program
Mary Adams	RWQCB, San Luis Obispo	Cammy Chabre	Elkhorn Slough National Estuarine Research Reserve	Cheryl Lesinski	Morro Bay National Estuary Program
Eric Van Dyke	Elkhorn Slough National Estuarine Research Reserve	Becky Christensen	Elkhorn Slough National Estuarine Research Reserve	Bill Hoffman	Morro Bay National Estuary Program
Kerstin Wasson	Elkhorn Slough National Estuarine Research Reserve	Andrea Woolfolk	Elkhorn Slough National Estuarine Research Reserve	Stacey Smith	California Conservation Corps
David Wolff	David Wolff Environmental	Matt Johnson	County of Santa Cruz, Planning		

Tasks And Deliverables

Implementation of a wetlands monitoring system suitable for assessing ecosystem response to restoration actions

Task ID	Task Name	Start Month	End Month	Deliverables
1	Project Management	1	36	Semiannual and final reports. Periodic invoices with Progress Reports
2	Extend Wetland and Riparian Inventories	6	30	NWI Updates; Riparian Maps; Project Maps; Tracker Release
3	Train Multi-Disciplinary Regional Teams	6	30	Selection of Trainees; Field Tests; Revised Manual; Training Report
4	USE CRAM to Evaluate ERP Projects	6	30	Project Selection; Field Evaluation Report
5	Report on Ecosystem Response of Multiple ERP Projects	6	36	Press Release; Public Workshops; Final Report

Comments

If you have comments about budget justification that do not fit elsewhere, enter them here.

Budget Summary

Project Totals

Labor	Benefits	Travel	Supplies And Expendables	Services And Consultants	Equipment	Lands And Rights Of Way	Other Direct Costs	Direct Total	Indirect Costs	Total
$405,879	$109,586	$22,500	$9,000	$416,421	$0	$0	$0	$963,386	$811,294	$1,774,680

Do you have cost share partners already identified?
No.

If yes, list partners and amount contributed by each:

Do you have potential cost share partners?
No.

If yes, list partners and amount contributed by each:

Are you specifically seeking non−federal cost share funds through this solicitation?

Implementation of a wetlands monitoring system suitable for assessing ecosystem response to restoration actions

Implementation of a wetlands monitoring system suitable for assessing ecosystem response to restoration actions

Year 1 (Months 1 To 12)

Task	Labor	Benefits	Travel	Supplies And Expendables	Services And Consultants	Equipment	Lands And Rights Of Way	Other Direct Costs	Direct Total	Indirect Costs	Total

1: project management (12 months)	**16794**	**4534**	**1500**	**500**	**3667**	**0**	**0**	**0**	$26,995	**26874**	$53,869
2: Extend Wetland and Riparian Inventories (7 months)	**65021**	**17556**	**1500**	**500**	**13552**	**0**	**0**	**0**	$98,129	**104046**	$202,175
3: Train Multi−Disciplinary Regional Teams (7 months)	**9682**	**2614**	**1500**	**500**	**8008**	**0**	**0**	**0**	$22,304	**15493**	$37,797
4: USE CRAM to Evaluate ERP Projects (7 months)	**11907**	**3215**	**1500**	**500**	**3080**	**0**	**0**	**0**	$20,202	**19054**	$39,256
5: Report on Ecosystem Response of Multiple ERP Projects (7 months)	**12929**	**3491**	**1500**	**500**	**88928**	**0**	**0**	**0**	$107,348	**20689**	$128,037
Totals	**$116,333**	**$31,410**	**$7,500**	**$2,500**	**$117,235**	**$0**	**$0**	**$0**	**$274,978**	**$186,156**	**$461,134**

Year 2 (Months 13 To 24)

Task	Labor	Benefits	Travel	Supplies And Expendables	Services And Consultants	Equipment	Lands And Rights Of Way	Other Direct Costs	Direct Total	Indirect Costs	Total
1: project management (12 months)	**16794**	**4534**	**1800**	**700**	**3667**	**0**	**0**	**0**	$27,495	**26874**	$54,369
2: Extend Wetland and Riparian Inventories (12 months)	**111464**	**30095**	**1800**	**700**	**23232**	**0**	**0**	**0**	$167,291	**178365**	$345,656

3: Train Multi−Disciplinary Regional Teams (12 months)	**16598**	**4481**	**1800**	**700**	**13728**	**0**	**0**	**0**	$37,307	**178365**	$215,672
4: USE CRAM to Evaluate ERP Projects (12 months)	**20413**	**5511**	**1800**	**700**	**5280**	**0**	**0**	**0**	$33,704	**32664**	$66,368
5: Report on Ecosystem Response of Multiple ERP Projects (12 months)	**22164**	**5984**	**1800**	**700**	**152448**	**0**	**0**	**0**	$183,096	**35467**	$218,563
Totals	**$187,433**	**$50,605**	**$9,000**	**$3,500**	**$198,355**	**$0**	**$0**	**$0**	**$448,893**	**$451,735**	**$900,628**

Year 3 (Months 25 To 36)

Task	Labor	Benefits	Travel	Supplies And Expendables	Services And Consultants	Equipment	Lands And Rights Of Way	Other Direct Costs	Direct Total	Indirect Costs	Total
1: project management (12 months)	**16794**	**4534**	**1200**	**600**	**3667**	**0**	**0**	**0**	$26,795	**36874**	$63,669
2: Extend Wetland and Riparian Inventories (6 months)	**55732**	**15048**	**1200**	**600**	**11616**	**0**	**0**	**0**	$84,196	**89183**	$173,379
3: Train Multi−Disciplinary Regional Teams (6 months)	**8299**	**2241**	**1200**	**600**	**6684**	**0**	**0**	**0**	$19,024	**13280**	$32,304
4: USE CRAM to Evaluate ERP Projects	**10206**	**2756**	**1200**	**600**	**2640**	**0**	**0**	**0**	$17,402	**16332**	$33,734

(6 months)											
5: Report on Ecosystem Response of Multiple ERP Projects (12 months)	**11082**	**2992**	**1200**	**600**	**76224**	**0**	**0**	**0**	$92,098	**17734**	$109,832
Totals	**$102,113**	**$27,571**	**$6,000**	**$3,000**	**$100,831**	**$0**	**$0**	**$0**	**$239,515**	**$173,403**	**$412,918**

Budget Justification

Implementation of a wetlands monitoring system suitable for assessing ecosystem response to restoration actions

Labor

PI Proj. Management Asst. Env. Scientist Analyst Data Management IT Management IT support Contract Management Graphic Artist hrs $$ hrs $$ hrs $$ hrs $$ hrs $$ hrs $$ hrs $$ $$ hrs $$ task 1 20 140 2800 60 130 7800 10 85 850 0 52 0 20 75 1500 0 110 0 0 125 0 8 80 640 0 68 0 2 800 140 112000 100 130 13000 700 85 59500 3000 52 156000 800 75 60000 1000 110 110000 1200 125 150000 60 80 4800 140 68 9520 3 300 140 42000 300 130 39000 200 85 17000 100 52 5200 10 75 750 60 110 6600 40 125 5000 20 80 1600 300 68 20400 4 300 140 42000 300 130 39000 300 85 25500 100 52 5200 200 75 15000 100 110 11000 100 125 12500 40 80 3200 100 68 6800 5 300 140 42000 300 130 39000 300 85 25500 200 52 10400 200 75 15000 100 110 11000 100 125 12500 20 80 1600 200 68 13600

Benefits

Benefits are calculated at Labor X 0.27

Travel

$4500 of travel per task for all three years of the project is requested. Non−local travel will be necessary to meet with project partners. All travel will be reimbursed at current California rates.

Supplies And Expendables

$1800 of supplies and expendables is requested per task for all three years of the project. This will include $1200 of supplies (papers, copies, etc) and $600 of computer supplies

Services And Consultants

Will work with ERP manager to assemble the team to conduct training and tech transfer.

Equipment

Not Applicable

Lands And Rights Of Way

Not Applicable

Other Direct Costs

Not Applicable

Indirect Costs/Overhead

IDC is calculate by the following formula (labor+benefits)X1.26. IDC includes primarily rent, phones, general office staff, unbillable time)

Comments

Environmental Compliance

Implementation of a wetlands monitoring system suitable for assessing ecosystem response to restoration actions

CEQA Compliance

Which type of CEQA documentation do you anticipate?
X none
− negative declaration or mitigated negative declaration
− EIR
− categorical exemption

If you are using a categorical exemption, choose all of the applicable classes below.
− Class 1. Operation, repair, maintenance, permitting, leasing, licensing, or minor alteration of existing public or private structures, facilities, mechanical equipment, or topographical features, involving negligible or no expansion of use beyond that existing at the time of the lead agency's determination. The types of "existing facilities" itemized above are not intended to be all−inclusive of the types of projects which might fall within Class 1. The key consideration is whether the project involves negligible or no expansion of an existing use.
− Class 2. Replacement or reconstruction of existing structures and facilities where the new structure will be located on the same site as the structure replaced and will have substantially the same purpose and capacity as the structure replaced.
− Class 3. Construction and location of limited numbers of new, small facilities or structures; installation of small new equipment and facilities in small structures; and the conversion of existing small structures from one use to another where only minor modifications are made in the exterior of the structure. The numbers of structures described in this section are the maximum allowable on any legal parcel, except where the project may impact on an environmental resource of hazardous or critical concern where designated, precisely mapped, and officially adopted pursuant to law by federal, state, or local agencies.
− Class 4. Minor public or private alterations in the condition of land, water, and/or vegetation which do not involve removal of healthy, mature, scenic trees except for forestry or agricultural purposes, except where the project may impact on an environmental resource of hazardous or critical concern where designated, precisely mapped, and officially adopted pursuant to law by federal, state, or local agencies.
− Class 6. Basic data collection, research, experimental management, and resource evaluation activities which do not result in a serious or major disturbance to an environmental resource, except where the project may impact on an environmental resource of hazardous or critical concern where designated, precisely mapped, and officially adopted pursuant to law by federal, state, or local agencies. These may be strictly for information

gathering purposes, or as part of a study leading to an action which a public agency has not yet approved, adopted, or funded.
– Class 11. Construction, or placement of minor structures accessory to (appurtenant to) existing commercial, industrial, or institutional facilities, except where the project may impact on an environmental resource of hazardous or critical concern where designated, precisely mapped, and officially adopted pursuant to law by federal, state, or local agencies.

Identify the lead agency.

Is the CEQA environmental impact assessment complete?

If the CEQA environmental impact assessment process is complete, provide the following information about the resulting document.

Document Name
State Clearinghouse Number

If the CEQA environmental impact assessment process is not complete, describe the plan for completing draft and/or final CEQA documents.

NEPA Compliance

Which type of NEPA documentation do you anticipate?
X none
– environmental assessment/FONSI
– EIS
– categorical exclusion

Identify the lead agency or agencies.

If the NEPA environmental impact assessment process is complete, provide the name of the resulting document.

If the NEPA environmental impact assessment process is not complete, describe the plan for completing draft and/or final NEPA documents.

Successful applicants must tier their project's permitting from the CALFED Record of Decision and attachments providing programmatic guidance on complying with the state and federal endangered species acts, the Coastal Zone Management Act, and sections 404 and 401 of the Clean Water Act.

Please indicate what permits or other approvals may be required for the activities contained in your proposal and also which have already been obtained. Please check all that apply. If a permit is *not* required, leave both Required? and Obtained? check boxes blank.

Local Permits And Approvals	Required?	Obtained?	Permit Number (If Applicable)
conditional Use Permit	–	–	
variance	–	–	
Subdivision Map Act	–	–	
grading Permit	–	–	
general Plan Amendment	–	–	
specific Plan Approval	–	–	
rezone	–	–	
Williamson Act Contract Cancellation	–	–	
other	–	–	

State Permits And Approvals	Required?	Obtained?	Permit Number (If Applicable)
scientific Collecting Permit	X	–	
CESA Compliance: 2081	–	–	
CESA Complance: NCCP	–	–	
1602	–	–	
CWA 401 Certification	–	–	
Bay Conservation And Development Commission Permit	–	–	
reclamation Board Approval	–	–	
Delta Protection Commission Notification	–	–	
state Lands Commission Lease Or Permit	–	–	

action Specific Implementation Plan	**–**	**–**	
other	**–**	**–**	

Federal Permits And Approvals	**Required?**	**Obtained?**	**Permit Number (If Applicable)**
ESA Compliance Section 7 Consultation	**–**	**–**	
ESA Compliance Section 10 Permit	**–**	**–**	
Rivers And Harbors Act	**–**	**–**	
CWA 404	**–**	**–**	
other	**–**	**–**	

Permission To Access Property	**Required?**	**Obtained?**	**Permit Number (If Applicable)**
permission To Access City, County Or Other Local Agency Land Agency Name **Specific Sites Have Not Yet Been Selected**	**X**	**–**	
permission To Access State Land Agency Name **Specific Sites Have Not Yet Been Selected**	**X**	**–**	
permission To Access Federal Land Agency Name **Specific Sites Have Not Yet Been Selected**	**X**	**–**	
permission To Access Private Land Landowner Name **Specific Sites Have Not Yet Been Selected**	**X**	**–**	

If you have comments about any of these questions, enter them here.

The exact locations and ownership of monitoring sites have not yet been determined. Site selection will include access permission as a criterion

Land Use

Implementation of a wetlands monitoring system suitable for assessing ecosystem response to restoration actions

Does the project involve land acquisition, either in fee or through easements, to secure sites for monitoring?
X No.
– Yes.

How many acres will be acquired by fee?

How many acres will be acquired by easement?

Describe the entity or organization that will manage the property and provide operations and maintenance services.

Is there an existing plan describing how the land and water will be managed?
– No.
X Yes. **Various DFG and USFWS reserve management plans**

Will the applicant require access across public or private property that the applicant does not own to accomplish the activities in the proposal?
– No.
X Yes.

Describe briefly the provisions made to secure this access.

After monitoring sites have been selected, access permits will be obtained

Do the actions in the proposal involve physical changes in the current land use?
X No.
– Yes.

Describe the current zoning, including the zoning designation and the principal permitted uses permitted in the zone.

Describe the general plan land use element designation, including the purpose and uses allowed in the designation.

Describe relevant provisions in other general plan elements affecting the site, if any.

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?
X No.
– Yes.

Land Designation	Acres	Currently In Production?
Prime Farmland		**–**
Farmland Of Statewide Importance		**–**
Unique Farmland		**–**
Farmland Of Local Importance		**–**

Is the land affected by the project currently in an agricultural preserve established under the Williamson Act?
– No.
X Yes.

Is the land affected by the project currently under a Williamson Act contract?
X No.
– Yes.

Why is the land use proposed consistent with the contract's terms?

This is a monitoring and assessment project and will not change Williamson Act contract terms

Describe any additional comments you have about the projects land use.