

# Memorandum

Date : July 25, 1997

To : Lester Snow, Executive Director  
CALFED Bay Delta Program  
1416 Ninth Street  
Sacramento, California 95814

FI-194  
DWR WAREHOUSE

97 JUL 28 PM 3:14

From : Department of Water Resources

Subject: Category III Proposal

Enclosed please find a project proposal in response to the CALFED Bay Delta Program Category III Request for Proposals. This proposal is entitled: *Engineering Investigation of Anadromous Fish Passage in Upper Battle Creek.*

This proposal is one of two proposals related to ecosystem restoration along Battle Creek being submitted by the California Department of Water Resources, Northern District. The second proposal, also being submitted today, is entitled: *Battle Creek Spawning Gravel Study and Restoration for the Winter-Run and Fall-Run Salmon, Lower Battle Creek.*

Thank you very much for your consideration. If you have any questions, please call me at (916) 529-7342.

*for*   
Naser J. Bateni, Chief  
Northern District

Enclosure

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## EXECUTIVE SUMMARY

### TITLE OF PROJECT

Engineering Investigation of Anadromous Fish Passage in Upper Battle Creek.

### PROJECT DESCRIPTION AND OBJECTIVE

This project is a planning and design investigation of fish passage for Battle Creek. California Department of Water Resources (DWR) proposes to investigate fish ladders for adult salmon and steelhead upstream passage and fish screen facilities for downstream juvenile passage. DWR will work cooperatively with California Department of Fish and Game (DFG), United State Fish and Wildlife Service (FWS), and Pacific Gas and Electric Company (PG&E), the owner and divertor, to provide reconnaissance and preliminary designs for various fish ladder and fish screen locations which will provide reliable passage and operation. The objective of this proposal is to provide data and acceptable designs for fish passage facilities to restore the utilization of this prime salmonid habitat. The goal of the project is to develop preliminary designs and environmental work substantially complete so that final design and construction can move ahead in the phased restoration program, being developed for DFG, FWS, and affected stakeholders by Kier and Associates.

### APPROACH

This investigation will collect needed field data followed by; preliminary design work for fish ladders and fish screen at three sites, reconnaissance investigation work at two other sites, draft California Environmental Quality Act (CEQA) work for the five sites, and pre-reconnaissance work for some alternative fish screen sites. Collection of field data will be completed by 10/1/99. Preliminary design work will be completed in stages with the last by 12/1/98. Reconnaissance investigation will be completed by 5/1/99. Draft CEQA documents will be completed by 6/1/99. Pre-reconnaissance of alternative fish screen sites will be completed by 5/1/99.

### JUSTIFICATION

Restoring passage for adult and juvenile salmonids on Battle Creek will provide 32 miles of habitat for spawning and rearing. This will benefit three of the priority species; spring-run chinook Salmon, winter-run chinook Salmon, and Steelhead Trout. Additionally, this proposal addresses three major stressors; entrainment, migration barriers, and water temperature. Entrainment is a severe threat due to the current

unscreened conditions at all of these diversions. The phased restoration plan will allow access for salmon and steelhead above these diversions. However, this will not be productive with the current situation of inadequate fish ladders and the unscreened diversion canal inlets. This investigation will provide the needed data and design information to move ahead with prioritization of projects and construction of facilities to remedy this situation.

## **BUDGET**

The budget cost for this proposal is \$790,000. No third party impacts are foreseen from the scope of this proposal. It will be implemented with the cooperation of the divertor and the collaboration of the other resource agencies.

## **APPLICANT QUALIFICATIONS**

The Northern District of DWR has a long history of providing engineering support to fishery restoration programs. DWR staff have extensive experience in performing the tasks outlined in this proposal, as well as, a history of cooperation with the collaborating agencies. The project manager for this project is Mr. William Mendenhall. He has over 20 years of experience with fishery restoration planning and design. Additionally, DWR has in house the equipment, technology, and resources to support this proposal.

## **MONITORING AND DATA EVALUATION**

The construction cost data, feasibility information, and environmental documentation prepared for this study will aid DFG and the Battle Creek Restoration Working Group (Working Group) with water release discussions, prioritizing fish passage construction projects, and addressing public comments about potential impacts, costs, and benefits of restoration work.

## **LOCAL SUPPORT**

The list of collaborators and supporters of this proposal include; DFG, FWS, PG&E, Western Shasta Resource Conservation District (WSRCD), and the Tehama County Resource Conservation District. Initial local community meetings have brought favorable comments from the public for the stream restoration work.

**ENGINEERING INVESTIGATION  
OF  
ANADROMOUS FISH PASSAGE  
IN  
UPPER BATTLE CREEK**

**California Department of Water Resources, Northern District  
William Mendenhall, Chief, Engineering Studies Section  
2440 Main St., Red Bluff, CA 96080**

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Type of Organization: State Government  
(Tax Exempt)

Implementation Participants and Collaborators:  
California Department of Fish and Game  
US Fish and Wildlife Service  
Pacific Gas and Electric Company  
Western Shasta Resource Conservation District  
Tehama County Resource Conservation District

RFP Project Group Type: Group 3 - Services

July 28, 1997

## **PROJECT DESCRIPTION**

### **PROJECT DESCRIPTION AND APPROACH**

This project is a planning and engineering investigation of fish passage for selected sites on North Fork Battle Creek through N.F. Battle Creek Feeder and South Fork Battle Creek through South Diversion Dam Battle Creek. DWR proposes to investigate fish ladders for adult salmon and steelhead upstream passage and fish screen facilities for downstream juvenile passage. DWR will work cooperatively with DFG, FWS, local property owners, and PG&E, the owner and divertor, to provide reconnaissance and preliminary designs for various fish ladder and fish screen locations which will provide reliable passage and operation. DWR will coordinate its work with the comprehensive planning process, funded by category III and being carried out by Kier and Associates. As with other such projects DWR will receive design guidance and biological input from DFG and the other resource agencies. The current process established for Battle Creek restoration work will be followed. The technical working group currently working on the Eagle Canyon Diversion Fish Ladder and Fish Screen Project will continue with these additional designs and alternatives.

The objective of this proposal is to provide data and acceptable designs for fish passage facilities to restoration the utilization of this prime salmonid habitat. The goal of the project is to have preliminary designs and environmental work substantially complete so that a final design and construction process can move ahead in the phased restoration program developed for DFG, FWS, and affected stakeholders by Kier and Associates.

### **LOCATION OF PROJECT**

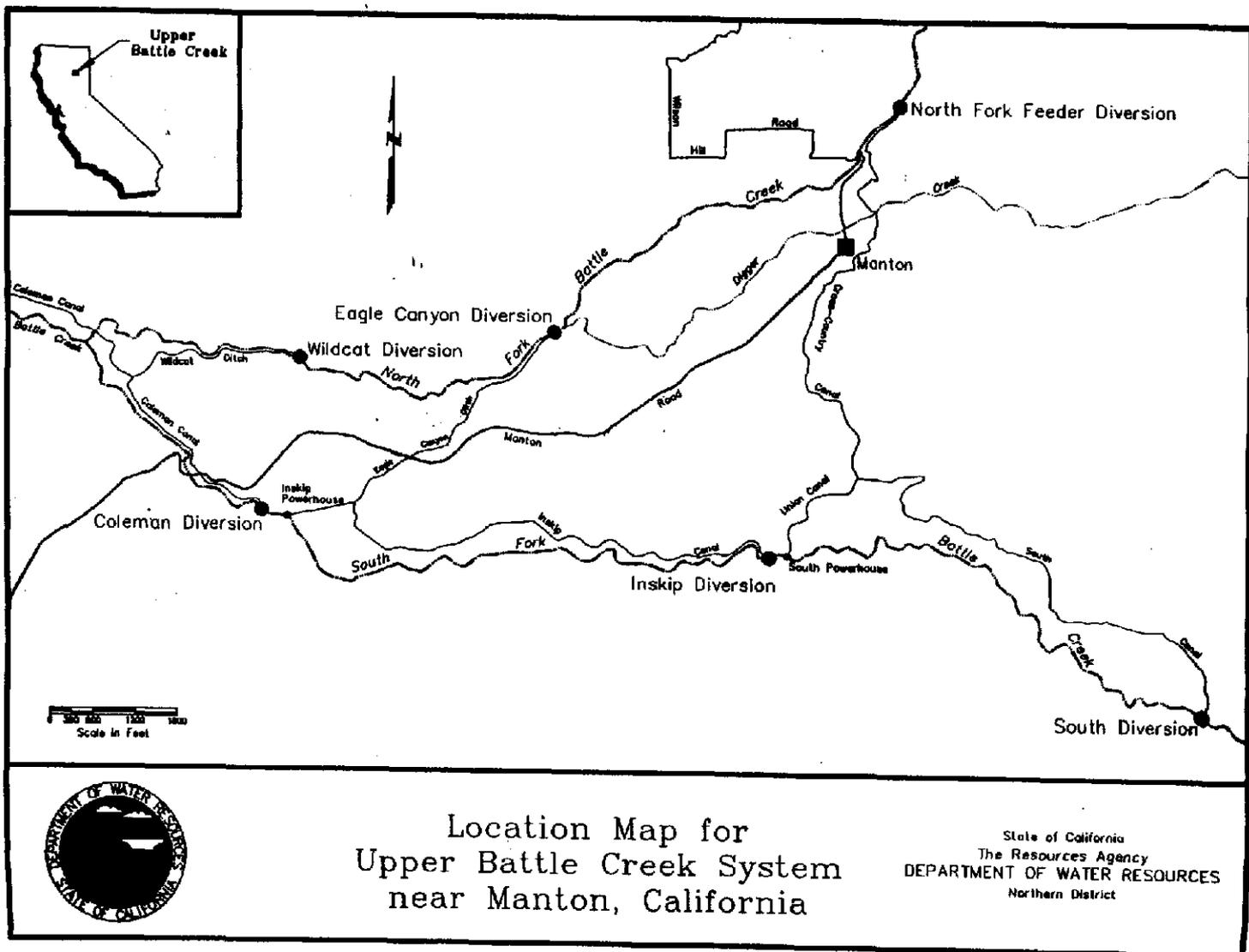
The study area is the North Fork and South Fork Battle Creek near Manton, California (USGS Quads Shingletown, Manton, Finley Butte). Five diversion locations and an unspecified number of offstream, down-canal sites will be investigated. Refer to Figure 1 for a map of the area.

### **EXPECTED BENEFITS**

This project will provide construction cost data, feasibility information, draft CEQA documentation, and basic water temperature and streamflow data for the Battle Creek Restoration Program. This information will be used to quantify the costs and prioritize measures to eliminate the identified system stressors and facilitate the restoration of remnant populations of steelhead, spring-run chinook, and perhaps, winter-run chinook.

1-004358

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Location Map for  
Upper Battle Creek System  
near Manton, California

State of California  
The Resources Agency  
DEPARTMENT OF WATER RESOURCES  
Northern District

Figure 1

1-004358

## BACKGROUND AND TECHNICAL JUSTIFICATION

Between 1900 and 1912, Battle Creek was developed into one of the West's earliest hydroelectric systems. Construction of a series of small diversions, several long canals, and low volume/high head power generators made Battle Creek a highly efficient power generation system. There is evidence that efforts to provide adult salmonids with passage at these dams predate the mid 1930's. Fish screens were removed many years ago. The early drum screen designs proved to be ineffective, mainly due to operational failures. None of these diversions are currently screened, but newer designs and technology can provide better results.

PG&E has owned and operated the Battle Creek Hydroelectric Unit since the 1930's. Over the years they have maintained and replaced fish ladders at these diversions. These previous fish ladders have been sized to meet the minimum flow releases as required by the Federal Energy Regulatory Commission (FERC) license agreement. These flow releases are not adequate for the instreamflow needs of Battle Creek. Fish ladders at these diversions need to have larger capacity for adequate attraction and passage flows. PG&E, FWS, and DFG have been in discussions for several years regarding the need to increase flows. There is a short term agreement to increase flows on the North Fork of Battle Creek with continuing discussions on a long term agreement. At this stage of discussions and in the developing Battle Creek Restoration Program, there is a real need for construction cost data and feasibility information for new fish ladders and fish screens. With this information adequate solutions can be presented and their costs quantified. This will lead to prioritizing construction projects and facilitate discussions over the cost of water diversion vs. instreamflow needs.

Seven fishery restoration plans have identified the restoration of fish passage in Battle Creek as a priority. These plans are the California Resources Agency Upper Sacramento River Fisheries and Riparian Habitat Management Plan, 1989; the DFG Central Valley Salmon and Steelhead Restoration Enhancement Plan, 1990; the DFG Restoring Central Valley Streams: A Plan for Action, 1993; the FWS Draft Anadromous Fish Restoration Plan, 1996; the DFG Steelhead Restoration and Management Plan for California, 1990; the DFG Actions to Restore Central Valley Spring-run Chinook Salmon, 1996; and the CalFed CalFed Bay Delta Program Sacramento River and Tributaries Technical Team Meeting Report, 1997. This last report identified Battle Creek as one of the highest priority streams for restoration. Among potential restoration actions identified for Battle Creek were fish screens and fish ladders at North Fork diversions below N.F.B.C. Feeder and all South Fork diversions. Also, options and feasibility analysis for additional fish screens, fish ladders, and a flow allocation methodology above Eagle Canyon was listed as potential actions.

The recent petition presented to the California Fish and Game Commission to list the spring-run chinook under the California Endangered Species Act has amplified the need for action on Battle Creek.

Restoring passage for adult and juvenile salmonids on Battle Creek will provide 32 miles of habitat for spawning and rearing. This will benefit three of the priority species, *spring-run chinook Salmon*, *winter-run chinook Salmon*, and *Steelhead Trout*. It is estimated that the available spawning habitat opened up by restoring passage will accommodate 2,500 chinook salmon and 5,700 steelhead (DFG 1994). The Working Group, which is contributing to the development of the Battle Creek Restoration Plan, needs data and information to identify and prioritize specific alternatives to seek funding for implementation

This proposal addresses three major stressors; entrainment, migration barriers, and water temperature. Entrainment is a severe threat due to the current unscreened conditions at all the diversions. There are six diversions taking a total of approximately 720 cfs within the study area. Adult migration is currently blocked at the request of FWS due to the potential pathogen problems at Coleman National Fish Hatchery (CNFH) and DFG because of the lack of fish screens and adequate streamflows. Once fish screens are in operation upstream migration can be resumed. However, the current fish ladders at the diversions are Alaskan Steeppass design with maximum capacity of seven cfs. Current DFG guidance for fish ladder capacity is 10 percent of the stream discharge. At all the five diversions covered by this proposal, the current fish ladders are significantly undersized.

Some water temperature data is currently being collected by DFG. This data collection needs to continue and the number of locations expanded to adequately monitor the effectiveness of the short term water release agreements and formulate a basis for the long term agreement.

Some streamflow data at specific locations needs to be collected in order to complete the fish ladder designs. Current available data is spotty and inaccurate for higher streamflows. This data will also facilitate monitoring of streamflow releases.

#### **PROPOSED SCOPE OF WORK**

The proposed scope of work for this project is to collect necessary field data, prepare preliminary designs for three diversion sites, reconnaissance level investigations for two diversion sites, pre-reconnaissance work for alternative screen sites, and preparation of draft CEQA documents for the five diversion sites. Topographic mapping, streamflow data, and water temperature data will be collected to facilitate design work and provide needed biological data. The design work will consist of preliminary designs and construction cost estimates for three diversions (Wildcat, Coleman, and Inskip) and two reconnaissance level investigations of design and costs (South and N.F.B.C. Feeder). See Figure 1 for locations of these diversions. Additionally, alternative off-stream, down-canal fish screen locations will be investigated to a pre-reconnaissance level.

Surveying and topographic mapping of the five diversion sites will be completed. This will provide site specific data necessary for the preliminary and reconnaissance designs, as well as, final design and construction documents in the future. Streamflow and water temperature data will be collected over a two year period. DFG and DWR staff have agreed that this data is necessary for this project and currently not available.

Preliminary design and construction cost work will be for the Wildcat Diversion on the North Fork of Battle Creek and the Coleman and Inskip Diversions on the South Fork of Battle Creek. These sites have been prioritized by DFG as the next group of diversions needing improved fish passage. Reconnaissance work will be for the North Fork Battle Creek Feeder Diversion and the South Diversion on South Fork Battle Creek. Construction work at these sites will probably be the last to move forward. However, initial design concepts and cost estimates are needed to prioritize and evaluate benefits.

Environmental work will initially consist of an area species review and completion of an environmental checklist for the proposed or conceptual construction work. This will be followed with draft CEQA documents (Initial Study) prepared to a level appropriate for the detail of the investigation.

The following is a summary of tasks and product descriptions presented in their approximate order of implementation.

Task-1 Topographic survey and map five stream diversions on the Battle Creek Hydroelectric System. These sites are Wildcat, Coleman, Inskip, South, and N.F.B.C. Feeder. A topographic map of the immediate upstream and downstream area of each diversion will be produced. The contour interval for these maps will one foot.

Task-2 Install, operate, and maintain 19 temporary water temperature recorders at various locations, as directed by DFG. Data will be tabulated into spreadsheets and made available to resource agencies and the public. Two years (24 months) of data will be collected and tabulated.

Task-3 Install, operate, and maintain four temporary stream gaging stations at locations established in collaboration with DFG. Data will be tabulated into spreadsheets available to resource agencies and the public. Two years (24 months) of data will be collected and tabulated.

Task-4 Perform preliminary design for new fish ladders and fish screens at three sites on Battle Creek. These sites are Wildcat Diversion on N.F. Battle Creek and Coleman and Inskip Diversions on S.F. Battle Creek. A preliminary engineering technical report will be produced for each site. Each report will include a standard format containing an introduction, location map, site layout map, fish ladder and fish screen technical

background, design and construction summary, preliminary design drawings showing major component dimensions and locations, explanation of alternatives considered, construction cost estimates, a summary of environmental review and a checklist of status, and appendices containing collected field data.

Task-5 Perform reconnaissance level investigation for fish ladders and fish screens at two sites on Battle Creek. These sites are N.F. Battle Creek Feeder Diversion and South Diversion on S.F. Battle Creek. A (single) reconnaissance engineering technical report will be produced containing findings for both sites. This report will include an introduction, location map, site topographic map with potential fish ladder and fish screen locations, fish ladder and fish screen technical background, cursory construction cost estimates, a summary of environmental review and a checklist of status, and appendices containing collected field data.

Task-6 Perform an initial environmental investigation regarding the impacts of construction at these five diversion locations. This will include researching the existence of sensitive plant and wildlife species at the exact area of impact of the projects and visits to the immediate construction area and access routes. Prepare a draft CEQA document for each of the five diversion locations to a level appropriate for the detail of investigation.

Task-7 Perform pre-reconnaissance level investigation for alternative, down-canal fish screening locations. A technical memorandum will be produced presenting the findings of the investigation and recommendations. Work for this task will not exceed 3 person-months under this proposal.

## **MONITORING AND DATA EVALUATION**

The construction cost data, feasibility information, and environmental documentation from this study will aid DFG and the Working Group with water release discussions, prioritizing fish passage construction projects, and addressing public comments about potential impacts, costs, and benefits of restoration work.

## **IMPLEMENTABILITY**

Restoration planning, coordination, and investigation has already begun for Battle Creek. CalFed has already approved Category III funding for a comprehensive technical restoration plan and a local planning effort. A Working Group has been meeting and preliminary design for a new fish ladder and fish screen for the Eagle Canyon Diversion is under way, funded with Tracy Pump Mitigation Funds. All agreed that Eagle Canyon should be the first diversion to be modified. Once designs are

**complete with consensus among the Working Group, cost sharing agreements and construction funding sources will be pursued.**

**A Battle Creek Watershed Group has been created to coordinate all the entities involved in watershed planning and restoration work. WSRCD has received Central Valley Project Improvement Act (CVPIA) and Category III to be the coordinating agency for this group.**

## COSTS AND SCHEDULE

### BUDGET COSTS

The budget cost for this proposal is \$790,000. Below is a summary table breaking down this cost into task costs and category. With the exception of the purchase of thermographs and stream gaging sensors, all equipment, supplies, materials, and vehicles necessary to conduct this investigation will be provided by DWR.

TASK	DIRECT LABOR	SALARY & BENEFITS	OVERHEAD	MATERIALS	TOTAL COSTS
1	2440	\$81,301	\$100,016		\$181,317
2	432	\$11,053	\$13,597	\$2,519	\$27,169
3	1536	\$51,180	\$62,961	\$12,000	\$126,141
4	3600	\$119,952	\$147,565		\$287,517
5	1248	\$41,583	\$51,156		\$92,739
6	800	\$26,656	\$32,792		\$59,448
7	480	\$15,994	\$19,675		\$35,669
Total Proposal	10536	\$347,718	\$427,763	\$14,519	\$790,000

DWR and DFG are seeking funding to start as soon as possible. Potential sources are Proposition 204 Funds, Four Pumps Mitigation Funds, Tracy Pumps Mitigation Funds, CVPIA Funds, and Category 3 Funds.

### SCHEDULE MILESTONES

The following table lists anticipated completion dates for several sub-tasks. These are provided based upon the assumption that a funding source is committed by September 1, 1997. Topographic surveying and data collection equipment installation must begin approximately at this time to provide information for the design investigations to proceed on schedule.

<u>Task Number</u>	<u>Sub-task</u>	<u>Completion Date</u>
1	3 Sites	12/1/97
	2 Sites	9/1/98
2	Year 1	10/1/98
	Year 2	10/1/99

3	Year 1	10/1/98
	Year 2	10/1/99
*4	Wildcat	6/1/98
	Coleman	9/1/98
	Inskip	12/1/98
*5	N.F.B.C. Feeder	5/1/99
	South	5/1/99
6	Wildcat	10/1/98
	Coleman	10/1/98
	Inskip	2/1/99
	N.F.B.C. Feeder	6/1/99
	South	6/1/99
7		5/1/99

\* Priorities for completion of these sites can be adjusted within each task.

### **THIRD PARTY IMPACTS**

No third party impacts are foreseen from the scope of this Proposal. It will be implemented with the cooperation of the divertor and the collaboration of the other Resource Agencies, stakeholders, local land owners, and PG&E. Information provide through this investigation will be used to make decisions which may impact third parties.

## APPLICANT QUALIFICATIONS

This project will be conducted by staff of the Northern District DWR in collaboration with staff from PG&E, DFG, FWS, Nation Marine Fisheries Service (NMFS), and WSRCD. The scope of this proposal was put together with the consensus of DFG and FWS. Collaborators will provide input through periodic Working Group meetings and the design review process. DFG will provide specific guidance and input for biological perimeters related to design concepts. DFG will also approval of the final preliminary design concepts. Environmental and water quality elements of this project will likewise be carried out with collaboration.

This project will be directed by Mr. William Mendenhall, who is Chief of the Engineering Studies Section of the Northern District DWR. Mr. Kayl Echols and Mr. Kevin Dossey will be the lead engineers for the preliminary designs investigations. They will be assisted by other staff engineers, surveyors, technician, and office support staff as necessary to complete the project.

### William Mendenhall

Mr. Mendenhall earned his B.S. degree in Civil Engineering from California State University, Chico in 1980. He a registered California Professional Engineer in the Civil Branch. He has been directly involved with fishery restoration work since 1975. He is currently a member of the Trinity River Technical Coordinating Committee. Mr. Mendenhall has been Chief of the Engineering Studies Section since 1990. Under his lead or direction, DWR has provided engineering support for: Trinity River Sediment Removal, 1980; Trinity River Habitat Restoration Projects, including numerous streambed stabilization, gravel replacement, spawning channel, and rearing habitat projects, 1980; Lewiston Temperature Control Curtain Investigation, 1983; Klamath and Shasta River spawning channels, 1980; Upper Sacramento River Instreamflow Needs Study, 1985; Scott River Flow Augmentation Study, 1990; Santa Ynez Instreamflow Needs Study, 1989; Feather River Instreamflow Needs Study, 1989; Mill Creek Water Transfer Investigation, 1991; Deer Creek Water Transfer Investigation, 1991; several Butte Creek fish ladder and fish screen designs for DFG, 1994; Battle Creek - Eagle Canyon Diversion Fish Ladder and Fish Screen Design, current; Clear Creek Instreamflow Needs Study, 1984; Clear Creek - Saeitzer Dam Fish Ladder Design, current. William has also received training in numerous hydraulic design and habitat modeling courses. References include Paul Ward, DFG, 2440 Main Street, Red Bluff, CA; Harry Rectenwald, DFG, 601 Locust Street, Redding, CA; and Patricia Parker, FWS, 10950 Tyler Road, Red Bluff, CA.

### Kayl Echols

Mr. Echols earned his B.S. degree in Civil Engineering from Brigham Young University, in 1983. He a registered California Professional Engineer in the Civil Branch. He has been directly involved with fishery restoration work since 1980. Mr. Echols has

provided engineering support with increasing level responsibility for: Trinity River Sediment Removal, 1982; Lewiston Temperature Control Curtain Investigation, 1983; Klamath and Shasta River spawning channels, 1981; Scott River Flow Augmentation Study, 1990; Santa Ynez Instreamflow Needs Study, 1990; Clear Creek Instreamflow Needs Study, 1982; Battle Creek - Eagle Canyon Diversion Fish Ladder and Fish Screen Design, current. . Kayl has also received training in several hydraulic design and habitat modeling courses.

Kevin Dossey

Mr. Dossey earned his B.S. degree in Civil Engineering from California State University, Chico in 1985. He a registered California Professional Engineer in the Civil Branch. He has been directly involved with fishery restoration work since 1986. Mr. Dossey has provided engineering support with increasing level responsibility for: Trinity River Sediment Removal, 1986.; Trinity River Habitat Restoration Projects, including numerous streambed stabilization, gravel replacement, spawning channel, and rearing habitat projects, 1987; Upper Sacramento River Instreamflow Needs Study, 1987; Deer Creek Flood Control and Fishery Enhancement Channel, 1986; several Butte Creek fish ladder and fish screen designs for DFG, 1994; Clear Creek - Saeltzer Dam Fish Ladder Design, current. Kevin has also received training in numerous hydraulic design and habitat modeling courses.

Gerald Boles

Mr. Boles has a B.A. degree in Microbiology (minor in Chemistry) and a M.A. degree in Biological Sciences. In addition to years of experience with budgets and general supervisory functions, he has supervised and conducted numerous water quality investigations. His duties have required him to develop and implement studies and research projects to determine environmental effects on water quality, wildlife, plants, and fisheries. Some projects for which he has been directly responsible include; assessment of impacts to the aquatic macroinvertebrate community following the metam sodium chemical spill in the upper Sacramento River, 1991; development and implementation of a water quality assessment program at Lake Almanor in cooperation with Plumas County; long-term water quality monitoring at both Clear and Eagle Lakes; evaluation of effects to aquatic resources from cloudseeding in the upper Feather River area; groundwater quality assessments in the Sacramento Valley, Eagle Lake, and Cady Springs areas; and assessment of factors affecting the water quality of a drinking water supply reservoir. References include Steve Turek, DFG, 2440 Athens Avenue, Redding, CA; Lauri Zander, Lahontan Regional Water Quality Control Board, 2501 Lake Tahoe Boulevard, South Lake Tahoe, CA; and Laura Barnhouse, Plumas County Environmental Health Department, P.O. Box 545, Chester, CA.

## **COMPLIANCE WITH STANDARD TERMS AND CONDITIONS**

As a public agency, all standard terms and conditions will be approved at signing of the contract. No forms are necessary for submission with this proposal .