Restoration of Eastern Delta Floodplain Habitats on Grizzly Slough in the Cosumnes River Watershed

Project Information

1. **Proposal Title:**

   Restoration of Eastern Delta Floodplain Habitats on Grizzly Slough in the Cosumnes River Watershed

2. **Proposal applicants:**

   Dave Brown, California Department of Water Resources
   Brad Burkholder, Department of Fish and Game
   Naill McCarten, Environmental Science Associates
   Chris Neudeck, Kjeldsen Sinnock Neudeck Inc., Consulting Engineers and Land Surveyors
   Fred Brovold, Lowney Associates
   Betty Andrews, Philip Williams & Associates, Consultants in Hydrology
   Jeffrey Mount, Cosumnes Research Group, Center for Integrated Watershed Science and Managment
   Rick Cooper, The Nature Conservancy, Cosumnes River Preserve

3. **Corresponding Contact Person:**

   Dave Brown
   Department of Water Resources, Environmental Services Office, Mitigation and Restoration Branch
   3251 S Street Sacramento, CA 95816
   916 227-2493
   dbrown@water.ca.gov

4. **Project Keywords:**

   At-risk species, fish
   Geomorphology
   Habitat Restoration, Riparian

5. **Type of project:**

   Planning

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

   No

7. **Topic Area**:

   Riparian Habitat

8. **Type of applicant:**

   State Agency

9. **Location - GIS coordinates:**

   Latitude: 38.2531738

   Longitude: -121.4262772

   Datum:

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

   The Grizzly Slough Property is a 489-acre parcel. The property is within the Cosumnes River Watershed and is located in Sacramento County approximately two miles northeast of the town of Thornton. New Hope road borders it to the south and Grizzly Slough and Bear Slough meet at its northern tip and form the east, and west boundaries. The proposal also includes a reconnaissance level study of the potential for similar restoration projects on adjacent parcels. These adjacent properties include the Cougar property in the Cosumnes River Preserve and lands to the west between Grizzly Slough and the Mokelumne River and to the south between Dry Creek and New Hope Road.

10. **Location - Ecozone:**

    11.1 Cosumnes River, 11.2 Mokelumne River

11. **Location - County:**

    Sacramento

12. **Location - City:**

    Does your project fall within a city jurisdiction?

    No

13. **Location - Tribal Lands:**

    Does your project fall on or adjacent to tribal lands?

    No

14. **Location - Congressional District:**

    11th, Richard W. Pombo

15. **Location:**

    California State Senate District Number: 4 and 5

    California Assembly District Number: 10

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

    3

17. **Requested Funds:**

    a) Are your overhead rates different depending on whether funds are state or federal?

    Yes

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

State Overhead Rate:	55
Total State Funds:	40000
Federal Overhead Rate:	42
Total Federal Funds:	40000

    b) Do you have cost share partners already identified?

    Yes

    If yes, list partners and amount contributed by each:

    The Nature Conservancy $3,200

    Department of Water Resources $40,000

    c) Do you have potential cost share partners?

    No

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

    No

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

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

    No

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

    Yes

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

2001-C200	**Phase 2 - Merced River Salmon Habitat Enhancement: River Mile 42 to 43.5 (Robinson Ranch and Gravel Mining Permit #307 site)**	**CALFED - ERP**
98-C1009	**Phase 2 - Merced River Salmon Habitat Enhancement: River Mile 42 to 43.5 (Robinson Ranch and Gravel Mining Permit #307 site)**	**CALFED - ERP**
99B05	**Phase I - Merced River Salmon Habitat Enhancement: River Mile 40 to 40.5 (Robinson/Gallo Project - Ratzlaff Reach Site)**	**CALFED - USBR/Directed Action**
96-M02	**Prospect Island Shallow Water Habitat/Wetland Restoration Plan**	**CALFED - ERP**
99A02	**Prospect Island Monitoring Plan**	**CALFED - ERP**
96-M26	**Prospect Island Develop Monitoring Plan**	**CALFED - ERP**

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

No

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

Yes

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

113329J023	**Phase I - Merced River Salmon Habitat Enhancement: River Mile 40 to 40.5 (Robinson/Gallo Project - Ratzlaff Reach Site)**	**AFRP - USFWS**

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:**

Regarding 17.a: The amount of State and federal funds granted is at the discretion of CALFED.

Environmental Compliance Checklist

Restoration of Eastern Delta Floodplain Habitats on Grizzly Slough in the Cosumnes River Watershed

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.

      Compliance with NEPA would only be required if federal funds were granted.

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

   CEQA Lead Agency: Department of Water Resources
   NEPA Lead Agency (or co-lead:) US Fish and Wildlife Service or Bureau of Reclamation
   NEPA Co-Lead Agency (if applicable):

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

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

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

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

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

      No

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

It is anticipated that the Initial Study/Environmental Assessment will be completed by August 2003 and that a final Mitigated Negative Declaration/NOD and final Environmental Assessment/FONSI will be filed by September 2003.

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

FEDERAL PERMITS AND APPROVALS

ESA Compliance Section 7 Consultation	Required
ESA Compliance Section 10 Permit	
Rivers and Harbors Act	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: Department of Water Resources	Obtained
Permission to access federal land. Agency Name: Bureau of Reclamation	Obtained
Permission to access private land. Landowner Name: Tonarelli, Oreno and Marry; Fry 99 Trust	Required

6. **Comments.**

Land Use Checklist

Restoration of Eastern Delta Floodplain Habitats on Grizzly Slough in the Cosumnes River Watershed

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?**

   Yes

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?

      489

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

      Currently, the land is mostly used for row-crop agriculture. The project will convert most of the property to floodplain habitat, but will still maintain agricultural uses on a portion.

   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	**Row-crop agriculture and 35-acre mitigation site**	**Reduce amount of land used for agriculture. The 35-acre mitigation site will be sustained.**
Zoning	**Ag 80**	**none**
General Plan Designation	**Agriculture**	**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 Water Resources and The Nature Conservancy.

4. **Comments.**

Conflict of Interest Checklist

Restoration of Eastern Delta Floodplain Habitats on Grizzly Slough in the Cosumnes River Watershed

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):

Dave Brown, California Department of Water Resources
Brad Burkholder, Department of Fish and Game
Naill McCarten, Environmental Science Associates
Chris Neudeck, Kjeldsen Sinnock Neudeck Inc., Consulting Engineers and Land Surveyors
Fred Brovold, Lowney Associates
Betty Andrews, Philip Williams & Associates, Consultants in Hydrology
Jeffrey Mount, Cosumnes Research Group, Center for Integrated Watershed Science and Managment
Rick Cooper, The Nature Conservancy, Cosumnes River Preserve

Subcontractor(s):

Are specific subcontractors identified in this proposal? No

Helped with proposal development:

Are there persons who helped with proposal development?

Yes

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

Ramona Swenson The Nature Conservancy, Cosumnes River Preserve

Aric Lester Department of Water Resources

Niall McCarten Environmental Science Associates

Chris Neudeck Kjeldsen Sinnock Neudeck. Inc

Betty Andrews **Philip Williams and Associates**

Fred Brovold **Lowney Associates**

Comments:

Budget Summary

Restoration of Eastern Delta Floodplain Habitats on Grizzly Slough in the Cosumnes River Watershed

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	**Project Managment**	**286**	**5405**	**3804**						**9209.0**	**10809**	**20018.00**
2.1	**Soil and geotechnical survey on Grizzly Property**						**105600**			**105600.0**		**105600.00**
2.2	**Topographic and bathymetric survey on Grizzly Property**						**128774**			**128774.0**		**128774.00**
2.3	**Collection of biological data and information on Grizzly Property**						**25815**			**25815.0**		**25815.00**
2.4	**Collection of hydrology and hydraulic data and information on Grizzly Property**						**28718**			**28718.0**		**28718.00**
2.5	**Collection of geomorphology data and information on Grizzly Property**						**41085**			**41085.0**		**41085.00**
3.1	**Topographic and bathymetric survey on adjacent properties**						**38151**			**38151.0**		**38151.00**
3.2	**Collection of biological data on adjacent properties**						**2040**			**2040.0**		**2040.00**
3.3	**Collection of hydrology and hydraulic data\initial model prep for adjacent properties**						**1984**			**1984.0**		**1984.00**
3.4	**Collection of geomorphology data and information for adjacent properties**						**5486**			**5486.0**		**5486.00**
4.1	**Identify restoration alternatives**						**24000**			**24000.0**		**24000.00**
4.2.1	**Hydrodynamic model/flood hazard for Grizzly Slough Property**						**15297**			**15297.0**		**15297.00**

4.2.2	**Hydrodynamic model/flood hazard for adjacent property**						**2466**			**2466.0**		**2466.00**
4.2.3	**Model refinement to address issues**						**44988**			**44988.0**		**44988.00**
4.3.1	**Geomorphology: Grizzly Slough Property**						**25815**			**25815.0**		**25815.00**
4.3.2	**Geomorphology: adjacent properties**						**1636**			**1636.0**		**1636.00**
4.4	**Vegetative design/habitat design**						**8002**			**8002.0**		**8002.00**
5.1	**Environmental documentation/Public Outreach**						**13970**			**13970.0**		**13970.00**
		286	**5405.00**	**3804.00**	**0.00**	**0.00**	**513827.00**	**0.00**	**0.00**	**523036.00**	**10809.00**	**533845.00**

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	Project Managment	286	5405	3804						9209.0	10809	20018.00
4.1	Identify restoration alternatives						19670			19670.0		19670.00
4.2.1	Hydrodynamic model/flood hazard for Grizzly Slough Property						10677			10677.0		10677.00
4.2.3	Model refinement to address issues						110221			110221.0		110221.00
4.3.1	Geomorphology: Grizzly Slough Property						18071			18071.0		18071.00
4.4	Vegetative design/habitat design						17050			17050.0		17050.00
4.5	Identify selection prcess for restoration plan						22415			22415.0		22415.00
5.1 & 5.2	Environmental documentation/Public Outreach						47830			47830.0		47830.00
5.3	Permitting						19935			19935.0		19935.00
6.1	Hydraulic analysis of refined alternative						35540			35540.0		35540.00
6.2	Geomorphic analysis of refined alternative						28313			28313.0		28313.00
6.3	Restoration plan						49440			49440.0		49440.00
6.4	Preliminary design/engineering						28074			28074.0		28074.00
6.5	Monitoring plan						30430			30430.0		30430.00
6.6	Adaptive managment strategy						28530			28530.0		28530.00
		286	5405.00	3804.00	0.00	0.00	466196.00	0.00	0.00	475405.00	10809.00	486214.00

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
		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Grand Total=1020059.00

Comments.
This budget does not include contingency. The amount of State or federal funds granted is to the discretion of CALFED. Task 1, Project management is the only task affected by differing State and federal rates. $40,036 in state funds is required to cover this task (54% overhead; shown above). $31,756 in federal funds ($15,878 in years 1 & 2) is required to cover this task (42% overhead).

Budget Justification

Restoration of Eastern Delta Floodplain Habitats on Grizzly Slough in the Cosumnes River Watershed

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

Aric Lester, Environmental Scientist III - 572 hours

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

Aric Lester, ES III - $3,959.00 per month

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

ES III benefit rate = 19%

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

Not applicable

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

Not applicable

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.

Outside consultants where sought to accomplish the tasks identified below because DWR did not have staff time that could be dedicated. Attachment A of the proposal also depicts the budget information given below. Task Cosultant* Labor Rate Exp Total 2.1 Lowney 62600 43000 105600 2.2 KSN 86126 42648 128774 2.3 ESA 25040 775 25815 2.4 PWA 24620 4098 28718 2.5 PWA 34780 6305 41085 3.1 KSN 16398 21753 38151 3.2 ESA 2040 0 2040 3.3 PWA 1669 315 1984 3.4 PWA 4540 946 5486 4.1 ESA 41420 2250 43670 4.2.1 PWA 22200 3774 25974 4.2.2 PWA 2151 315 2466 4.2.3 PWA 130209 25000 155209 4.3.1 PWA 36720 6305 43886 4.3.2 PWA 1320 315 1635 4.4 ESA 23385 1667 25052 5.1&5.2 ESA 54700 7100 61800 5.3 ESA 19360 575 19935 6.1 PWA 30812 4728 35540 6.2 PWA 23900 4413 28313 6.3 ESA 47015 2425 49440 6.4 KSN 25824 2250 28074 6.5 ESA 30080 350 30430 6.6 ESA 28080 450 28530 * Consultants ESA - Environmental Science Associates KSN - Kjeldsen Sinnock Neudeck Inc., Lowney - Lowney Associates PWA - Philip Williams & Associates, Consultants in Hydrology

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.

Equipment is not being purchased with granted funds

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.

Inspection of work in progress - $22,020 Meetings - $8,007 Presentations - $6,005 Quarterly Reports - $2,002 Response to Questions - $2,002 Note: DWR is providing a 50% cost share for project managment.

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

All direct costs have been covered above

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.

The amount of State or federal funds granted is to the discretion of CALFED. Task 1, Project management is the only task affected by differing State and federal rates. $40,036 in state funds is required to cover this task (54% overhead; shown in summary). $31,756 in federal funds ($15,878 in years 1 & 2) is required to cover this task (42% overhead). DWR's overhead encompasses the following: - Salaries & wages - permanent - Salaries & wages - temporary - Overtime - General expense - Misc office supplies - IT software - IT Hardware - Printing - Communications - Postage - Travel - Training - Facilities operations

Executive Summary

Restoration of Eastern Delta Floodplain Habitats on Grizzly Slough in the Cosumnes River Watershed

Restoration of Eastern Delta Floodplain Habitats on Grizzly Slough in the Cosumnes River Watershed Phase I will contribute to the restoration of former floodplain habitat along the tributaries east of the Delta in an effort to restore floodplain processes and habitat for at risk species. Phase I will evaluate the potential to achieve the restoration goals through the breaching/modification of levees on a 489 acre parcel of the Cosumnes River Nature Preserve owned by the California Department of Water Resources, known as the Grizzly Slough property. The property is within the Cosumnes River Watershed and is located in Sacramento County approximately two miles northeast of the town of Thornton. The primary tasks will include data collection, modeling, environmental planning, preliminary design and engineering and development of an adaptive management strategy. The proposal also includes a reconnaissance level study of the potential for similar restoration projects on adjacent parcels. These adjacent properties include property in the Cosumnes River Preserve and land to the west between Grizzly Slough and the Mokelumne River, and land to the south between Dry Creek and New Hope Road. The key uncertainty is the attempt to predict habitat based on a very limited data set and the uncertainty of evolution of these habitats over time. We can acknowledge these uncertainties by predicting outcomes, testing them over time, and designing the project to adapt as concepts are refined. General objectives of the project are to restore self-sustaining habitat for at-risk species and improve the expanse of existing riparian habitat. It is our hypotheses that floodplain process can be restored on the Grizzly Slough property and that this will accomplish these objectives. We further hypothesize that the design of the levee breach/modification will influence the habitat types that develop on the floodplain, and how they develop.

Proposal

California Department of Water Resources

Restoration of Eastern Delta Floodplain Habitats on Grizzly Slough in the Cosumnes River Watershed

Dave Brown, California Department of Water Resources
Brad Burkholder, Department of Fish and Game
Naill McCarten, Environmental Science Associates
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Betty Andrews, Philip Williams & Associates, Consultants in Hydrology
Jeffrey Mount, Cosumnes Research Group, Center for Integrated Watershed Science and Managment
Rick Cooper, The Nature Conservancy, Cosumnes River Preserve

Restoration of Eastern Delta Floodplain Habitats on Grizzly Slough in the Cosumnes River Watershed – Phase I

A. Project Description: Project Goals and Scope of Work

1. Problem

The land adjacent to tributaries east of the Delta historically functioned as seasonal floodplain and supported a broad and expansive network of riparian forest, grassland, emergent marsh, and seasonal wetlands. Development and reclamation of these lands through levee construction channelized these tributaries and eliminated approximately 95 percent of the pre-existing floodplain habitat. Floodplain habitat is very important for many native fish, wildlife and plant species and its loss has been implicated in the decline of at-risk species such as Chinook salmon, Sacramento splittail, yellow-billed cuckoo and California black rail. Restoration of Eastern Delta Floodplain Habitats on Grizzly Slough in the Cosumnes River Watershed – Phase I (Phase I) will contribute to the restoration of former floodplain habitat along the tributaries east of the Delta in an effort to restore habitat for at risk species.

The goal of Phase I is to evaluate the potential to restore stream and floodplain process through the breaching/modification of levees and create habitat for native terrestrial and aquatic species on a 489 acre parcel of the Cosumnes River Nature Preserve owned by the California Department of Water Resources (DWR), known as the Grizzly Slough property. The property is within the Cosumnes River Watershed and is located in Sacramento County approximately two miles northeast of the town of Thornton. New Hope road borders it to the south and Grizzly Slough and Bear Slough meet at its northern tip and form the east, and west boundaries (Figures 1, 2 and 3).

The interior of the Grizzly Slough property is currently used primarily for row-crop agriculture, but also supports 35 acres of wetland and young mixed riparian forest that was created for mitigation purposes. The proposal also includes a reconnaissance level study of the potential for similar restoration projects on adjacent parcels. These adjacent properties include the Cougar property in the Cosumnes River Preserve and land to the west between Grizzly Slough and the Mokelumne River, and land to the south between Dry Creek and New Hope Road (Reconnaissance Level Study Area, Figure 3).

In the Cosumnes River Preserve and upstream from the project area, breaching of levees at the ‘Accidental Forest’ and ‘Corps Breach’ sites have accomplished successful floodplain restoration. We expect similar results can be achieved on the Grizzly Slough property. On these upstream floodplains, riparian forests began developing immediately in areas where sediments were deposited. Flooding has begun to restore considerable topographic relief and complexity through erosion and sedimentation on the floodplain. Restoration of this process has made conditions suitable for the establishment of a diverse assemblage of riparian and wetland habitats, including cottonwood-willow forest and oak woodland (Trowbridge et al., 2000). These areas currently support spawning and rearing habitat for Sacramento splittail, and rearing habitat for juvenile fall run Chinook salmon. The restored floodplains support high abundance of primary and secondary producers, which are critical to rearing salmon and splittail and other aquatic and terrestrial species (Mount et al. In review, Grosholz, 2000; Whitener and Kennedy, 1999). The value of floodplain habitat for Chinook salmon and splittail has been corroborated by Sommer et al., 2001 on the Yolo Bypass.

Figure 1. Grizzly Slough project site in relation to the Sacramento-San Joaquin Delta and Eastside Tributaries

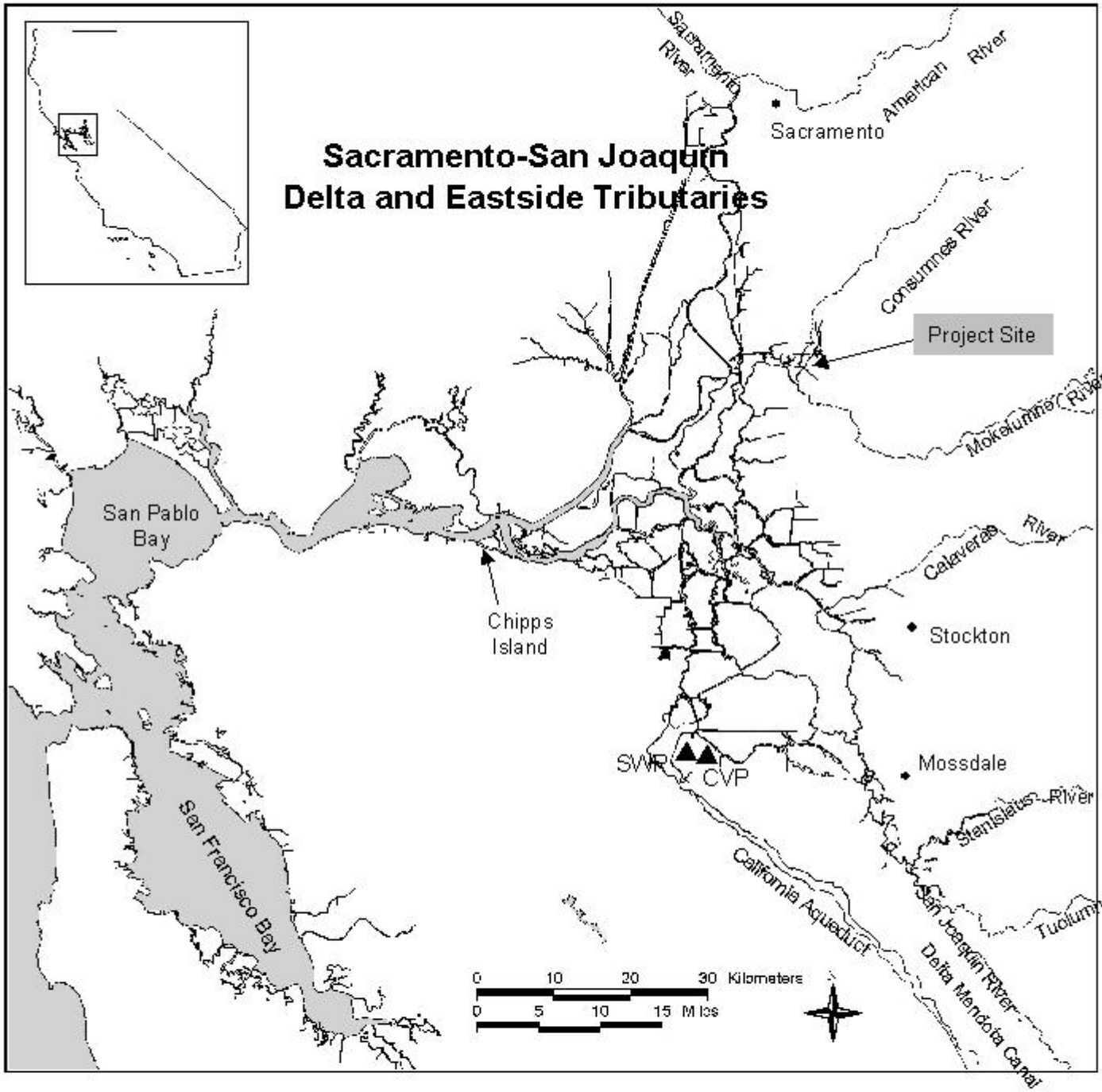


Figure 2. The Grizzly Slough Property and Cosumnes River Preserve

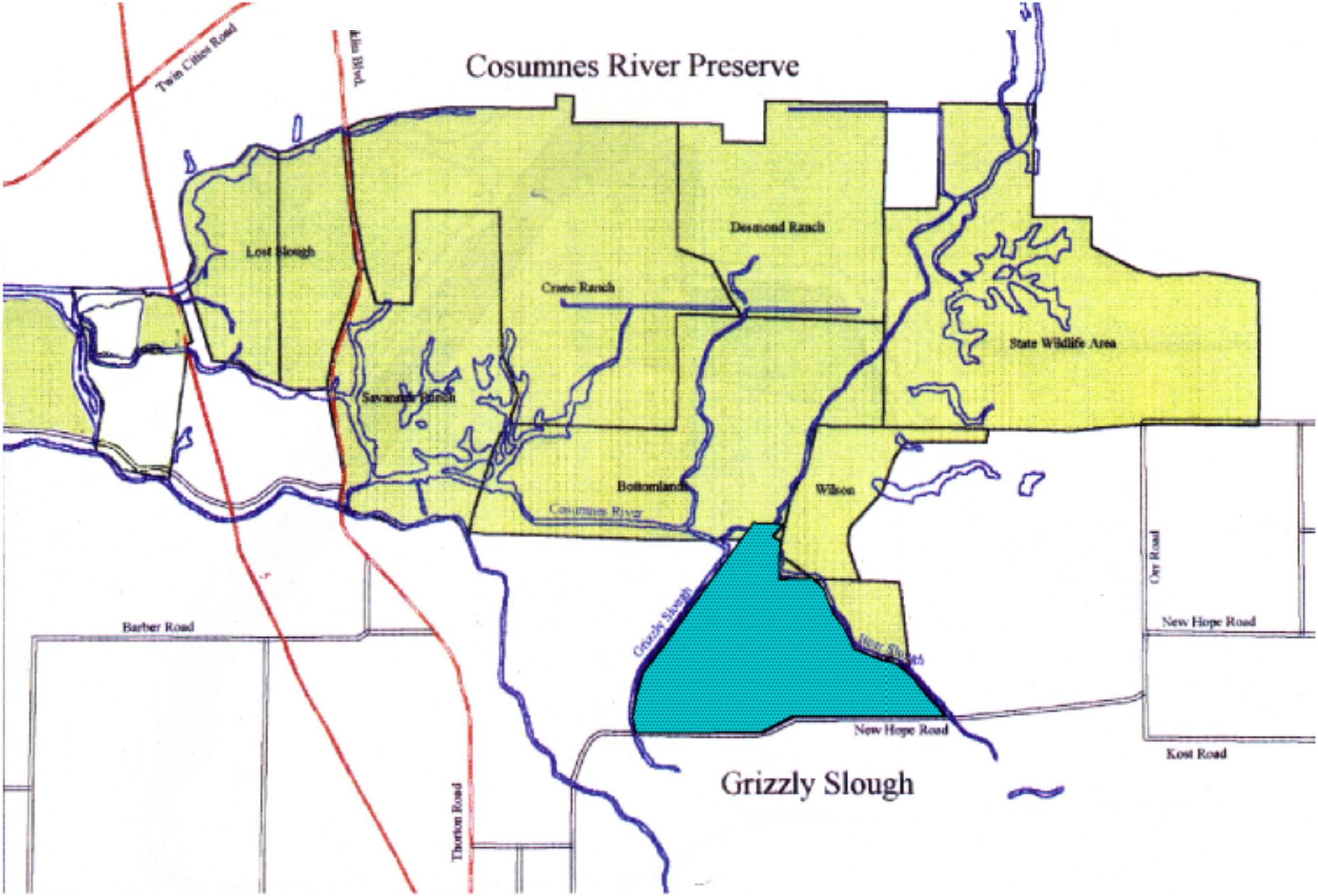
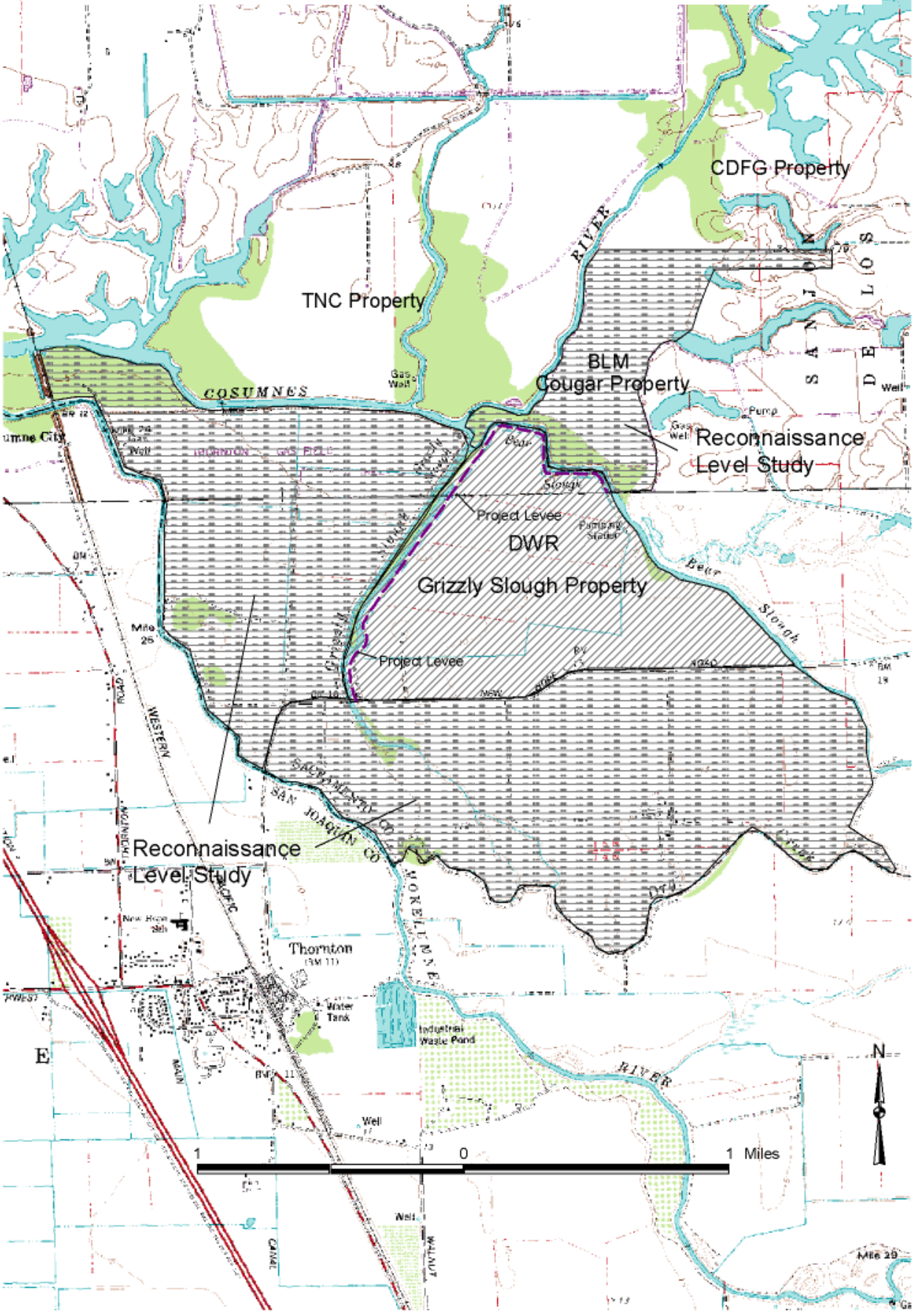


Figure 1. Grizzly Slough project site in relation to the Sacramento-San Joaquin Delta and Eastside Tributaries



Although this proposal will examine actions similar to the upstream projects, the Grizzly Slough site is influenced by Dry Creek and is bordered by a county road and bridge. Therefore, a substantial planning effort is required to identify potential outcomes and to address issues in Phase I. The primary tasks will include development of the preliminary design and engineering, environmental planning, permitting, development of a monitoring plan, and development of an adaptive management strategy. The objectives of the project will be refined and quantified once the above tasks have been completed, but the general objectives of the project are to restore self-sustaining habitat for at-risk fish and wildlife species and improve the expanse of existing riparian habitat and floodway in the Cosumnes River corridor. It is our hypotheses that floodplain process can be restored on the Grizzly Slough property and that this will accomplish these objectives. We further hypothesize that the design of the levee breach/modification will influence the habitat types that develop on the floodplain, and how they develop.

The hypothesis to be tested is that floodplain processes can be restored to the Grizzly Slough and Cosumnes River Preserve properties and restoration of these processes will promote a self-sustaining and dynamic system that will support habitat for at-risk fish and wildlife species and other native species. Phase I will test the feasibility and likelihood of this hypotheses through modeling, field studies, and the environmental impact analysis process. Through this process, we will also test the hypothesis that the design of the levee breach/modification will affect the type of habitats that develop on the floodplain. Phase II will see the implementation of restoration and monitoring to further address the above hypotheses as well as expand the area of study for hypotheses that are already being tested related to fisheries, geomorphology, groundwater, and the development of vegetative communities.

2. Justification

The restoration of floodplain process and habitat through levee breaches has been successful along the Cosumnes River. Grizzly Slough and Bear Slough, although adjacent and connected to the Cosumnes River, have different hydrologic regime that is influenced by Dry Creek and existing information, like stream gage data, is sparse or nonexistent. Therefore, achieving the desired extent and frequency of flooding, and habitats by breaching and/or manipulating the levee is very dependent on understanding the linkages between hydrodynamics, geomorphology, existing soil and topography, and habitat development specific to the site, which is a primary focus of this proposal.

The conceptual model for the feasibility study (Figure 4a and 4b) is based on the premise that levee breeches and/or modifications will re-establish hydrologic connectivity between the main channel and floodplain. This will restore the fundamental processes seasonal floodplain inundation that will transport nutrients, biota, water, and sediment from adjacent waterways onto the Grizzly Slough property. Restoration of this fundamental process will foster the accretion and erosion of sediment for the development of splays and channels required for the establishment of diverse habitat types. The project will promote a self-sustaining and dynamic system that will lead to habitat, community, and species diversity and complexity. Row-crop agriculture will also be sustainable on a portion of the Grizzly Sough property.

Soil, hydrology, topography, and the changes induced by geomorphic process will limit the distribution and extent of habitat types. Hydrologic parameters such as water volume, velocity, timing, depth, frequency, areal extent, and residence time will be the primary controlling

Figure 4a. Diagram of Phase I conceptual model

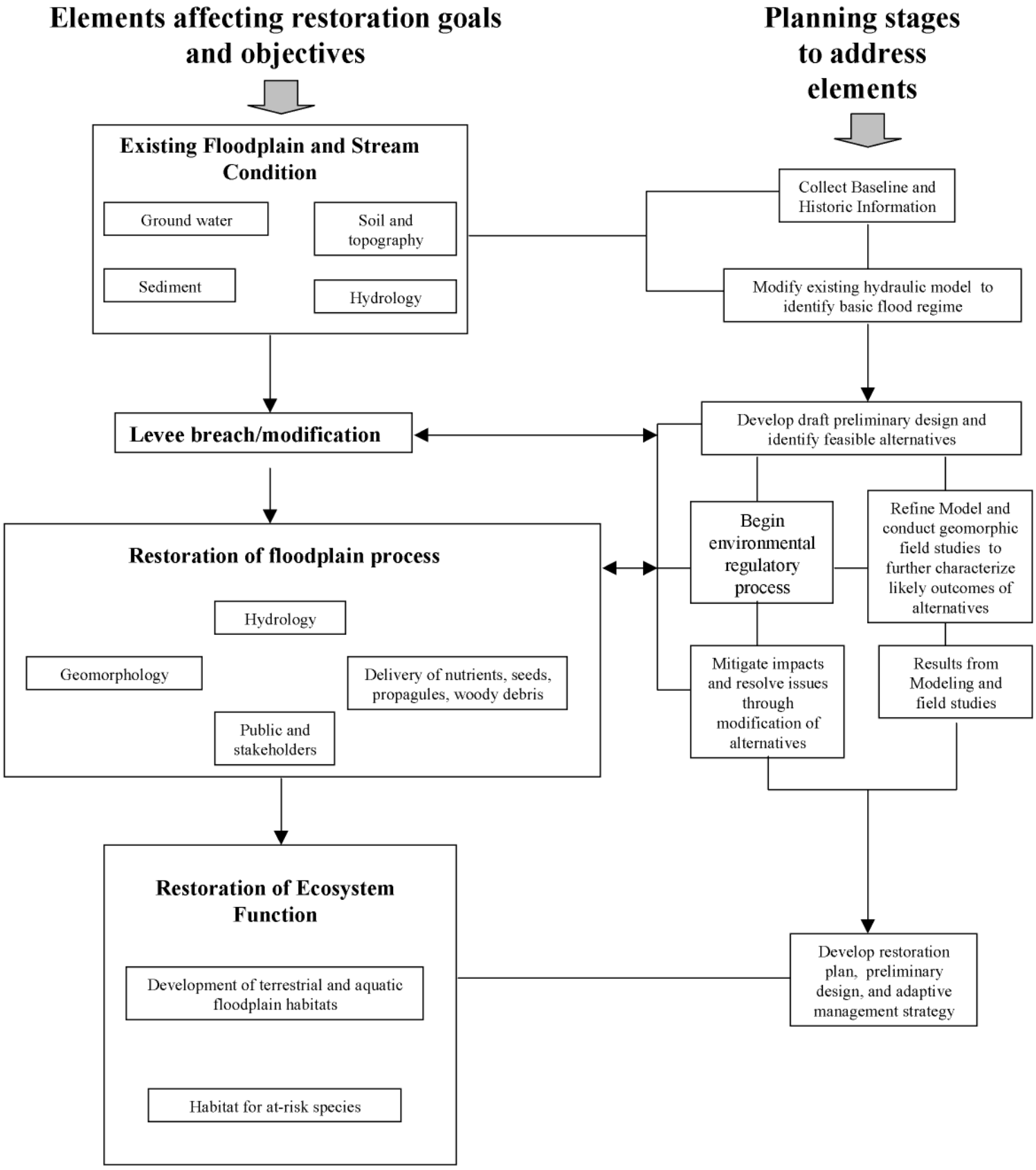
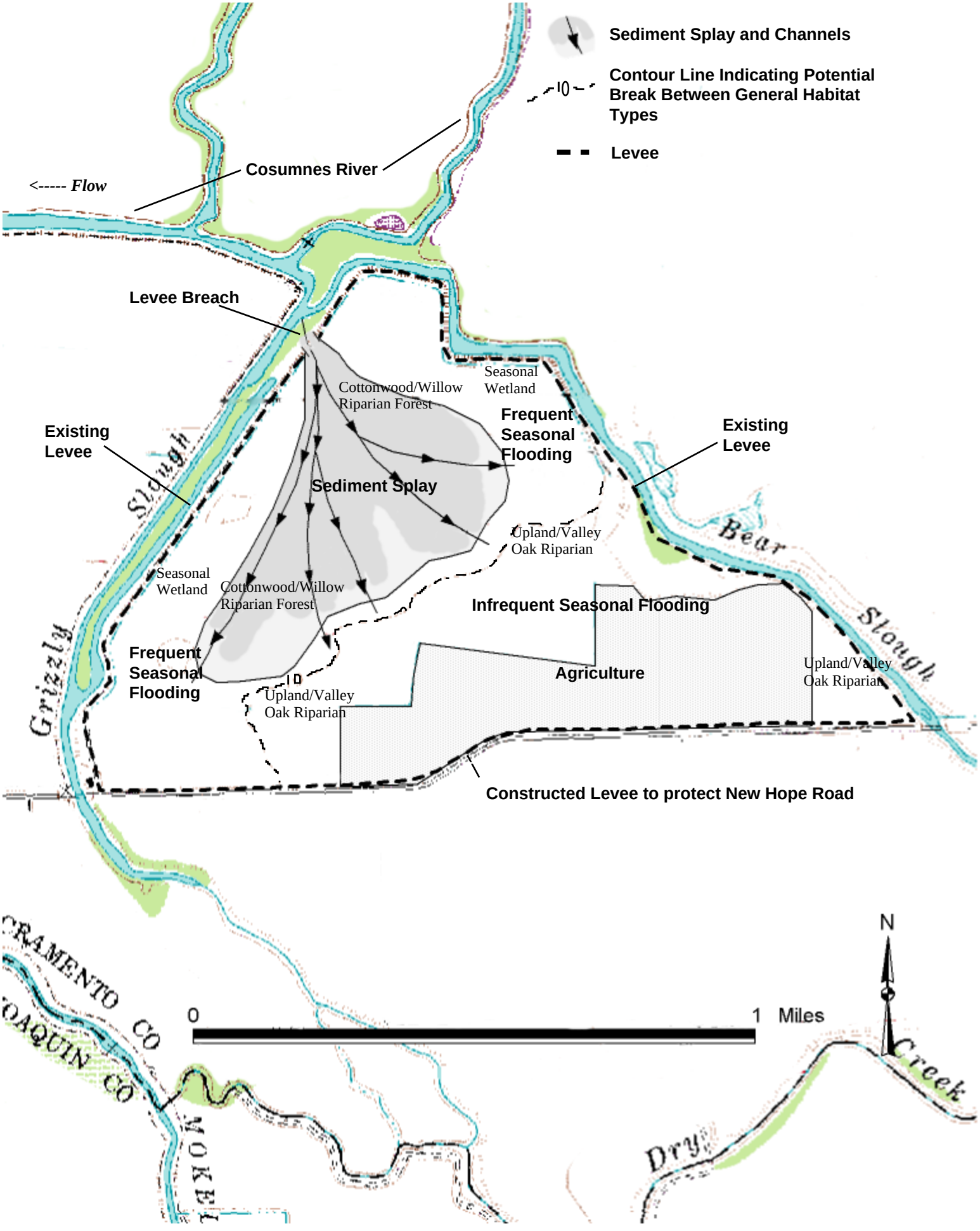


Figure 4b. Conceptual model of floodplain restoration through levee breach/modification on the Grizzly Slough Property



variables affecting the other limiting factors. Sufficient data on these factors does not exist to predict the outcome and optimize the benefits of reconnecting Grizzly Slough and Bear Slough with their former floodplain. Therefore, the participants will collect soil, hydrology, and topography data, and collect and review existing information on historic and contemporary geomorphic conditions in Phase I to model and analyze levee breaches and modification scenarios. Based on analyses of these physical processes, the likely extent and distribution of habitats will be delineated for the scenarios and potential flood risk will be assessed. The best scenario will be chosen based on stakeholder input, maximum sustainability, and greatest benefit for at-risk species and their associated habitats.

The key uncertainty is the attempt to predict habitat based on a very limited data set and the uncertainty of evolution of these habitats over time. We can acknowledge these uncertainties by predicting outcomes, testing them over time, and designing the project to adapt as concepts are refined.

An adaptive management strategy will be developed in Phase I for application in Phase II of the project. Figure 5 depicts how the project fits into the adaptive management process. The Cosumnes Research Group, Center for Integrated Watershed Science and Management (CRG) and The Nature Conservancy (TNC) are currently conducting investigations to better understand the effectiveness of floodplain restoration projects within the Cosumnes River floodplain. These investigators will provide oversight for the development of the adaptive management strategy for the Grizzly Slough project. Development and monitoring of the project will be done in close coordination with these other investigations, so that results are comparable and so apparently successful techniques and models can be verified. The adaptive management strategy will be outlined early in Phase I to insure that key facets fit into the framework.

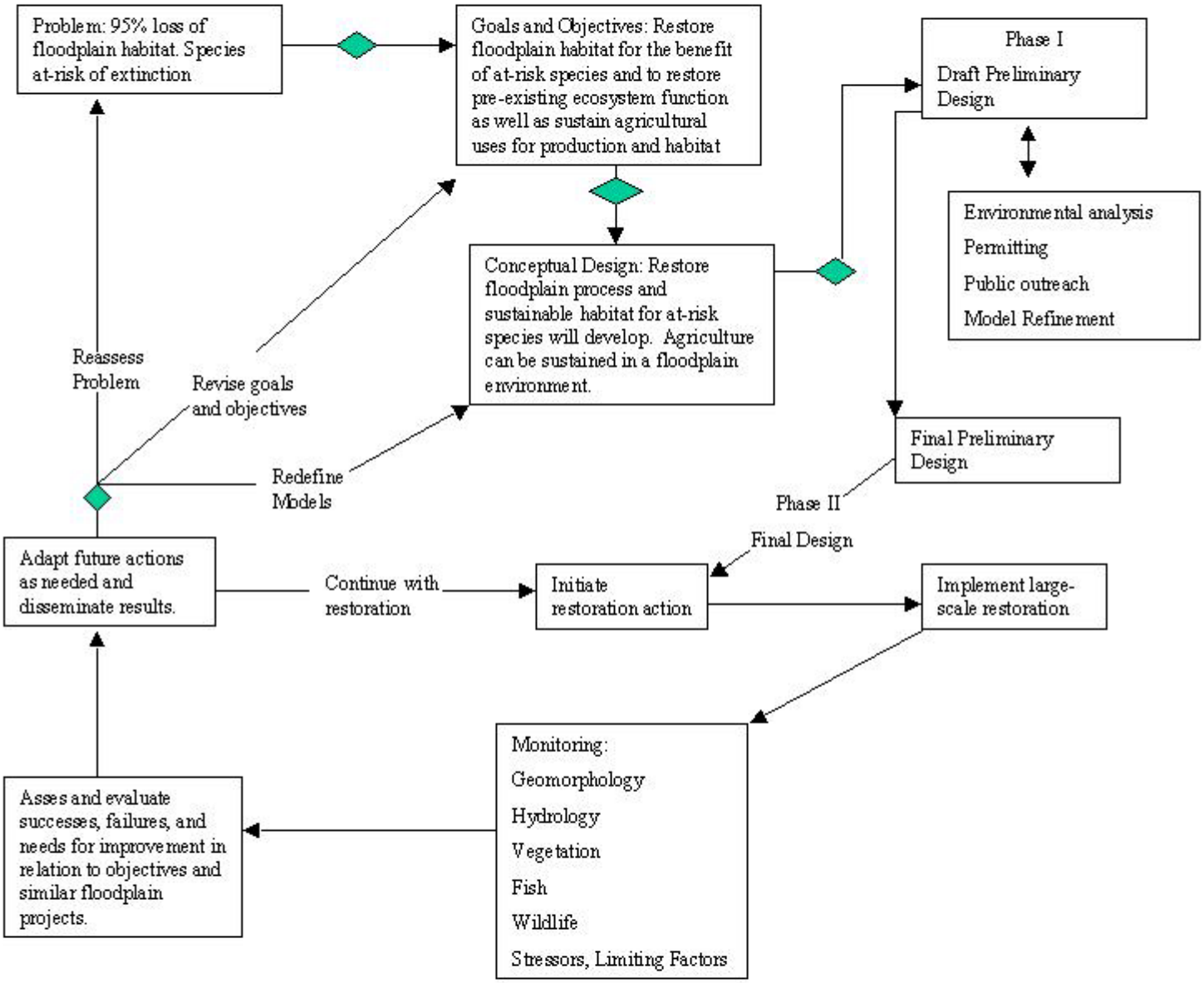
Adaptive management will be applied in Phase I to the extent that project alternatives will be chosen using an iterative process of modeling, field study and issue identification, and that the resulting models and reports will be made available to other practitioners through the web and upon request to improve their likelihood of success. The application of adaptive management in Phase II will be considered during alternative development. Phase I and Phase II of this project will augment the existing knowledge base and expand the area of study for the topic of floodplain restoration in the Cosumnes River floodplain.

Once the project is implemented, it will be monitored to determine if our objectives of habitat restoration for at-risk species are being accomplished, and how well the models and predictions performed. The success of agricultural uses will also be monitored and documented. Data will be collected on geomorphology, topography, hydrology, and soils along with the distribution of habitats to assess conditions that are limiting or promoting the development of desired conditions. The monitoring data will be compared to other floodplain projects on the Cosumnes River Preserve to assess the relative level of success. The results will be disseminated and made available to other practitioners in the field of floodplain restoration via the Internet, conferences, ‘fact sheets’, newsletters, and publications.

3. Approach

A draft preliminary project design will be developed based on initial topography, hydrology, soil, geotechnical, sediment data, expert knowledge, and from the examination of the ‘Corps Breach’, ‘Desmond Ranch’, and ‘Accidental Forest’ breaches. The design will be modified to address

Figure 5. Adaptive management Process



issues and innovations that arise during environmental document review, public outreach, and permitting process, and as the understanding of hydraulic, geomorphic, and ecological processes of the site are refined. The draft preliminary design will focus on the identification of the flood hazards and address the issue of flood protection for adjacent properties and New Hope Road.

Phase I will also include a reconnaissance level study to explore the potential for similar floodplain restoration projects on adjacent parcels. This will include soliciting landowners and collection of baseline topography, hydrology, and environmental information to identify potential obstacles to floodplain restoration on these properties. These adjacent properties include the Cougar property in the Cosumnes River Preserve and lands to the west between Grizzly Slough and the Mokelumne River.

CDFG's Valley Bay-Delta Branch, The Nature Conservancy (TNC), and The Cosumnes Research Group, Center for Integrated Watershed Science and Management (CRG). CDFG will assist DWR with oversight in the development of potential alternatives and participate on project team meetings. These team members will work with DWR, contractors, and any other potential stakeholders to develop alternatives based upon the best available scientific information. CDFG could also serve as the lead in coordinating the project with the Delta Protection Commission and any CALFED working groups that may have an interest in the project.

Task 1 – Project Management

Project management will include coordination of project tasks, contract and budget management, monitoring project progress and ensuring timelines are met. This task will also include coordinating and facilitating periodic team meetings.

Task 2 & 3 – Collection of baseline information for the Grizzly Slough Property and adjacent properties

Task 2.1 – Soil and geo-technical - The success of this project greatly relies upon the understanding of the existing soil on the Grizzly Slough property. Soil types will greatly influence the retention of surface water for plants following the subsidence of seasonal flow events. Onsite soils will also be used to construct levees to protect New Hope Road and adjacent properties. Permeable lenses near the Grizzly Slough property boundaries need to be identified too to address seepage of floodwaters onto adjacent property.

To accomplish the geotechnical investigation, existing geologic information related to the soil in the area will be reviewed, including the topographic survey from Task 2.2. The field drilling and sampling program will consist of drilling 5 deep boring and 6 shallow borings together with approximately 20 test pits. Laboratory tests will be conducted for moisture/density, plasticity, grain size, triaxial shear, consolidation, and hydraulic conductivity. Engineering analysis of the laboratory test data will include both seepage and stability analysis.

Task 2.2 & 3.1 – Topographic and Bathymetric survey - The primary source of topographic, channel, and levee information for the reconnaissance and study areas will be survey data derived specifically for this study. A precise primary static GPS control network to encompass the Grizzly Slough and Reconnaissance Level project areas (Figure 3) will be established. Utilizing the adjusted primary network, the project control will be densified with a secondary network of control points established using RPK GPS methods with typical 2-minute

occupations and redundancy. Total stations will be utilized in areas where tree cover and other obstructions preclude the use of GPS.

A portion of the secondary network will include placement of aerial photo targets within the Grizzly Slough and Reconnaissance Level project area limits to control approximately 43 stereo models for aerial photography. The photo targets will be placed along planned flight lines to support aerotriangulation methods sufficient to meet National Mapping Accuracy Standards of 1"= 40' scale mapping with 1' contour intervals for the Grizzly Slough Project Area and 1" = 100' scale mapping with 2' contour intervals for the Reconnaissance Level project area. Ground survey will be utilized to locate specific drainage and design features within the project limit that can not be captured by aerial based topography mapping.

Bathymetric survey will be conducted along the channel adjoining the Grizzly Slough and Reconnaissance Level project areas to improve the hydraulic data for the hydraulic modeling and to identify potential sites for aquatic restoration. With this survey data, spot elevations, cross sections or digital terrain models of the channel bottom can be prepared and incorporated with aerial and ground based mapping for a final composite topography map including submerged and obstructed areas.

Customized mapping and hard copy sheets will be prepared for design team use for roads, interior grades, levee profiles, bathymetric cross sections, and identification of design constraints located during the ground survey. A digital terrain models (DTM) will be developed for the existing topography of the Grizzly Slough Project Area and the proposed topography for floodplain Restoration in order to compare the two surfaces and develop preliminary estimates of earth work quantities.

Task 2.3 & 3.2 – Biological Data - Baseline biological data will be collected for the project area using several techniques. They include reviewing existing literature and databases, conducting field surveys, and coordinating with relevant agencies. Each activity is described in detail below.

We will contact the USFWS to obtain a species list for the project area. The species list will be reviewed to determine which species may be affected by the project and to determine survey needs, in conjunction with the tasks described below. The California Natural Diversity Database (CNDDB) will also be queried to generate a list of occurrence records for the project area.

Existing biological data from DWR, CDFG, USFWS, other public agencies and adjacent landowners that is relevant to the project area or potentially affected species will be collected and reviewed. A database will be created to maintain and update this information as needed. Furthermore, a GIS database will be created for spatial information to display data and overlay with other GIS databases, such as the California Natural Diversity Database (CNDDB), DWR data, and Environmental Science Associate's (ESA) internal GIS data sets. Aerial photography will be reviewed and vegetation and habitats will be classified and delineated using WHR and CNPS classification systems (other classification systems may be used where appropriate, such as the USFWS wetland classification system, see below). The literary and GIS databases will be updated regularly throughout the project as new information is collected.

Once habitats are classified, and species lists have been generated, we will conduct field surveys to address information gaps and increase the accuracy of our databases. Field surveys will include wildlife, botanical, and fishery surveys. The surveys will focus on identifying suitable

habitat for special-status species. While the habitat classification conducted previously may dictate sampling locations and methods, it is anticipated field surveys will include both walking transects and point collection. Collected data will be captured on field forms and a Global Positioning System (GPS), for later transfer to the GIS database. Lists will be generated for those species documented during field surveys, and any special-status plant or animal populations will be mapped. Standard CNDDB forms will be used to document special-status species. For the purpose of conducting an impact analysis (such as preformed in the Biological Assessment), suitable habitat will be assumed occupied unless protocol-level surveys indicate the species is absent. In addition to these general methods, the following specific methods will be used:

- Terrestrial wildlife surveys will identify potential denning/nesting habitat and foraging habitat. Where necessary, protocol-level surveys will be conducted to determine the extent of suitable habitat or species presence.

- Botanical surveys will include wandering transects within habitat polygons and point sampling. Habitat and vegetation polygons classified previously will be verified. Wetlands will be formally delineated using the methods described in the U.S. Army Corps of Engineers 1987 Wetland Delineation Manual. Wetlands will also be classified according the USFWS wetland classification system (**Cowardin 1976**). Populations of invasive weeds will be documented.

- The presence of fish species will be based on existing survey data and observation records for the Cosumnes River and Floodplain. Observations during field studies of special-status fish will be recorded, as well as any non-natives.

Task 2.4 & 3.3 – Hydrodynamic Model Input Data - The primary source of model geometry data will be the survey effort described in tasks 2.2 & 3.1. This data will be supplemented by data made available from prior modeling studies by the California Department of Water Resources (DWR) and University of California at Davis (UCD), and specific surveys of terrain features. The DTM developed under tasks 2.2 & 3.1 will comprise the primary elevation model for the modeling effort, which will be amended and added to as necessary to describe the complete model domain. Photo derived products collected in tasks 2.2 & 3.1 will be combined with available imagery to serve as a basemap for the modeling effort.

Hydraulic boundary information required for the modeling effort (flow and water surface elevations) will be derived from existing data sources, including the USGS and DWR gauge records. Historic records at these locations will be used to define three flood scenarios for analysis, which represent the important channel – floodplain interactions at the site. Supplemental, synthetic data will be used to represent data at key locations for which no useful record exists, based on available partial records and prior studies. This composite hydraulic data will be used to describe a variety of return frequencies, channel interactions, and flood peak characteristics deemed appropriate for the site. If available, the UCD MIKE11 model will be used to test and further assist in the specific development of flood scenarios.

Task 2.5 & 3.4 – Geomorphology - Data will be collected to enable the watershed historical context of the project to be understood, including the pre-disturbance conditions. Historic data will be assembled from existing geomorphic accounts of the project site and watershed, a review of historic land use, soils and geology maps and anecdotal evidence, use of sequential aerial

photography, and long-term archive records indicating variability in flow (see task above) and sediment transport. For this project, preliminary findings from the nearby Cosumnes River research will add to the available data source.

Task 4 – Modeling/Restoration Planning

Task 4.1 – Identify Restoration Alternatives - There are uncertainties inherent with restoration projects on eastside Delta floodplains due to lack of knowledge on these processes, limited direct experience (even though some planned and unplanned restoration has occurred), and unique site specific conditions associated with Grizzly Slough. We propose to develop a series of four restoration alternatives including up to three levee-breach alternatives and one no-breach alternative. The three levee-breach alternatives will evaluate potential outcomes from two alternate breaches along Grizzly Slough and a third alternative that would potentially breach a levee along Bear Slough. The no-breach alternative has been partially developed by the Central Valley Bay-Delta Branch of CDFG. The CDFG no-breach alternative will be evaluated under Tasks 4.1 and 4.2 using the baseline data and evaluated, as will the three levee-breach alternatives.

Habitat and vegetation goals and objectives and their associated target acreage values will be used to identify endpoints for the restoration alternatives. Each of the habitat types will require a particular suite of environmental variables for these habitats to function. Water depth, flood regimes, sediment deposition, scour rates, elevation above the river, and substrate types all will determine the habitat potential. Therefore, the hydraulic modeling and geomorphologic analyses will provide the initial physical parameters that are needed to establish particular habitat types. Each alternative will include: 1) a map showing the likely location of each habitat and vegetation type; 2) maps with habitat polygons that will be proportional to the target acre value with variance maps showing habitat polygons at the low and high end of their target acre; and 3) a map showing the locations of levee breaches, and bathymetry and topography.

Task 4.2 – Hydrodynamic Modeling - A one-dimensional hydrodynamic looped network model that is capable of representing complex flood waves and tributary interactions, including the flow processes governing intact levee overtopping, planned breaches of the channel, and floodplain processes will be constructed. Model simulations will be used to describe the effective floodplain, by generating both cumulative statistics and flood map output. Elevations and horizontal control will be extracted from the DTM product described in Tasks 2.4 & 3.3.

Tasks 4.2.1 and 4.2.2 Initial Modeling (Grizzly Slough and Adjacent Areas)
The hydrodynamic model will be used to define existing conditions at Grizzly Slough and at adjacent properties including the Cougar property, land to the west between Grizzly Slough and the Mokelumne River, and the area to the south between Dry Creek and New Hope Road. Using the three flood scenarios constructed in Task 2.5, the hydraulic model will be applied in order to simulate baseline conditions. The existing levee configuration will be used to gauge current system function, and to verify that the model provides a reasonable representation of flood hydraulics at the site.

4.2.3 Model Refinement Model refinements may be necessary in order to adequately address issues identified during the initial study review and public scooping period. Such model refinements may include additional model calibration, extension of model boundaries, increased

temporal or spatial resolution, or implementation of a two-dimensional model. A two-dimensional vertically averaged model would allow simulation of velocities on the floodplain; however, such improvements in model capability may not be warranted given the amount and availability of data required for implementation. Such an effort could be warranted if issues or concerns are identified during the environmental review process and results from the simulation model are necessary for further characterization of expected project impacts from the preferred alternative.

Task 4.3 Geomorphology The morphology and dynamics of contemporary site conditions will be assessed using historic data in combination with field reconnaissance of the project site and watershed. The databases developed by prior research in the Cosumnes basin will be supplemented by evaluation of conditions specific to the Dry Creek basin, which interacts with the Cosumnes at this site. Geomorphic processes and ecological habitat conditions will be interpreted using field evidence from the project site, from upstream and downstream of the project, from across the contributing watershed and, where they exist, from reference reaches. The lines of evidence will be drawn together into a 'fluvial audit' of conditions including a site map of existing geomorphic conditions, a watershed map of critical boundary features and a time-chart describing river system changes, including both natural and human disturbances. Examples include the impact of large floods, channel alterations, river maintenance, land use changes, and mining activity. This process allows the characterization of system disturbances that may govern or direct restoration efforts, including an indication of former wetland and riparian habitat values and constraints on restoration activities.

Based on the available data, we will evaluate the extent to which natural recovery processes can fulfill restoration objectives. Natural recovery processes will be dictated to a large extent by the availability of sediment to transport through the breaches and by sufficient flood capacity to distribute sediment across the floodplain. Important in this regard are the relative levels of the channel bed and the slough 'floodplain' area to dictate the frequency of flooding, and the extent to which human activity has altered the sediment transport regime through the watershed.

Following identification of project objectives, Philip Williams & Associates, Ltd. (PWA) staff will perform a geomorphologic analysis combining field observations, sediment samples, aerial photography, observations of processes occurring on similar restoration sites, and hydraulic analysis. These analyses will assist in identifying the best opportunities for restoration, characterizing alternatives that have a high likelihood of fulfilling habitat restoration objectives in the context of constraints identified in the audit of past, present and predicted future watershed conditions. An appropriate sediment transport analysis to the extent feasible given available data will be undertaken and a conceptual model of the expected sediment budget will be developed.

Task 4.4 – Vegetative Design/Habitat Design - Specific habitats, including aquatic, emergent wetland, riparian scrub and forest, and uplands, will be considered in the in the restoration design. Specifically, we will recognize a suite of plant associates to create a diversity of habitats such as shallow water aquatic, floating aquatic vegetated, perennial emergent marsh (dominated by tule/bulrush), seasonal wetlands and transition zone, riparian scrub and forest (dominated by sandbar willow, Fremont cottonwood, and valley oak); and wildlife-friendly agriculture such as alfalfa. We will establish habitat goals and objectives to identify qualitative and quantitative (acreage) targets for each habitat type. We will develop the aquatic, emergent and riparian

habitat objectives with the understanding that fluvial processes will regulate the rates of succession and determine the conditions for development of these habitats. Each habitat type will be assigned a target acreage value and a variance range to allow for variation in the ultimate hydraulic model and geomorphologic analyses. For example, wetland emergent habitat may have a target of 50 acres with a variance of 10 acres (i.e. equal to a range of 40 to 60 acres). This will provide a reasonable amount of buffer within the experimental design and modeling error. Rates of succession also will be identified as a temporal range to meet riparian plant association objectives as the abiotic factors change over time. Existing data from the Cosumnes River Preserve and on-going research will provide potential successional rates for riparian vegetation. We will include the dynamic nature of riparian and other habitat successional processes into our habitat restoration and design model. Therefore, our restoration design for each alternative will include a habitat type and acreage goals and objectives and temporal goals and objectives.

Task 4.5 – Identify Selection Process for Restoration Plan - We will develop a review process with criteria upon which we will evaluate and choose a preferred restoration alternative. Criteria will be developed based on 1) physical parameters such as hydrology, sedimentation, and scouring, 2) biotic factors for habitats and vegetation including potential to meet goals and objectives and establishing ecological functions, 3) flood control capability, and 4) economic costs to implement restoration. Most of the criteria will have quantifiable indicators that will be used to compare alternatives. Some criteria will be qualitative such as whether a particular alternative will benefit individual at-risk species. Ultimately, the alternative that can be achieved based on the ability to meet ecological requirements, meet habitat goals and objectives, provide adequate flood protection, meet water quality standards, does not have a net impact to the environment, is affordable, and meets with the approval of local stakeholders will become the preferred alternative.

Task 5 – Environmental Regulatory Process and Public Outreach

Task 5.1 through 5.3 – Public Outreach/Environmental Documentation & Permitting - We will prepare a joint NEPA/CEQA document that tiers to the *CALFED Bay-Delta Program Programmatic Environmental Impact Statement/Environmental Impact Report* (CALFED, July 2000, hereafter referred to as the Programmatic EIS/EIR). The joint document will be prepared as an Environmental Assessment/Initial Study and Negative Declaration (EA/ISND). The document will meet the requirements of 40 CFR 1501.3 and 1506.2 (for the EA) and CEQA Guidelines Section 15063 and 15222 (for the ISND). Where appropriate, mitigation measures identified in Appendix A of the Record of Decision for the Programmatic EIS/EIR will be incorporated into the EA/ISND. Mitigation measures from Appendix A that may be incorporated include:

- 5.3 – Water Quality
- 6.2 – Vegetation and Wildlife
- 7.12 – Public Health and Environmental Hazards

Following the preparation and public circulation of the joint document, it is anticipated a Finding of No Significant Impact (FONSI) and Negative Declaration will be prepared for the project.

Federal Endangered Species Act Compliance – We will prepare a Biological Assessment that meets the requirements of 16 U.S.C 1536 (ESA Section 7) and 50 CFR 402.12. This document will evaluate the proposed project's potential for direct, indirect, and cumulative effects to federally listed species. The BA will make a determination on whether the proposed project will

adversely affect any of the species addressed, and mitigation measures will be recommended. A draft BA will be prepared and forwarded to the USFWS for their review. After incorporating USFWS comments, a final BA will be prepared. Should the BA determine a federally listed species may be adversely affected by the project, formal consultation will be initiated with the USFWS. Full compliance with the Act will be accomplished when either a letter of concurrence (for a determination of not likely to adversely affect) or a Biological Opinion is received from the USFWS.

Clean Water Act Compliance (Sections 401 and 404) - We will prepare and submit permit applications to the Regional Water Quality Control Board (RWQCB) and the U.S. Army Corps of Engineers (Corps) for the discharge of fill material into waters regulated by these agencies. Based on the type and amount of discharge that would occur, the proposed project would likely qualify for the Corps' Nationwide Permit (NWP) program (specifically NWP 27, Stream and Wetland Restoration Activities). No project-related ground disturbance will commence until a Water Quality Certification and a 404 permit (or authorization to proceed under the NWP program) has been obtained from the RWQCB and Corps, respectively.

California Fish and Game Code (Sections 1600-1607) - Under Sections 1600-1607 of the California Fish and Game Code, the California Department of Fish and Game (CDFG) regulates activities that would alter the flow, bed, channel, or bank of streams and lakes. We will prepare and submit to CDFG an application for a Streambed Alteration Agreement (SAA) under Section 1601 of the Code. No project-related ground disturbance will commence until a SAA has been obtained from CDFG.

Public Outreach - To ensure public participation and awareness the project will include several opportunities for public participation. The first opportunity will be the development and distribution of an Initial Study (IS) listed above under the CEQA process. The IS will identify issues and potential impacts that could be of interest to the public, regional and local interests. It is anticipated that the project will identify benefits to habitat quality, flood control and water quality. However, the IS process will identify any potential benefits and impacts and allow comment from the public and interested parties. In addition, the project will produce a "Fact sheet-News letter" each year that will be sent to a list of stakeholder and public agencies. This Fact sheet will provide updated information on how the project is developing and summarize the results. Finally, once the project has identified a preferred restoration alternative and developed a preliminary plan, we will hold a workshop at the Cosumnes River Preserve. The workshop will provide detailed information on the project, the process of how the preferred alternative was identified, and what steps will be taken in the subsequent phases to complete the design and start implementation.

Task 6 – Restoration design for preferred alternative

Task 6.1 –Hydraulic Analysis of Refined Alternative - Three restoration alternatives will be simulated. These alternatives will probably consist of two breach scenarios along Grizzly Slough and a third alternative that would potentially breach a levee along Bear Slough. A total of nine scenarios will be simulated: each of the three levee breach alternatives will be modeled for the three flood scenarios identified in task 2.5. Hydraulic analyses will include model simulation of frequency, duration, timing and depth of flooding.

Task 6.2 – Geomorphic Analysis – The previously conducted geomorphic analysis will be revisited to reflect the refined project alternative. In particular, the appropriate sediment transport analysis and conceptual model of the expected sediment budget will be modified as appropriate.

Task 6.3 & 6.4 – Restoration Plan and Preliminary Plans and Estimates - We will develop a detailed restoration plan based on the selection of a single preferred alternative. The restoration plan will include; 1) identifying the goals and objectives and acreage targets for each habitat, 2) information on existing and proposed hydrology, bathimetry, and topography, 3) proposed habitat types, including vegetation structure, function, and ecological processes (successional sequences), 4) an implementation process, cross sections, material quantities and plan views, for structural removal of levees, potential grading, and internal levees for flood control, 5) a schedule for implementation and a predicted timeline to meet restoration goals and objectives, 6) a detailed multi-year monitoring plan, and 7) an adaptive management chapter .

The alternatives will have adequate information upon which we can accurately evaluate each one and identify the best or preferred alternative. The preferred alternative will be fleshed out to proved further details at higher resolution. As needed, models will be rechecked for accuracy and the biotic and abiotic factors scrutinized. The final restoration design will represent a 100 percent design for construction that can go out for bid to contractors. This will include construction associated with levee breaches and other structural engineering. The plan will include a detailed planting plan for those habitats that will require hand revegetation. The planting plan including species, plant quantities, spacing of plants, temporary irrigation, and agricultural crop types and rotation schedules. A detailed monitoring plan will be developed that will measure the successional process of the floodplain including species establishment and growth. Areas that may have been artificially planted will be monitored to determine survivorship of the plants.

Task 6.5 &6.6 – Monitoring Plan and Adaptive Management Strategy - A preliminary monitoring plan and adaptive management strategy will be developed as part of the restoration plan. The monitoring chapter of the restoration plan will identify how annual monitoring reports will analyze the data and determine whether the goals and objectives are being met. An adaptive management chapter will identify how the monitoring data will be used to evaluate the success of the restoration project based on quantitative and qualitative indicators and the goals and objectives. Threshold levels will be established that must be reached. If these threshold levels are not being met then the adaptive management chapter will specify what procedures will need to be taken to adjust the plan or take actions to manage the restoration. These sections will build upon ecological, hydraulic, and geomorphologic investigations that are already being conducted at the breach sites upstream. The focus will be to gather and disseminate information that will

improve our success and that of others at accomplishing CALFED and CVPIA goals and objectives in the future.

4. Feasibility

The land is owned by DWR and is part of the Cosumnes River Preserve. The project is supported by DWR, CDFG's Valley Bay-Delta Branch, The Nature Conservancy (TNC), and The Cosumnes Research Group, Center for Integrated Watershed Science and Management (CRG).

All of the members of the project team have had successfully planned and implemented floodplain and habitat restoration projects and studies. CRG is a multidisciplinary team of researchers that will provide oversight and review for this project along with CDFG and TNC. Of particular value to the success of this proposal is their investigation of the linkage between land use, ecosystem function, and restoration effectiveness within the Cosumnes and Mokelumne River Watersheds and North Delta. Currently, the program is evaluating the habitat benefits of similar levee breach projects upstream on the Cosumnes River, which will serve as reference sites for this project.

Due to the inherent nature of this project, it is anticipated that acquisition of permits and completion of the NEPA and CEQA process will not result in the identification of significant issues that cannot be mitigated to a less-than-significant level of impact. Other projects like the Grizzly Slough project have been completed without identification of significant issues. Flooding of adjacent lands will be looked at carefully through geo-technical surveys and mitigated for if the need arises. Protection of New Hope Road and the bridge will be engineered into the project.

The characteristics of Grizzly Slough and adjacent floodplain are similar to successfully restored floodplains upstream on the Cosumnes River. The Grizzly Slough property has similar topography and an availability of large woody debris, seeds, and propagules from mature riparian forest that exist along the slough. Restored floodplain on the Grizzly Slough property is likely to expand habitat for at-risk species. Grizzly Slough is connected to the Cosumnes River, which is known to support Sacramento Splittail and Chinook salmon and the Grizzly Slough property currently supports habitat for sandhill crane and Swainson's hawk.

Phase I will be completed within the three years allotted for CALFED contracts. To streamline planning, development of the design will occur at the same time the environmental and regulatory process is being worked through. This will also allow the project design to evolve as environmental issues are identified.

By splitting the project into a planning phase and implementation phase the project will benefit from a flexible schedule and budget for the final design and construction. By putting forth a thorough planning effort in Phase I, significant issues will be identified and resolved before the construction design, budget, and schedule are finalized in Phase II to broaden the choice of feasible alternatives.

5. Performance Measures

Reports, functional models, issuance of permits, and final environmental documents will mark the completion of the tasks under Phase I. Adherence to the schedule for task completion will be monitored to track progress and insure that the three year contract horizon is met.

6. Data Handling and Storage
DWR will store all data and reports that are developed as a result of the project in hard copy and in formats like Adobe Acrobat, Access, Excel, CAD, and ArcView. Information that would be important to the public and other restoration professionals will be made available on DWR's website and CRG's Information Center for the Environment website.

7. Expected Products/Outcomes
See Table 1

8. Work Schedule
See Table 3

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

1. ERP, Science Program and CVPIA Priorities
Restoration of Eastern Delta Floodplain Habitats on Grizzly Slough in the Cosumnes River Watershed – Phase I will contribute to the ERP, Science Program Priorities listed below. Accomplishment of these priorities will also help to achieve CVPIA's goal of protecting, restoring, and enhancing fish and wildlife and associated habitats in the Central Valley.

DR-1.) The project will restore habitat corridor in the East Delta. – This project will contribute to the extent and continuity of floodplain and riparian corridor in the area of the lower Cosumnes River and will create intermittent shallow water habitat as well as tidal marsh habitat, seasonal wetland, grassland, and riparian forest. The habitat restored and protected by the project will support habitat for Swainson's hawk, giant garter snake, greater sandhill crane, and waterfowl.

DR-2.) The project will restore and rehabilitate floodplain habitat in the eastside tributaries. – The Grizzly Slough channel connects with the Cosumnes River, which supports fall-run Chinook salmon and Sacramento splittail. Restoration of floodplain habitat along Grizzly Slough will provide intermittent shallow water habitat that provides spawning and rearing habitat for Sacramento splittail and highly productive rearing habitat for juvenile fall-run Chinook salmon. Restoring the Grizzly Slough property as floodplain will provide another area to examine the benefits and methods of restoring floodplain through the modification or breaching of levees.

DR-3.) Agriculture – The project will incorporate agriculture on a portion of the project site that can coexist with adjacent floodplain and will provide an area to examine techniques, benefits, and shortcomings of such coexistence.

Agriculture will benefit the Swainson's hawk, greater sandhill crane and will provide forage for game and non-game wildlife.

DR-4). The project would specifically restore habitat for one or more at-risk species. – The project will protect and restore habitat for greater sandhill crane, yellow-billed cuckoo, California black rail, Swainson's hawk, Sacramento splittail, and Chinook salmon. Restoration of floodplain process will provide intermittent shallow water habitat for Sacramento splittail and Chinook salmon. The level of use, growth rates, forage, and stranding will be monitored and compared to areas of restored floodplain adjacent the main channel of the Cosumnes River.

Table 1. Tasks and expected products

TASK	*PRODUCT/OUTCOME*
Task 1 – Project Management	Adherence to Schedule and expected products
Task 2 – Baseline Data\Existing Condition for Grizzly Slough	
2.1 – Soil and geo-technical survey	Baseline Report
2.2 – Topographic and Bathymetric survey	Baseline Report
2.3 – Collection of Biological Data and Information	Baseline Report
2.4 – Collection of Hydrology and hydraulic Data and Information	Baseline Report
2.5 – Collection of Geomorphology Data and Information	Baseline Report
Task 3 – Baseline Data\Existing Condition for Adjacent Properties	
3.1 – Topographic and Bathymetric survey	Baseline Report
3.2 – Collection of Biological Data	Baseline Report
3.3 – Collection of Hydrology and hydraulic Data/Initial Model Prep	Baseline Report
3.4 – Collection of Geomorphology Data and Information	Baseline Report
Task 4 – Modeling/Restoration Planning	
4.1 – Identify Restoration Alternatives	Narrative/Figures
4.2 – Hydrodynamic Model/Flood Hazard	Model/Tech Report
4.2.1 – Grizzly Slough Property	Model/Tech Report
4.2.2 – Adjacent Properties - Recon & Opportunities/Constraints	Model/Tech Report
4.2.3 – Model Refinement to Address Issues	Model/Tech Report
4.3 – Geomorphology	Tech Report
4.3.1 – Grizzly Slough Property	Tech Report
4.3.2 – Adjacent Properties - Recon & Opportunities/Constraints	Tech Report
4.4 – Vegetative Design/Habitat Design	Narrative/Figures
4.5 – Identify selection process for restoration plan	Narrative/Figures
Task 5 – Environmental Regulatory Process and Public Outreach	
5.1 – Environmental Documentation/Public Outreach	Report
5.2 – Mitigated Neg Dec/EA	NOD/FONSI
5.3 – Permitting	Permits Acquired
Task 6 – Restoration design for preferred alternative	
6.1 – Hydraulic Analysis of Refined Alternative	Focused Model/Results
6.2 – Geomorphic Analysis of Refined Alternative	Preliminary Design Report
6.3 – Restoration plan	Preliminary Design Report
6.4 – Preliminary Design/Engineering	Preliminary Design Report
6.5 – Monitoring Plan	Preliminary Design Report
6.6 – Adaptive Management Strategy	Preliminary Design Report

Table 2. Phase I Project Schedule

TASK	2002 JAN-MAR	APR-MAY	JUN-JUL	AUG-SEP	OCT-NOV	DEC-JAN	2003 JAN-MAR	APR-MAY	JUN-JUL	AUG-SEP	OCT-NOV	DEC-JAN	2004 JAN-MAR	APR-MAY	JUN-JUL	AUG-SEP	OCT-NOV	DEC-JAN
Phase I																		
Task 1&2 - Baseline/Existing Condition for Grizzly and Adjacent Properties																		
Topography, soil, bathymetry, and geotechnical																		
Collection of biological data and information																		
Collection of water quality data																		
Hydrology: general flood regime and stream data																		
Geomorphology: define historic & existing condition																		
Task 3 - Modeling and Restoration Planning																		
Identify restoration alternatives																		
Hydrodynamic modeling/Flood hazard												2D Model to address flood issues						
Geomorphic analyses																		
Vegetative design/habitat design																		
Develop selection process for restoration plan																		
Task 4 - Environmental Regulatory process																		
Initial Study/Public Outreach																		
Negative Declaration/EA and NOD/FONSI							If no flood issues*							If flood issues*				
Permitting/ESA compliance																		
Task 5 - Restoration Design																		
Restoration Plan																		
Preliminary Design																		
Adaptive Management Strategy/Monitoring Plan						+++		+++		+++		+++						

* Issues may surface during the CEQA/NEPA initial study and public scoping process that will require additional time to address. This may delay completion of Task 5.
+++ = as needed bases

DR-5). Native Species – The project will support conditions that favor native species, such as intermittent shallow water habitat. The Cosumnes River floodplain is known to provide spawning habitat for Sacramento splittail, blackfish, and hitch, and provide rearing habitat for juvenile Chinook salmon, pikeminnow, and Sacramento sucker. Use patterns of striped bass, centrarchid preditors and other non-native species will be monitored.

2. Relationship to Other Ecosystem Restoration Projects

The project will address uncertainties associated with restoring floodplain geomorphic and hydrologic processes and creating habitats for at-risk species through the breaching and modification of levees. This project will augment the existing knowledge base and expand the area of study for this topic in the Cosumnes River and Mokelumne River floodplain. The development and monitoring of the project will be done in close coordination with other investigations already being conducted on the Cosumnes River Preserve by TNC and CRG, so that results are comparable and apparently successful techniques and models can be verified. The hypotheses being tested under these studies are commensurate with those that will be tested under Phase II of this project.

3. Request for Next-Phase Funding

Phase I is the initial phase of this project.

4. Previous Recipients of CALFED Program or CVPIA funding

The projects listed below were have been implemented by DWR's Mitigation and Restoration Branch in cooperation with CDFG, USFWS, and USACE and were funded in part by CALFED and CVPIA programs. Table 3 provides a list of CALFED projects that the other team members have been a part of:

1. Phase 2 – Merced River Salmon Habitat Enhancement: River Mile 42 to 43.5 (Robinson Ranch and Gravel Mining Permit #307 site) Project
   CALFED ERP Numbers: 2001 – C200, 98-C1009
   AFRP – In-kind contribution
   Project Status: Under construction
   Accomplishments: After a significant planning effort, which included substantial review and input from stakeholders and restoration experts, the project is under construction and on schedule for completion in October 2001.

2. Phase I – Merced River Salmon Habitat Enhancement: River Mile 40 to 40.5 (Robinson/Gallo Project – Ratzlaff Reach Site)
   CALFED ERP Number: 99B05
   AFRP Agreement – 114209J032
   Project Status: Project has been constructed and is being monitored for the achievement of benefits to salmon and riparian habitat, and improved river function, including more natural floodplain and geomorphic processes.
   Accomplishments: The project was successfully constructed on schedule and the channel and floodplain are performing as designed.

3. Prospect Island – Shallow Water Habitat/Wetland Restoration Plan
   CALFED ERP Number: 96-M02
   Project Status: Waiting to award contract for construction

Table 3. Team members and CALFED projects

PROJECT TITLE/TEAM MEMBER	*PROJECT #*	*PRIMARY APPLICANT*	*PROGRAM*
DFG			
Canal Ranch Habitat Restoration Phase II	99-B116	CDFG	CALFED - ERP
PWA			
Understanding Tidal Marsh Restoration Processes and Patterns	99-B13	University of Washington	CALFED - ERP
Research to Predict Evolution of Restored Diked Wetlands	96-M10	University of Washington	CALFED - ERP
Twitchell Island Subsidence Study	98-C01	DWR	CALFED - ERP
Hamilton Wetlands Restoration Planning	98-C03	California Coastal Conservancy/City of Novato	CALFED - ERP
Non-Structural Alternative at the San Joaquin River National Wildlife Refuge: Refinement for Habitat Enhancement	2001-D202	Ducks Unlimited, Inc.	CAFED - ERP
Yuba Tools: Collaborative Watershed Management for Flood Control	99-B131	Yuba Watershed Council/South Yuba River Citizens League	CALFED - ERP
KSN and Lowney Accociates			
Tuolumne River Restoration Special Run Pool 10	2001-B201	Turlock Irrigation District	CALFED - ERP
Canal Ranch Habitat Restoration Phase II	99-B116	CDFG	CALFED - ERP
In Channel Berm Islands Rehabilitation	K185	Association of Bay Area Governments	CALFED
Georgiana Slough Bank Restoration		DWR	CALFED
Decker Island Habitat Restoration		CDFG	CALFED - ERP
ESA			
South Napa River Tidal Slough and Floodplain Restoration Project	1998-F23	City of American Canyon	CALFED - ERP
Sherman Island Levee Habitat Demonstration Project	1996-M09	DWR	CALFED - ERP
TNC			
Subreach/Site-Specific Management Planning on the Sacramento River	99-B126	TNC	CALFED - ERP
Cosumnes/Mokelumne Corridor Floodplain Acquisitions, Management, and Restoration Planning	2001-D200	TNC	CALFED - ERP
Cosumes River Acquisition, Restoration Planning and Demonstration	98-C1032	TNC	CALFED - ERP
Floodplain Acquisition, Management, and Monitoring on the Sacramento River	98-C1028	TNC	CALFED - ERP
Sacramento River floodplain acquisition and riparian restoration	G261	TNC	CALFED - ERP
Cosumnes floodplain acquisition and restoration	H307		CALFED - ERP
CRG			
The Influence of Flood Regimes, Vegetative and Geomorphic Structures on the Links between Aquatic and Terrestrial Systems	2001-A205	CRG	CALFED - ERP
Levee Setback Geomorphic Model	99-B191	CRG	CALFED - ERP
Linked Hydrogeomorphic-Ecosystem Models to Support Adaptive Management: Cosumnes-Mokelumne Paired Basin Project	B190	CRG	CALFED - ERP
McCormack-Williamson Tract Restoration Planning, Design and Monitoring Program	99-B192 & B193	CRG	CALFED - ERP

Accomplishments: Construction contract is out for bid, permits and Biological Opinions have been acquired, and Reclamation Board has given approval.

4. Prospect Island – Develop Monitoring Plan
   CALFED ERP Number: 96-M26
   Project Status: Project completed
   Accomplishments: Final monitoring plan

5. Prospect Island Habitat Protection Project
   CALFED ERP Number: 98-A01
   Project Status: Project complete
   Accomplishments: Repaired levee

6. Prospect Island Monitoring Plan
   CALFED ERP Number: 99A02
   Project Status: Will not start until construction is completed

5. System-Wide Ecosystem Benefits

This project will increase the width and patch size of riparian habitat within the Cosumnes River floodplain corridor and will be done in close coordination with other restoration efforts along the Cosumnes River. This project will provide habitat for anadromous fish and migratory bird species. The deposition of sediments and filtering through wetlands on the floodplain will improve water quality.

6. Additional Information for Proposals Containing Land Acquisition

C. Qualifications

Principal Investigator – Mr. Dave Brown, Environmental Specialist IV with DWR's Environmental Services Office, Mitigation and Restoration Branch. Mr. Brown has worked for DWR in the Sacramento-San Joaquin Delta for 29 years. Currently, Mr. Brown manages the Delta Wetland Mitigation section and is DWR's representative to the Cosumnes River Preserve and well as president of Reclamation District 1601 in the western Delta. He has planned, designed and supervised teams to implement numerous environmental projects and investigations in the Sacramento-San Joaquin Delta. He has developed many cooperative relations with local, State, and federal agencies. Staff from the Department of Water Resources, Environmental Services Office, Mitigation and Restoration Branch will be assisting Mr. Brown to accomplish this project. Staff has considerable experience in developing restoration projects, including the Merced River Salmon Habitat Enhancement project and the Barker Slough Wetland Mitigation Project. Specialties among staff include botany, fisheries and wildlife management, CEQA and NEPA compliance, and contract administration.

Project Development and Coordination – Mr. Aric Lester, Environmental Specialist III with DWR's Environmental Services Office, Mitigation and Restoration Branch. Mr. Lester has over six years of experience in the restoration planning and environmental investigation fields. Mr. Lester works under the West Delta Program and the Harvy O. Banks Fish Mitigation Program and has been an Environmental Specialist for DWR since 1998. His current position involves project management and coordination of various aspects of planning and implementation of fish, floodplain, and wetland mitigation and restoration projects. Responsibilities include contributing to elements of project design, preparation of contracts, acquisition of permits, preparation of

CEQA documents, insurance of environmental compliance, and preparing and implementing monitoring plans.

Biology & Ecology – Dr. Niall F. McCarten is senior biologist with Environmental Science Associates and Research Associate with the Section of Plant Biology at UC Davis, and the UC Jepson Herbarium at UC Berkeley. He received his B.A. in botany at UC Santa Barbara, M.A. in Ecology and Systematics at San Francisco State University, and Ph.D. in botany at UC Berkeley. He is a nationally recognized riparian, wetlands and plant ecologist with peer-reviewed papers and conference presentations on rare and endangered plants, wetlands ecology and monitoring. His area of research is on the ecology and population biology of aquatic and wetland plants. He has over 15 years experience conducting research, restoration, and monitoring on Delta and Sacramento River wetland and riparian vegetation. He was one of the few non-public agency scientists asked to participate in the development of the original CALFED Ecosystem Restoration Program (ERP) plan, participated in the development of the CALFED Natural Community Conservation Plan (NCCP). He was chairman of conservation and vice-president of the California Botanical Society.

Biology & Ecology – Mr. Erich Fischer is a biologist with Environmental Science Associates in Sacramento. He received his B.A. in biological sciences from California State University, Sacramento. He serves as a technical analyst for a variety of projects. He specializes in environmental assessments, environmental impact statements, and biological assessments. Mr. Fischer is also skilled in field surveys for many California listed species, habitat modeling on GIS systems, ecological monitoring and restoration, and habitat delineation. Mr. Fischer possesses a working knowledge of the provisions and requirements of the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA) as they relate to the preparation of environmental documents.

Biology & Ecology – Mr. Thomsas Leeman is a biologist with Environmental Science Associates. He has expertise in ornithology and wildlife ecology. He is skilled in performing terrestrial wildlife inventories, vegetation surveys, and salmonid monitoring, and applying GIS and statistical methodologies for data analysis. He received his B.S. in biology from UC Davis and his M.S. in Natural Resource Sciences at Humboldt State University. His extensive experience working as a field biologist for private companies, Federal and State agencies, and in the non-profit sector, make him especially sensitive to the objectives and requirements of these diverse organizations.

Biology & Ecology – Ms. Martha Lowe is a biologist and watershed ecologist with Environmental Science Associates. She has expertise in botany, plant taxonomy, habitat assessment, wetland delineation, watershed planning and assessment, and ecosystem restoration. She received her M.A. in Ecosystem Restoration and Management at Sonoma State University, California. Through her graduate work she developed an in-depth understanding of ecological interactions, functions, and processes, especially as they pertain to California's ecosystems. Her field experience includes qualitative and quantitative assessments of general ecological conditions, vegetation, and bird populations. Ms. Lowe offers a solid understanding of the basic principles that guide ecosystem restoration and management, as well as regulatory and permitting mechanisms that steer environmental planning.

Engineering Design, Topography and Bathymetric Survey - Mr. Christopher H. Neudeck, PE, Senior Project Engineer with Kjeldsen, Sinnock & Neudeck, Inc. Mr. Neudeck has nineteen years experience in the field of civil engineering and land surveying. His career emphasis has been in the area of planning, design, and construction of a wide variety of water resource and public works related projects. In addition Mr. Neudeck has served as the Principal Engineer/Project Engineer for KSN on many flood control projects including, most recently the project to restore 100 year flood protection for the City of Stockton and San Joaquin County. Mr. Neudeck has also been recently recognized by the State of California for the synergistic combination of habitat restoration with conventional flood control techniques.

Topographic Survey - Mr. Darrel G. Ramus, LS, Project Manager in Charge with Kjeldsen, Sinnock & Neudeck, Inc has over ten years of experience in the land surveying and civil engineering fields. Mr. Ramus has technical and management experience in all aspects of the land surveying field including project site research, historic boundary analysis, boundary surveys and mapping, topography surveys and mapping, design support surveys, construction staking, aerial photogrammetry, digital orthophotography, bathymetric surveys, static GPS control networks, real-time kinematic (RTK) GPS surveys and precise differential leveling. Mr. Ramus has extensive knowledge of the Sacramento – San Joaquin Delta region where the firm specializes in the civil design, maintenance, habitat restoration and construction of hundreds of miles of rivers and levee systems.

Soils and Geotechnical - Fred Brovold, PE, GE, Senior Project Engineer, with Lowney Associates has over 25 years of practical geotechnical engineering experience. He has performed geotechnical investigations for public works, transportation projects, levees, and pipelines in northern California, the Pacific Northwest, Rocky Mountains, and southeastern parts of the United States. Mr. Brovold has significant experience in levee engineering, soft ground engineering, shallow and deep foundations, and hillside and slope stability. He has been project engineer, project manager and/or peer reviewer for the geotechnical engineering aspects of several large projects including Avalon Canyon Storm Damage Repairs, Mokelumne Aqueduct Preliminary Engineering and Seismic Upgrading Final Design, San Francisco International Airport Inbound and Outbound Ramps project, and Discovery Bay Litigation Support. Mr. Brovold's extensive engineering and project experience with his professional enthusiasm and communication skills and attention to detail, has directly contributed to the success of many local projects and clients.

Hydrology & Geomorphology – Ms. Elizabeth Andrews, Project Manager with Philip Williams and Associates. Ms. Andrews maintains considerable experience in water resources management, including expertise in hydrology, hydraulics, restoration and enhancement, flood hazard reduction, and water systems management, with emphasis on simulation modeling. Stream restoration, floodplain restoration, fluvial geomorphology, and river management policy are areas of special interest. As a project manager, Ms. Andrews has led team efforts on stream restoration, wetland management, flood hazard reduction, gravel extraction, and FEMA Flood Insurance Studies. Other projects she has conducted include: helping to develop multi-objective flood hazard reduction and ecological enhancement plans for Santa Rosa Creek, the Petaluma River, Arroyo Mocha, and Arroyo Las Positas; and developing a large-scale floodplain restoration proposal for the Cosumnes River; and evaluating floodplain restoratin potential at the USFWS San Joaquin River NWR.

Geomorphology – Dr. Peter Downs, fluvial geomorphologist with Philip Williams and Associates. Dr. Downs has particular expertise in the field of watershed scale processes and their affects on channel processes and restoration efforts. He has expertise in geomorphic assessments at various levels of detail, river restoration design planning and post-project monitoring and evaluation, and conceptual understanding of adaptive management and integrated river basin management planning. Prior to joining PWA in 2000, Dr. Downs was, for 8 years, a Faculty member at the University of Nottingham, UK. Dr. Downs has led geomorphic assessment, restoration planning and monitoring and evaluation efforts in a variety of river habitats with differing management needs. These have included low- to high-gradient rivers in semi-natural to highly degraded environments, with rural and urban riparian land uses. The primary concerns have included river channel preservation, in-stream fisheries improvement, functional and aesthetic riparian improvement, flood defense and channel stability.

Hydrodynamic Model - Stephen Blake with Philip Williams & Associates. Mr. Blake is a water resources engineer with an emphasis on surface and subsurface fluid mechanics and transport processes of environmental significance. His focus includes the application and further understanding of these processes and their connection to river and marsh restoration and the management of urban rivers and floodplains. Selected project experience includes the modeling of fluvial and tidal systems to represent both flood dynamics and sediment transport issues. In particular, Mr. Blake has developed a hydrodynamic model (MIKE 11) of the lower Cosumnes/Dry Creek/Mokelumne system and its interaction with the North Delta for the purpose of studying the effects of flood flows on the sediment transport regime, ecologic function, and water quality issues of concern.

Hydrodynamic Model – Dr. Cindy Lowney, Water Resources Engineer with Philip Williams & Associates. Dr. Lowney's work focuses on water quality and temperature dynamics of fluvial systems with a specialization in hydraulics, hydrodynamic and water quality modeling. She has applied her knowledge to projects addressing: effects of riparian vegetation on water quality and stream dynamics, mixing processes in lakes and streams, optimization techniques for restoration, water quality management for salmonids, and floodplain restoration for fisheries habitat and riparian restoration.

Review & Oversight – Professor Jeffrey F. Mount, Department of Geology, UC Davis and Center for Integrated Watershed Science and Management. Professor Mount received a B.A. in Geology from the University of California, Santa Barbara in 1976, and a Ph.D. in Earth Sciences from UC Santa Cruz in 1980. From 1980 to the present he has been a professor in the Department of Geology at UC Davis. Current research interests include analysis of the response of rivers to changing watershed conditions, sedimentation patterns in floodplain environments, and ecosystem restoration in lowland floodplains. Dr. Mount is presently Director of the UC Davis Center for Integrated Watershed Science and Management and Director of the multi-disciplinary, multi-agency Cosumnes Research Group. Dr. Mount is also a Member of the State Reclamation Board and an appointee to the national Environmental Advisory Board of the US Army Corps of Engineers.

Review & Oversight – Dr. Ramona Swenson has worked as the Senior Project Ecologist for The Nature Conservancy since 1999. She earned a bachelor's in Biology from Swarthmore College (Pennsylvania) in 1986, and a doctorate in Integrative Biology from the University of California at Berkeley in 1995 where she focused on behavioral ecology, aquatic ecology and fisheries. She

provides ecological expertise for the development and implementation of conservation strategies for the Cosumnes River Project and throughout California, with a focus on riparian and aquatic ecosystems. Dr. Swenson collaborates with scientists and research institutions to address key conservation issues. Prior to joining The Nature Conservancy, she worked for the Smithsonian Institution, U.S. Fish and Wildlife Service, and as an environmental consultant.

Review & Oversight – Keith Whitener is a Project Ecologist specializing in fisheries and aquatic systems for The Nature Conservancy's Cosumnes River Preserve. He graduated from U.C. Davis in 1988 with a degree in Wildlife and Fisheries Biology. Prior to working at the Preserve, Mr. Whitener worked as an environmental consultant for four years specializing in riverine systems throughout the Western United States before moving to the Sacramento/San Joaquin Delta to concentrate on Delta fisheries. His work in the Delta included stints at the California Department of Fish and Game, Hanson Environmental and proprietary consulting. Since joining the Preserve in 1998, Mr. Whitener has focused on restoring the Cosumnes River salmon run, fisheries issues relating to floodplain restoration and native fish restoration.

Review & Oversight – Mr. Brad Burkholder, Environmental Specialist III, with the CDFG Central Valley Bay Delta Branch. Mr. Burkholder has been with CDFG for eight years and has had experience with the development and monitoring of a variety of habitat restoration projects. Mr. Burkholder is principle investigator for the Palm Tract Mitigation Site and Grizzly Slough Restoration Site. His primary duties associated with these projects are compliance monitoring to ensure restoration objectives and mitigation requirements are met. Mr. Burkholder is also responsible for leading large-scale field investigations for biological assessments and manages CDFG's public hunt program on Sherman Island and Twitchell. Mr. Burkholder is the principle investigator for the Canal Ranch Habitat Restoration Project.

D. Cost

California Department of Water Resources will cost share $40,000 for project management, oversight and review, and general biological and ecological tasks. The Nature Conservancy will cost share $3,200 for oversight and review. Total cost share is $43,200.

E. Local Involvement

The public will be involved through the CEQA and NEPA process. The initial study and scoping letter will be sent to stakeholders, including adjacent landowners. If the need arises, public meetings will be held to discuss the project and resolve issues. Periodic "fact sheets" will also be sent to stakeholders to provide them an update of progress.

F. Compliance with Standard Terms and Conditions

The project participants will comply with state and federal standard terms and conditions.

G. Literature Cited

Grosholz, E. 2000.Influence of spatial variation in residence time on lower trophic levels on a Cosumnes River floodplain: CALFED Bay-Delta Program Science Conference, Abstract with Program, p 69.

Mount, F.M. et al. In Review. Multidisciplinary Research in Support of Adaptive Floodplain Management and Restoration: Cosumnes Research Group. University of California, Davis. The Nature Conservancy, Cosumnes Preserve. Cosumnes Research Group, Center for Integrated Watershed Science and Management, University of California, Davis

Sommer, T.R., M. L. Nobriga, W. C. Harrell, W. Batham, and W. J. Kimmer. 2001. Floodplain rearing of juvenile chinook salmon: evidence of enhanced growth and survival. Canadian Journal of Fisheries and Aquatic Sciences 58(2):325-333

Trowbridge, W. B., J. L. Floresheim, and J. F. Mount. 2000. Restoration of floodplain and riparian forests at levee breaches. Department of Environmental Science and Policy and Center for Integrated Watershed Sciences and Management, University of California, Davis

Whitener, K and T. Kennedy. 1999. Evaluation of fisheries relating to floodplain restoration on the Cosumnes River Preserve. Interagency Ecological Program for the Sacramento-San Joaquin Estuary Newsletter 12(3):50-57

Attachment A

Consultant's Budget by Task

TASK	*Consultant**	*Labor Cost*	*Exp*	*Total*
Task 1 – Project Management				
Task 2 – Baseline Data\Existing Condition for Grizzly Slough				
2.1 – Soil and geo-technical survey	Lowney	$ 62,600	$ 43,000	$ 105,600
2.2 – Topographic and Bathymetric survey	KSN	$ 86,126	$ 42,648	$ 128,774
2.3 – Collection of Biological Data and Information	ESA	$ 25,040	$ 775	$ 25,815
2.4 – Collection of Hydrology and hydraulic Data and Information	PWA	$ 24,620	$ 4,098	$ 28,718
2.5 – Collection of Geomorphology Data and Information	PWA	$ 34,780	$ 6,305	$ 41,085
Task 3 – Baseline Data\Existing Condition for Adjacent Properties				
3.1 – Topographic and Bathymetric survey	KSN	$ 16,398	$ 21,753	$ 38,151
3.2 – Collection of Biological Data	ESA	$ 2,040	0	$ 2,040
3.3 – Collection of Hydrology and hydraulic Data/Initial Model Prep	PWA	$ 1,669	$ 315	$ 1,984
3.4 – Collection of Geomorphology Data and Information	PWA	$ 4,540	$ 946	$ 5,486
Task 4 – Modeling/Restoration Planning				
4.1 – Identify Restoration Alternatives	ESA	$ 41,420	$ 2,250	$ 43,670
4.2 – Hydrodynamic Model/Flood Hazard				
4.2.1 – Grizzly Slough Property	PWA	$ 22,200	$ 3,774	$ 25,974
4.2.2 – Adjacent Properties - Recon & Opportunities/Constraints	PWA	$ 2,151	$ 315	$ 2,466
4.2.3 – Model Refinement to Address Issues	PWA	$ 130,209	$ 25,000	$ 155,209
4.3 – Geomorphology				
4.3.1 – Grizzly Slough Property	PWA	$ 36,720	$ 6,305	$ 43,886
4.3.2 – Adjacent Properties - Recon & Opportunities/Constraints	PWA	$ 1,320	$ 315	$ 1,635
4.4 – Vegetative Design/Habitat Design	ESA	$ 23,385	$ 1,667	$ 25,052
4.5 – Identify selection process and select alternative	ESA	$ 21,915	$ 500	$ 22,415
Task 5 – Environmental Regulatory Process and Public Outreach				
5.1 & 5.2 – Environmental Documentation/Public Outreach	ESA	$ 54,700	$ 7,100	$ 61,800
5.3 – Permitting	ESA	$ 19,360	$ 575	$ 19,935
Task 6 – Restoration design for preferred alternative				
6.1 – Hydraulic Analysis of Refined Alternative	PWA	$ 30,812	$ 4,728	$ 35,540
6.2 – Geomorphic Analysis of Refined Alternative	PWA	$ 23,900	$ 4,413	$ 28,313
6.3 – Restoration plan	ESA	$ 47,015	$ 2,425	$ 49,440
6.4 – Preliminary Design/Engineering	KSN	$ 25,824	$ 2,250	$ 28,074
6.5 – Monitoring Plan	ESA	$ 30,080	$ 350	$ 30,430
6.6 – Adaptive Management Strategy	ESA	$ 28,080	$ 450	$ 28,530

* Consultants:
ESA - Environmental Science Associates
KSN - Kjeldsen Sinnock Neudeck Inc.,
Lowney - Lowney Associates
PWA - Philip Williams & Associates, Consultants in Hydrology