

# Lower Deer Creek Restoration and Flood Management: Feasibility Study and Conceptual Design

## Project Information

1. **Proposal Title:**

Lower Deer Creek Restoration and Flood Management: Feasibility Study and Conceptual Design

2. **Proposal applicants:**

Bill Berens, Deer Creek Watershed Conservancy

3. **Corresponding Contact Person:**

Bill Berens  
Deer Creek Watershed Conservancy  
P.O. Box 111 Vina, CA 96092  
530 384-2737  
lmmutual@shasta.com

4. **Project Keywords:**

**At-risk species, fish**  
**Flood Plain and Bypass Management**  
**Habitat Restoration, Instream**

5. **Type of project:**

Planning

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

No

7. **Topic Area:**

Floodplains and Bypasses as Ecosystem Tools

8. **Type of applicant:**

Private non-profit

9. **Location - GIS coordinates:**

Latitude: 39.947

Longitude: -122.053

Datum: WGS84

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

Tehama County, Town of Vina, California, on State Highway 99, 11 miles of stream channel

**10. Location - Ecozone:**

3.2 Red Bluff Diversion Dam to Chico Landing, 7.4 Deer Creek

**11. Location - County:**

Tehama

**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:**

California, 3rd

**15. Location:**

**California State Senate District Number: 04**

**California Assembly District Number: 02**

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

3

**17. Requested Funds:**

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

No

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

Single Overhead Rate: 0

Total Requested Funds: 1,860,000

b) Do you have cost share partners already identified?

No

c) Do you have potential cost share partners?

No

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

No

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

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

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.

**F237 Watershed Planning ERP**

**0049 Rangeland and Riparian Management Watershed**

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

No

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

No

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

No

**Please list suggested reviewers for your proposal. (optional)**

**Earle Cummings California Department of Water Resources, Division of Land Management 916/227-7519**

**Terry Mills CALFED 916/653-3244 tmills@water.ca.gov**

**Harry  
Rectenwald**

**California  
Department of Fish  
and Game**

**530/225-2368**

**103424.2422@compuserve.com**

**21. Comments:**

**17a. DCWC has no permanent staff and will hire consultants to perform the duties under the contract; therefore, will not charge CALFED any overhead.**

# Environmental Compliance Checklist

## Lower Deer Creek Restoration and Flood Management: Feasibility Study and Conceptual Design

### 1. CEQA or NEPA Compliance

- a) Will this project require compliance with CEQA?

No

- b) Will this project require compliance with NEPA?

No

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

No construction activities in this phase. A portion of the proposed project is to develop documentation for CEQA compliance for later implementation.

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

CEQA Lead Agency:

NEPA Lead Agency (or co-lead:)

NEPA Co-Lead Agency (if applicable):

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

#### CEQA

-Categorical Exemption

Negative Declaration or Mitigated Negative Declaration

-EIR

-none

#### NEPA

-Categorical Exclusion

Environmental 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?

Not Applicable

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

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

#### **LOCAL PERMITS AND APPROVALS**

Conditional use permit

Variance

Subdivision Map Act

Grading Permit

General Plan Amendment

Specific Plan Approval

Rezone

Williamson Act Contract Cancellation

Other

#### **STATE PERMITS AND APPROVALS**

Scientific Collecting Permit

CESA Compliance: 2081

CESA Compliance: NCCP

1601/03

CWA 401 certification

Coastal Development Permit

Reclamation Board Approval

Notification of DPC or BCDC

Other

#### **FEDERAL PERMITS AND APPROVALS**

ESA Compliance Section 7 Consultation

ESA Compliance Section 10 Permit

Rivers and Harbors Act

CWA 404

Other

#### **PERMISSION TO ACCESS PROPERTY**

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

Agency Name:

Permission to access state land.

Agency Name:

Permission to access federal land.

Agency Name: USFWS

Required

Permission to access private land.

Landowner Name: Various Landowners

Required, Obtained

## 6. **Comments.**

Need for permits and approvals will be determined during the feasibility study as part of proposed project.

# Land Use Checklist

## Lower Deer Creek Restoration and Flood Management: Feasibility Study and Conceptual Design

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?**

No

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

Monitoring, feasibility evaluations, public involvement, NEPA/CEQA process for proposed actions.

4. **Comments.**

# Conflict of Interest Checklist

## Lower Deer Creek Restoration and Flood Management: Feasibility Study and Conceptual Design

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):**

Bill Berens, Deer Creek Watershed Conservancy

### **Subcontractor(s):**

Are specific subcontractors identified in this proposal? Yes

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

Maurice Hall      CH2M HILL

Tim Hamaker      CH2M HILL

Mark Oliver      CH2M HILL

Ken Iceman      CH2M HILL

Mark Tompkins      CH2M HILL

Mathias Kondolf      U.C. Berkeley

None      None

None      None

None      None

None      None

### **Helped with proposal development:**

Are there persons who helped with proposal development?

Yes

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

**Stacy Capello California Department of Water Resources**

**Randy Benthin California Department of Fish & Game**

**Colleen Harvey Arrison California Department of Fish & Game**

**Rob Titus California Department of Fish & Game**

**Trisha Brasher California Department of Fish & Game**

**Ernie Ohlin Tehama County Flood Control**

**Comments:**

Also Helped with Proposal Development: Mary Hall CH2M HILL Dick Daniels CH2M HILL Bill Berens Deer Creek Watershed Conservancy Diane Gaumer Deer Creek Watershed Conservancy Bill Paris O'Loughlin and Paris, LLP Chris Leininger Deer Creek Watershed Conservancy

# Budget Summary

## Lower Deer Creek Restoration and Flood Management: Feasibility Study and Conceptual Design

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

### Independent of Fund Source

Year 1												
Task No.	Task Description	Direct Labor Hours	Salary (per year)	Benefits (per year)	Travel	Supplies & Expendables	Services or Consultants	Equipment	Other Direct Costs	Total Direct Costs	Indirect Costs	Total Cost
1	Phase 1						475,000			475000.0		475000.00
2	Monitoring						136,000			136000.0		136000.00
3	Project Management						70,400			70400.0		70400.00
		0	0.00	0.00	0.00	0.00	681400.00	0.00	0.00	681400.00	0.00	681400.00

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
		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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=681400.00**

**Comments.**

# Budget Justification

## Lower Deer Creek Restoration and Flood Management: Feasibility Study and Conceptual Design

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

DCWC has no permanent staff and will hire consultants to perform the duties under the contract; therefore, CALFED will not be charged for direct labor.

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

DCWC has no permanent staff and will hire consultants to perform the duties under the contract; therefore, CALFED will not be charged for salaries.

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

DCWC has no permanent staff and will hire consultants to perform the duties under the contract; therefore, CALFED will not be charged for benefits.

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

DCWC has no permanent staff and will hire consultants to perform the duties under the contract; therefore, CALFED will not be charged for travel.

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

DCWC has no permanent staff and will hire consultants to perform the duties under the contract; therefore, CALFED will not be charged for supplies and expendables.

**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.

Phase 1--CH2M HILL \$613,000 (approx. 5,000 hours) Phase I--O'Laughlin & Paris \$100,000 Hourly 2001 rates for senior project team are as follows: Maurice Hall \$100/hour Ken Iceman \$120/hour Tim Hamaker \$100/hour Mark Thompkins \$84/hr Mark Oliver \$120/hour Mathias Kondolf/ \$125/hour Bill Paris/ \$180/hour Phase II--CH2M HILL \$327,000 (approx. 3,000 hours) Phase II--O'Laughlin & Paris \$75,000 Phase III--CH2M HILL \$223,000 (approximately 2,000 hours) Phase III--O'Laughlin & Paris \$75,000 Monitoring--CH2M HILL \$271,000 (approximately 3,000 hours)

**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.

DCWC has no permanent staff and will hire consultants to perform the duties under the contract.

**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.

Project Management--O'Laughlin & Paris \$75,000

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

DCWC has no permanent staff and will hire consultants to perform the duties under the contract; therefore, CALFED will not be charged for other direct costs.

**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.

DCWC has no permanent staff and will hire consultants to perform the duties under the contract; therefore, CALFED will not be charged for indirect costs.

# **Executive Summary**

## **Lower Deer Creek Restoration and Flood Management: Feasibility Study and Conceptual Design**

Deer Creek drains the west slope of the southern Cascades and joins the Sacramento River near the town of Vina in Tehama County. It is one of only three streams in the Central Valley still supporting wild populations of threatened spring-run chinook salmon, steelhead trout, and fall-run chinook salmon. The lower reaches have historically supported spawning by fall-run chinook and provided rearing habitat for other runs. Instream habitat quality has declined since levee construction in 1949. The levees have since failed repeatedly, and the potential exists for catastrophic levee failure. The goal of the proposed long-term project is to improve habitat while developing feasible solutions to the flooding problem on lower Deer Creek. These solutions will emphasize improving conditions for passage, spawning, and/or rearing of chinook salmon and steelhead. This goal will be achieved in an atmosphere of respect for private property and cooperation with willing participants. The general objective of this proposed project (Feasibility Study and Conceptual Design) is to develop a conceptual design for a flood control alternative for lower Deer Creek that uses managed floodplain inundation as a restoration tool. The main hypothesis is: The restoration of Deer Creeks access to its floodplain will result in more natural fluvial and floodplain processes in the main channel while preserving established uses of bordering lands. Implementation of the project will help CALFED achieve ERP strategic goals 1, 2, and 4, as well as its Science Program Goal. This type of project is listed as a milestone for the ERP Multi-species Conservation Strategy for the Sacramento River Basin; and this project directly addresses Sacramento Region priorities 1, 2, 3, 4, and 7 as described in the Draft Stage 1 Implementation Plan (2001). The general approach and schedule are: --Baseline Monitoring months 1 - 36 --Phase 1 Feasibility Study and Identification of Project Elements months 1- 18 --Phase 2 - Conceptual Design of Initial Project Elements months 19 - 24 --Phase 3 - Environmental Documentation for Implementation months 24 - 36 --Phases 4 6 Implementation, Monitoring, and Adaptive Management NOT included in this funding request The total requested budget is \$1.86 million.

# **Proposal**

**Deer Creek Watershed Conservancy**

## **Lower Deer Creek Restoration and Flood Management: Feasibility Study and Conceptual Design**

Bill Berens, Deer Creek Watershed Conservancy

# Lower Deer Creek Restoration and Flood Management: Feasibility Study and Conceptual Design

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## A Project Description: Project Goals and Scope of Work

### 1. Problem

Deer Creek drains the west slope of Mount Lassen, flowing westward through bedrock canyons until it reaches the Sacramento Valley floor, and then flowing across its alluvial fan to join the Sacramento River near the town of Vina in Tehama County. Deer Creek is one of only three streams in the Central Valley still supporting wild populations of the federally threatened spring-run chinook salmon (Campbell and Moyle 1991) (NMFS 2000). It also supports the threatened steelhead trout and fall-run chinook salmon, the mainstay of California's sport and commercial salmon fishery. Spring-run chinook spawn in upstream reaches. The lower reaches have historically supported spawning by fall-run chinook and provided rearing habitat for various runs from Deer Creek and rearing of fish from other drainages.

The quality of instream habitat in the lower reaches of Deer Creek has declined visibly since the early 1900s. This habitat decline is likely due in part to the construction of a flood control project by the U.S. Army Corps of Engineers (COE) in 1949. The project involved straightening and simplifying the channel, and constructing levees along 10 miles of lower Deer Creek. The levees eliminated Deer Creek's natural ability to absorb high flows on its floodplain. By restricting the stream to an unnaturally narrow channel, flood waters flow quickly to the downstream reaches inhibiting channel meander, disrupting sediment transport, preventing floodplain inundation, scouring the channel, uprooting native habitat and increasing the flood risk downstream thereby endangering private property, including the Abbey of New Clairvaux.

Because the levees concentrate flow and increase flow depths and shear stress, the potential for catastrophic levee failure is ever present. The levees have failed repeatedly, twice in the last two decades (including 1997) at a point about 1,000 feet downstream of the Leininger Rd. Bridge. The 1997 levee breach allowed concentrated floodwaters to rush onto the floodplain, damaging farmland. However, by allowing some of the floodwaters to occupy the natural floodplain and relieving pressure on the main channel, the levee breach may have prevented serious flood damage to the Abbey downstream.

In addition to the direct, mechanical channel modification that resulted from the construction of the flood control system, the levees also concentrate flow in a narrow channel, and increase depth and shear stress. The high shear stresses tend to wash out gravels and irregularities driving the channel to a simple geometry, with correspondingly low habitat values.

To respond to the flooding and habitat problems in lower Deer Creek, the Deer Creek Watershed Conservancy (DCWC) has explored the concept of deliberately using the floodplain of Deer Creek to accommodate part of the flood flows, but in a controlled fashion. With careful planning and adequate protection for vulnerable property and infrastructure, such an approach should reduce the risk of levee failure and eliminate the need for the channel of Deer Creek to accommodate the entire flood flow, thereby allowing the channel to reestablish some of its irregular, hydraulically rough, and ecologically complex pre-levee condition.

### **Review of Past Studies**

In the Deer Creek Watershed Management Plan (DCWC, 1998), DCWC, in cooperation with numerous stakeholders and agency personnel, carried out an assessment of the watershed and subsequently developed the watershed management strategies that outline the needed implementation measures for responsible resource management in the watershed. The Plan outlines eight strategies for meeting these goals. This proposed flood plan project is one of those strategies that came directly from this organized effort.

The Deer Creek Watershed Management Plan provides background information on hydrology, geomorphology, and the existing flood control project, documenting the inadequacy of the current flood control facilities and the suspected impact of the current flood control project on the geomorphologic processes of the main channel of lower Deer Creek. Following the damaging floods of 1997, Dr. Mathias Kondolf of U.C. Berkeley and staff from the California Department of Water Resources (DWR) conducted a preliminary field reconnaissance of lower Deer Creek and prepared a preliminary estimate of the extent and nature of the flooding (Figure 1).

The CALFED Bay-Delta Program Strategic Plan for Ecosystem Restoration (1999) cites Deer Creek and chinook salmon as an example of adaptive management using conceptual models. In that discussion, several alternative measures are presented including mechanical ripping of the gravelbed, artificial addition of smaller gravel, installation of log structures, planting of riparian trees. However, the long-term viability of any of these fixes is highly uncertain as long as the current flood-control system remains unchanged.

### **Goals, Objectives, and Hypotheses**

The overarching goal of the proposed Lower Deer Creek Restoration and Flood Management Project is to improve aquatic and terrestrial habitat while developing feasible solutions to the flooding problem on lower Deer Creek that are sensitive to the needs and values of the local landowners. These solutions will have a particular emphasis on improving conditions for passage, spawning and/or rearing of chinook salmon and steelhead. This goal will be achieved in an atmosphere of respect for private property and cooperation with willing participants.

The general objective of this proposed project (Feasibility Study and Conceptual Design) is to develop a conceptual design for a flood control alternative for lower Deer Creek that uses managed floodplain inundation to meet the above-described habitat restoration goals. Inseparable from this general objective are these associated objectives:

- Develop an integrated long-term adaptive flood management plan for lower Deer Creek and a comprehensive monitoring plan to support the adaptive management program.

- Incorporate the considerable landowner and stakeholder knowledge and values into the design of the restoration and flood control elements and provide a model process demonstrating the value of the stakeholder resource in restoration.
- Educate other stakeholders and the region's public about the need and rationale for the plan and project.
- Provide critical information to improve understanding of biologic and hydrologic processes in the Bay-Delta System and disseminate that information for the benefit of other restoration efforts and the greater CALFED Bay-Delta program.

The hypotheses on which this proposal is based are described in Section A2. Justification below.

## 2. Justification

The proposed actions and expected outcomes for this lower Deer Creek restoration planning project are based on the conceptual model illustrated in Figure 2. Under existing conditions, much of lower Deer Creek is confined by levees, and the channel is frequently maintained to provide flood control and passage, which also damages the integrity of the aquatic and riparian habitat. Spring- and fall-run chinook salmon and steelhead trout production may be limited by this degraded habitat. And despite these flood control efforts, flooding still occurs because of repeated levee failures, resulting in unexpected and significant damage to private property.

This project will investigate the feasibility of allowing flood flows in Deer Creek to access the floodplain in a controlled manner to improve habitat and improve flood control. The conceptual model illustrates the hypothesized nested set of benefits of this situation. Testing these hypothesis will generate insights as to how ecological restoration can be implemented, how restoration can be integrated into existing land uses, and how ecological performance can be measured and monitored.

### Hypotheses

The overarching hypothesis is: The restoration of Deer Creek's access to its floodplain will result in more natural fluvial and floodplain processes in the channel of Deer Creek while preserving the economic viability of the bordering lands.

Related hypotheses include:

- Providing floodplain capacity to absorb flood flows will reduce (though perhaps not eliminate) the need for channel maintenance and allow diverse and complex aquatic and riparian habitat to become established in Deer Creek.
- A program of managed floodplain inundation for flood control on lower Deer Creek will reduce flood damage and flood management costs.
- Restoring floodplain access to lower Deer Creek will decrease the magnitude of in-channel shear stresses associated with high flow events and allow diverse and complex aquatic and riparian habitat to be formed and maintained by natural fluvial processes.

- Increased aquatic and riparian habitat complexity and diversity will increase the production, growth rate and survival of chinook salmon and other species, potentially including winter-run chinook salmon, dependent on Deer Creek.

As this project moves through the Feasibility Study process of gathering information and modeling to test alternatives (described in Section A3. Approach), the above hypotheses will be scrutinized and revised as part of the process of identifying preferred alternatives for implementation.

### 3. Approach

Developing the conceptual design for a Deer Creek flood bypass system and channel restoration will require approaching the problem from several different aspects concurrently. These aspects may be thought of as loosely chronologically sequenced phases with considerable overlap and exchange of information between the phases. In fact, one aspect, monitoring for adaptive management, is to be conducted simultaneously with all the other phases. Although efficiency of execution, maintaining momentum, and consistency of project team members strongly favor funding of the entire proposed project, Phase I (approximately 1.5 years), Phase II (approximately 8 months if funded separately), and Phase III (approximately 1 year) could be funded individually.

***Ongoing Monitoring for Adaptive Management.*** Monitoring will be conducted throughout the project period and beyond to establish baseline conditions, refine the conceptual model for the system, and support adaptive management under preferred alternative.

***Phase I. Feasibility Study and Identification of Initial Project Elements for Initial Implementation.*** This will include identifying—through detailed mapping, geomorphic analyses, and hydraulic and hydrologic modeling—physical alternatives for relieving flood flows on lower Deer Creek and the basic requirements for implementing these options; and in cooperation with stakeholders and responsible agencies, developing a preferred alternative that combines physical and fiscal soundness and adaptive management with local public and private values.

***Phase II. Conceptual Design of Initial Implementation Project Elements.*** The selected alternative from Phase I will be refined to the point where environmental documentation can be completed, construction cost estimates can be made, and funding sources for implementation can be pursued.

***Phase III. Environmental Documentation for Implementation of Initial Project Elements.*** Environmental documentation to meet CEQA, NEPA, and other regulatory compliance will be developed for the selected alternative.

***Future Phases IV – VI. Not included in this funding request.***

IV. Detail Design of Initial Implementation Project Elements

V. Construction of Initial Implementation Project Elements

VI. Future Adaptive Management Implementation Projects

As indicated, this proposal requests funding for the ongoing baseline monitoring and phases I through III of the Deer Creek restoration project. More details of these phases are given

below. The later phases of the program will incorporate knowledge gained from the activities of these first phases, and the details for these future phases will be developed at a later time.

### **Key Functions**

During development of the lower Deer Creek project idea, three primary functions surfaced that encompass most of the required tasks. The three functions, Science/Engineering, Public/Stakeholder Involvement, and Monitoring for Adaptive Management must be conducted simultaneously and cooperatively, as illustrated in Figure 3, to realize the desired goal. Only with continuous, effective information exchange between the functions can the diverse activities converge on a single path forward. The hydrologic modeling activities and engineering scenario evaluations can suggest many potential structural and non-structural options to restore a more natural flow regime to the lower Deer Creek channel. However, landowner and public interests must feed into the scenario development and evaluation, or all the “preferred” engineering solutions may be moot.

**Outside Technical Review Committee.** An outside technical review committee will be assembled to review significant science and engineering findings and recommendations of the project. The committee will consist of approximately four members who have unique expertise in either the lower Deer Creek watershed issues or the science and engineering concepts involved in this study. The committee members will attend selected key milestone presentations and will review project reports and drawings to ensure direction and outcomes adhere to high standards and are consistent with the objectives of the ERP.

### **Ongoing Monitoring for Adaptive Management.**

Biological monitoring will consist of pre-project baseline monitoring and post-project hypothesis testing for adaptive management. Both are discussed here to provide reviewers a sense of what can be done to test the hypotheses associated with this proposal. As this is, however, a feasibility study, we will not finalize the hypothesis testing monitoring plan until a preferred project is defined following the feasibility study.

**Baseline Monitoring: Terrestrial.** Aerial photography and GIS mapping will be used to document existing plant species diversity, particularly riparian vegetation, and percent cover in the area likely to be affected by a future lower Deer Creek project, including areas of potential flood plain restoration. Except in areas where impacts or land use changes are possible outcomes of the lower Deer Creek project, only plants will be monitored. Species composition, lineal extent and patch size will be documented and mapped. The exact extent of the pre-project vegetation mapping will be developed as part of the initial project. Most likely it will cover the lower 11 miles of Deer Creek and all of the potential flood plain.

**Baseline Monitoring: Aquatic.** Existing aquatic monitoring on Deer Creek focuses on chinook salmon management issues. Adult escapement is monitored for spring-run and fall-run chinook salmon. Screw traps are used to evaluate run timing and size at emigration. Some electro-shocking for juvenile fish has been conducted in the past. Weight and length data have been collected and some scales have been collected but they have not been analyzed. Snorkel surveys of holding spring-run chinook adults are regularly conducted in the summer. This work has been carried out by the California Department of Fish and Game (CDFG) and

has been funded in part by the CAMP program of the Anadromous Fisheries Restoration Program. We are assuming that this monitoring will continue.

Additional monitoring to establish pre-project baseline conditions will include aquatic insects and terrestrial insect drop. Zooplankton biomass estimates will be established.

**Post-Project Performance and Adaptive Management: Biological Monitoring.** This lower Deer Creek project offers an exciting opportunity to implement and evaluate a project to test the ecological value of restoration of riparian habitat and flood plain function to an otherwise intact ecosystem. The similarities between Deer Creek and Mill Creek could make it possible to conduct a paired stream experiment and offers the chance to evaluate and document ecological changes. If this project is approved, we would immediately start the planning needed to be ready to include detailed project performance and adaptive management monitoring in a subsequent proposal. The monitoring protocols will be based on those developed by CALFED in its terrestrial and aquatic monitoring plans and included in the Program's Comprehensive Monitoring and Research Plan.

**Geomorphology Monitoring for Adaptive Management.** A unique opportunity exists to measure the performance of the eventual preferred project by comparing the existing geomorphic conditions (determined from recent air photographs and supplementary field studies), the pre-flood control system geomorphic conditions (determined from 1938 aerial photographs (Figure 4), and the post-project geomorphic conditions (determined by on-going monitoring).

The pre-disturbance (1938) aerial photos (Figure 4) clearly show riparian and channel conditions, such as alternating pools and riffles, and overhanging riparian vegetation, and will enable us to quantify aquatic and riparian habitat present in the system before the construction of the 1949 flood control levees on Deer Creek. These historical conditions can then be compared with current conditions and will provide a basis for estimating the fraction of the original (pre-1949) habitat restored by implementing this project.

Documentation of the existing geomorphic conditions of lower Deer Creek will be initiated at the outset of this project, as site-specific geomorphic information will be needed to assess existing and post-project conditions. The geomorphic investigations will include studies of the streambed topography to determine existing pool and riffle habitat extent and distribution and surveys of shaded riparian habitat and large wood. Permanent and recoverable channel cross sections will also be established to provide a basis for direct comparison of current and post-project channel geometry. A schedule of photogrammetric surveys will also be established to continuously update the record of conditions in the watershed. Once aerial photography targets are established and maintained on a regular basis, and once the initial year's photogrammetry is undertaken, subsequent flights and updates of the photogrammetric topography are relatively inexpensive and provide a record of conditions over a broad area of channel and floodplain. The monitoring program will also incorporate a detailed "event-driven" monitoring protocol to capitalize on the information to be gained from storm events that significantly change conditions in Deer Creek.

On the floodplain, specific habitat type will be catalogued and coverage will be determined from aerial photographs.

## Phase I. Feasibility Study

The Feasibility Study phase will include significant stakeholder/landowner involvement. Bringing affected landowners and other stakeholders into the project early on and inviting them to become a part of the project team through workshops and other activities will coalesce diverse opinions into a positive approach that recognizes the individual interests and common good while minimizing contention in later phases. This involvement will include workshops and formal and informal meetings between stakeholders and DCWC representatives and stakeholders and technical team members.

The general approach of the science/engineering function of Phase I is to identify a range of possible project elements that could be implemented to restore more natural flow conditions to the lower Deer Creek channel. Then, with simulations, we will evaluate the effects and benefits of these possible elements on distribution of flow depths, velocities, and shear stresses in the channel and on the floodplain and combine the information gained from the modeling with stakeholder input to arrive at a set of “possible” alternatives. Simulations of this smaller suite of alternatives will then be conducted to more fully describe the conditions that would result from implementation. The resulting simulation output will be used in an iterative workshop setting with key stakeholders to arrive at a preferred implementation alternative for conceptual design in Phase II.

Following is a brief outline of the major activities and some selected milestones of Phase I. The primary function(s) of each activity are given in parentheses. Note that all public meetings and minor steps are not explicitly described for sake of brevity.

***Chartering Meeting*** (Involves all three primary functions – See Figure 3) – The chartering meeting will bring together key project team members, and will include key landowners, key agency personnel, technical team leaders, and other key cooperators. The proposal, funding conditions, conceptual model and overall plan will be reviewed. The technical review committee will also be included in the chartering meeting to improve familiarity with the team and objectives and to provide guidance on the execution of initial project tasks.

***Assembling/Reviewing Existing Data/Information*** (All three primary functions) – A significant amount of historical data (physical and biological) exists for Lower Deer Creek. A focused effort will be made to collect and arrange this information and make it available to the project team. Existing data will be collected and organized for efficient use during this project. Digital terrain models developed from recent aerial photographs of the Deer Creek Basin will be used to establish the existing physical conditions. In addition, institutional knowledge of contentious issues and specific concerns will be collected and documented, and the team will begin making key stakeholder contacts.

***Monitoring Plan Development and Initiation*** (Monitoring) – The general monitoring plan will be detailed and initiated to supplement existing data and augment ongoing monitoring. A physical monitoring plan will be developed to establish a firm understanding of existing conditions and enable informative assessments of post-project performance with respect to the formation of aquatic and riparian habitat through natural processes. Specific elements of this plan are detailed in the Ongoing Monitoring for Adaptive Management Section (page 5).

***Workshop with Participants/Stakeholders/Agencies*** (Public/Stakeholder Involvement) – Approximately 1-2 months after the chartering session, an informational workshop including

poster presentations will be conducted to educate a broader group of interests on the project goals and plan.

***Preliminary modeling setup*** (Science) – A modeling framework will be developed to support flood-flow simulations of various implementation elements. This will include HEC-RAS modeling, to investigate the effects of potential project elements on average in-channel velocities and flood water surface elevations. A 3-D hydraulic model, currently in use on similar stream systems by Michael McWilliams at Stanford University, will also be adapted for use on Deer Creek to improve predictions about fine-scale changes in velocities and flow paths in Deer Creek associated with proposed project alternatives. Both models will require manipulations of existing topographic information from aerial photographs and may also require sub-surface channel geometry and channel particle size distribution.

***Collection of Additional Data*** (Science) – Additional detailed data (topography, stream/slough channel characteristics, levee conditions, etc.) will be collected as necessary to support development of detailed modeling. Gaps in existing physical data will be filled, when possible, by collecting new data. This will likely include, but is not limited to, field surveys to better classify variables such as grain size and underwater contours within the channel, and vegetation and habitat types in riparian and terrestrial zones.

***Hydrologic/Hydraulic Modeling Evaluation of Preliminary Scenarios*** (Science) – Basic simulations of a wide range of **project elements** (individual project features that together make up an **alternative**) that might be implemented will be conducted to identify those elements that offer reasonable benefit for improving the hydrologic conditions of the lower Deer Creek channel. Project elements that might be considered include: levee setback; controlled levee bypass to historical distributary channels (along with restoration of these distributary channels); upgrading bridges/crossings; targeted in-channel maintenance; levee upgrades; ring levees; landuse modifications; and/or combinations of these and possibly other options.

***Review of Project Elements Versus Conceptual Model*** (Science) – A critical scientific review of the preliminary simulation results will be conducted to evaluate the value of the various project elements against the conceptual model. If the conceptual model is revised based on new monitoring or other new information, suggestions of additional or modified project elements will be entertained and reviewed. If additional preliminary modeling is deemed necessary, the scope of those simulations will be developed and the additional modeling will be conducted. This review process may be repeated as necessary.

***Select Alternatives*** (Public/Stakeholder Involvement and Science) – Key stakeholders and team members (including key landowners) will be gathered in workshop settings to review the modeling and stakeholder process results to identify a set of project elements (alternatives) to be considered further. This will likely be an iterative process where various sets of promising project elements are combined, simulated, and brought back for consideration. Important aspects of this process will be up-front and continuous involvement of key landowners and stakeholders and clear presentation of results, including confidence intervals, data limitations and perceived risks. The outcome of this step will be a selected alternative or small set of alternatives that are recommended for further consideration (conceptual design).

***Workshop Alternatives and Evaluation*** (Public/Stakeholder Involvement and Science) – Thorough documentation of the selected alternatives will be prepared including visual simu

lations and poster descriptions of the process. This documentation will be presented in two or three broad public forums to gain general support, identify any fatal flaws in the selected alternatives, and set the stage for the environmental documentation. One of these forums will be held in the Vina Community Center or other suitable local location.

***Identify Environmental Documentation/Permitting Requirements*** (Science) – Based on perceived potential impact of the alternatives and feedback obtained throughout the process, the CEQA requirements of the project will be identified in cooperation with appropriate agencies.

***Document Alternatives and Monitoring – Feasibility Report and Monitoring Report*** (Science and Monitoring) – A cumulative documentation of the findings of the program phases thus far will be prepared including a feasibility report describing the alternatives considered, a report of the monitoring findings, and a summary description of the revised conceptual model and path forward.

## **Phase II. Conceptual Design of Initial Implementation Project Elements**

Phase II will take the selected alternative from Phase I and refine the details to the point where environmental documentation can be completed, construction cost estimates can be made, and funding sources for implementation can be pursued.

***Conceptual Design of Selected Alternative(s)*** (Science) – The selected alternative (2) will be refined, and a conceptual engineering design of the elements of the selected alternative will be produced. The design documentation will include: area-wide layouts of new facilities, facility upgrades, etc.; finalized mapping of simulated flood extents; 15 percent engineering design of project elements; order-of-magnitude construction cost estimate; suggested phasing of construction; detailed performance objectives and monitoring plan; and an updated/refined adaptive management plan.

***Public Presentation/Workshop of Conceptual Design(s)*** (Public Involvement) – The conceptual design will be presented to the public in public forums. The key stakeholders will join the DCWC and the engineer in presenting the conceptual design and responding to questions. Included in one public forum will be a visit to the site of one or more major elements of the project along Deer Creek where key participants will discuss the alternatives considered and the perceived advantages of the selected alternative.

## **Phase III. Environmental Documentation and Permitting**

The high level of landowner, stakeholder, public and agency involvement planned for the overall program will help to guide the project toward a selected alternative that minimizes undesirable impacts and maximizes environmental and public benefits. The situation and plan offer the opportunity to implement highly beneficial alternatives under a mitigated negative declaration. Therefore, the documentation for an IS/EA under the CEQA process guidelines will be prepared for the selected alternative.

The considerable amount of data and information assembled for the feasibility study will feed smoothly into the IS/EA development so that additional data and completion of the documentation can proceed efficiently and in a reasonable time frame. The emphasis on

stakeholder and community involvement in the earlier stages will be maintained in the CEQA documentation period to avoid unexpected opposition, and therefore control cost.

A likely component of the chosen alternative will be permissions and/or floodway easements on selected private and public properties. In the context of our overall process, these rights-of-ways will likely have been negotiated in concept prior to this point in the process, the details of any required rights-of-way will be defined, and any associated permits will be obtained during this phase.

#### **4. Feasibility**

A number of attributes of Deer Creek and its watershed make this an ideal project for demonstrating the opportunities and results of controlled floodplain inundation for stream channel restoration. Many of these have been touched on earlier in this proposal including the reasonably undisturbed upper watershed and the low-intensity of development in the lower watershed, and the fact that Deer Creek still supports populations of both spring- and fall-run chinook and steelhead.

Perhaps even more important than these physical characteristics is the already broad support among lower Deer Creek landowners. As documented in the Deer Creek Watershed Management Plan (DCWC 1998), a broad coalition of watershed landowners support the concepts offered in this proposal and have already invested large amounts of energy toward this and other goals in the watershed. The proposed project recognizes the critical role of the landowner and draws on their knowledge, enthusiasm, and coordination experience. In fact, many of the potentially impacted landowners have been involved in the development of this proposal and will work as part of the project team to meet and lead discussions with landowners who have expressed concerns about possible changes to the current facilities.

From a scientific perspective, reconnection of a stream with its floodplain is well recognized as a valuable tool for restoring channel diversity and habitat and reducing flood damage. The strategy of reusing floodplains to accommodate flood flows was adopted for the River Rhine, in France, where levees had cut off 95 percent of the former floodplain. Hydraulic engineers concluded that the most reliable and cost-effective way to reduce flood risk to downstream urban areas was to use the floodplain to store floodwater (Dister et al. 1990). Similarly, the committee appointed by President Clinton after the 1993 Mississippi River floods recommended moving settlements off floodplains so the floodplains could safely store water and reduce downstream flood risk (Interagency Floodplain Management Review Committee 1994). The Sutter and Yolo bypasses along the Sacramento River embody the same approach of setting aside part of the floodplain that can still function as a floodplain (Kelley 1986). This approach to floodplain management has been endorsed by the American Fisheries Society (Rasmussen 1996).

Thus, the idea of using floodplains to accommodate flood flows is not new, but to do so to restore habitat conditions in the channel is innovative. Moreover, the companion goals of solving a persistent flood problem *and* restoring habitat should make the project eligible for restoration funding as well as flood control funding. The strategy is most feasibly implemented where a floodplain is largely uninhabited, as fortunately is still the case along Deer Creek. However, with each passing year, more development occurs and the potential

conflicts with routing flood flows over the Deer Creek floodplain increase. Time is of the essence to explore these alternatives and evaluate the feasibility of their implementation.

Large amount of existing mapping and data already exist to support rapid progress including detailed topography from 1999 mapping, a wealth of historical aerial photography, and results from ongoing CDFG monitoring. The proposed project team involves many of the key participants in previous work in the watershed so that a maximum benefit is gained from the institutional knowledge. Against this background of physical setting, local control, and strong science, the requested funding should ensure steady progress toward long-recognized needs for restoration on Lower Deer Creek.

For the tasks proposed in the current funding request, no permits are required beyond those already held by CDFG for biological monitoring. Access will be required for stream channel condition assessment and for some spot surveying. Specific locations for this monitoring and surveying have not yet been identified, but numerous landowners, including those on the DCWC Board of Directors (Board), have agreed to allow access as necessary.

Permit requirements for later phases of the project (not included in this funding request) will be identified and pursued based on selected option(s) and conceptual design that are outcomes of the proposed project. In addition, any proposed modifications to the levees will be coordinated with the COE, DWR/Reclamation Board, and Tehama County. The proposed time allotment for the project as shown on the attached schedule is reasonable and consistent with similar previous projects conducted by DCWC and its consultants. The time allotted should be adequate to accommodate any weather or related interruptions.

Possible sources of funding for later implementation phases include the Sacramento and San Joaquin River Basins Comprehensive Study and the Flood Protection Corridor Program, funded by Proposition 13.

## **5. Performance Measures**

Since the proposed project includes the feasibility study, conceptual design, baseline monitoring, and environmental documentation, but not the actual implementation of restoration measures, the performance measures will be successful completion of key project activities rather than environmental indicators. Performance measures for each project phase are described below.

### **Monitoring Program**

The success of the baseline monitoring program will be demonstrated with a report to the DCWC Board, describing the biological and stream channel conditions in lower Deer Creek. This report will supplement the Deer Creek Watershed Management Plan (DCWC 1998), focusing on lower Deer Creek and will include a description of current channel conditions versus historical conditions as interpreted from historical photographs. The outcome of the monitoring program will also be presented publicly at one or more public workshops conducted as part of the Phase I. Feasibility Study.

The monitoring program outcome will also be documented to an extent in the refined and/or revised conceptual model of the lower Deer Creek system, which will be documented in the

Feasibility Study. This feedback from the monitoring and the hydraulic evaluations will be an important aspect of monitoring program performance.

### **Phase I. Feasibility Study**

The feasibility study and landowner/public involvement process will have multiple measures of performance. For the landowner involvement process, a key performance measure will be the number of landowners that participate in the chartering meeting, the alternatives selection process, and other less formal landowner meetings. The target for participation is 100% of the potentially impacted landowners, and at least 50% of landowners in the lower Deer Creek watershed.

The performance of the broader public involvement process is more challenging to gauge, but is still measured by the number of people reached, and to a lesser extent, the amount of feedback received. This will be documented in reports to the DCWC Board for each organized public meeting. Regular updates will also be presented to the Board on informal engagements. Overall activities and performance of the public involvement process will be summarized in the final Feasibility Report.

The performance of the modeling component of Phase I. will be measured by modeling results showing flooding extent for various scenarios and corresponding estimates of resulting in-stream conditions. While not itself an accurate measure of project success, the actual number of alternatives evaluated will be reported to illustrate the variety of variables and conditions considered.

The most comprehensive performance measure of this Phase will be attaining consensus on a reasonable alternative or small set of alternatives. The agreed upon alternative, along with the intermediate performance measures, will be documented in the Feasibility Report prepared for the DCWC Board and presented at the public forums described above. Additional documentation and measures of performance for component activities in Phase I may include: presentations accepted at scientific meetings and forums; invitations for presentations by project staff and cooperators; requests from other watershed organizations for materials, information, and support; and acceptance of manuscripts for publication in peer-reviewed journals. Opportunities for these activities will be sought and supported by the project team.

### **Phase II. Conceptual Design of Initial Implementation Project Elements**

The performance of Phase II will be demonstrated by production of a coherent conceptual design. The design will be documented in a set of conceptual design drawings and an accompanying summary report. The review by the technical review committee and other outside reviewers will ensure the quality of the design product. An additional measure of the performance will be the level of acceptance by public (expressed in response to the public workshops of the conceptual design) and acceptance by agency stakeholders.

### **Phase III. Environmental Documentation and Permitting**

The clear performance measure of Phase III is the consensus and acceptance of an Environmental Assessment and issuance of required permits. Less evident success measures are the working relationships and cooperative attitude that exists throughout and at the conclusion of

the process. It is the objective of the DCWC to conduct the project in an open and cooperative atmosphere that results in a win-win outcome for all parties.

## **6. Data Handling and Storage**

For this project, we will use a broad range of information management tools and systems. A large amount of spatial information will be acquired and developed including structure locations, vegetation characteristics, stream channel characteristics, and property ownership. The primary platform for storage and manipulation of spatial data will be Arc Info/Arc View GIS and related ESRI-supported data formats. Hydraulic modeling will be conducted with HEC-RAS and related software and with a developmental 3-D hydraulics model for in-channel velocity simulations. Other data generated will include stream channel and biological monitoring and landowner-supplied information on flood extent, flood damage, and constraints on alternative implementation. This information will be collected in written and digital field notes and transferred as appropriate to computer documents, spreadsheets, and GIS coverages.

During the project, the main working database of technical project data and information will be housed at the CH2M HILL office in Redding, California. A duplicate database will be maintained on a DCWC computer. Portions of the work will be conducted at other locations including the University of California at Berkeley, Stanford University, and the CH2M HILL Sacramento office. At regular intervals, data and information at these locations will be downloaded to the main project database.

General information exchange and storage will be conducted with extensive use of E-mail with file attachments, Microsoft Office suite of desktop software, additional desktop applications and intranet-deployed reference material and project/client-specific web sites

## **7. Expected Products/Outcomes**

The primary product of this project is three-fold: a feasibility study with a recommended alternative for implementation; a conceptual design of the selected alternative(s); and completed environmental documentation and permitting. But perhaps the most valuable products of phases I-III will be the clear documentation of the process and outcome that can feed back to the overall ERP strategy and provide a successful model for other similar projects within the CALFED program area and elsewhere.

In completing these products, numerous support products will also be developed. These include: publications and presentations; technical reports, memorandums and professional publications; maps; fact sheets, newsletters, press releases; workshops; educational materials; and a geomorphic and ecologic GIS database. All of these media will be used to share information assembled from the various project activities, including data gathering, baseline and ongoing biologic and geomorphic monitoring, workshops, and conceptual design.

Other possible avenues for sharing this information include: research publications in relevant scientific journals, presentations at professional technical conferences, and masters theses from university students on elements of the feasibility study and conceptual design, and educational materials.

Because this proposal does not include any physical implementation, no measurable physical or environmental outcomes are expected. However, there are anticipated community and social outcomes including stronger positive working relationships among the stakeholders.

## 8. Work Schedule

The proposed work schedule is summarized in Figure 5.

# B Applicability to CALFED ERP and Science Program Goals and Implementation Plans and CVPIA Priorities

## 1. ERP, Science Program, and CVPIA Priorities

Implementation of the final proposed project (one of the outcomes of this proposed feasibility study) will help CALFED *achieve ERP Strategic Goal 1, achieve recovery of at-risk species*, specifically spring-run chinook salmon and steelhead trout; *Goal 2, rehabilitate natural (ecosystem) processes*, specifically instream and flood flows; and *Goal 4: protect and/or restore functional habitat*, specifically instream flows and spawning beds needed by spring run chinook salmon (goals from CALFED ERP Draft Stage 1 Implementation Plan (2001)).

This type of project is listed as *a milestone for the ERP Multi-species Conservation Strategy for the Sacramento River Basin Ecological Processes*: Develop floodplain management plans to restore and improve opportunities for rivers to inundate their floodplain ...including the lower 10 miles of Deer Creek... (shortened from CALFED 2001). This proposal is a study of the feasibility of actions proposed under the *Stream Meander And Floodplain* section of ERP vol. 2 pages 249 and 250 (1999), specifically programmatic action 1B and Riparian and Riverine Aquatic Habitats target 2 and action 2A.

Additionally, this project will advance CALFED's achievement of its *Science Program Goal* of building on a body of knowledge to improve the effectiveness of restoration programs. The actions in this proposal parallel most of the actions listed in the ERP Draft Stage 1 Implementation Plan (CALFED 2001) to advance that goal: develop performance measures; conduct adaptive management experiments; advance process understanding; establish integrated science programs in complicated field settings, compare effectiveness of different restoration strategies; coordinate and extend existing monitoring; and take advantage of existing data.

This project directly addresses *Sacramento Region (SR) priorities 1-4 and 7* as described in the CALFED ERP Draft Stage 1 Implementation Plan (2001).

**SR-1: Develop and implement habitat management and restoration with local groups.** Priority tributaries for riparian habitat and channel meander under this restoration action include Deer Creek; and this feasibility study project is being submitted by a local group: Deer Creek Watershed Conservancy.

**SR-2: Restore fish habitat and fish and conduct passage studies.** This project will naturally replenish spawning gravel and maintain gravel recruitment in lower Deer Creek by reducing flood flow scour.

**SR-3: Conduct adaptive management experiments in regard to natural and modified flow regimes.** This project will simulate flood flows and instream flows in response to various implementation alternatives. These simulations will aid in developing an ecologically-based plan for a more natural instream flow regime sufficient for restoring populations of spring-run chinook salmon and steelhead trout. Once the restoration project is implemented, modeling results will be combined with and compared to physical measurements of flow, sediment transport, and other fluvial processes. The potential also exists to pair Deer Creek with nearby Mill Creek to conduct a sophisticated paired stream analysis.

**SR-4: Restore geomorphic processes.** This proposal is for a feasibility study to construct set-back levees to restore and improve opportunities for Deer Creek to inundate its floodplain.

**SR-7: Develop conceptual models to support restoration.** Project scientists will work with by CDFG staff to improve understanding of the processes that support the communities and related ecosystem functions based on project and CDFG monitoring.

The proposed project is also consistent with *CVPIA Section 3406 Fish, Wildlife, and Habitat Restoration (b)(1)(b) First priority given to measure which protect and restore natural channel and riparian habitat values; (e)(3) measures to eliminate barriers to salmonid migration; and (e)(6) Other measures to protect, restore, and enhance natural production of salmon and steelhead in Central Valley tributary streams* (CALFED 2001). This proposal is a study of the feasibility of two actions proposed in a 1998 report to Congress on the feasibility of implementing measures addressing (e)(3) and (e)(6) **Action 3: Improve spawning habitats in lower Deer Creek for fall- and late-fall-run chinook salmon;** and **Action 5: Plan and coordinate required flood management activities with least damage to the fishery resources and riparian habitats of lower Deer Creek** (USFWS 1998).

## 2. Relationship to Other Ecosystem Restoration Projects

This proposal is an outgrowth of a previously funded CALFED project (see number 4 below) and complements other restoration projects in the area. Through a 1997 CALFED ERP grant (project number F5) the U.S. Forest Service initiated a watershed improvement/sediment stabilization program on Deer Creek and two other streams. The proposed project is also complementary to efforts to provide critical passage flows for spring-run Chinook salmon funded by CDFG and the Department of Water Resources through the Delta Pumping Plant Fish Protection Agreement, and will complement *The Mill and Deer Creeks Protection and Stewardship* proposal of TNC, which is being prepared for 2002 ERP funding.

The DCWC and various partners have successfully completed other (non-CALFED) projects including the development of the 1998 Deer Creek Watershed Management Plan (DCWC 1998) with funding support from the U.S. Fish and Wildlife Service (USFWS) and the State Water Resources Control Board (WRCB). Another USFWS grant (\$98,000) has just be completed to reduce erosion and resulting sediment loads in Deer Creek and its tributaries from over 20 road sites in the upper watershed on mainly Collins Pine Co. lands and some “cost share” roads with the Lassen National Forest. These and other projects initiated by the

DCWC are all complementary and in accordance with the strategies outlined in the well-conceived watershed management plan.

### **3. Request for Next-phase Funding**

The proposed work is not a request for next-phase funding.

### **4. Previous Recipients of CALFED or CVPIA funding**

In 1997 the DCWC received \$196,554 from the CALFED Bay-Delta Ecosystem Restoration Program for general watershed planning (project number F237). This previous grant funded the development of a fire plan, a highway 32 spill plan and assessment, and a rangeland management plan for the watershed. The outcomes of all of these plans are documented in the DCWC's 2000 Annual Report. In addition, the preliminary plans developed from this previous grant have laid the foundation for other projects including a recently awarded Rangeland and Riparian Management Program under the CALFED Watershed Program (project number 0049). In addition, the concepts for this current proposal were developed from preliminary floodplain investigations conducted by Dr. G. Mathias Kondolf and DWR in association with (but not directly funded by) the 1997 ERP grant.

### **5. Systemwide Ecosystem Benefits**

Synergistic, systemwide ecosystem benefits will result through the regeneration of the stream side riparian forest — providing habitat for wildlife and avian species, SRA (Shaded Riverine Aquatic, USFW Category 1. habitat), and a source of in-stream large woody debris — as well as the preservation of open space. Additionally, this project compliments other projects/programs in watershed as discussed in section B2. Relationship to Other Ecosystem Restoration Projects above.

### **6. Proposals Containing Land Acquisition**

The proposed project is a feasibility study to evaluate alternatives for possible future implementation, and therefore, does not require any land acquisition.

## **C Qualifications**

The organization chart for the proposed project team is presented in Figure 6. Most of the team members have worked together on a variety of projects and have a proven successful track record. Individual team member qualification summaries are presented below.

### **O'Laughlin & Paris, LLP – Project Coordination and Stakeholder Involvement**

Located in Chico, O'Laughlin & Paris LLP practices throughout California. The firm's experience and expertise emphasize water rights, water and natural resources, environmental law and public entity representation. O'Laughlin & Paris LLP represents many public and private entities, including water and irrigation districts, community services districts, corporations, farms and individuals.

The firm has participated in many complex, stakeholder-based processes on behalf of its clients, including one concerning the operation of a system of dams on the Stanislaus River, one concerning the development of strategies to deal with dissolved oxygen at the Stockton

Deep Water Ship Channel, and one concerning the location and construction of flood protection facilities for the Hamilton City area. These processes all involve the participation of affected landowners, environmental organizations, and governmental agencies. In each case, the firm has taken a leading role in bringing the stakeholders together and establishing protocols by which each stakeholder can participate fully and constructively in the pursuit of mutually beneficial goals.

**Maurice D Hall, Ph.D. - Technical Project Management; Watershed Management  
Ph.D., Watershed Sciences; B.S., Chemical Engineering**

Dr. Hall is a project manager and water resources engineer at CH2M HILL with extensive experience in watershed management, water resources planning and management, and regional hydrologic modeling and geographic information system (GIS) analysis. Dr. Hall was project manager for a \$3 million design of irrigated managed vegetation and associated water conveyance facilities for dust control on more than 4 square miles of the Owens dry lakebed for the Los Angeles Department of Water and Power. He has been involved in numerous water resources projects in California and Oregon including the development of Sacramento Basin-Wide Management Plan, Water Supply Alternatives and Salinity Assessment for the Sacramento River Settlement Contractors and U.S. Bureau of Reclamation, California. Working extensively with farmers and other stakeholders, Dr. Hall developed a regional GIS-based model for linking landuse with groundwater in northeastern Colorado.

**Timothy L Hamaker - Fisheries Biologist  
B. S., Fisheries Biology; American Fisheries Society - Certified Fisheries Scientist**

Mr. Hamaker has more than 23 years of experience with CH2M HILL in fishery habitat and population inventory studies including channel and streambank realignment and restoration, and numerous fisheries studies under the Endangered Species Act and EIS/EIRs. Mr. Hamaker consulted in the development of wetland, aquatic, and riparian habitat in the realignment of Best Slough at Beale Air Force Base in northern California. He was task manager of the fisheries component of the Mainstem Trinity River Fisheries Restoration EIS/EIR for the U.S. Bureau of Reclamation. As part of the fisheries impact assessment team, he developed methods and analyzed the long-term consequences of implementing the 1992 CVPIA.

**Mark Oliver - Environmental Documentation/Permitting  
B.S., Environmental Policy Analysis and Planning**

Mr. Oliver is a senior environmental planner at CH2M HILL with 15 years of experience in the preparation and management of EIR/EISs under CEQA and NEPA. He is project manager for the Colusa Basin Drainage District feasibility study and integrated watershed management program, including a District-wide Conservation Plan, a project-level EIR/EIS, and a feasibility study. Previously he was project manager for the Mainstem Trinity River Fishery Restoration EIS/EIR for the U.S. Bureau of Reclamation, Hoopa Valley Tribe, and Trinity County. Mr. Oliver was also project manager for the U.S. Bureau of Reclamation Refuge Water Supply EA/IS in California.

**G. Mathias Kondolf, Ph.D. – Geomorphology/Stream Restoration****Ph.D., Geography and Environmental Engineering; MS, Earth Sciences; AB, Geology**

Dr. Matt Kondolf is a fluvial geomorphologist whose research concerns environmental river management, influences of land-use on rivers (notably the effects of mining and dams on river systems), interactions of riparian vegetation and channel form, geomorphic influences on habitat for salmon and trout, alternative flood management strategies, and application of fluvial geomorphology to river restoration. Dr. Kondolf is an associate professor of Environmental Planning and Geography, affiliated faculty member of the Energy and Resources Group, and instructor in the Environmental Sciences Program at the University of California at Berkeley. He also is a past member of the CALFED Ecosystem Restoration Program (ERP) Science Board. He has conducted hydrologic, historical, channel stability, and spawning gravel analyses on numerous streams in California including the Lower Yuba River, Rush Creek, Lee Vining Creek, Battle Creek, Stony Creek, the Sacramento River between Deer Creek and Stony Creek, and others.

**Kenneth R. Iceman, P.E. - Hydrologic Modeling****M.S., Engineering; B.S., Mathematics; Professional Engineer, California**

Mr. Iceman has more than 28 years of experience with CH2M HILL in hydraulics, hydrology, and water quality, including the use of both analytical, numerical, and statistical models and several field monitoring techniques for flood control, gradient restoration structures and fish passage improvement. Mr. Iceman directed all hydrology tasks and hydraulic modeling for the Indian Valley Flood Management Study and Indian Creek Watershed Management Plan for Plumas County. For Siskiyou County flood insurance studies Mr. Iceman conducted detail mapping, hydrology, and hydraulics for 3 detailed.

**Mark Tompkins – Hydrology, Geomorphology, and Stream Restoration****M.S., Environmental Engineering; B.S., Civil Engineering**

Mr. Tompkins is a project engineer and stream restoration specialist at CH2M HILL where he developed the firm's national Stream Restoration Initiative. He has extensive project experience in ecological engineering, water resources engineering, hydrology, fisheries biology, fluvial geomorphology, and stream restoration. Mr. Tompkins has performed geomorphic assessments for stream restoration projects on Best Slough and Lower Silver Creek in California, and on Sugarland Run in Washington D.C. Mr. Tompkins has assessed the potential effects of potential changes in hydrology and sediment transport on the Sacramento River. Mr. Tompkins also has expertise with hydraulic and hydrologic models, and has completed detailed analyses of proposed channel modifications on major river systems in California.

**D Cost**

The proposed project costs are detailed in forms V and VI, Budget Summary and Budget Justification. The total requested budget is approximately \$1.8 million.

## E Local Involvement

The Deer Creek restoration project is the result of local involvement and will depend on extensive continued local involvement to carry it through to completion. To begin with, the owner of the project, the Deer Creek Watershed Conservancy, is an active organization of local landowners. The DCWC formed in 1994 to coordinate efforts in Deer Creek watershed protection. With landowner members represented by 10 board members, the DCWC relies on close communications between landowners and the board. That close communication, which has brought the DCWC to the organizational, political, and technical level that it can now conceptualize and coordinate this project, will be crucial to the successful implementation of the project. The DCWC also enjoys cooperative relationships with Tehama County Flood Control, the Tehama County RCD, the Vina RCD, The Nature Conservancy, the U.S. Fish and Wildlife Service, California State Parks, CDFG, CalTrans, DWR, Lassen National Forest, and numerous other local watershed groups.

To ensure ongoing communications between the project team, landowners, and stakeholders the DCWC will employ a project director/public liaison officer dedicated to the project approximately half time. This person will focus on the flow of information to and from project team members, landowners, and stakeholders. A few landowners have expressed some reservations about the project and they in particular will be sought out for feedback and participation throughout the project. Listening to the concerns from landowners and other stakeholders and capitalizing on their unequaled knowledge of the local system will be an integral part of the duties of the project director. In addition, the project manager and other technical team members will spend considerable time with stakeholders, sharing information and listening to feedback.

As described in Section A3 Approach, the project will begin with a Chartering Meeting that will include key landowners and stakeholders. As information is gathered, several workshops with a broader assemblage of participants/stakeholders, and agency representatives will be held to plan the next steps in the project. To reinforce the idea that this the landowners' and stakeholders' project, to the greatest extent possible, landowner project team members will present new information at these meetings and chair the workshop sessions. The success of these workshops will depend on active participation from stakeholders. To help ensure large turnouts, these events will be widely publicized through newsletters, newspaper, and other media. An update on the information to date, as well as plans for the coming workshops, will be included in the publicity.

## F Compliance with Standard Terms and Conditions

The Deer Creek Watershed Conservancy will comply with all standard terms and conditions presented in Appendix D and Appendix E of the ERP 2002 Proposal Solicitation Package.

## G Literature Cited

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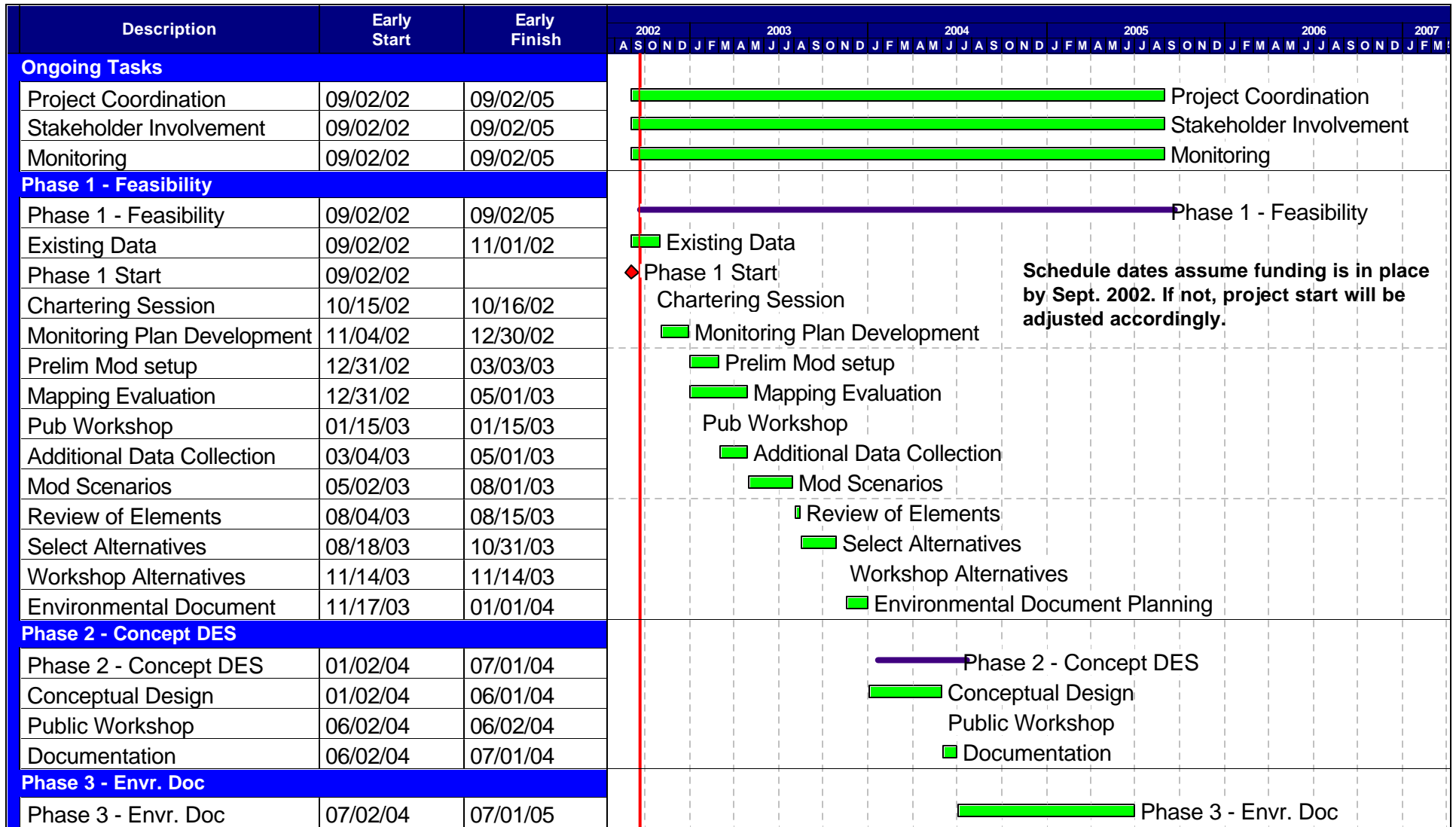
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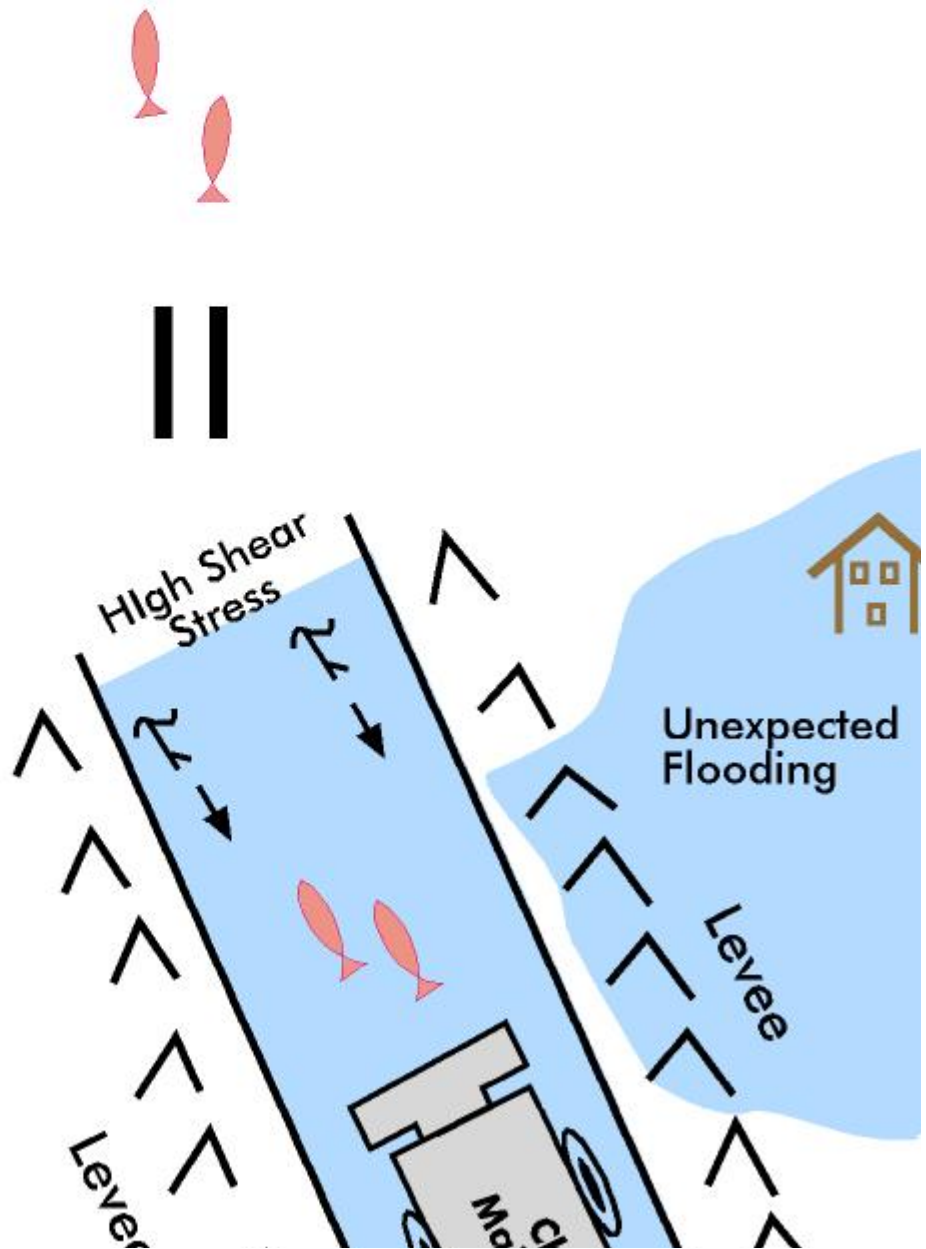


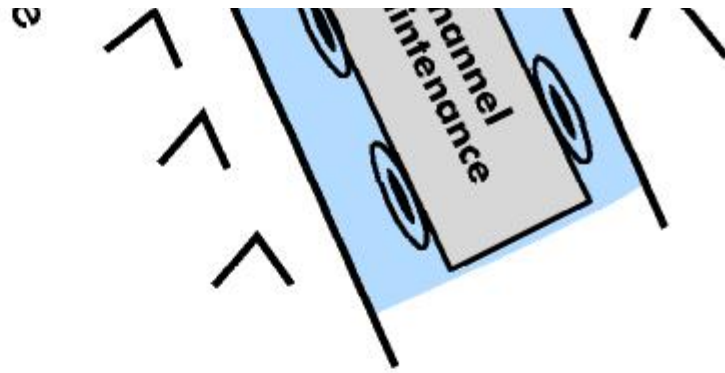
Schedule dates assume funding is in place by Sept. 2002. If not, project start will be adjusted accordingly.

Table 1 - Lower Deer Creek Restoration and Flood Management Feasibility Study and Conceptual Design Proposed Project Schedule

- Early bar
- Progress bar
- Summary bar
- Progress point
- Critical point
- Summary point
- Start milestone point
- Finish milestone point

## Limited Production

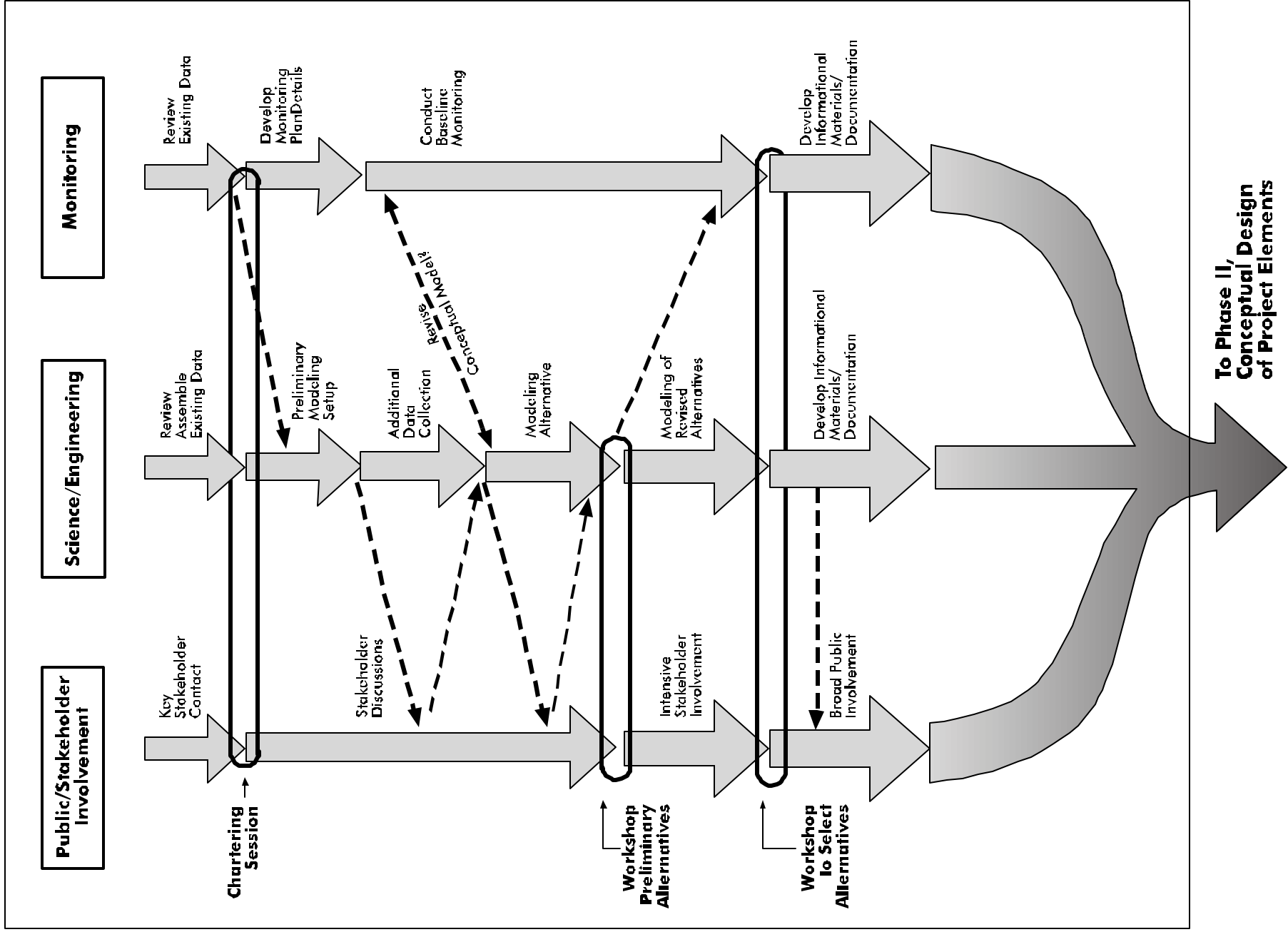




## Existing Condition

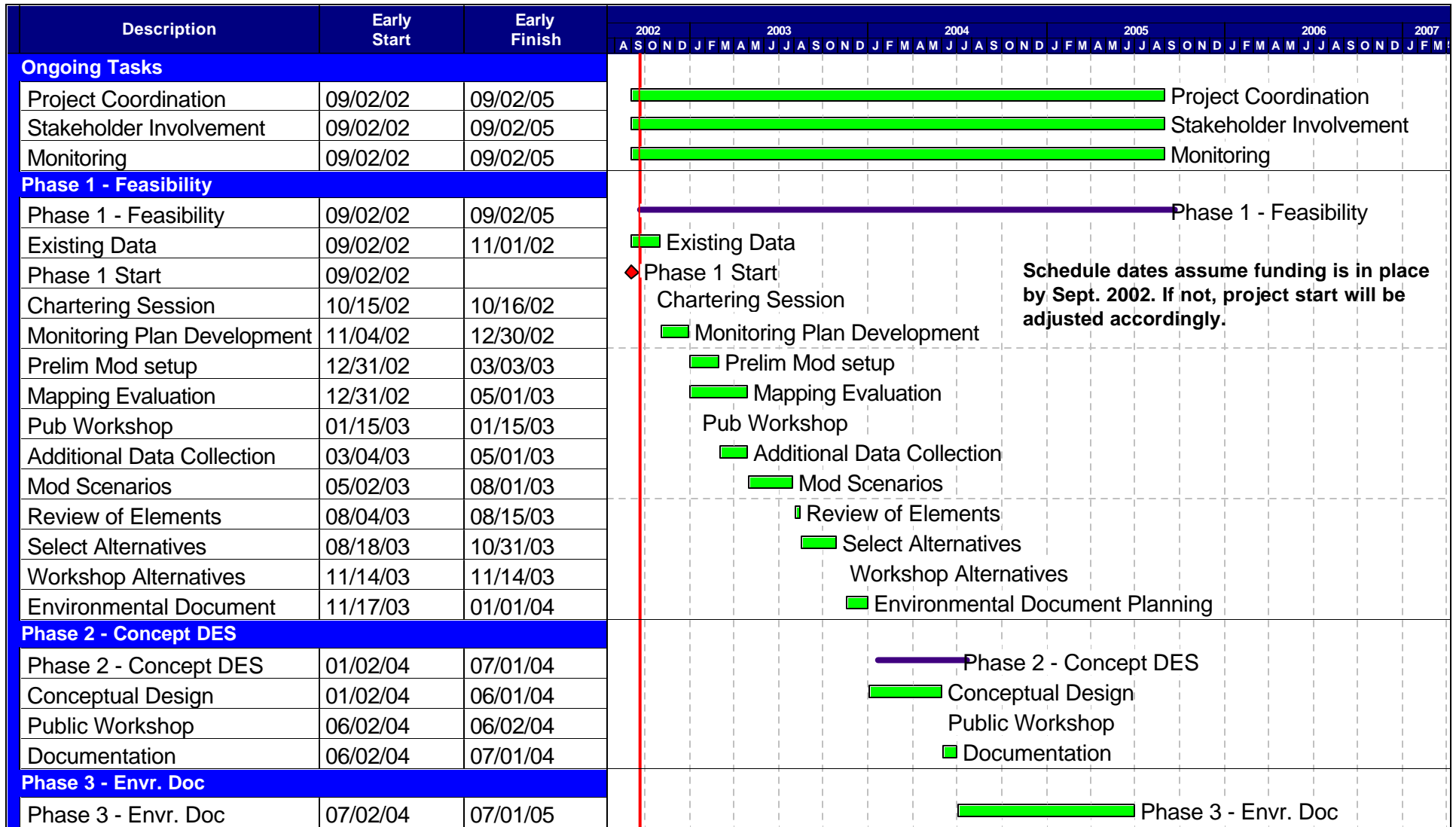
High shear stress from flows and channel maintenance limit has complexity. Unexpected flooding causes significant damage.

**Figure 3**  
**Communications Between Key Functions for Phase I**









**Schedule dates assume funding is in place by Sept. 2002. If not, project start will be adjusted accordingly.**

Figure 5  
 Lower Deer Creek Restoration & Flood Management  
 Feasibility Study & Conceptual Design  
 Proposed Project Schedule

- Early bar
- Progress bar
- Summary bar
- Progress point
- Critical point
- Summary point
- Start milestone point
- Finish milestone point

**FIGURE 6  
ORGANIZATIONAL STRUCTURE  
DEER CREEK RESTORATION**

