STATE OF CALIFORNIA—THE RESOURCES AGENCY

F1-251

PETE WILSON, Governor

DEPARTMENT OF WATER RESOURCES
3374 East Shields Avenue
Fresno, CA 93726

DWR WAREHOUSE
97 JUL 28 PM 3:53

July 25, 1997

Ms. Kate Hansel
CALFED Bay-Delta Program
1416 Ninth Street, Suite 1155
Sacramento, California 95814

Dear Ms. Hansel:

Enclosed are ten copies of a proposal to CALFED for Category III funding. The project titled, *Assessment of the Stanislaus River Corridor Below Goodwin Dam*, proposes to document the historical perspective of the lower Stanislaus River's development and identify processes that contributed to existing conditions. Information from this study will then be used to develop watershed management alternatives.

If you have any questions, please call Kevin Faulkenberry at (209) 445-5236.

Sincerely,

Louis A. Beck, Chief
San Joaquin District

Enclosures

ASSESSMENT OF THE STANISLAUS RIVER CORRIDOR BELOW GOODWIN DAM

(Other Service: Planning)

Proposed by

California Department of Water Resources
San Joaquin District
3374 East Shields Avenue
Fresno, CA 93726

in collaboration with

San Joaquin River Management Program (SJRMP)
Stanislaus River Stakeholders Group

Project Investigators
California Department of Water Resources
San Joaquin District

Jack Erickson, P.E. / DWR Special Investigations Branch Chief

Jose Faria, P.E. / DWR Aqueduct and Flood Protection Section Chief

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(technical and financial contact person)
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Paul Romero, P.E. / DWR Associate Engineer, Water Resources

Jenny Marr / DWR Environmental Specialist III

July 1997

ASSESSMENT OF THE STANISLAUS RIVER CORRIDOR BELOW GOODWIN DAM

proposed by

California Department of Water Resources
San Joaquin District

EXECUTIVE SUMMARY

Project Description and Primary Biological/Ecological Objectives. The primary objectives of this study are to: (1) Document a historical perspective of the lower Stanislaus River's development and identify processes that contributed to existing conditions, (2) Evaluate the effect of existing conditions on spawning, rearing, and migratory paths of the fall-run chinook salmon, and (3) Provide information that shall assist in prioritizing, planning and designing salmon habitat improvement projects on the lower Stanislaus River.

The project shall assemble the following information for the Stanislaus River corridor below Goodwin Dam:

- Flow frequency curves from current and historic conditions on the river.
- Land use and soil type data included in a geographical information system (GIS) format.
- Sediment budget, including the identification of fine sediment sources.
- Coarse sediment replenishment criteria that identifies gradation, quantity and location.
- Identification of basic river features included in a GIS format (e.g., riffles, pools, gravel pits).
- Include information on type, location and quality of riparian communities in a GIS format.
- Areas of critical need for riparian restoration shall be identified.
- Development of a watershed management alternatives to address the most obvious problems.

Approach/Tasks/Schedule. This project to assess the Stanislaus River corridor from below Goodwin Dam to the San Joaquin River involves the collection of baseline physical, chemical, and biological data on the river and evaluates the individual and collective affects they would have on fisheries. Work required for the assessment is broken into five distinct areas that shall provide information on the physical aspects of the river: hydrology, land use, geomorphology, water quality and riparian vegetation. Analysis of the information gathered under these areas shall identify the most obvious impacts from the contributory watershed to the reach of the river below Goodwin Dam, and allow for the identification and prioritization of projects and management practices. Project work shall involve the following tasks: (1) Hydrologic Assessment, (2) Land Use Assessment, (3) Geomorphic Assessment, (4) Water Quality

Assessment, and (5) Riparian Vegetation Justification. The project is expected to be conducted over the next three years to include two complete winter cycles. The majority of the field work shall be completed in the first two years. The third year is for report preparation and laboratory work. Tasks shall be completed concurrently, and begin by the spring of 1998.

Justification for Project and Funding by CALFED. This project focuses on improving these priority habitats — instream aquatic and shaded riverine aquatic — that are utilized by fall run chinook salmon and have experienced a severe decline in the last twenty years. The proposed project was identified as a priority action item in April 1997 "Joint CALFED/SJRMP San Joaquin River Fishery Technical Team Meeting Report," is consistent with CALFED Implementation Strategies, and addresses many stressors identified in the CALFED process.

Budget Costs and Third Party Impacts. Full implementation of the project is expected to cost approximately $600,000. This includes the following cost breakdown: (1) Hydrologic Assessment ($ 32,510), (2) Land Use Assessment ($ 29,370), (3) Geomorphic Assessment ($ 307,830), (4) Water Quality Assessment ($ 145,440), and (5) Riparian Vegetation Assessment ($ 80,860). There are no third party impacts expected from this proposal.

Applicant Qualifications. DWR, a CALFED participant, is qualified to complete the proposed assessment and has staff experienced in the fields of hydrology, water quality evaluation, land use, sediment transport, and riparian restoration. Department personnel also have extensive experience in river and riparian habitat restoration and watershed evaluation. Expertise is available to complete the tasks set out in this proposal, evaluate its data and meet its objectives.

Monitoring and Data Evaluation. This project is the collection of baseline data for the purpose of future monitoring of riverine habitat. Each project task has data collection and evaluation components that shall be used to alter the direction or scope of any tasks. All survey, land use, and riparian inventory data shall be provided in a form that is GIS compatible. All other data will be made available for review and collection by interested parties.

Program Support and Compatibility with CALFED Objectives. A coordinated effort shall insure that this assessment does not conflict or interfere with the objectives of the Stanislaus River Stakeholders Group. Consensus in this project shall be developed through coordination and planning with federal, state, local and stakeholder agencies to insure that funding investments have the greatest return for CALFED's priority goals and objectives. The proposed project is compatible with CALFED objectives and implementation strategies, and addresses many stressors identified in the CALFED process.

ASSESSMENT OF THE STANISLAUS RIVER CORRIDOR BELOW GOODWIN DAM

Project Description and Approach. Complete understanding of a regulated stream involves the comprehension of the major factors likely to impact its physical and biological characteristics. This understanding is formed by the collection of historical and current information on the physical, chemical and biological characteristics of the river and its contributing watershed. This information can be used to identify the factors that led to the current conditions and precipitate a plan that adjusts the river to the current flow regime while retaining much of its former function.

This proposal to assess the Stanislaus River corridor from below Goodwin Dam to the San Joaquin River involves the collection of baseline physical, chemical, and biological data on the river and evaluates the individual and collective affects they would have on fisheries. Work required for this assessment is broken into five distinct areas: hydrology, land use, geomorphology, water quality and riparian vegetation.

The hydrologic assessment will provide an understanding of the historic and current hydrologic condition of the river. Data of the historic conditions shall be collected back to the early 1900's. A comparison of past and present flood frequencies, seasonal distribution of flows and total discharge shall be made, and their effects on the watershed shall be assessed.

A geomorphic assessment shall be done to identify the dominant physical processes that presently control the river's sediment transport and assimilative capacity. Knowledge of the features and dynamics that control the geomorphic processes of the river (i.e., aggradation and degradation) is critical to the understanding of factors associated with sediment transport. This task involves a detailed literature review and field data collection efforts to identify gradation and quantity of bedload, sediment storage, suspended sediment sources, and identification of river features, dimensions and patterns. This assessment, along with a cursory hydraulic analysis, shall identify sediment sources in the main reach and determine the ability of flows to mobilize and transport this sediment.

The water quality assessment shall identify the water quality characteristics in the Stanislaus River and how those traits might affect river restoration efforts for fisheries. The study shall concentrate on (1) identifying the basic physical and chemical characteristics of flows in the river (2) evaluating the processes that dictate their occurrence, movement, and fate, and (3) identifying their effects on the fisheries. A literature review of historic water quality data that identifies historic water quality conditions shall be performed and used to implement and focus a 24-month monitoring program. The monitoring program shall collect water quality data (chemical, physical and biological) deemed to have an impact on fisheries.

The land use assessment shall evaluate the land uses within the river corridor and contributing watersheds located below Goodwin Dam to identify significant sources of sediment and chemical constituents. Contributions from urban, agricultural, ranching, and gravel mining activities shall

be the primary focus. This assessment shall also address the land use impacts of river corridor encroachment. To accomplish this, mapping to delineate land uses, soil types, and land management practices within the contributing watershed will be performed.

In order to prioritize riparian and wetland habitat restoration, it is necessary to determine the extent to which native riparian plant communities within the Stanislaus River floodplain have been lost or converted to non-native plant communities. This determination can be accomplished through a quantitative analysis and comparison of historic versus existing wetland plant communities using stereoscopic black and white and infrared aerial photographs. The aerial photographs will provide generalized data on riverine plant community types and hydrogeomorphic relationships. This information shall be digitized into a GIS format for analysis. The vegetation community analysis shall also entail periodic site visits during the classification to ensure accuracy in vegetation community typing. Information taken from present and historical aerial photographs shall be combined with data gathered from other tasks to provide a historic picture and possible explanation of changes in the riparian community. Critical habitat restoration areas shall be identified by type and location.

Results of these individual tasks will be incorporated into a comprehensive assessment of the corridor of the Stanislaus River below Goodwin Dam. This assessment shall identify the significant factors that form the characteristics of the river and health of fisheries and act as a precursor to identify potential solutions for better fisheries habitat. A final report will be assembled that contains, at the minimum, the following information:

- Flow frequency curves from current and historic conditions on the river.
- Land use and soil type data in a geographical information system (GIS) format.
- Sediment budget, including the identification of fine sediment sources.
- Coarse sediment replenishment criteria that identifies gradation, quantity and location.
- Identification of basic river features in a GIS format (e.g., riffles, pools, pits).
- Information on type, location and quality of riparian communities in a GIS format.
- Identification of critical need areas for riparian restoration.
- Development of a watershed management alternatives to address the most obvious problems.

Location and/or Geographic Boundaries of Project. The project begins just below Goodwin Dam on the Calaveras/Tuolumne County line and ends at the San Joaquin River on the San Joaquin/Stanislaus County line (see Figure 1). Tentative project boundaries have been chosen to develop project costs and scope of work. The maximum boundaries of the study should include the Stanislaus River corridor from immediately below Goodwin Dam to the San Joaquin River. A description of the tentative boundaries associated with each of the tasks can be found in the scope of work.

Expected Benefits. Once complete, each assessment shall recommend future actions, studies or projects, to lead to the restoration of this river corridor. The hydrologic assessment will provide an understanding of the historic and current hydrologic conditions of the river. Many restoration

principles are based on an understanding of hydrology. Historic changes in magnitude, quantity, duration, and timing of flows, affect the riparian vegetation, water quality and morphology of the stream. Flood frequencies also help identify and classify other riverine features such as riparian communities. This assessment shall identify the changes resulting from the construction of the upstream dams and provide the basis to develop restoration plans for the current hydrology that retains as much of the former river function as possible.

The land use task shall identify land use within the river corridor and contributing watersheds, and provide an understanding of how natural and human activities can impact stream stability and the health of fisheries. The results shall help focus future investigations on land use and watershed management practices that will benefit the river. The geomorphic task shall identify the fluvial geomorphic processes that exist in the river and the physical impacts these processes will have on fisheries habitat. By determining the geomorphic processes that dominate the river, a reasonable strategy can be developed to partially or fully restore the hydraulic processes required to maintain crucial fisheries habitat.

The water quality assessment shall identify water quality characteristics that would interfere with the restoration of the river and identify the point or non-point origin of the problem constituents. This assessment shall identify water quality trends and serve as a baseline for future actions or studies. Moreover, this assessment shall help prioritize future investigations and develop recommendations for future projects designed to reduce the adverse impacts of water quality on fisheries. Information obtained in the riparian vegetation assessment shall be combined with data gathered from the other tasks to provide a historic picture and possible explanation of changes in the riparian community. Areas of critical habitat restoration shall be identified by type and location.

In summary, resulting information from the study shall assist in prioritizing, planning and designing salmon habitat improvement projects on the lower Stanislaus River. The study shall also help focus restoration efforts on the most serious problems (e.g., coarse sediment replenishment and gravel mining) and the most beneficial adaptive management strategies. This collected effort will benefit restoration of this river corridor by:

(1) Documenting a historical perspective of the lower Stanislaus River's development and identify processes that contributed to existing conditions.
(2) Evaluating the effect of existing conditions on spawning, rearing, and migratory paths of the fall-run chinook salmon.
(3) Providing information to assist in prioritizing, planning and designing salmon habitat improvement projects on the lower Stanislaus River.

Background and Biological/Technical Justification. Stanislaus River salmon habitat has been significantly affected by man's activities since the late 1800's. The construction of Goodwin Dam in 1912 and New Melones Dam in 1979 has separated the lower Stanislaus river from the upper portion of its watershed, thereby trapping sediment and flows that enter the system above Goodwin Dam. Aggregate mining has removed large quantities of the bed material and created

large pits that not only inhibit the natural function of the river but provide habitat for warm water predator species that feed on salmon smolts. Encroachment from mining, vegetation and urban communities has constricted the river's floodplain and adversely effected riparian habitat. The river cannot be restored to pre-dam conditions, nor can what was lost be replaced. However, an understanding of the events that shaped this river shall provide information needed to plan and implement a restoration program.

Understanding the current problems requires collecting historical data about the river. Factors that led to the the current conditions can then be with current data to develop a plan that adjusts the river to the current flow regime and retains as much of its former function as possible. This proposal addresses the collection of historic and current baseline data necessary to development alternative restoration efforts for the river and formulate a plan of action.

Program Scope of Work (Tasks 1 through 5)

(1) **Hydrologic Assessment**. A comparison of past and present flood frequencies, seasonal distribution of flows and total discharge shall be made, and their effects on the watershed shall be assessed back to the early 1900's. Hydrologic data shall be collected form a variety of federal, state and local agencies, then entered into a data base for analysis. A report that documents the historical and current hydrological characteristics of the river will be prepared. Boundary limits for this task are the Stanislaus River corridor from below Goodwin Dam to the San Joaquin River (see Figure 1).

(2) **Land Use Assessment**. The major task in this assessment shall be a mapping effort to inventory the land uses and soil-types within the contributing watershed. Land management practices shall also be identified. This shall be accomplished by collecting recent aerial photographs, existing crop, soil and land use surveys, and on-site investigations. Data shall be collected from a variety of federal, state and local agencies. Since land use within the watershed is a factor that can significantly impact suspended sediment and water quality in the river, the results of the water quality and geomorphic tasks shall also be analyzed. This analysis shall also attempt to identify significant sources of fine sediments and chemical constituents in the river's main stem. On completion of this assessment, the data will be placed in a GIS format and a report of significant findings and recommendations shall be prepared. This task shall cover the corridor and those watersheds that drain into the Stanislaus River between Goodwin Dam and the San Joaquin River (see Figure 1).

(3) **Geomorphic Assessment**. A review of available geomorphic information shall be performed to (1) obtain an understanding of the physical features of the river and (2) help select critical locations where additional data shall be collected. The data collection effort shall include collection of new and historic aerial photos, stream cross-sectional surveys, longitudinal profiles, and bed material sampling. This effort shall identify riffle/pool sequences, availability of coarse sediment material, and hydraulic features that effect the sediment carrying capacity of the stream. Color and infrared

photographs shall be used to locate depositional areas, make rudimentary sediment size classifications, and identify significant sediment inflow sources within the main stem. Bed sampling shall include bulk samples and pebble counts of material sources to determine particle-size classification and detail the hydraulic sorting of the bed. These data, along with hydraulic data, will provide a general guide to the mobility of the sediment.

Ideally Sediment samples shall also be gathered from storm runoff events approaching bankfull and the river design maximum of 8,000 cubic feet per second. This information, combined with tracer gravel movement studies and bed gradation, shall be used to estimate the sediment transport characteristics within the study reach. Samples shall be taken at stream gages, bridges, selected cross-sections, potential problem areas, and at tributary inflow points. Reference reaches shall be identified within the study reach to characterize restoration designs. Suspended and bedload sediment samples shall be collected to identify sediment sources and the stream's potential to transport material. Tracer gravel shall be placed to correlate sediment data with actual bed mobilization during ordinary flows. Because of the physical difficulties involved with sampling bedloads, theoretical equations may be used to complete this analysis. Scour chains may also be used in areas of significant scour to document bed movement during a rare flood, should one occur during the study period. Results of this monitoring shall include the delineation of sediment sources and determination of the ability of flows to mobilize bed material. Finally, a report of significant findings and recommendations shall be prepared. The boundaries of this task include the river between Goodwin Dam and the town of Riverbank — the predominant spawning reach of the river (see Figure 1).

(4) **Water Quality Assessment**. This assessment shall identify the water quality characteristics in the Stanislaus River and how they might affect river restoration efforts for fisheries. Work performed under this task includes a literature review of historical data and analyses, and a 24-month water quality monitoring program. The literature review shall be used to focus the monitoring program by identifying historic water quality conditions. Historic water quality, and review of current monitoring programs shall be utilized to direct the amount, timing, and locations of monitoring efforts. Based on anticipated findings from the literature review, data collection most likely shall focus on the presence of several minerals, trace-metals, pesticides, and herbicides deemed critical to the river. Monitoring data on dissolved oxygen, temperature, and nutrients shall also be collected since they are critical to the health of fisheries. *San Joaquin River Real-time Water Quality Management Program* proposes expanding the collection of real-time electrical conductivity and temperature data. Real-time information shall also be used to make decisions about frequency, timing, and locations of monitoring efforts.

Sampling sites shall include historical locations, major inflows, stream flow gaging sites, and downstream of municipalities. Sampling sites shall be concentrated on the main stem of the river, but may also include tributaries and other inflow points which are suspected to have a significant impact on water quality in the river. The monitoring program shall

include continuous, seasonal, monthly, and specific-event measurements to identify fluctuations in water quality throughout the year that result from human activities and winter run-off. A report of significant findings and recommendations will then be prepared. The monitoring shall be conducted over a 24-month time period. Boundaries of this task include the River from below Goodwin dam to Riverbank (see Figure 1).

(5) **Riparian Vegetation Assessment.** In order to prioritize riparian and wetland habitat restoration, it is necessary to determine the extent to which native riparian plant communities within the Stanislaus River floodplain have been lost, or converted to non-native plant communities. This determination can be accomplished through a quantitative analysis and comparison of historic versus existing wetland plant communities using present and historic stereoscopic black and white, infrared aerial photographs. The aerial photographs will provide generalized data on riverine plant community types, and hydrogeomorphic relationships that shall be digitized into a GIS format for analysis. The vegetation community analysis shall also entail periodic site visits during the classification to ensure accuracy in vegetation community typing. Information taken from aerial photographs and existing riparian habitat surveys shall be combined with data gathered from other tasks to provide a historic picture and possible explanation of changes in the riparian community. Areas of critical habitat restoration shall be identified by both type and location. This information will be placed in a GIS format and a report of significant findings and recommendations will be prepared. Boundary limits are the riparian corridor from below Goodwin Dam to the San Joaquin River (see Figure 1).

Monitoring and Data Evaluation. This project is the collection of baseline data for the purpose of future monitoring of riverine habitat. Each project task has data collection and evaluation components that shall be used to alter the direction or scope of any tasks. All survey, land use, and riparian inventory data shall be provided in a form that is GIS compatible. All other data will be made available for review and collection by interested parties.

Implementability. This assessment shall comply with all laws and regulations as they apply. The final recommendations and coordination between DWR and Stanislaus Stakeholders and other concerned individuals shall be of extreme importance to reduce the chance of duplication and insure the correct application of resources on the watershed.

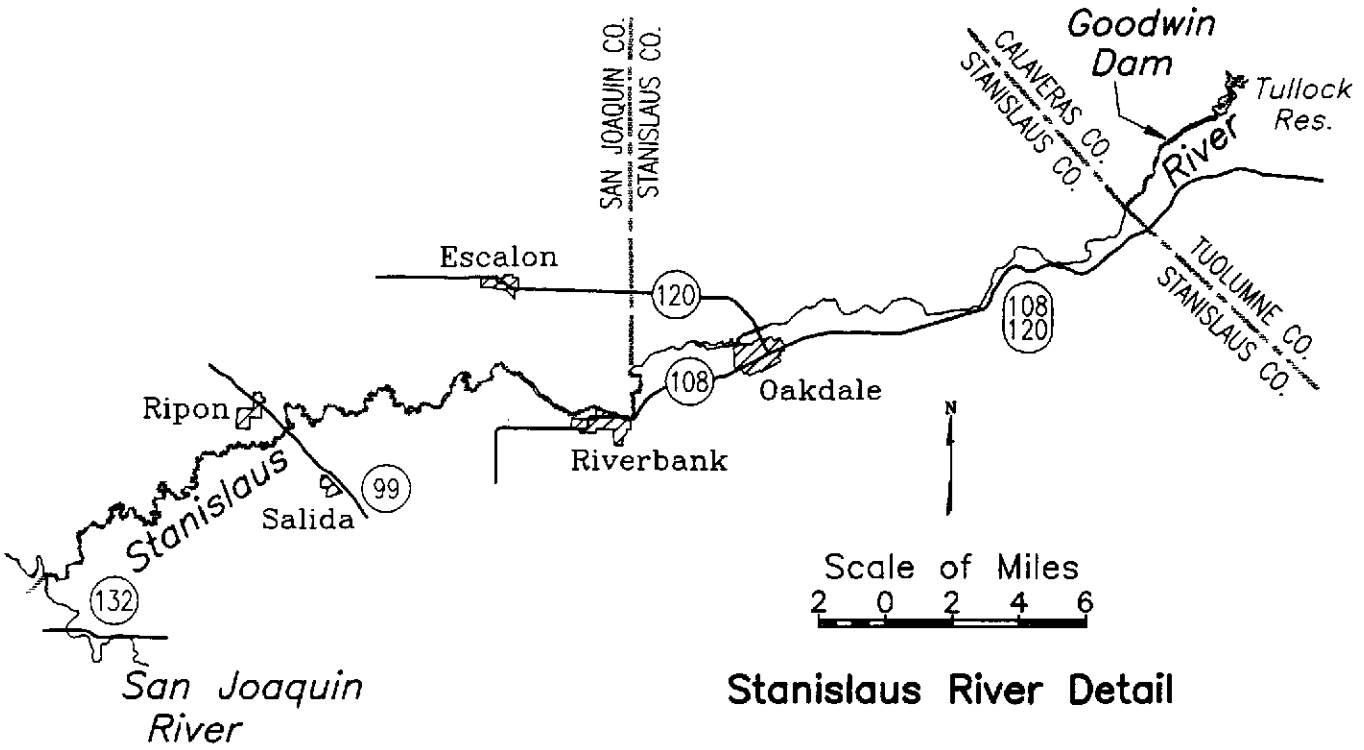

Figure 1. Stanislaus River Corridor Below Goodwin Dam

COSTS AND SCHEDULE TO IMPLEMENT PROPOSED PROJECT

Budget Costs. Project budget costs are identified in the table below. A more detailed breakdown of costs is included as Attachment 1.

Task	Direct Labor Hours	Direct Salary and Benefits	Overhead Labor Costs (75.73%)	Service Contracts (LabTesting)	Material Contracts	Per-Diem	Total Costs
Task 1 Hydrology	496	$18,500	$14,010				**$32,510**
Task 2 Land Use	416	$16,430	$12,440			$500	**$29,370**
Task 3 Geomorphic	3544	$125,270	$94,860	$53,200	$19,000	$15,500	**$307,830**
Task 4 Water Quality	896	$31,340	$23,740	$83,860	$6,000	$500	**$145,440**
Task 5 Riparian Vegetation	1256	$36,620	$27,740		$8,500	$8,000	**$80,860**
Totals	**6608**	**$228,160**	**$172,790**	**$137,060**	**$33,500**	**$24,500**	**$596,010**

Schedule Milestones. It is anticipated that a contract approving this work shall be completed during Spring 1998. Work on Tasks 1-5 shall begin at this time. Tasks 1, 2, and 5 are relatively short-term tasks, and payment shall be expected as these tasks are completed. Tasks 3 and 4 include monitoring programs that shall cover a two-year period. Scheduled payments would be required at the end of each monitoring cycle. The scheduled payments would likely result in six-month billings throughout the 3-year period. These billings would likely be arranged as follows.

Ending six-month Period	Task Completed/In-Progress	Payment
1	Task 1 - Complete Task 3 - Initial Analysis, Monitoring Setup Task 4 - Initial Analysis, Monitoring Setup	$102,900
2	Task 3 - First Monitoring Cycle Task 4 - Continuous Monitoring Task 5 - Aerial Photos and ground truthing	$95,700
3	Task 3 - Lab Results, surveys & bed analysis complete Task 4 - Continuous Monitoring, Lab Results	$153,400
4	Task 3 - Second Monitoring Cycle Task 4 - Continuous Monitoring, Lab Results Task 5 - Complete	$62,900
5	Task 3 - Monitoring Complete, Lab Results Task 4 - Monitoring Complete, Lab Results	$62,900
6	Task 2 - Complete Task 3 - Complete Task 4 - Complete	$118,200
Total		$596,000

Third Party Impacts. There are no third party impacts expected from this proposal.

APPLICANT QUALIFICATIONS

JACK A. ERICKSON, Supervising Engineer
California Department of Water Resources
San Joaquin District
Education B.S., Civil Engineering, 1962, University of Nebraska
Registration *Civil Engineer, California*
Agricultural Engineer, California
Experience and Professional Background. Mr. Erickson has more than 30 years of professional worldwide experience as an engineering planner and designer of water resources projects. He has acted at levels of responsibility up to Director of Engineering for a large corporation, as an independent consultant, and as a team leader on an overseas irrigation project feasibility study.

His design experience includes projects ranging from portions of the California Aqueduct to a large 250,000-acre irrigation project in Iran and small 50- to 100-acre irrigation projects in Indonesia. Mr. Erickson is experienced in the design of specific facilities including canals and related structures, surface and subsurface drainage systems for irrigation projects, project roadway networks, run-of-the river diversions dams and headworks, earthen dams to 50-foot heights, steel penstocks and large diameter bifurcations, large-diameter (20-foot) cast-in-place concrete pipe, composite steel and concrete bridges, river control levees, river channel control with vegetation management, and land leveling for irrigated agriculture.

Mr. Erickson's planning experience includes large irrigation projects in Iran and Afghanistan, a comprehensive river basin plan for the San Francisco River in Brazil, a Water Plan for Iran, a National Agricultural Research Plan for Iran, a plan for irrigation with municipal waste water for the City of Santa Rosa, a study for the U.S. Environmental Protection Agency for control of non-point source pollutants, and participation in present DWR planning efforts for the Red Bank Project. Presently, Mr. Erickson is Chief of the Water Management Branch of the California Department of Water Resources' San Joaquin District.

JOSE I. FARIA, Senior Engineer
California Department of Water Resources
San Joaquin District
Education B.S., Civil Engineering, 1983, California State University Fresno
Registration *Civil Engineer, California*
Experience and Background. Mr. Faria has 12 years of experience working with the Department of Water Resources in the fields of hydrology, hydraulics, hydraulic modeling, hydraulic structure design, flood control, sediment transport, water and sediment routing, data collection, and environmental documentation. Currently, Mr. Faria is the Chief of San Joaquin District's Aqueduct Protection and Floodplain Management Section.

Mr. Faria has extensive experience in conducting reconnaissance and feasibility level investigations to solve flooding and sedimentation problems of several streams in western Fresno County. Mr. Faria coauthored DWR's *1990 Arroyo Pasajero Feasibility Study Report.* The report investigated three alternative flood control solutions for Arroyo Pasajero. Mr. Faria also implemented a comprehensive data collection program needed to define the flow and sediment transport characteristics of the Arroyo Pasajero and its tributaries. The data collection program included planning and installation of

precipitation, streamflow, and sediment monitoring stations throughout the watershed. In 1992, Mr. Faria published a technical information report titled *Sediment Characteristics Arroyo Pasajero and Tributaries February and March 1992*. To date, the data collected has been extensively used in various investigations. Mr. Faria has participated in many short courses involving sedimentation and fluvial processes; hydrology and hydraulic modeling, sediment data collection techniques, sediment transport analysis, and river geomorphology.

Mr. Faria also has experience in supervising and preparing environmental documentation, he directed and coauthored the *EIR for the Arroyo Pasajero Interim Operating Procedure*. Mr. Faria is also responsible for the administration of the San Joaquin District's National Flood Insurance programs activities on behalf of FEMA, the program provides floodplain management evaluation and assistance to local communities. Mr. Faria also supervises the local Flood Subventions program, which processes claims and reimburses local agencies for relocations and rights of way related to flood control projects.

KEVIN J. FAULKENBERRY, Associate Engineer
California Department of Water Resources
San Joaquin District
Education B.S., Civil Engineering, 1989, California State University, Fresno
B.S., Survey Engineering, 1989, California State University, Fresno
Registration Civil Engineer, California
Experience and Professional Background. *Currently* Mr. Faulkenberry manages the San Joaquin District's salmon habitat restoration program. While working to manage this program, Mr. Faulkenberry has developed many cooperative relations with local, State and federal agencies that have proven to be instrumental in all phases of project development and implementation.

Mr. Faulkenberry has five years of experience in planning, permitting, surveying, design, and construction management of river restoration projects on the San Joaquin River system while working for the Department of Water Resources.

Familiar with gravel replacement, predator habitat isolation, floodplain restoration and backwater stabilization, Mr. Faulkenberry has completed numerous successful projects on the Stanislaus, Tuolumne, Merced and San Joaquin Rivers. Mr. Faulkenberry also has training in developing hydraulic models for HEC-2, flow-frequency and sediment-transport analysis.

PAUL EDWARD ROMERO, Associate Engineer
California Department of Water Resources
San Joaquin District
Education B.S., Civil Engineering, 1988, California State University, Fresno
Registration Civil Engineer, California
Experience and Background. Mr. Romero has eight years of experience working with the Department of Water Resources in the Aqueduct Protection and Floodplain Section. He currently is working on several aspects of the development of solutions to the flooding and sedimentation problems of the Arroyo and Cantua Creeks in western Fresno County.

During the last four years, Mr. Romero has been responsible for the development of feasibility and reconnaissance-level hydrology studies for numerous creeks in western Fresno County and has developed extensive knowledge in the field of hydrology. He is qualified in the use of the Corps of Engineers' Flood

Hydrograph Package (HEC-1), Water Surface Profiles (HEC-2), and Flood Frequency Analysis (HEC-FFA) computer programs.

Mr. Romero has also acquired extensive field experience in data collection and analysis of streamflow and suspended sediment. His experience includes developing rating curves and employing indirect-measurement techniques for sand-bed channels. He has a comprehensive understanding of the intricacies of reconstituting flood events from gathered data and is familiar with flood frequency analysis methods in applying historical flood records for the development of future design events.

In addition to hydrology, Mr. Romero's experience also includes writing hydrology reports and reconnaissance-level reports for flood control project designs. His topographic and construction surveying experience, which was acquired during four years with private consulting firms, rounds off his experience.

JENNY C. MARR, Environmental Specialist III
California Department of Water Resources
San Joaquin District

Education M.S., Botany, 1995, California State University, Chico
B.S., Biology, 1991, California State University, Chico

Experience and Professional Background. Ms. Marr is the San Joaquin District botanist, rare plant specialist, and vegetation management specialist.

Ms. Marr has six years of experience in the environmental management field, having worked previously for Caltrans, the Department of Fish and Game, and the U.S. Forest Service. She has worked on numerous environmental documents including biological assessments, biological evaluations, natural environmental studies, botanical research investigations, environmental impact reports/statements, and mitigation and monitoring revegetation plans.

Ms. Marr has worked extensively with California's threatened and endangered plant species and natural plant communities, including autecological research, literature reviews, field surveys, population delineations and mapping, and development of species management plans. She has a strong research and statistical analysis background. She has worked successfully with multi-agency and development teams in coordination of permits, development of project and mitigation alternatives, and resolution of State and federal regulatory compliance issues pertaining to the State and federal endangered species acts, wetlands regulations, and the California Environmental Quality Act.

Ms. Marr has taught environmental awareness, and rare plant training workshops for agency personnel and has presented research and project informational presentations at public meetings.

COMPLIANCE WITH STANDARD TERMS AND CONDITIONS

DWR agrees and will comply with the terms and conditions of the attached non-discrimination compliance form, and the terms and conditions of STANDARD CLAUSES - CONTRACTS WITH PUBLIC ENTITIES.

ONDISCRIMINATION COMPLIANCE STATEMENT

OMPANY NAME

California Department of Water Resources, San Joaquin District

The company named above (hereinafter referred to as "prospective contractor") hereby certifies, unles specifically exempted, compliance with Government Code Section 12990 (a-f) and California Code o Regulations, Title 2, Division 4, Chapter 5 in matters relating to reporting requirements and th development, implementation and maintenance of a Nondiscrimination Program. Prospective contracto agrees not to unlawfully discriminate, harass or allow harassment against any employee or applicant fo employment because of sex, race, color, ancestry, religious creed, national origin, disability (includin HIV and AIDS), medical condition (cancer), age, marital status, denial of family and medical care le and denial of pregnancy disability leave.

CERTIFICATION

I, the official named below, hereby swear that I am duly authorized to legally bind the prospectiv contractor to the above described certification. I am fully aware that this certification, executed on th date and in the county below, is made under penalty of perjury under the laws of the State of Californi

OFFICIAL'S NAME

Louis A. Beck

DATE EXECUTED

July 24, 1997

EXECUTED IN THE COUNTY OF

Fresno

PROSPECTIVE CONTRACTOR'S SIGNATURE

PROSPECTIVE CONTRACTOR'S TITLE

Chief, San Joaquin District

PROSPECTIVE CONTRACTOR'S LEGAL BUSINESS NAME

Not Applicable

ATTACHMENT 1

Budget Details

The budget for the identified tasks are listed in the tables below. The tables present the personnel costs as charged by DWR's San Joaquin District. The daily charges, shown below, include 20% indirect costs, 75.7% overhead costs, and 26.1% benefits costs.

Engineer = Associate Engineer @ $580/day
Student = E/A Student @ $264/day
Technician = WR Technician II @ $450/day
Delineator = Senior Delineator @ $437/day
ES III = Environmental Specialist III @ $500/day
Scientific Aid @ $240/day
L&WU Analyst = Associate Land and Water Use Analyst @ $517/day
Travel = $100/day/person

(Table located on next page)

Budget Summary of Tasks

Task	Budget
Hydrology Assessment	
Literature review	$5,800
Data analysis	$23,810
Prepare report	$2,900
Task Total	**$32,510**
Land Use Assessment	
Collect existing land use data	$7,990
Analyze land use impacts	$9,280
Analyze results and recommend future actions	$5,800
Prepare report	$5,800
Per-diem	$500
Task Total	**$29,370**
Geomorphic Assessment	
Literature review	$17,400
Aerial photography processing	$16,000
Analyze aerial photos	$2,900
Survey cross-sections	$25,320
Survey longitudinal water surface profiles	$25,320
Bed material sampling	$12,880
Sediment transport sampling	$140,890
Place and monitor tracer gravel	$34,800
Place and monitor scour chains	$2,320
Analyze results and recommend future actions	$8,700
Prepare report	$5,800
Per-diem	$15,500
Task Total	**$307,830**
Water Quality Assessment	
Literature review	$5,220
Daily automated monitoring	$10,860
Monthly monitoring	$21,600
Specific-event monitoring	$10,800
Laboratory analysis of samples	$83,860
Analyze results and recommend future actions	$5,800
Prepare report	$5,800
Per-diem	$500
Supplies	$1,000
Task Total	**$145,440**
Riparian Vegetation Assessment	
Literature review	$5,000
Data analysis	$57,360
Analyze results and recommend future actions	$5,000
Prepare report	$5,000
Per-diem	$8,000
Supplies	$500
Task Total	**$80,860**
Grand Total	**$596,010**

Task 1 Hydrologic Assessment Budget:

Task	Staff	Time (days)	Budget
Literature Review			
Research historical/existing gage data	1 Engineer	5	$2,900
Collect available flow data	1 Engineer	5	$2,900
Subtotal			**$5,800**
Data analysis			
Data entry and format conversion	2 Student	5	$2,640
Develop flood frequency curves	1 Engineer	10	$5,800
Develop seasonal and total discharge curves	1 Engineer	10	$5,800
Analyze curves	1 Engineer	15	$8,700
Drafting	1 Delineator	2	$870
Subtotal			**$23,810**
Prepare Report	1 Engineer	5	**$2,900**
Grand Total			**$32,510**

Task 2 Land Use Assessment Budget:

Task	Staff	Time (days)	Budget
Collect Existing Land Use Data			
Aerial photographs	1 Engineer	1	$580
Soil survey maps	1 Engineer	1	$580
Crop survey	1 Engineer	2	$1,160
Land use maps	1 Engineer	3	$1,740
Generate composite land use maps	1 Delineator	5	$2,190
Watershed management practices	1 Engineer	3	$1,740
Subtotal			**$7,990**
Analyze Land Use Impacts			
Analyze aerial photographs	1 Engineer	2	$1,160
Assimilate geomorphology results	1 Engineer	2	$1,160
Assimilate water quality results	1 Engineer	2	$1,160
Identify specific land use impacts	1 Engineer	10	$5,800
Subtotal			**$9,280**
Analyze Results and Recommend Future Actions	1 Engineer	10	**$5,800**
Prepare Report	1 Engineer	10	**$5,800**
Per-Diem (Task Total)	-	5	**$500**
Grand Total			**$29,370**

Task 3 Geomorphic Assessment Budget:

Task	Staff	Time (days)	Budget
Literature Review			
Site visit	2 Engineer	5	$5,800
Review aerial photos	2 Engineer	2	$2,320
Research existing cross-sections	2 Engineer	3	$3,480
Analyze existing sediment data and analysis	2 Engineer	3	$3,480
Identify data sampling locations	2 Engineer	2	$2,320
Subtotal			**$17,400**
Develop Aerial Photographs (2 Flights)	-	-	**$16,000**
Aerial Photography Processing	1 Engineer	5	**$2,900**
Survey Cross-Sections (15 Total)	2 Engineer/2 Student	15	**$25,320**
Survey Longitudinal Water Surface Profiles (3 Total)	2 Engineer/2 Student	15	**$25,320**
Bed Material Sampling			
Collect Bulk Samples (15 locations)	1 Engineer/2 Student	7	$7,760
Collect pebble counts (15 locations)	1 Engineer/2 Student	2	$2,220
Develop bed material grain-size distribution curves	1 Engineer	5	$2,900
Subtotal			**$12,880**
Sediment Transport Sampling			
Purchase sampling equipment and supplies	-		$3,000
Formulate sampler installation	1 Engineer	5	$2,900
Install sampling equipment	1 Engineer/3 Tech	15	$28,950
Collect suspended sediment samples (5 locations)			
Wading - 4 EWI verticals per location (4 times a year)	2 Engineer	10	$11,600
Bridge - single-point samples during floods (60 total samples per year)	2 Engineer	8	$9,280
Collect bedload samples (5 locations)			
Wading - 5 EWI verticals per location (4 times a year)	2 Engineer	10	$11,600
Bridge - single-point sample during floods (60 total samples per year)	2 Engineer	8	$9,280
Analyze Collected Data			
Develop grain-size distribution -suspended (280 samples)	Laboratory ($190 ea)	-	$53,200
Develop grain-size distribution -bedload (320 samples)	1 Student	20	$5,280
Bedload & suspended sediment rating curves	1 Engineer	5	$2,900
Discharge/sediment concentration curves	1 Engineer	5	$2,900
Subtotal			**$140,890**
Place and Monitor Tracer Gravel	2 Engineer	30	**$34,800**
Place and Monitor Scour Chains	2 Engineer	2	**$2,320**
Analyze Results and Recommend Future Actions	1 Engineer	15	**$8,700**
Prepare Report	1 Engineer	10	**$5,800**
Per-Diem (Task Total)		155	**$15,500**
Grand Total			**$307,830**

Task 4 Water Quality Assessment Budget:

Task	Staff	Time (days)	Budget
Literature Review			
Site visit	2 Engineer	1	$1,160
Review aerial photos	1 Engineer	1	$580
Analyze existing water quality data and analysis	1 Engineer	5	$2,900
Identify data sampling locations	1 Engineer	1	$580
Subtotal			**$5,220**
Daily Automated Monitoring (1 location)			
Purchase sampling equipment	-	-	$5,000
Install sampling equipment	1 Engineer/2 Tech	2	$2,960
Download data	1 Engineer	5	$2,900
Subtotal			**$10,860**
Monthly Monitoring (3 locations)			
Data Collection	2 Technician	24	$21,600
Subtotal			**$21,600**
Specific-Event Monitoring (6 locations)			
Data Collection	2 Technician	12	$10,800
Subtotal			**$10,800**
Laboratory Analysis of Samples			
Standard Minerals ($135/complete & $75/partial)	-	-	$12,600
Minor Elements ($336/complete & $200/partial)	-	-	$32,160
Nutrients ($95/complete)	-	-	$7,600
Pesticides ($350/complete)	-	-	$21,000
Herbicides ($175/complete)	-	-	$10,500
Subtotal			**$83,860**
Analyze Results and Recommend Future Actions	1 Engineer	10	**$5,800**
Prepare Report	1 Engineer	10	**$5,800**
Per-Diem (Task Total)		5	**$500**
Supplies			**$1,000**
Grand Total			**$145,440**

Task 5 Riparian Vegetation Assessment Budget:

Task	Staff	Time (days)	Budget
Literature Review			
Collect existing data	1 ES III	5	$2,500
Collect and review historic photos	1 ES III	5	$2,500
Subtotal			**$5,000**
Data analysis			
Aerial photography processing	-	-	$8,000
Geo reference aerial photos	1 L&WU Analyst	7	$3,620
Ground proof photos	1 ES III	50	$25,000
Ground proof photos	1 Scientific Aid	50	$12,000
Digitize maps (base, historic and current, extra layer)	Delineator	20	$8,740
Subtotal			**$57,360**
Analyze Results and Recommend Future Actions	1 ES III	10	**$5,000**
Prepare Report	1 ES III	10	**$5,000**
Per-Diem (Task Total)		80	**$8,000**
Supplies			**$500**
Grand Total			**$80,860**