Executive Summary

Hamilton City Ecosystem Restoration and Flood Damage Reduction: Chico Landing Sub-Reach

The Hamilton City Ecosystem Restoration and Flood Damage Reduction proposal is requesting $420,000 from CALFED to complete the Hamilton City feasibility study, initiated by the Sacramento and San Joaquin River Basin Comprehensive Study. The goals of this proposed study are to: 1. Complete a feasibility study for ecosystem restoration and flood damage reduction in the Hamilton City area. 2. Demonstrate the ability to implement a successful multi-objective project. 3. Integrate and unify a relationship between CALFED and the Comprehensive Study to attain CALFED Ecosystem Restoration Plan (ERP) goals and objectives. 4. Work with Federal and State government, local agencies, stakeholders, and the public in an iterative and consensus-building process. Specific objectives for this proposed study include identification of water and related land resources problems, concerns and opportunities, detailed evaluation of flood damage reduction alternatives and ecosystem restoration plans, development of an ecosystem restoration plan that will restore approximately 2,600 acres and benefit ERP priorities for riparian and floodplain habitat, and development of a flood damage reduction and ecosystem restoration plan that is consistent with the goals and objectives of CALFED ERP, Sacramento River Conservation Area, The Nature Conservancy, and local stakeholders. The objectives also include identification of a locally-preferred plan, selection of a recommended plan based upon the most accurate technical and scientific data, and implementation of a process that demonstrates the integrated and cooperative efforts between CALFED and the Comprehensive Study. The expected product of this proposal will be a final Feasibility Report on the evaluation of levee alternatives and ecosystem restoration plans.

Tasks completed for the Hamilton City Feasibility Study to date includes; Preliminary economic inventory (structural); Topographic surveys (1995, 1998); Aerial photographs (1995); Hydraulic model developed (1-D); Floodplains developed for 2, 10, 50, 100, 200, 500; HTRW survey; Cultural Resources literature search and field survey; HEP analysis (existing condition); Preliminary risk analysis; Preliminary real estate appraisal of structures; Rights-of-entry established; Preliminary real estate parcels identified; Preliminary environmental baseline condition. Seven preliminary alternatives for flood damage reduction and ecosystem restoration have been identified and are listed in **Attachment B** of this proposal. In the next phase of the feasibility study the measures contained in these alternatives will be screened based on costs, acceptability, flood damage reduction gains, ecosystem restoration gains, and subsequent operation an maintenance requirements and costs. Alternative plans will be identified from the screening process and these alternative plans will move forward in the process to identify a recommended plan for Hamilton City.

Through the planning process outlined for this study, this proposal will support the following CALFED ERP goals as identified in the Strategic Plan. These goals are:

1. Assessment and research to improve understanding of the ecological and physical processes affecting at-risk species (Goal 1: At-Risk Species). 2. Evaluation of the potential for restoring natural flow regimes and biological processes (Goal 2: Ecological Processes). 3. Improved understanding of floodplains as components in restoring habitats, physical processes, and species (Goal 4: Habitats). 4. Management of *Arundo donax, Tamarix* spp. and other non-native invasive weedy plant and animal species in upper Sacramento River tributaries (Goal 5: Non-native Invasive Species). The planning efforts involved in the Hamilton City proposal represent a major step forward in implementing multi-objective projects and truly integrating the efforts toward ecosystem restoration and flood damage reduction.

Proposal

The Reclamation Board

Hamilton City Ecosystem Restoration and Flood Damage Reduction

HAMILTON CITY ECOSYSTEM RESTORATION AND FLOOD DAMAGE REDUCTION

The Reclamation Board in Partnership
With the U.S. Corps of Engineers
July 19, 2002

A. Project Description: Project Goals and Scope of Work

1. Problem

Throughout the Sacramento River Valley societies needs for flood protection, agriculture, urban development, hydropower, and firewood have collectively destroyed approximately 95% of the historical riparian forests and associated aquatic habitats of the Sacramento River and its floodplains. Two-thirds of the linear extent of the Sacramento River's banks have been modified and confined by levees, riprap, and flood damage reduction projects. These factors have caused the Sacramento River to lose its ability to function in a natural manner, by overflowing its banks, connecting with its floodplain and sustaining ecological processes that drive changes in geomorphology and vegetation succession (Gregory et al. 1991, Baker and Walford 1995). In 1904 the now defunct Holley Sugar Company constructed a levee, now known as the J levee, on the right bank of the Sacramento River. The levee was constructed to protect the company and the surrounding area from floodwaters. For the last 100 years the levee has been effective at separating the river from its floodplain but has not provided an acceptable level of protection for the residents of Hamilton City. The annual exceedance probability for lands protected by the levee is estimated to be 1-in-10 by the Corps of Engineers. The materials used to construct the levee, primarily sand and silt, are highly erodeable at high river flows. High flows in 1970, 1974, 1986, 1995, 1997, and 1998 caused considerable damage to the levee. Fortunately, in 1986 and 1997, serious levee failure was prevented through flood fighting efforts. In addition, the Sacramento River has been meandering to the west for the past several years resulting in erosion to the levees foundation.

One of the priorities for the Ecosystem Restoration Plan (ERP) Stage1 implementation is the restoration of geomorphic processes in stream and riparian corridors, specifically the inclusion of feasibility studies to construct setback levees to restore and improve opportunities for floodplain inundation (CALFED 2001). The Hamilton City feasibility study provides a unique opportunity to investigate the integration of ecosystem restoration actions with flood damage reduction alternatives. This is why the Sacramento and San Joaquin Rivers Basins Comprehensive Study (Comp Study), Federal and State agencies working together with local government and stakeholders to develop a comprehensive plan to reduce flood damage and integrate ecosystem restoration identified the Hamilton City study as an initial project. This Hamilton City study proposal provides a unique opportunity to investigate the integration of ecosystem restoration actions with flood damage reduction alternatives. The study proposal will also address key uncertainties regarding the construction of levee alternatives for flood damage reduction and restoration of the floodplain. It is anticipated that this study will provide valuable information that will be used to restore approximately 2,600 acres of floodplain habitat in the area. The CALFED Bay-Delta Program and the Comp Study are directed by legal documents, such as the CALFED Record of Decision (CALFED ROD 2000) and Federal Water Resources Development Act (WRDA 2000), to integrate activities to the maximum extent possible. The Hamilton City feasibility study is an ideal process through which such integration and coordination can be

implementable. Both programs have overlapping objectives and goals that would benefit from the integration. The coordination would also strengthen the relationship for future cooperative efforts in the Central Valley.

Project Location:

The study area is located approximately 100 miles north of Sacramento and 10 miles west of Chico. Hamilton City lies less than 1 mile to the west of the Sacramento River. The study area is bound on the west by the Glenn-Colusa Irrigation Canal and on the east by the Sacramento River. An existing local levee runs along the west bank of the Sacramento River from the northern tip of the study area at River Mile 201 to just south of Dunning Slough, River Mile 194 (**See figure 1, pg 20**). The Reclamation Board, in partnership with the Corps and in coordination with Glenn County, the town of Hamilton, and stakeholders, propose this project to complete the Hamilton City feasibility study initiated by the Comp Study in March 2001. The Hamilton City feasibility study initiated by the Comp Study is approximately 30% complete. The remaining work includes detailed habitat benefit analysis of each levee modification alternative, completion of technical modeling and documentation, the environmental compliance documentation and process; and most critically, continuation of building consensus between local, State, Federal government, residents, and stakeholders regarding a preferred alternative.

Goals and Objectives:

The goal of this feasibility study is to:

- Restore connection to the floodplain and expand riparian habitat to the maximum extent possible, 2,600 acres, in the Hamilton City area while simultaneously reducing the flood risk to local residents.

Specific objectives for this feasibility study include:

- Successfully formulate a multi-objective project to maximize flood damage reduction and restore up to 2,600 acres of habitat including riparian, oak woodland, and native grassland. Many species could benefit from habitat restoration within the study area, in particular, the valley elderberry longhorn beetle, winter-run Chinook salmon, bank swallow, Swanson's hawk, and yellow-billed cuckoo.
- Work with Federal and State government, local agencies, stakeholders and the public in an iterative and consensus-building process
- Develop a flood damage reduction and ecosystem restoration plan that is consistent with the goals and objectives of CALFED ERP, Sacramento River Conservation Area Forum, The Nature Conservancy, and local stakeholders

Hypothesis:

- The planning process for this feasibility study, which includes the coordinated efforts of Federal, State and local agencies, non-profit environmental organizations and the public, will result in a scientifically sound, publicly acceptable and implementable flood damage reduction and ecosystem restoration plan for the Hamilton City area.
- The riparian, floodplain and riverine habitat functions will be restored while flood risk to Hamilton City is reduced by modifying the existing levee and reconnecting up to 2,600 acres of floodplain to the Sacramento River.

2. Justification

The problems associated with the degrading local levee, its foundation, and the lack of connectivity between the river and the natural floodplain in the Hamilton City area, present a rare opportunity to develop a combined ecosystem restoration and flood damage reduction project. However, there are a number of key uncertainties regarding the evaluation of the levee alternatives, ecosystem restoration planning, implementation and cost of the project that would need to be identified and resolved prior to implementation of a pilot project or recommendation of a preferred plan. Key unknowns include:

1. Will realignment of the levee improve opportunities for ecosystem restoration while reducing flood damages to Hamilton City and the surrounding area?
2. Will ecosystem restoration be possible if the levee is strengthened in place?
3. If the levee needs to be re-aligned, what distance from the river and the city limits would provide the most benefit for the multi-objective project?
4. With the various levee alternatives being evaluated, which ecosystem restoration plan would be most effective in meeting the ERP and Comp Study goals for ecosystem restoration?
5. How will reconnecting the river with the floodplain effect vegetation and habitat values in the project area?
6. What are the costs associated with each alternative and will there be enough of a Federal interest to warrant Federal funding of 65% of the project cost?
7. Will the preferred alternative receive enough local support to be acceptable?

The proposed study, considered by CALFED as a planed demonstration project, will take the adaptive approach of the Corps planning process to test the hypothesis of this study and address the key uncertainties identified.

Conceptual Model

The Hamilton City area has been at risk from flooding for many years as indicated by the numerous flood fights that have occurred in the past to protect the town. In addition, the construction of the J levee in 1906 constricted the river and severed it from the floodplain. These factors have contributed to the decrease in riparian habitat and a decrease in aquatic floodplain habitat. The loss of riparian habitat has a direct correlation to the abundance of species along the river. The loss of floodplain habitat for anadromous fish along the Sacramento River may have contributed to declining salmon populations. Setting back the J levee will promote a continuous riparian corridor along the river enhancing wildlife and recreational opportunities while providing an increased level of flood protection for the people of Hamilton City and the surrounding area. A graphical representation of this conceptual model is displayed in **Figure 2** on page 21.

A setback levee will increase river meandering and sediment supply to this reach of the river. A geomorphic analysis will be conducted to estimate channel/bank migration rates for the Sacramento River in the study area. Migration rates will be estimated by comparing historic aerial photographs and topographic maps. Migration rate estimates will be compared with predictions from previous studies on the subject (e.g. Department of Water Resources Sacramento River Meander Belt Future Erosion Investigation, 1995). If migration rates differ

significantly, migration rates may be determined using one of the new meander model's that are available.

Possible sediment yield resulting from the project will be determined using the SAM channel stability program. Sediment yield determinations will be developed to compare sediment transport for the existing channel and each levee setback alternative at four locations in the reach. A more in-depth sediment study may be performed using HEC-6 if the SAM channel stability analysis indicates a significant sediment impact.

A predictive model for vegetative growth developed by the Nature Conservancy for the Hamilton City area will be the primary tool used to determine the potential vegetative growth of each of the alternatives within the potential area of inundation. The existing vegetation has been mapped. In addition, for predictive purposes, the model uses soil type and elevation and the with-project floodplains as inputs and the future with-project vegetation maps are generated and habitat acres calculated.
These habitat acres are then used in the Habitat Evaluation Procedure (HEP) analysis to develop the potential average annual habitat units (AAHU's) for each alternative. HEP is an approach for evaluating habitat quality. The existing vegetation is mapped and assessed for current habitat quality as compared with the ideal habitat for the specific species/model that is being used. The habitat quality is then given a numerical value called the Habitat Suitability Index (HSI). The HSI is then multiplied by the habitat area to get the habitat unit (HU). The total number of HU's is then divided by the number of years of the project life to calculate the average annual habitat units (AAHU's). These AAHU's are then used to compare the with and without project alternatives.

A new pilot Ecosystem Functions Model (EFM) will also be used to predict how aquatic and terrestrial ecosystems in the study area may be impacted by the various project alternatives. A description of the EFM is included on page six under Environmental Studies. Habitat types will be prioritized for each alternative by those established in the Calfed ERP. Alternatives having these habitat types will be ranked higher for ecosystem restoration than alternatives that do not.

The flood damage reduction component of the project will be accessed using the hydraulic model HEC-RAS. The one-dimensional model will be used to identify water surface elevations for various events (e.g. 25-yr, 50-yr, 100-yr). A risk analysis is then conducted using the Hydrologic Engineering Center's Flood Damage Assessment (HEC-FDA) computer model to analytically incorporate considerations of risk and uncertainty to express engineering and economic performance in terms of probability distributions. This model allows the determination of without-project (baseline) and with-project flood risk and economic damages.

Project selection criteria will be based on a combined benefit/cost analysis and an Incremental Analysis process. A Combined National Economic Development/National Ecosystem Restoration (NED/NER) Plan analysis combines the monetary NED evaluation with the non-monetary NER evaluation. Projects that produce both NED and NER benefits will result in a "best" recommended plan so that no alternative plan has a higher excess of NED monetary benefits plus NER non-monetary benefits over project costs. The Hamilton City project shall attempt to maximize the sum of net NED and NER benefits and to offer the best balance between

two Federal objectives. The combined NED/NER plan will consider non-monetary valuations for ecosystem restoration such as Average Annual Habitat Unit's (AAHU's) for acres restored.

3. Approach and Tasks

The Reclamation Board and the Corps are leading the Comp Study to improve flood management and integrate ecosystem restoration in the Sacramento and San Joaquin River Basins. It is one of the initial Comp Study projects for the Middle Sacramento Region to evaluate the existing levee stability and restore the natural functions and habitats of the Sacramento River floodplain.

To date, this study has preliminarily evaluated engineering designs and economic analysis for various levels of flood protection. It is estimated that work completed thus far accounts for 30% of the work necessary to complete the Feasibility Study. Tasks completed for the Hamilton City Feasibility Study includes; Preliminary economic inventory (structural); Topographic surveys (1995, 1998); Aerial photographs (1995); Hydraulic model developed (1-D); Floodplains developed for 2, 10, 50, 100, 200, 500; HTRW survey; Cultural Resources literature search and field survey; HEP analysis (existing condition); Preliminary risk analysis; Preliminary real estate appraisal of structures; Rights-of-entry established; Preliminary real estate parcels identified; Preliminary environmental baseline condition. Seven preliminary alternatives for flood damage reduction and ecosystem restoration have been identified and are listed in **Attachment B** of this proposal. In the next phase of the feasibility study the measures contained in these alternatives will be screened based on costs, acceptability, flood damage reduction gains, ecosystem restoration gains, and subsequent operation and maintenance requirements and costs. A refined array of alternative plans will be identified from the screening process and these alternative plans will move forward in the formulation, evaluation, and comparison process to identify a recommended plan for Hamilton City.

The Hamilton City Ecosystem Restoration and Flood Damage Reduction Project, in cooperation with Federal, State, local agencies and interested stakeholders, represents the next phase for completion of the 2001 Hamilton City feasibility study. The proposed approach will build upon existing scientific knowledge and will support future efforts for flood damage reduction and ecosystem restoration projects. The approach and major tasks identified in this section will also be used to test the proposed study's hypothesis and provide valuable information regarding implementation of the multi-objective project.

The Corps and the Department of Water Resources (DWR) have developed an Ecosystem Functions Model (EFM) that will be used in a demonstration capacity for the Hamilton City project. This evolving restoration modeling tool uses statistics, hydraulic modeling, and GIS spatial presentation to predict and display differences in terrestrial and aquatic conditions between with-project and without-project conditions. The aquatic element of the EFM focuses its analysis on the seasonal inundation of floodplains and flood bypasses to evaluate potential impacts on the Sacramento splittail and Chinook Salmon. In addition, the aquatic element of the EFM identifies suitable over bank flows that will benefit floodplain spawning, rearing, foraging/migration, and avoidance of stranding, and predicts spatial changes in the extent of suitable floodplain habitat. The terrestrial element of the EFM focuses on the establishment and initial survival of riparian and wetland vegetation. It evaluates criteria for suitable flows and topography to promote seedling establishment and avoid post-establishment losses due to

insufficient soil moisture and/or flood scouring. The Bureau of Reclamation, FWS, Hydrologic Engineering Center, and the Waterways Experiment Station were involved in the development of the EFM.

An interdisciplinary Independent Review Panel (IRP) will be established to evaluate the tools, data and other criteria to be used in evaluating the alternative plans. The IRP will also provide an overall assessment of study products to evaluate how well the products satisfy the objectives and goals of the feasibility study. The IRP will work together with the study team so as not to jeopardize the study schedule as shown on page 24 of this proposal. See Step 1 of the planning process for a full description of how the IRP will be established.

Public involvement for the project will be accomplished through a coordinated and collaborative process involving the Reclamation Board, the Department of Water Resources (DWR), the Corps, Glenn County, and stakeholders. This task will be specifically designed to obtain public input on ecosystem restoration and flood damage reduction issues and concerns. This task will consist of coordinating and developing the study scope, results, and solutions with the public; conducting public meetings/workshops; and responding to public inquiries. The Reclamation Board and the Corps will prepare a public involvement plan and document all public meetings.

The Corps planning approach follows the six-step planning process as defined in the Corps economic and environmental principals and guidelines. This process is a structured, but adaptive, approach to problem solving which provides a rational framework for sound decision-making.

The steps are:

Step 1 - Identifying problems and opportunities
Step 2 - Inventorying and forecasting conditions
Step 3 - Formulating alternative plans
Step 4 - Evaluating alternative plans
Step 5 - Comparing alternative plans
Step 6 - Selecting a plan

A description of each step is presented in subsequent paragraphs. A graphical representation is displayed in **Figure 3** on page 22**.** The Corps decision-making process is generally based on the accomplishment and documentation of all of these steps. However, it is important to stress that this process can and will be managed to ensure that each step addresses the uncertainties. As more information is acquired and developed, it may be necessary to reiterate some of the previous steps to formulate efficient, effective, complete, and acceptable plans. Estimates as to the percentage of work completed for each step is listed in parenthesis.

Step 1 - Identifying Problems and Opportunities (70% complete). Proper identification of problems and opportunities is the foundation for initiating the planning process. Additional information on flooding problems and habitat opportunities will help to identify current as well as future issues that need to be addressed in subsequent steps of the planning process. This will require public involvement, collaboration and coordination with numerous individuals and organizations. Meetings throughout the planning process will be used to maintain open channels of communication with the public and allow full consideration of public views, issues and information.

An interdisciplinary external review panel will be established to evaluate the tools, data and other criteria that will be used in the feasibility study to evaluate alternative plans. The IRP will specifically evaluate the effectiveness of each plan towards meeting ecosystem restoration and CALFED ERP goals. In addition, the panel will provide an overall assessment of the five reports that will be written for this study. Reports are required for the F3, F4, F4A, F5, and F8 Milestones that are listed in **Table 1** of this Proposal.

The IRP will be provided pertinent information for reviews throughout the planning process to assess the reasonableness of study data, analysis, and subsequent conclusions. IRP members will provide their comments so as not to affect the study schedule as outlined on page 24 of this proposal. IRP members will attend the Alternative Review Conference in May 2003 and present their findings and recommendations. The IRP will re-convene, if necessary, to review any changes in the study that resulted from the Alternative Review Conference. The IRP will provide a written public document of their conclusions.

Nominations for panel members of the IRP will be requested from the CALFED Science Program and Independent Science Board. The Reclamation Board will make the final selection of panel members. (See Table 6 for specific expertise required.) Funding for the IRP will be provided by CALFED and is separate from the $420,000 that is being requested in this Proposal. Panel formation will begin as soon as funding is available.

Step 2 – Inventory and Forecast (40% complete). The second step of the planning process is to develop an inventory and forecast critical resources (physical, demographic, economic, social, etc.) relevant to the problems and opportunities under consideration in the planning area. Technical models will be used to further define and characterize these problems and opportunities. A quantitative and qualitative description of these resources will be made, for both current and future conditions, and will be used to define existing and future without-project conditions. The forecast of the future without-project condition reflects the conditions expected during the period of analysis. The future without-project condition provides the basis from which the impacts of alternative plans are assessed. Since impact assessment is the basis for plan evaluation, comparison and selection, clear definition, and full documentation of the without-project condition is essential. An inventory of historic and existing conditions information will be developed. Gathering information about potential future conditions requires forecasts, which will be made for selected years over the period of analysis to indicate how changes in economic and other conditions are likely to have an impact on problems and opportunities. Information gathering and forecasts will most likely continue throughout the planning process.

Step 3 - Formulation of Alternative Plans (35% complete). Alternative plans will be formulated to identify specific ways to achieve planning goals and objectives, address the problems and opportunities identified, and test the key uncertainties. A range of alternative plans will be identified at the beginning of the planning process, then screened and refined throughout the process. All plans will be in compliance with existing statutes. Plans will not be limited to those the Corps of Engineers could implement directly under current authorities. Plans that could be implemented under the authorities of other Federal agencies, State and local entities and non-government interests will also be considered.

Step 4 – Evaluating Alternative Plans (30% complete). Evaluation of effects is a comparison of the with-project and without-project conditions for each alternative. Each alternative plan will be evaluated for its effectiveness in meeting ecosystem restoration and flood damage reduction goals. The ERP targets will be incorporated into the feasibility study planning efforts. Coordination efforts with CALFED ERP's regional coordinators will continue throughout the development of this study to ensure CALFED's ERP goals and objectives are integrated into the planning process and ultimately project design and construction. Uncertainties such as levee positioning and maximum benefit to the natural floodplain processes will be assessed. A river meander analysis will be conducted to identify bank migration rates for each alternative. Associated costs for the protection of the setback alignment being evaluated will be factored into the selection process. Potential sediment yield for each alternative will be evaluated using the channel stability program SAM. A list of additional criteria used in this step is identified in Section 5 of this proposal. Through an iterative process, the Hamilton City feasibility study will also use technical tools to evaluate alternative plans. The flow of information involves initial evaluation by the hydrologic model (HEC-5), which passes flow data to the hydraulic models (UNET, HEC-RAS), which in turn pass flow frequency information to flood damage assessment (FDA). This process is outlined in **Figure 4** on page 23**.**

Step 5 - Comparing Alternative (0% complete). The comparison step can be defined as a reiteration of the evaluation step, with the exception that in the comparison step, plans are compared against each other and not against the without-project condition. The output of the comparison step will be a ranking of plans.

Step 6 - Selecting a Plan (0% complete). A single alternative plan will be selected for recommendation. The recommended plan must be shown to be preferable to taking no action (if no action is not recommended) or to implementing any of the other alternatives considered during the planning process. The culmination of the planning process is the selection of the recommended plan or the decision to take no action. Below is a list of various studies that will be developed throughout the 6-step planning process. The planning process is iterative and as information is acquired throughout the development of these studies, it may be necessary to re-iterate some of the planning steps.

Social Studies. The social studies task will be performed by the Corps as part of the Environmental Studies effort. The social studies section will determine the social environment of the study area and determine the social effects that result from each alternative plan. A detailed report will include the applicable information generated during the public meetings/workshops.

Cultural Resources Studies. The Corps will perform the cultural resources task in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended, 36-CFR 800 "Protection of Historic Properties," and Corps ER 1105-2-100. In consultation with the State Historic Preservation Officer (SHPO), the Corps will conduct sufficient archival and field surveys to identify cultural sites within the study's Area of Potential Effects, as defined by SHPO, and evaluate the eligibility of all cultural sites for the National Register of Historic Places. A detailed report will describe all cultural resources within the Area of Potential Effects and assess the effects of alternatives on these resources. The report will describe the range of additional future preservation or mitigation efforts, if required, and the associated costs of these efforts. An archeological survey of the Area of Potential Effects will be conducted. If

necessary, a scope of work will be developed and a contract issued and administered for surveys. Coordination with the SHPO will be maintained.

Environmental Studies. Environmental studies will be performed primarily by the Reclamation Board and the Corps and will include the preparation of an EIR/EIS. The Corps will prepare the draft and final EIR/EIS and public notice. The EIR/EIS will evaluate the environmental effects and habitat restoration benefits associated with each alternative. The evaluation and results will be coordinated with Federal, State, and local governments and agencies, and interested groups and individuals. Study tasks include all activities required to comply with the National Environmental Protection Act (NEPA) and the California Environmental Quality Act (CEQA) including literature searches and review of reports and field surveys to establish baseline conditions; identification of future without-project conditions; determination of effects of the alternatives; analysis of mitigation needs, if necessary; coordination with the U.S. Fish and Wildlife Service (FWS) and Department of Fish and Game (DFG); review of in-house reports; response to comments; and support to the project manager and others during the study phase.

Economic Studies. The Reclamation Board and the Corps will perform the economic studies task. The Corps' Economics Branch will assist the planner in (1) updating structural inventory data; (2) updating the depth-damage curves; (3) inputting the cost estimating values obtained from cost estimates; and (4) preparing a summary report for inclusion as an appendix in the feasibility study.

All collected data will be input into the HEC-FDA computer model to analytically incorporate considerations of risk and uncertainty to express engineering and economic performance in terms of probability distributions. This model allows the determination of without-project (baseline) and with-project flood risk and economic damages.

Cost Estimates. The Corps will perform the cost estimates that will be evaluated for implementing the project, including ecosystem restoration costs, monitoring, construction costs, easements, rights-of-way, disposal areas, engineering and design, and construction management. Detailed first and annual cost estimates, including an inspection plan, interest during construction, and replacement costs, would be developed for the recommended plan, in accordance with Engineering Circular (EC) 1110-2-538, Civil Works Projects Cost Estimates-Code of Accounts, and EC 110-2-263, Civil Works Project Construction Cost Estimating. A narrative Basis of Cost Estimate would be prepared and included as an appendix in the feasibility study.

Fish and Wildlife Studies. The Reclamation Board and the Corps, in coordination with staff from non-profit organizations and State and Federal agencies, will perform this task. The task includes environmental studies performed by FWS in cooperation with the Corps as required by the Fish and Wildlife Coordination Act. A HEP has been conducted and existing conditions evaluated.

Engineering/Design Studies. The Corps will make use of existing technical data collected and analyzed from other agencies and non-profit organizations, and perform additional engineering and design studies. The Reclamation Board and DWR may assist. Work will include hydraulic analysis, hydrology, surveying and mapping, soil design, river migration rate analysis, channel stability assessment, geology, as well as any other necessary engineering and design studies. A Basis of Design will be completed by the Corps Engineering Division to determine engineering criteria necessary for the project.

Real Estate Studies. Although there will be no land acquisition action taken in this phase of the project, there have been preliminary discussions on land acquisition with landowners and an evaluation of the major study products will need to be prepared by the Corps Real Estate Division. The study will include identification of prime agricultural land, property appraisal, values within the study area, obtaining rights of entry for agents of the Federal government participation in Pre-Project Cooperation Agreement activity, preparation of a real estate supplement for inclusion in the feasibility study, preparation of a baseline cost estimate for real estate prepared in the code of accounts format, and preparation of a scope of work outlining real estate input.

Plan Formulation. The Corps will perform the plan formulation task in coordination with the Reclamation Board. The plan formulation task includes scoping the feasibility study, formulating alternatives, evaluating benefits/costs for each alternative, identifying the selected plan, coordinating the technical study elements, and preparing the Feasibility Report document of study findings.

Draft and Final Report Preparation. Preparation of the draft and final report will be performed by the Reclamation Board and the Corps and will include collection and assembling of pertinent data for meeting CEQA and NEPA compliance; writing, editing, and word processing; preparing figures and plates; and reviewing, revising, reproducing, and responding to stakeholder requests for documentation; distributing the draft and final alternative reports which include technical appendices.

Peer Review/Quality Control/Quality Assurance. The peer review process for the Hamilton City Study begins with supervisor and technical oversight that occurs seamlessly throughout the study development as technical and policy issues arise. The peer review process also includes a separate Independent Technical Review. This review is accomplished by an independent technical review team (ITRT) composed of individuals having expertise in and representing all disciplines involved in the study, who were not involved in product development or supervision thereof (See **Table 4**, pg. 28). Review team members have been nominated by the chiefs of the technical disciplines involved in study development. Some reviewers have been selected from outside of the district. Outside reviewers include other Corps offices, Regional Technical Specialists, Centers of Expertise, government agencies, and private A-Es. Product development team members consult their Independent Technical Review Team (ITRT) counterparts throughout the development effort to discuss major assumptions and functional decisions, analytical approaches and calculations to preclude significant comments from occurring during the final independent technical review that could adversely impact project schedules and costs. The State and CALFED will coordinate to assess the need for and to address potential additional funding requirements to develop an independent technical review team that is either completely separate from the Corps ITR team or that can be integrated into the Corps ITR process. In addition, The Comprehensive Study maintains an Executive Committee that meets on a quarterly basis. This committee integrates various federal and state agency representatives to assure interagency program consistency and allows for agency input throughout the study. As part of the Coordination Act Report requirements team members from the Resources agencies will coordinate with the Comprehensive Study team members throughout study development to assure consideration of natural resources throughout the planning process and review interim and final reports for technical adequacy. Please see **Table 5** on page 29 for a listing of these Resource Agency team members.

Agency Coordination. Coordination with CALFED will begin early in the study process to establish a clear understanding of reporting and coordination requirements between CALFED and the study team. The study will likely be coordinated with CALFED for ecosystem restoration through the annual reporting requirements to CALFED and regular updates at the CALFED management meetings. The annual reporting requirements to CALFED will be an opportunity for CALFED to collaborate on the study development. Comments on the annual report will be taken into account as the study develops further. The Reclamation Board will also attend CALFED policy and management group meetings to provide updates on the development of the study.

As spelled out in the Interim Draft Report for the Comprehensive Study, scientific/peer review includes review of the modeling and mapping tools, the proposed project, and the success of the established project. To ensure scientific review of conceptual models, hypotheses, and uncertainties, the study will be coordinated with the CALFED ERP's science program, and draw to the extent feasible on advice from CALFED's Independent Science Board. To further ensure integration of the proposed ecosystem restoration portion of the project into the CALFED ERP, the Hamilton City Study will integrate those CALFED ERP goals, objectives, targets and actions that can be accomplished through changes in the flood management system of the Sacramento River within the study area. An additional assessment will be developed to measure progress towards the ERP's MSCS milestones.

Project Management. The Reclamation Board and the Corps will conduct this task. The Comp Study project managers will ensure that all required tasks are performed to produce a high-quality Feasibility Report. The project managers will (1) maintain coordination with the multi-disciplinary teams to ensure effective and timely decision making, (2) monitor the scope and progress of study activities to keep the study within budget and on schedule, and (3) take necessary action to resolve potential problems with scope, schedule, cost, and funding. The Comp Study manager will also manage this project as it relates to the Comp Study and CALFED, which include monitoring funds and schedules; managing the project programming, project budget development, execution of congressional and legislative testimony, and preparation of quarterly reports to CALFED and provide presentations as necessary.

Criteria for Hypothesis Testing. In addition to completion of the tasks listed above, there are milestones throughout the planning process that, together with the ITR process, will ensure a scientifically sound, publicly acceptable and implementable flood damage reduction and ecosystem restoration plan for Hamilton City. Please see **Table 1** on page 24 for a listing of these milestones

As discussed previously, a predictive model for vegetative growth developed by the Nature Conservancy for the Hamilton City area will be the primary tool used to determine the potential vegetative growth of each of the alternatives given the elevation and the soil type within the potential area of inundation. In addition, the new pilot EFM will also be used to predict how aquatic and terrestrial ecosystems in the study area may be impacted by the various project alternatives. Potential increases to existing Average Annual Habitat Units and floodplain habitat, as determined by these tools, will be factored into the alternative selection process.

4. Feasibility

The proposed study has addressed the following feasibility issues to demonstrate that the planning approach described in earlier sections is both feasible and appropriate.

Federal Interest. A preliminary assessment of the potential project based on existing, readily available data and professional and technical judgment was performed and indicated a high likelihood a cost-effective plan could be developed to restore habitat and reduce flood damages in the project area.

Public Outreach. In the past two years, several series of public workshops have been conducted throughout the state, and in the Chico area in particular. In addition, the Comp Study public outreach team with staff support as needed will conduct workshops specifically for the Hamilton City project. The Comp Study mailing list is updated regularly and includes agencies, groups and individuals who are known to or thought to have an interest in the Hamilton City area.

Staff Availability. The Comp Study has identified the Hamilton City study as one of their initial projects and has dedicated a team of experts from the Corps and DWR to staff future efforts. The Comp Study is a long-term program that is anticipated to receive funding and resources for the next 30 years.

Permits. There are no permits required to conduct the Feasibility Study.

Land Use. All real estate rights-of-way have already been established for this proposal to conduct the necessary studies in the project area. Data collection does, however, require permission from Federal, State and private landowners to access property. Permission to access property for data collection has been obtained through the Corps Real Estate office from all property owners including the U.S. FWS, DFG, The Nature Conservancy, and several local private landowners.

Partnership. There has been extensive coordination by local residents for a number of years with the Corps and The Reclamation Board for a flood damage reduction project for this area. Coordination occurs often between the Corps, The Reclamation Board, the Hamilton City Community Services District, and the Nature Conservancy. The Hamilton City project has been regularly discussed at a series of focus group, Technical Advisory Committee, and Executive Committee meetings where coordination with various stakeholders involved in the Comprehensive Study occurs.

Time Frame. The proposed date of completion for the study is necessary due to the Water Resources Development Act (WRDA) 2004 timeline. This may appear as a tight schedule; however, considering that 30% of the work has already been accomplished, the remainder of the work to complete the study can be done with the proposed schedule.

Future Funding. The Hamilton City Feasibility Study is cost-shared 50-50 between the Corps and The Reclamation Board. Approval of this proposal would secure the funding necessary for completing the study. However, additional funds (65% federal, 35% non-federal) will be required for implementation of the project. Although the Comprehensive Study will request federal funding for implementation of this project in WRDA 2004, future project funding is dependent upon State and Federal annual appropriations.

5. Performance Measures

Performance criteria are used to evaluate and rank the performance of the alternative plans against one another. The following is a list and description of the performance criteria, which may be revised as the study progresses.

Ecosystem Restoration Performance Measures

Specific resources and associated benefits will be identified and will be a means of comparison for ecosystem restoration measures during plan formulation. Resources that are considered to be significant include: designated critical habitat for listed species; habitat that is used by, or includes protected species; habitat that benefits protected species or migratory waterfowl; and riparian or wetland habitat. The Ecosystems Function Model will be used as a tool to evaluate, on a comparative basis, outputs of alternative plans in relation to the ecosystem restoration performance targets.

- Changes in Riparian, wetland, and native grassland vegetation – This performance measure will focus on the total changes in the amount of acres and increased habitat values of riparian vegetation in the study area and associated beneficial effects. Habitat values will be measured using HEP to determine AAHU's for the future without, and with project condition.
- An increase in floodplain spawning and rearing habitat – The EFM will be used to evaluate this performance measure by visually showing changes to the floodplain for return periods of 3-years or less for the future without, and with project condition.

Flood Damage Reduction Performance Measures

Total reduction in flood damages – This will measure changes in flood damages and flood risks. This performance measure will focus on changes in flood damages and flood risk. This will be measured using HEC-RAS and FDA models, which associate flood stage to economic damages and flood risk.

Report Completion

- The study and report preparation milestones are met
- Completion of final feasibility study for submittal to HQUSACE
- NEPA/CEQA scooping, public involvement, and EIR/EIS filing requirements met
- Reclamation Board adopts EIR

In addition to the alternative performance measures presented above, a monitoring plan will be developed and included in an Operation and Maintenance agreement between The Reclamation Board, the Corps, and Hamilton City. This agreement will specify periodic surveys that will help ascertain if predicted ecosystem responses, increases in the spatial extent of floodplain inundation (aquatic habitat) and Cottonwood/Willow generation, are occurring. This information will be used to refine the functional relationships that are used in the Ecosystem Functions Model.

6. Data Handling and Storage

The Comprehensive Study maintains a website at: www.compstudy.org. Any/all reports and appendices ready for public review will be available at this website. All technical data (including environmental, engineering, economic, geotechnical) collected for this study will be documented in appendices to the Feasibility Report or in office reports. All computer models; Hydrologic (HEC-5), hydraulic (UNET, HEC-RAS), Economics (FDA) and Environmental (EFM) will be archived by DWR and the Corps. Both agencies are located in Sacramento, California. Requested data may be subject to the Freedom of Information Act process due to post 9/11 Homeland Security Issues.

7. Expected Products/Outcomes

1. Progress reports to CALFED. The Reclamation Board will provide CALFED with quarterly programmatic and financial reports, and annual reports that will include progress to date. Presentations to CALFED will also be provided if appropriate.
2. Final Feasibility Report. The Reclamation Board will provide CALFED with the final Feasibility Report on the evaluation of levee alternatives and ecosystem restoration plans. The report will specifically provide the feasibility-level analysis of the following:
   (1) Evaluation of alternative plans;
   (2) Selection of a preferred alternative plan
   (3) Public involvement;
   (4) Engineering design data;
   (5) Detailed economic data;
   (6) Compliance with environmental laws and regulations;
   (7) Real estate appraisal and acquisition plan; and
   (8) Detailed cost estimates.

8. Work Schedule

All project tasks fit into a 15-month timeline as shown in **Table 2** on page 25. The project tasks are considered a complete package. The study will begin as soon as the funding has been awarded and the contract approved.

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

1. ERP, Science Program, and CVPIA Priorities

Completion of the feasibility study outlined in this proposal will advance several CALFED and CVPIA goals. Subsequent implementation of the final plan has the potential to further advance those goals and others. Detailed analysis and assessment of the habitat restoration alternatives in the project area will support the following CALFED ERP goals as identified in the Strategic Plan.

- Assessment and research to improve understanding of the ecological and physical processes affecting at-risk species (Goal 1 At-Risk Species).
- Evaluation of the potential for restoring natural flow regimes and biological processes (Goal 2 Ecological Processes).
- Improved understanding of floodplains as components in restoring habitats, physical processes, and species (Goal 4 Habitats).

- Management of *Arundo donax, Tamarix* spp. and other non-native invasive weedy plant and animal species in upper Sacramento River tributaries (Goal 5 Non-native Invasive Species).

The Strategic Plan specifically identifies the need for CALFED and the agencies conducting the Comprehensive Study to partner on projects to, "fully integrate river and floodplain ecological restoration with flood management measures" (pg. 69). The project at Hamilton City currently represents the best opportunity to fully develop this partnership. The project has a high likelihood of identifying real ecological and flood management benefits, has strong local involvement and support, and has much of the work already completed. In addition, the ERP Strategic Plan Stage 1 Actions (Action 2, pg. D-17) states, "In conjunction with the USACE and Reclamation Board Comprehensive Study, evaluate the feasibility of setting back levees on the Sacramento River between Chico Landing and Verona." This project will resolve uncertainties likely to be similar throughout this portion of the river, and will develop protocols enabling easier repetition at future sites. A completed feasibility study will lay the groundwork for initiation of a restoration and flood management project. Implementation of recommended measures are likely to help achieve the following CALFED Goals and Objectives.

- ERP Goal 2 Ecological Processes, Objective 6 - Reestablish floodplain inundation and *channel-floodplain connectivity* of sufficient frequency, timing, duration and magnitude to support the restoration and maintenance of functional natural floodplain, riparian, and riverine habitats.
- ERP Goal 2 Ecological Processes, Objective 8 - Increase the *extent of freely meandering reaches* and other pre-1850 river channel forms to support the restoration and maintenance of functional natural riverine, riparian and floodplain habitats.
- ERP Goal 4 Habitats, Objective 2 - Restore *large expanses of all major aquatic, wetland, and riparian habitats, and sufficient connectivity among habitats*, in the Central Valley and its rivers to support recovery and restoration of native species and biotic communities and rehabilitation of ecological processes. These habitats include riparian and shaded riverine aquatic, instream, fresh emergent wetlands, seasonal wetlands, other floodplain habitats, lacustrine, and other freshwater fish habitats.

Evaluation of the floodplain restoration actions in the study area will meet five restoration priorities in the Sacramento Region, as described in the ERP Stage 1 PSP Priorities (CALFED 2002).

- Alternatives for this riparian restoration project will result in continued protection and restoration of stream meander corridors between Red Bluff and Colusa along the Sacramento River (priority SR-1). This project specifically meets the objective listed under this priority for riparian habitat and channel meander. The PSP states, "Projects for riparian habitat restoration should focus on continued protection and restoration of stream meander corridors between Red Bluff and Colusa along the Sacramento River including continued coordination with DWR/Corps Comprehensive Study actions. … Efforts should be designed and sized to provide multiple ecosystem benefits, including habitat for at-risk fish species, insects, reptiles and amphibians, riparian mammals, and migratory songbirds in the riparian zone (Strategic Goal 1 At-Risk Species, Strategic Goal 4 Riparian Habitat)."

- The Ecosystem Functions Model will assist in evaluation of whether or not fish stranding may occur under different proposed alternatives. Project design will be implemented to avoid fish stranding based on these results (priority SR-2)
- A baseline hydrologic assessment has been made of this section of the Sacramento River to implement a strategy of adaptive assessment and management (priority SR-3).
- A floodplain management plan, including a feasibility study for construction of setback levees construction, will be developed to improve floodplain inundation on a seasonal basis (priority SR-4).

In addition, this project proposal is consistent with CALFED's Multi Species Conservation Strategy (MSCS), which includes identifying species goals ("Recovery", "contribute to recovery", or "maintain") for each of the 244 evaluated species as well as conservation measures to achieve the goals. An initial evaluation of the special status species of the upper Sacramento River indicates that 30 species evaluated by CALFED may be in the project area.

2. Relationship to Other Ecosystem Restoration Projects

This study proposal builds upon ongoing restoration activities in the area and provides a number of coordination benefits. This coordination accomplishes the following: (1) allows for an avoidance of duplication of efforts and a collaboration on efforts with other agencies where appropriate; (2) contributes to the definition of the existing conditions with and without project conditions; (3) identifies where work is taking place and helps ensure consistency with CALFED and the Comprehensive Study; and (4) helps identify recent restoration and flood damage reduction trends. Ongoing restoration activities in the area include:

Studies

- **Sacramento River National Wildlife Refuge.** USFWS land acquisition (more than 10,000 acres) and habitat restoration program along the Sacramento River between Colusa and Ord Bend.
- **The Nature Conservancy.** Land Acquisition (498 acres) and habitat restoration of the Westermann property adjacent to Hamilton City on the Sacramento River.
- **The Nature Conservancy, Hamilton City Landscape scale analysis.** Analysis of some key physical attributes of parcels in Hamilton City area previously acquired for conservation.
- **The Nature Conservancy, Flood plain reconnection/limited channel meander investigation.** Two-dimensional hydraulic and hydrologic modeling to (1) evaluate the potential flood damage reduction and ecosystem restoration benefits of a setback levee somewhere southwest of the existing levee, and (2) potentially remove the private levees within and around the USFWS Pine Creek Unit.
- **The Nature Conservancy. Riparian recruitment pilot study.** TNC, in partnership with DWR, has initiated a pilot project to evaluate the current status of cottonwood recruitment with respect to the current, altered flow regime of the Sacramento River.
- **The Nature Conservancy. Integrating floodplain management.** Various ongoing studies will be integrated at the subreach scale to develop an integrated approach to floodplain management in this area.

- **The Nature Conservancy. Restoration/Planning proposal.** TNC has submitted a restoration/planning proposal the to CVPIA Anadromous Fish Restoration Program.

Projects

- **The Nature Conservancy, Sacramento River Project.**
- **Sacramento River Flood Plain Acquisition and Monitoring.**
- **Chico Landing to Red Bluff Project.**

3. Next-Phase Funding

The intent of this project proposal is to continue the Hamilton City feasibility study initiated by the Comprehensive Study. The summary of the existing feasibility study status and next phase funding is provided in the budget justification form. This is not a request for next phase funding.

4. Previous Recipients of CALFED Program or CVPIA Funding

To date, the Comprehensive Study, including the Reclamation Board and Corps, have not been awarded any CALFED or CVPIA grants for the Hamilton City feasibility study.

5. System-Wide Ecosystem Benefits

This project proposal provides system-wide benefits for restoration and floodplain management that will impact the Central Valley and resource management statewide.

One of the most important long-term benefits is the Reclamation Board and the Corps' future work with stakeholders, public agencies and non-profit organizations to implement multi-objective projects for flood protection and ecosystem restoration. In addition, the Hamilton City project will help further the goals of the following programs: Central Valley Project Improvement Act, Central Valley Habitat Joint Venture, Sacramento River National Wildlife Refuge, Department of Fish and Game's Sacramento River Wildlife Area, California Riparian Habitat Conservation Program, Riparian Habitat Joint Venture (Partners in Flight), and the Comprehensive Study.

This planning study offers substantial system wide ecosystem benefits. By assessing both horticultural and natural-process restoration in an adaptive management framework, these collective efforts are successfully reducing the uncertainty of restoring the viability of native species and the proliferation and adverse impacts of non-native invasive species. Specifically, the planning effort to establish a continuous riparian corridor along the Sacramento River will improve the health of local wildlife populations by promoting the recolonization of areas where local extirpations have taken place. Several taxa, including the state threatened yellow-billed cuckoo and the federally threatened Valley Elderberry Longhorn Beetle, have colonized and successfully bred on restoration tracts in the area. The ecological benefits of future restoration activities extend far beyond the reaches of the project area. For many species, the main stem of the Sacramento River is a migratory pathway. By making the habitat in this region more supportive of migratory species, this project will bolster breeding and wintering populations in areas physically removed, but ecologically linked to the Sacramento River. Examples include the habitat benefits to Neotropical migratory birds and anadromous fish. Improvements in water quality as a result of restoration efforts have positive impacts down the Sacramento River into the Bay-Delta.

C. Qualifications

The Reclamation Board will be partnering efforts with the Corps and coordinating closely with environmental organizations (See **Table 3, pgs 26-27)**. The Reclamation Board is a State agency whose mission is to control flooding along the Sacramento and San Joaquin Rivers and their tributaries in cooperation with the U.S. Army Corps of Engineers, cooperate with various agencies of the Federal, State and local governments in establishing, planning, constructing, operating, and maintaining flood damage reduction works, and maintaining the integrity of the existing flood control system and designated floodways through the Board's regulatory authority by issuing permits for encroachments (The Reclamation Board. 2002. Mission Statement). For this project, the Reclamation Board will be using DWR's expert technical staff to manage, coordinate, and assist in the flood damage reduction and ecosystem restoration investigations.

The U.S. Army Corps of Engineers (USACE) mission is to provide quality, responsive engineering services to the Army and the nation. The Corps plans, designs, builds, and operates water resources and other civil works projects; manages engineering, construction and real estate programs for the U.S. Army and Air Force; provides design, construction management, and real estate support, other federal agencies and foreign governments; supervises research and development in support of its programs; manages and executes Army installation support programs; and manages and executes civil works programs to develop and maintain capability to mobilize in response to national security emergencies, domestic emergencies, and emergency water planning programs. The Comprehensive Study has a State/Federal combined team dedicated to working on initial projects like the Hamilton City Feasibility Study.

D. Cost

1. Budget

The total cost to finish the feasibility study is approximately $840,000. Funds requested from CALFED for this proposal total **$420,000.** Please see the budget forms for details.

2. Cost Sharing

The cost share of the study is 50% federal and 50% non-federal. The cost share of the project will be 65% federal and 35% non-federal.

E. Local Involvement

This project has been closely coordinated with the Hamilton City Community Services District, Glenn County, and other local stakeholders. This planning study includes a detailed outreach plan to ascertain and include the local opinions and issues. Included in **Attachment A** are letters of support from Glenn County and Sacramento River Conservation Area Forum.

F. Literature Cited

Appendix E, Section IX of the Corps' ER 1105-2-100 (April 2000)

CALFED 1999. CALFED Bay-Delta Program Ecosystem Restoration Program Plan, Volume II. Draft EIS/EIR Technical Appendix.

CALFED 2001 Ecosystem Restoration Program 2002 Proposal Solicitation Package. August 2001. CALFED Bay-Delta Program.

California Resources Agency. 2000. Sacramento River Conservation Area Handbook.

Castelle, A.J., A.W. Johnson, and C. Conolly. 1994. Wetland and stream buffer size

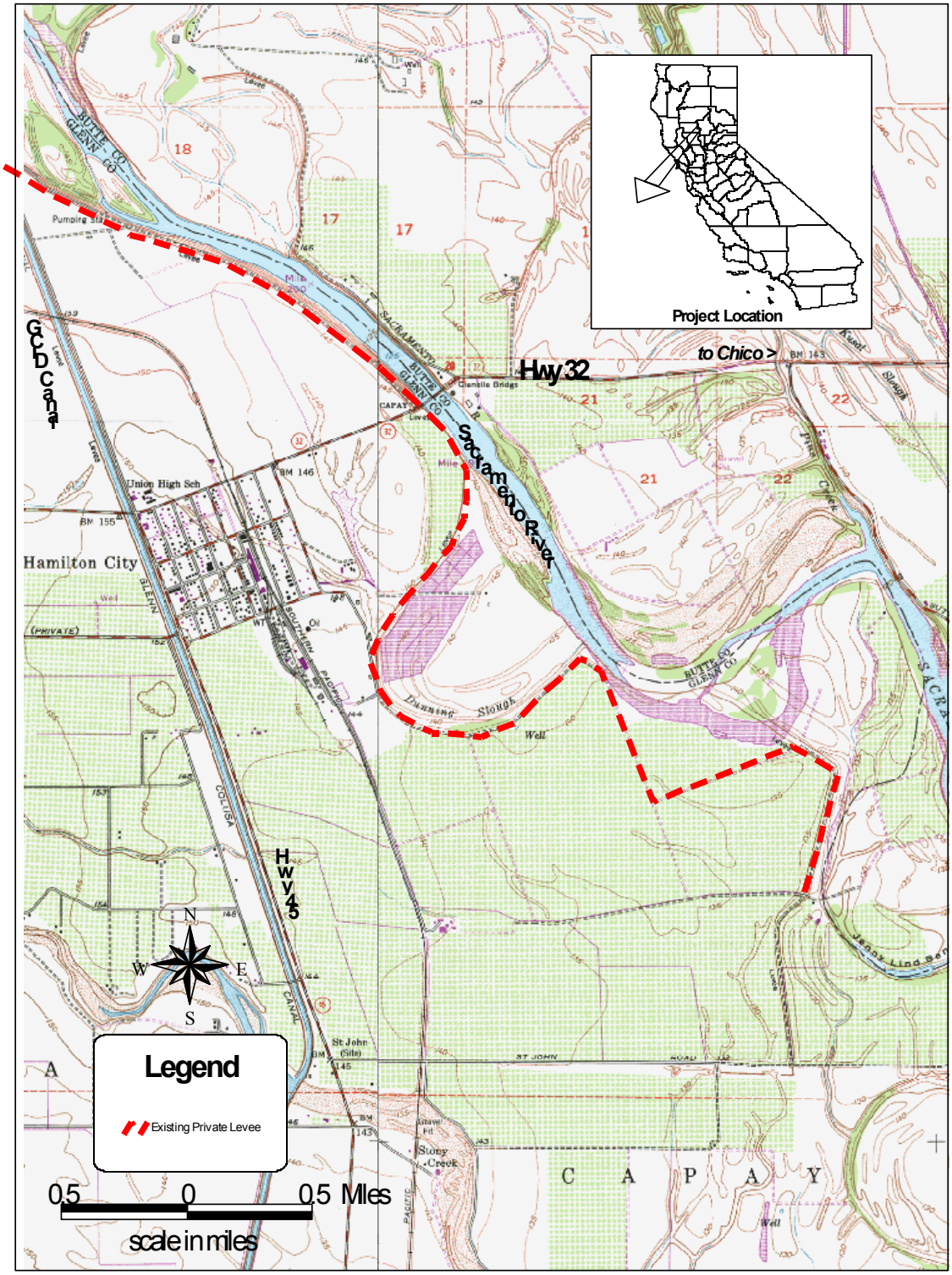
Department of Water Resources, Sacramento, CA.

Gregory, S.V., F.J. Swanson, W.A. McKee, and K.W. Cummins. 1991. An ecosystem perspective of riparian zones: focus on links between land and water. BioScience 41: 540-551.

Requirements - A Review. Journal of Environmental Quality. 23(5): 878-882.

The Reclamation Board. 2002 Mission Statement. http://recbd.ca.gov/

Figure 1. Project Proposal Study Area



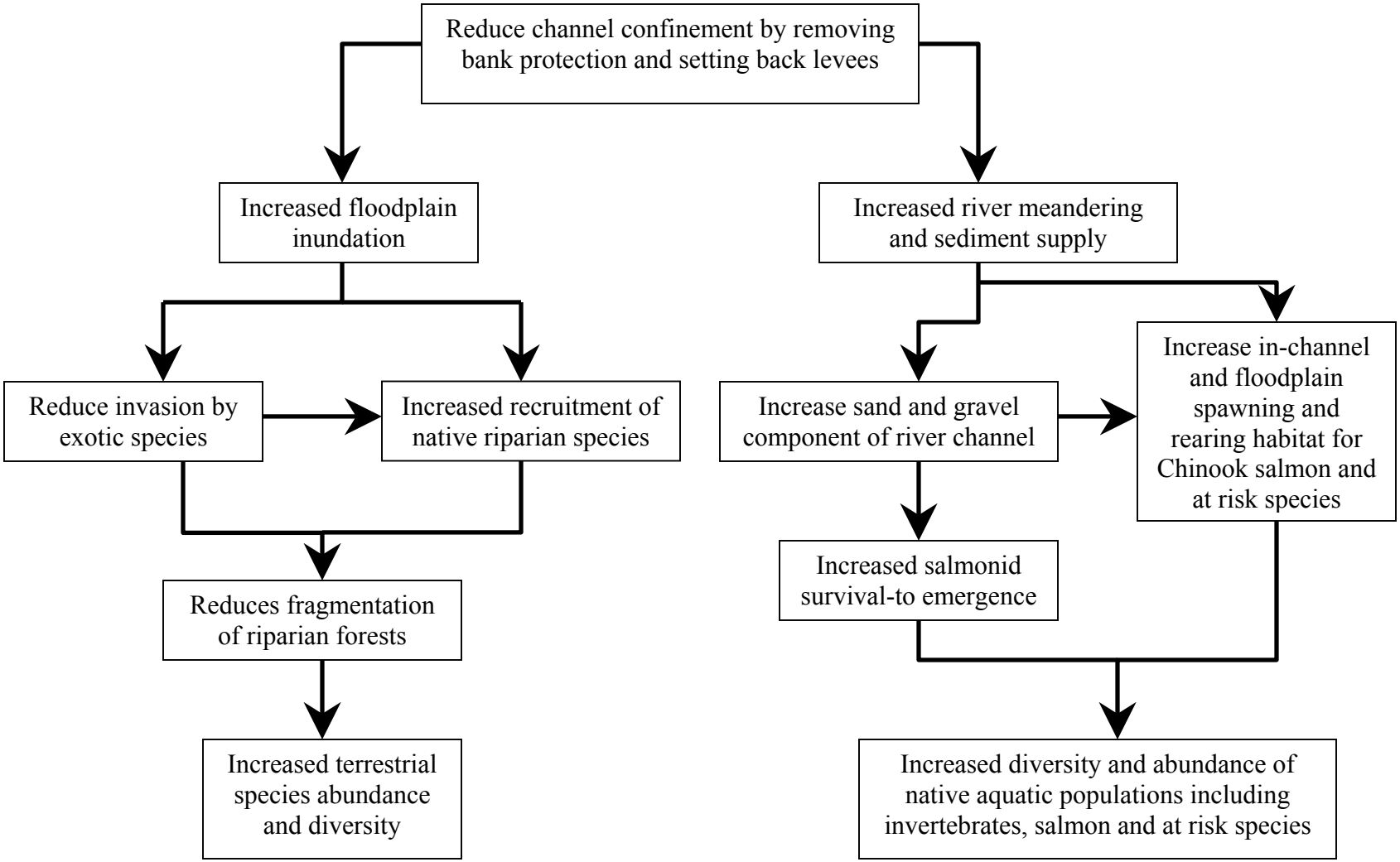


Figure 2- Conceptual Model for Hamilton City Ecosystem Restoration and Flood Damage Reduction

Figure 3 -Planning Process

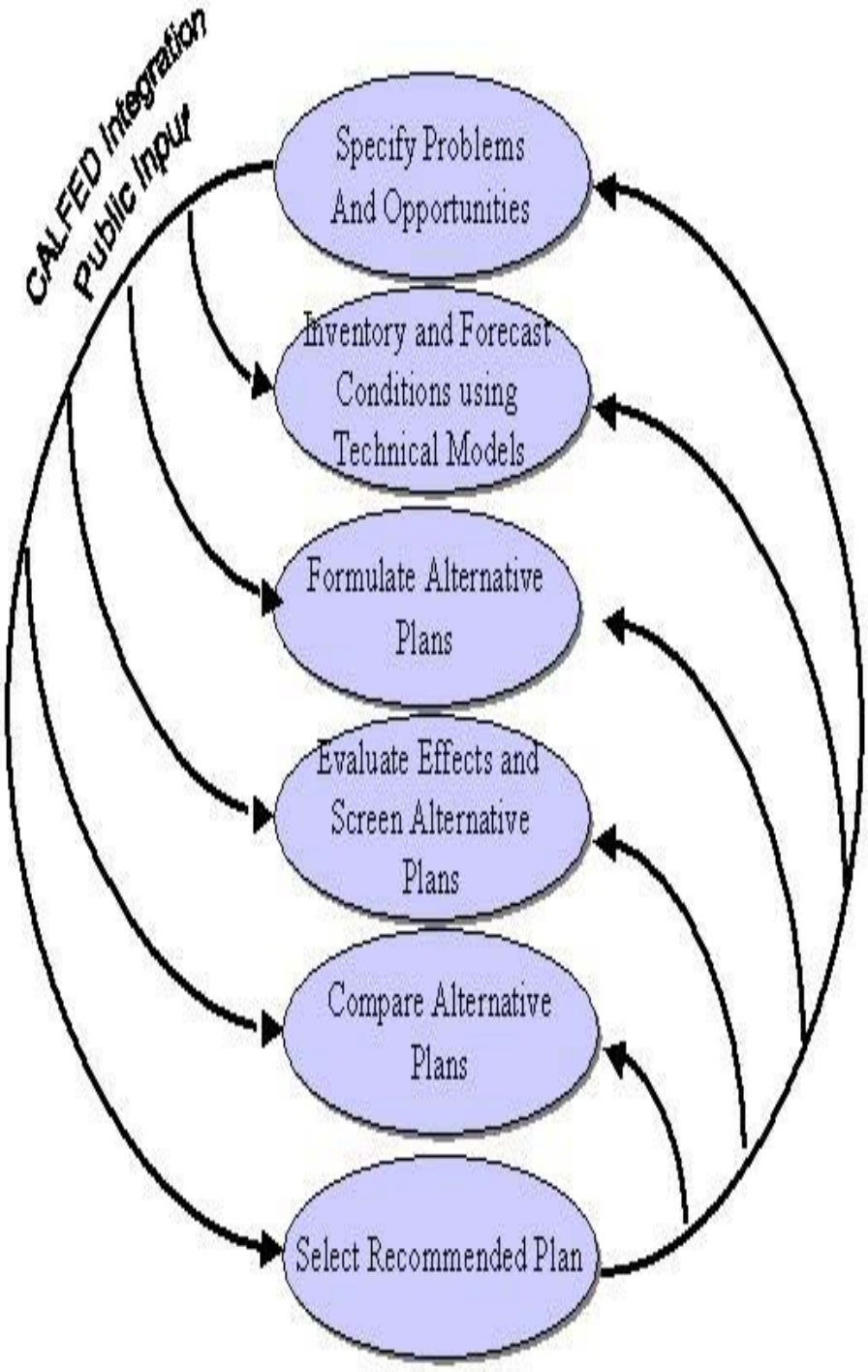


FIGURE 4 – Flow of Information Between Technical Tools

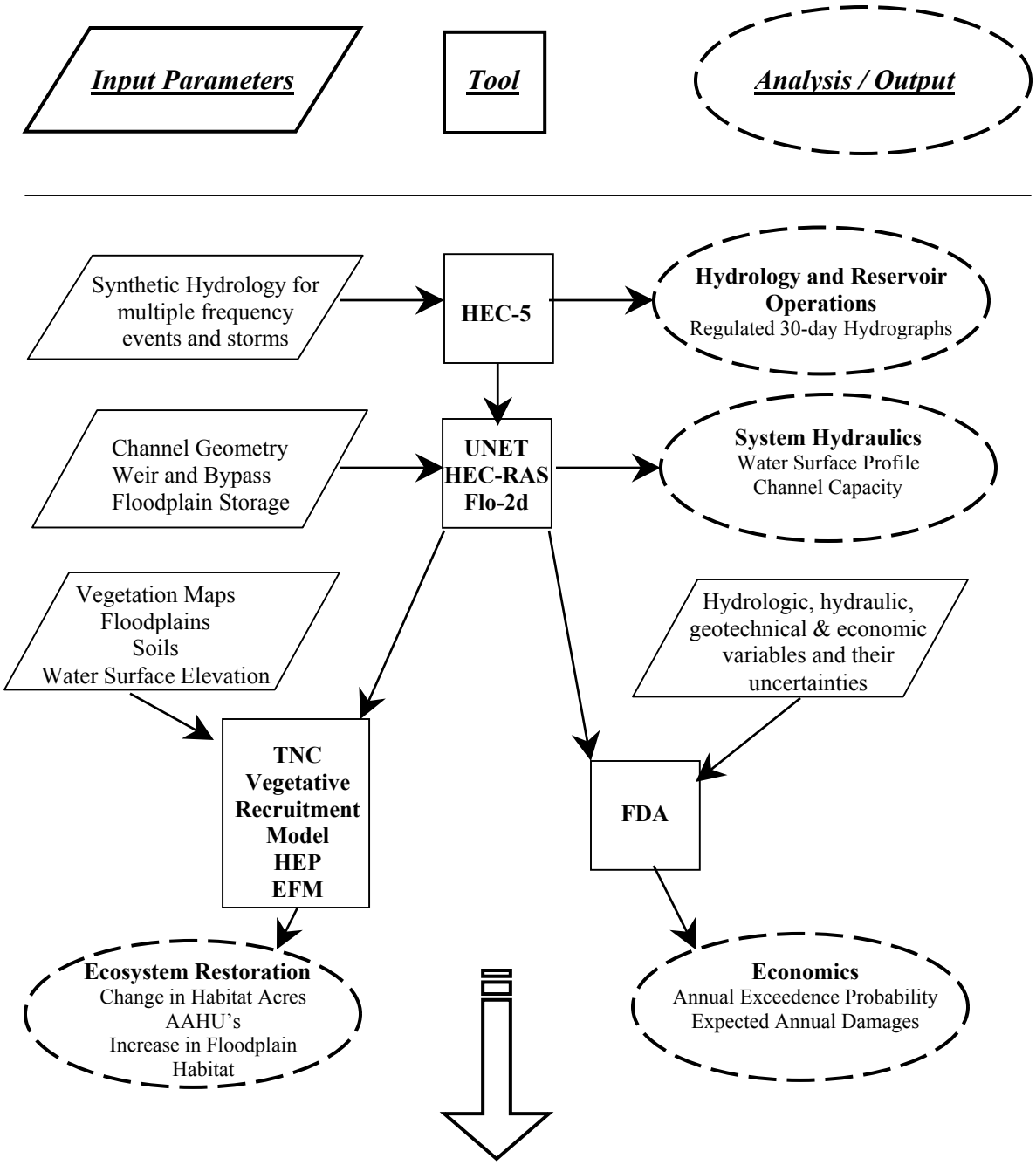


Table 1, Milestones

Milestone	Action	Estimated completion date
F1	Initiate Study	Completed
F2	Public Workshop/Scoping	Completed
F3	Feasibility Scoping Meeting	January 2003
F4	Alternative Review Conference	May 2003
F4A	Alternative Formulation Briefing	July 2003
F5	Draft Feasibility Report	September 2003
F6	Final Public Meeting	October 2003
F7	Feasibility Review Conference	November 2003
F8	Final Report	December 2003
F9	Public Notice	February 2004
- -	Chief's Report	August 2004
- -	Project Authorization	October 2004

Table 2, Schedule Timeline

Step	Description	2002			2003											
		Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	Problems and Oportunities															
2	Inventoryand Forcast Condition using Technical Models															
3	Formulate Alternative Plans															
4	Evaluate and Screen Alternative Plans															
5	Compare Plans and Peer Review															
6	Select Recommended Plan															

Table 3 - PROJECT DELIVERY TEAM

The following team members will participate in the preparation, review, and editing of the document.

Name and Title	Expertise	Credentials	Role in Study
Jerry Gianelli, Project Manager	31 years Corps of Engineers: Military & CW Project Management & Construction – CA, GA and Germany	BSCE Univ. Santa Clara BS General Science Univ. of San Francisco	**Project Manager**, Report Review
William C. Gaines, Project Manager	15 years Corps of Engineers, 13 years private engineering experience	BS Engineering, Law School	Project Manager, Report Review
Kevin Elcock Project Manager	DWR Engineer		**Project Manager**, Report Review
Alicia Kirchner, Water Resources Planning Specialist	12 years Corps of Engineers	BA History CSUS 1993 Regional plan formulation specialist	Report Preparation and Review
Eric Thaut, Water Resources Planner	8 years Corps Planner; Civil Engineer and planner	B.S. Civil Engineering, University of Washington, 1994	Lead Planner; plan formulation and evaluation, report preparation
Gary Lemon, Water Resources Engineer	2-years project inspector 2-years engineer floodplain management	B.S. Geological Engineering, 1998	Engineering coordination
Erin Taylor, Environmental Manager	4 years planning studies Corps of Engineers	BS Environmental Biology and Management	Report Preparation and Impact Assessment
Kim Emerick, Environmental Engineer	2 years Corps of Engineers and 12 years of Environmental Engineering experience with other government entity	BS in Chemical Engineering and Cross Connection Specialist	HTRW Analysis and Report Preparation
Edward Flint, Geotechnical Engineer	8 years Corps of Engineers/ 15 years private industry	BS Geological Sciences, MSCE (Soils)	Measures Development, Report Review

Project Delivery Team Continued;			
Name and Title	**Expertise**	**Credentials**	**Role in Study**
Kyle Keer, Hydrologist	Hydrologist/Water Management Specialist	MS Hydrology	Hydrology and Reservoir Operations
Brett Whitin, Hydrologist	Hydrologic/Hydraulic Engineering	MS in Civil Engineering	Hydrology/Reservoir Operations
Arden Sansom, Economist	8 years Corps of Engineers Economist	B.A. in Economics, Marshall University (WV) 1993 M.A. in Mathematics, Marshall 2000	Economic Analysis, Report Preparation
Cherie Johnston-Waldear, Cultural Resources	3 years Corps of Engineers, 10 years Archeologist		Cultural Resources Impacts and Cost Analysis
Jane Bolton Geotechnical Engineer	14 years Corps of Engineers	B.S. Geology M.S. Civil Engineering P.E. Civil Engineering	Geotechnical Analysis and Report Prep
Don Twiss, Hydraulics	29 years Water Resource Projects 14 years Corps of Engineers	P.E. Civil Engineering	Hydraulics Sediment Trans Geomorphology
Dan Mrva, Real Estate (Appraisals)	Total of 25 years real estate appraisal experience; (5 with USACE)	BS degree in Marketing; Certified General Real Estate Appraisal License with the State of California	Real Estate Valuation
Dan Fodrini, Real Estate			
Judy Fong, Real Estate	Real Estate Planning & Control 5 years Corps of Engineers Budget Analyst	BS degree in Accounting MS degree in Business Administration Real Estate Broker License	Cost Estimating
Rod Bradley, Real Estate (Cadastral)	21 yrs. Federal Cadastral/ Cartographic (7 at Corps), 7 yrs. Corps Geotechnical Engineering Draftsman/Technician	A.A. Natural Science A.A. Drafting Technology	Project Real Estate Maps & Tract Registers
Annalena Bronson	20 years DWR Environmental (CEQA)	BA degree in Environmental Studies	Environmental Documentation
Steve Cowdin, Economist	25 years DWR Economist	BA Economics, CSU Chico, 1972 Masters Public Administration, CSU Chico, 1977	Economic Analysis, Report Preparation
Matt Davis, NEPA Compliance Technical Specialist	17 years Corps of Engineers, environmental planning	Regional NEPA Compliance specialist	Independent Technical Review (ITR) Chairman

Table 4 - Independent Technical Review Team			
Name and Title	**Expertise**	**Credentials**	**Role in Study**
Brian Anderson, Hydrologic Engineer, Corps of Engineers	15 years Corps of Engineers	BS Civil Engineering Licensed Professional Engineer	Hydrology ITR Review
Kerry Curtis, Attorney, Corps of Engineers	15 years private sector, 1 year Corps of Engineers	BA Communication JD Alabama School of Law	Legal ITR Review
Sherman Fong, Cost Engineer, Corps of Engineers	17 years Corps of Engineers	BS Civil Engineering	Cost Estimating ITR Review
Dail Hatch, Chief, South Valley/Delta Section, Corps of Engineers	30 years Flood Plain Management	MS Water Resources, PE California	Plan Formulation ITR Review
Fred Kindel, Environmental Specialist, Montgomery, Watson, Harza	45 years environmental planning: Corps of Engineers-28; State & private agencies-7; part-time consulting-10.	Water Resources Planner, Corps' Board of Engineers for Rivers & Harbors--1984. MS, Wildlife Mgmt, U of Idaho--1958. BS, Wildlife Mgmt, Humboldt State College--1956.	Environmental Resources ITR Review
Delia LaSala, Real Estate, Corps of Engineers	5 years – Realty Specialist	BA Education, CSU Chico	Real Estate ITR Review
Daniel Sulzer, Economist, Corps of Engineers	14 years Corps of Engineers Economics	BA Economics, Occidental College, 1984	Economic ITR Review
Jim Weir, Civil Engineer, Corps of Engineers	27 years civil design experience	BSCE Professional Engineer	Civil Engineer ITR Review
Laurine White, Hydrologist, Corps of Engineers	34 years Corps of Engineers Hydrology studies	BA, Mathematics, Sacramento State College	Hydrology ITR Review

Table 5 - Interagency Coordination Team		
Name	**Affiliation**	**Function**
Patricia Fernandez	CALFED	Input/review
Mathew Reischman	CV Water Control Board	Input/review
Nick Burmas	CAL TRANS	Input/review
Steve Shaffer	CDFA	Input/review
Chris Adams	OES	Input/review
Jennifer Bain	USFWS	Input/review
Dwight Sanders	State Lands Commission	Input/review
Karen Schwinn	EPA	Input/review
Rosalie del Rosario	NMFS	Input/review
Walter Sykes	NRCS	Input/review
Rick Heimes	USGS	Input/review
John Jordan	BOR	Input/review
Allan Oto	USBR	Input/review
Rich Dixon	CA DFG	Input/review
Becky Miller	CA DFG	Input/review
David Schaub	CA Parks and Recreation	Input/review
David Johnson	CA Boating and Waterways	Input/review
Stein Buer	DWR	Input/review

Table 6. Areas of Expertise for the Independent Review Panel

Area of Expertise
Water Quality Specialist
Riparian Ecologist
Fluvial Geomorphologist
Fisheries Ecologist
Resource Economist