

COVER SHEET (PAGE 1 of 2)

May 1998 CALFED ECOSYSTEM RESTORATION PROPOSAL SOLICITATION

Proposal Title: Fish Passage Assessment in Floodplain/Floodbasin Habitat
 Applicant Name: Jones & Stokes Associates
 Mailing Address: 2600 V St. Sacramento, CA 95818-1914
 Telephone: 916/737-3000
 Fax: 916/737-3030

Amount of funding requested: \$ 177,505 for 2 years

Indicate the Topic for which you are applying (check only one box). Note that this is an important decision: see page __ of the Proposal Solicitation Package for more information.

- | | |
|---|---|
| <input checked="" type="checkbox"/> Fish Passage Assessment | <input type="checkbox"/> Fish Passage Improvements |
| <input type="checkbox"/> Floodplain and Habitat Restoration | <input type="checkbox"/> Gravel Restoration |
| <input type="checkbox"/> Fish Harvest | <input type="checkbox"/> Species Life History Studies |
| <input type="checkbox"/> Watershed Planning/Implementation | <input type="checkbox"/> Education |
| <input type="checkbox"/> Fish Screen Evaluations - Alternatives and Biological Priorities | |

Indicate the geographic area of your proposal (check only one box):

- | | |
|---|---|
| <input type="checkbox"/> Sacramento River Mainstem | <input type="checkbox"/> Sacramento Tributary: _____ |
| <input type="checkbox"/> Delta | <input type="checkbox"/> East Side Delta Tributary: _____ |
| <input type="checkbox"/> Suisun Marsh and Bay | <input type="checkbox"/> San Joaquin Tributary: _____ |
| <input type="checkbox"/> San Joaquin River Mainstem | <input checked="" type="checkbox"/> Other: <u>Floodplains/floodbasins of the Sacramento</u> |
| <input type="checkbox"/> Landscape (entire Bay-Delta watershed) | <input type="checkbox"/> North Bay: <u>and San Joaquin River Basins</u> |

Indicate the primary species which the proposal addresses (check no more than two boxes):

- | | |
|--|---|
| <input type="checkbox"/> San Joaquin and East-side Delta tributaries fall-run chinook salmon | <input type="checkbox"/> Spring-run chinook salmon |
| <input type="checkbox"/> Winter-run chinook salmon | <input checked="" type="checkbox"/> Fall-run chinook salmon |
| <input type="checkbox"/> Late-fall run chinook salmon | <input type="checkbox"/> Longfin smelt |
| <input type="checkbox"/> Delta smelt | <input type="checkbox"/> Steelhead trout |
| <input checked="" type="checkbox"/> Splittail | <input type="checkbox"/> Striped bass |
| <input type="checkbox"/> Green sturgeon | |
| <input type="checkbox"/> Migratory birds | |

COVER SHEET (PAGE 2 of 2)

May 1998 CALFED ECOSYSTEM RESTORATION PROPOSAL SOLICITATION

Indicate the type of applicant (check only one box):

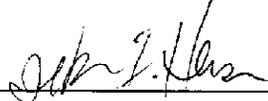
- | | |
|--|---|
| <input type="checkbox"/> State agency | <input type="checkbox"/> Federal agency |
| <input type="checkbox"/> Public/Non-profit joint venture | <input type="checkbox"/> Non-profit |
| <input type="checkbox"/> Local government/district | <input checked="" type="checkbox"/> Private party |
| <input type="checkbox"/> University | <input type="checkbox"/> Other: _____ |

Indicate the type of project (check only one box):

- | | |
|--|---|
| <input checked="" type="checkbox"/> Planning | <input type="checkbox"/> Implementation |
| <input type="checkbox"/> Monitoring | <input type="checkbox"/> Education |
| <input type="checkbox"/> Research | |

By signing below, the applicant declares the following:

- (1) the truthfulness of all representations in their proposal;
- (2) the individual signing the form is entitled to submit the application on behalf of the applicant (if applicant is an entity or organization); and
- (3) the person submitting the application has read and understood the conflict of interest and confidentiality discussion in the PSP (Section II.K.) and waives any and all rights to privacy and confidentiality of the proposal on behalf of the applicant, to the extent as provided in the Section.



(Signature of Applicant)

Albert I. Herson, President

FISH PASSAGE ASSESSMENT IN FLOODPLAIN/FLOODBASIN HABITAT

Submitted by:
Jones & Stokes Associates

II. Executive Summary

b. Project Description and Primary Biological/Ecological Objectives: The project will identify and prioritize specific opportunities and actions for improving fish passage to spawning and rearing habitat associated with floodplains and floodbasins in the Sacramento and San Joaquin River basins. Actions to improve fish passage will be prioritized based on frequency and timing of inundation regime and on species occurrence, supported by existing species specific data on life-stage timing, distribution, and behavioral ecology. New information from aerial photographs, field surveys, and focused passage research will increase the accuracy of the evaluation and potential benefits of subsequent recommendations.

Species that would benefit from improved passage include juvenile chinook salmon (fall, late-fall, winter, and spring runs), steelhead, and splittail. The primary focus of the project is access to the mainstem rivers to accommodate downstream migration needs of juvenile chinook salmon, steelhead, and splittail following flood and high flow events. Priority habitat types potentially increased by the project include shaded riverine aquatic and seasonal wetland and aquatic. Through improved waterflow connections between the river channel and floodplains or floodbasins, implementation of project objectives may also reduce stressors associated with altered hydrologic characteristics attributable to reservoir operations, floodplain changes, channel-form changes, and undesirable species interactions. Increased waterflow connections provide access to habitat, refuge from introduced predators, and input of woody material and other organic carbon sources.

c. Approach/Tasks/Schedule: The project is proposed in two phases: (1) preliminary assessment and (2) refined assessment. The preliminary assessment involves review and analysis of available map, aerial photographs, electronic topography data, and flow and stage gage data, along with a comparison with available information on the potential presence of juvenile salmonids and splittail in time and space in the Central Valley floodplain. The refined assessment encompasses field surveys to verify physical floodplain features that may inhibit downstream passage of juvenile salmonids and adult and juvenile splittail, and evaluation of the behavioral ecology of juvenile chinook salmon in flooded habitats. Phase 1 would require about 8 months to complete all six tasks. Phase 2 would require up to 16 months, depending on occurrence of flood events, to complete the seven tasks identified in the project description.

d. Justification for Project and Funding by CALFED: This project provides a cohesive process by which to address fish passage problems on an ecosystem scale consistent with the Ecosystem Restoration Program Plan (ERPP) objectives. Floodplain and basin habitat provide conditions conducive to increased survival, growth, and reproduction for several species. Adult, larval, and juvenile splittail have been documented in floodplain and floodbasin habitat, an apparently essential habitat for successful reproduction. Floodplains and basins have also been documented as rearing habitat for juvenile chinook salmon. This habitat provides a refuge from

predators, readily available food, spawning habitat (i.e., splittail), and a range of water temperatures that is conducive to maximum growth of fish. Fish passage problems in the floodplains and floodbasins of the Central Valley have, until recently, been largely overlooked and disregarded. Existing efforts to address these passage problems are, at best, minimal.

e. Budget Costs and Third-Party Impacts: The total cost of this project will be \$177,505. Third-party impacts will not occur during this fish passage assessment project, but may result from implementation of recommended fish passage improvements.

f. Applicant Qualifications: Jones & Stokes Associates' (JSA's) fishery biologists and aquatic ecologists identified the importance of rearing and spawning habitat associated with the Sacramento River basin floodplain in 1992. JSA has kept abreast of ongoing research on fish in the bypasses (i.e., reviewing California Department of Fish and Game [DFG] and California Department of Water Resources [DWR] studies) and has further documented passage problems and habitat use in the Sacramento and Yolo Bypasses and the floodplains of the Sacramento, Feather, and American Rivers. Work by JSA staff has increased awareness of fish passage-related issues among federal and state agencies.

JSA staff members have developed methods that interface biological and physical attributes (e.g., topographic, hydrologic, and water quality elements) for evaluation of numerous water-related project effects on fish habitat, including effects of reservoir operations, diversions, and structural changes to levees and flood bypasses. Geographic Information System (GIS) specialists and landscape architects at JSA can integrate available topographic, hydrologic, and fish life-history information into a graphical database immediately useful to resource managers. JSA can ensure that the quality of the information needed to prioritize and implement actions to improve fish passage in the Sacramento and San Joaquin River basins is based on the in-depth background and experience of its staff members.

g. Monitoring and Data Evaluation: Does not apply.

h. Local Support/Coordination with other Programs/Compatibility with CALFED Objectives: The project will use information developed from the ongoing Yolo Bypass Fish Monitoring conducted by DWR. Several coordination meetings with resource agencies (e.g., DFG, DWR, U.S. Fish and Wildlife Service [FWS], U.S. Army Corps of Engineers [ACOE]) are anticipated to identify available information, coordinate mutually beneficial work products, and solicit comments to improve the proposed approach. Information developed during the study could benefit other CALFED and ACOE program objectives, including increased flood capacity and reduced water management constraints.

III. Title Page

FISH PASSAGE ASSESSMENT IN FLOODPLAIN/FLOODBASIN HABITAT

Applicant:

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Principle Investigators: Thomas Cannon and Warren Shaul

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Facsimile: (916)737-3030

E-mail: warrens@jsanet.com or tomc@jsanet.com

Type of Organization: Environmental Consulting Firm
Tax Identification Number: 94-1730361
Participants/Collaborators: Does not apply.
Proposal Solicitation Topic: Fish Passage Assessment

July 2, 1998

IV. Project Description

a. Project Description and Approach

Under existing conditions, reservoir operations, floodplain and floodbasin topography, levees, and flood bypass weirs alter the natural magnitude, timing, frequency, duration, and rate of change of seasonal inundation of spawning and rearing habitat important to reproduction, growth, and survival of many native species. In addition, structural elements (e.g., borrow pits, human-made ponds, agricultural fields, waterfowl refuges, side channels) in seasonally flooded areas strand substantial numbers of juvenile chinook salmon, splittail, and other species.

The project will identify and prioritize specific opportunities and actions for improving fish passage to spawning and rearing habitat associated with the floodplains, floodbasins, and high-flow riverwash areas in the Sacramento and San Joaquin River basins. Species that would benefit from improved passage include juvenile chinook salmon (fall, late-fall, winter, and spring runs), steelhead, and splittail. The primary focus of the project is access to the mainstem rivers to accommodate downstream migration needs of juvenile chinook salmon, steelhead, and splittail following flood and high flow events. Access to spawning habitat by adult splittail and access to rearing habitat by juvenile chinook salmon, steelhead, and splittail will be also be considered during analysis of topographic and hydrologic information.

Evaluation of existing topographic information (e.g., quad maps, digital topography), aerial photographs, and historical stage and hydrologic conditions will form the basis by which to identify opportunities to improve fish passage. Actions to improve fish passage will be prioritized based on frequency and timing of inundation regime and on species occurrence, supported by existing species specific data on life-stage timing, distribution, and behavioral ecology. New information from aerial photographs, field surveys, and focused fish passage research will increase the accuracy of the evaluation and potential benefits of subsequent recommendations.

b. Proposed Scope of Work

The project is proposed in two phases: (1) preliminary assessment and (2) refined assessment. The preliminary assessment involves review and analysis of available map, aerial photographs, electronic topography data, and flow and stage gage data, along with a comparison with available information of the potential presence of juvenile salmonids and splittail in time and space in the Central Valley floodplain. The refined assessment encompasses field surveys to verify physical floodplain features that may inhibit downstream passage of juvenile salmonids and adult and juvenile splittail, and evaluation of the behavioral ecology of juvenile chinook salmon in flooded habitats. Completion of the second phase is dependent on occurrence of flood events, and specific tasks may be implemented prior or subsequent to completion of the first phase. Funding is being requested for both phases.

Phase 1: Preliminary Assessment

Task 1-1. Assemble detailed topographic information for all Central Valley rivers, streams, and floodplains for lands at an elevation less than 300 feet. Available U.S. Geologic Survey (USGS) quadrangle maps, aerial photographs, digital elevation models (DEM), and digital terrain maps (DTM) will be obtained from various sources, including USGS, DWR, ACOE, reclamation

districts, FWS, and DFG. **Schedule:** Months 1-4. **Budget:** \$11,757. **Deliverables:** Marked and coded quad maps, aerial photographs, and electronic data.

Task 1-2. Assemble available historical stage and flow data for all Central Valley rivers and floodplains. Stage and flow from available historical gage information will be assembled and used to determine floodplain and floodbasin inundation. Data will be obtained from the "Internet" (California Data Exchange Center [CDEC] web page), CDEC archives, and other sources for gages that best relate flow and water surface elevation for Central Valley rivers, floodplains, and floodbasins. **Schedule:** Months 1-4. **Budget:** \$12,836. **Deliverables:** Electronic flow and stage data by river and watershed.

Task 1-3. Develop a topographic database of floodplain and floodbasin inundation. Information from Tasks 1-1 and 1-2 will be used to develop a topographic database of the magnitude, timing, frequency, duration, and rate of change of floodplain and floodbasin inundation. **Schedule:** Months 2-6. **Budget:** \$30,216. **Deliverables:** Topographic database (e.g., GIS database in ARC/INFO or ArcView format).

Task 1-4. Evaluate and prioritize potential fish passage problems. Available distribution and timing data will be assembled for spawning and rearing life stages of splittail, steelhead, and chinook salmon. The data will be integrated with the topographic database to determine potential fish passage problems arising from inundation of floodplains and floodbasins. Passage impediments will be identified based on existence of hydraulic controls that cause water bodies to disconnect from the main river channel as stage recedes. Water bodies include managed and unmanaged marshes, permanent and ephemeral ponds, borrow pits, sloughs, oxbows, side channels, depressions, toe drains, and rice fields. Fish passage problems will be prioritized based on the magnitude, frequency, and timing of impediments; total area drained exclusively through the channel restrained by the hydraulic control; and the potential occurrence of priority species as identified by CALFED. **Schedule:** Months 3-6. **Budget:** \$8,835. **Deliverables:** Watershed maps showing location and priority of potential fish passage problems by species.

Task 1-5. Prepare report on opportunities for improving fish passage. Information from Tasks 1-1 through 1-4 will be summarized. Prioritized opportunities to improve fish passage to spawning and rearing habitat associated with the floodplains, floodbasins, and high-flow riverwash areas in the Sacramento and San Joaquin River basins will be described for all runs of chinook salmon, steelhead, and splittail. **Schedule:** Months 4-7. **Budget:** \$14,908. **Deliverables:** Preliminary report.

Task 1-6. Meetings. JSA will invite representatives of FWS, National Marine Fisheries Service (NMFS), DFG, DWR, and other interested parties to attend up to four meetings to discuss availability of physical and biological information, database structure, methods, and results. The purpose of the meetings will be to gather information that will help develop a useful floodplain and floodbasin management tool. **Schedule:** Months 2-8. **Budget:** \$5,436.

Phase 2: Refine Assessment

Task 2-1. Conduct field surveys at priority sites. Field surveys will be conducted at priority sites identified in Phase 1. The purpose of the surveys will be verification of potential fish passage problems (e.g., confirm hydraulic controls and affected area), preliminary identification of other ecosystem values provided by existing conditions at the site (e.g., habitat for priority species and species listed and proposed for listing under the Endangered Species Act [ESA]), and documentation of site elements that may affect resolution of passage problems (e.g., land ownership, cultural sites, structural relationship to other sites and the river channel). Particular attention will be placed on human-made features in the floodplain such as road crossings, culverts, levees, weirs, and diversion dams. Scour, deposition, and other active hydraulic features will also be noted. Photographs and videos will be included as part of site documentation. **Schedule:** Months 5-18. **Budget:** \$21,516. **Deliverables:** Site survey reports.

Task 2-2. Conduct aerial surveys during flood events. During recedence of a major flood event (i.e., based on historical data, a flood event that would occur, at most, once every 3 years), aerial surveys will provide confirmation of the priority sites identified in Phase 1. Photographs will be included as part of site documentation. **Schedule:** Months 4-18 (dependent on occurrence of a major flood event). **Budget:** \$13,354. **Deliverables:** Site survey reports.

Task 2-3: Refine the topographic database of floodplain and floodbasin inundation. The database developed in Phase 1 will be refined using information obtained in Tasks 2-1 and 2-2. **Schedule:** Months 7-20. **Budget:** \$8,114. **Deliverables:** Refined topographic database.

Task 2-4. Measure physical attributes during flooding. Physical attributes will be measured at four high-priority sites, including water surface elevation, depth cross sections, water temperature 1 foot below the water surface and 1 foot above bottom, and hydraulic controls for inflow and outflow. **Schedule:** Months 3-19 (dependent on occurrence of a major flood event). **Budget:** \$11,835. **Deliverables:** Site survey reports.

Task 2-5. Monitor fish occurrence and passage. Fish monitoring will be performed at the four priority sites included in Task 2-4. Monitoring will consist of beach seine surveys to determine fish species and life-stage presence at the beginning of flood recedence; fyke net, beach seine, or other appropriate surveys to monitor fish movement during flood recedence; and beach seine, gill net, or other appropriate surveys to determine fish stranding after isolation from the main river channel. Juvenile chinook salmon abundance will be estimated during flood recedence and isolation periods by mark-recapture techniques. Fish will be marked with Bismarck brown or other appropriate marker. **Schedule:** Months 3-19 (dependent on occurrence of a major flood event). **Budget:** \$22,279. **Deliverables:** Site survey reports.

Task 2-6. Reevaluate potential fish passage problems. Based on information from Phase 1 and on the information from Tasks 2-1 through 2-5, fish passage problems and site priorities will be reevaluated. **Schedule:** Months 7-21. **Budget:** \$4,493. **Deliverables:** Revised watershed maps showing location and priority of potential fish passage problems by species.

Task 2-7. Prepare final report on opportunities for improving fish passage. Information from Phase 1 and Tasks 2-1 through 2-6 will be summarized. Prioritized opportunities to improve fish passage to spawning and rearing habitat associated with the floodplains, floodbasins, and high-flow riverwash areas in the Sacramento and San Joaquin River basins will be described for all runs of chinook salmon, steelhead, and splittail. Additional information needs: recommended solutions to passage problems will be described for the four high-priority sites in Tasks 2-4 and 2-5, including construction needs and preliminary costs, assessment of fish benefits and potential effects on other ecosystem values (e.g., wildlife habitat, flood control, agriculture), and potential long-term monitoring that may be required to meet the adaptive management goals of the CALFED Ecosystem Restoration Program. **Schedule:** Months 20-22. **Budget:** \$11,927. **Deliverables:** Final report.

Inseparable Tasks in Phases 1 and 2: The objective of assessing potential passage problems for juvenile salmonids and adult and juvenile splittail can be achieved only by conducting all tasks in Phase 1 (i.e., Tasks 1-1 through 1-5). Although the project cost could be reduced by limiting the geographic extent, prioritization of potential passage problems would be incomplete. Phase 2 is separable from Phase 1; however, increased understanding and resolution of passage problems requires the additional information gained in Phase 2. Tasks 2-1 through 2-5 may be completed independently of each other. Completion of each task, however, increases the value of information provided in the final report (i.e., Task 2-7).

c. Location and/or Geographic Boundaries of the Project

The project will encompass the active floodplains and floodbasins of the Sacramento and San Joaquin Rivers, their tributaries, and bypasses (including portions of these water bodies in the legal Delta) at elevations below 300 feet.

d. Expected Benefits

The project will identify and prioritize specific opportunities and actions for improving fish passage to spawning and rearing habitat associated with the floodplains and floodbasins of the Sacramento and San Joaquin Rivers and their tributaries. Species that would benefit from the project include winter-run chinook salmon; spring-run chinook salmon; late fall-run chinook salmon; steelhead; splittail; and fall-run chinook salmon, including San Joaquin River fall run. Priority habitat types potentially increased and reestablished by implementation of project recommendations include shaded riverine aquatic and seasonal wetland and aquatic. By improving the water connection between the river channels and floodplains or floodbasins, implementation of project objectives may also reduce stressors associated with altered hydrology attributable to reservoir operations, floodplain changes, channel form changes, and undesirable species interactions. Increased water connection provides access to habitat, refuge from introduced predators, and input of woody material and other organic carbon sources. In addition to potential benefits to fish, benefits would also accrue to wildlife. Non-environmental benefits that may be achieved include increased flood capacity and, with the potential for increased abundance of endangered and threatened fish species, reduced water management constraints.

The information developed by this project may also be used by ACOE, the State Reclamation Board, DWR, and other state and federal agencies to identify measures to implement under the Sacramento and San Joaquin River Basins Comprehensive Study that would reduce flood damage

and restore ecosystem structure and processes. JSA is developing an ecosystem function model for the ACOE as part of the Comprehensive Study that would incorporate information developed by this project into an analysis tool to help identify and design appropriate and effective management measures.

e. Background and Ecological/Biological Justification

Floodplain and floodbasin habitats provide conditions conducive to increased survival, growth, and reproduction for several species. Adult, larval, and juvenile splittail have been documented in floodplain and floodbasin habitats, an apparently essential habitat for successful reproduction (Sommer et al. 1997, Baxter pers. comm., personal observation). Floodplains and floodbasins have also been documented as habitat for juvenile chinook salmon (Sommer pers. comm., personal observation). The habitat provides a refuge from predators, readily available food (e.g., terrestrial and aquatic invertebrates), spawning substrate (i.e., splittail), and a range of water temperatures that is conducive to maximum growth of fish.

Fish passage problems in the floodplains and floodbasins of the Central Valley have, until recently, been largely overlooked and disregarded. Existing efforts to address these passage problems are, at best, minimal. This project provides a cohesive process to address passage problems on an ecosystem scale consistent with the following ERPP objectives:

- Restore hydraulic conditions (ERPP Vol 1, page 27): the project will help to identify areas where basic hydraulic conditions can be reactivated to sustain fish passage.
- Maintain, improve, and restore natural stream meander processes (ERPP Vol 1, page 37): the project will help to identify portions of stream meanders where restoration could improve fish passage.
- Modify channel and basin configuration to improve floodplain function (ERPP Vol 1, page 45): the project would identify basin configurations that improve fish passage.
- Recovery of splittail (ERPP Vol 1, page 144): the project would identify improvements that would increase passage of splittail to spawning and rearing habitat.
- Restore the distribution and abundance of white sturgeon and ensure the recovery of green sturgeon (ERPP Vol 1, page 148): the project could lead to changes that would reduce losses of sturgeon from stranding.
- Restore Sacramento chinook salmon (ERPP Vol 1, page 153): the project would identify improvements that would increase passage for chinook salmon to rearing habitat.
- Ensure recovery of steelhead (ERPP Vol 1, page 160): the project would identify improvements that would increase passage of steelhead to rearing habitat.
- Maintain and restore the distribution of resident fishes (ERPP Vol 1, page 172): the project could increase the amount of available habitat for resident fish.
- Increase the connection of upstream spawning habitat and rearing habitat with mainstem rivers (ERPP Vol 1, page 280): the project would identify areas that disconnect spawning from rearing habitat.
- Reestablish or reactivate geomorphological processes in artificially confined channel reaches (ERPP Vol 1, page 284): the project would identify areas in leveed reaches of the floodplain where levees, roads, bridges, and other structures have blocked waterways (e.g., sloughs, borrow canals, etc.) and inhibit fish passage.

f. Monitoring and Data Evaluation

Does not apply.

g. Implementability

The proposed project involves only planning and some survey work. Surveys dependent on flood events may be delayed by hydrologic conditions over the course of the project. The proposed fish survey work will require a research take permit from NMFS to sample threatened or endangered populations of chinook salmon and steelhead. An additional research take permit may be required from FWS if splittail is listed. Researchers potentially involved in this study have applied to NMFS for Section 10 consultation and research take exemptions.

Extensive floodplain topographic and habitat mapping has been and is being collected within the Central Valley by ACOE (e.g., Sacramento River Flood Control Study), DWR (e.g., Yolo Bypass Fish Monitoring), the U.S. Bureau of Reclamation (BOR), DFG, the Resources Agency, counties, cities, irrigation districts, and reclamation districts. The project would coordinate activities and needs with these programs. To ensure access for field surveys, watershed conservancies, resource conservation districts, reclamation districts, levee districts, irrigation districts, and individual landowners and organized landowner groups (e.g., farm bureaus, water-user associations), and other organizations (e.g., California Waterfowl Association) will be asked to support and participate in this process.

V. Costs and Schedule to Implement Proposed Project

a. Budget Costs

CALFED funding is needed to accommodate the project scale. The proposed project implements a cohesive process to address passage problems on an ecosystem scale encompassing the Sacramento and San Joaquin River basins. The project will develop a database essential for prioritizing actions by state and federal agency participants in the CALFED process that improve fish passage and are consistent with CALFED objectives, including the ERPP, water supply and water management, and levee system integrity. Total project cost is \$177,505. Budgeted costs for each of the project tasks are shown in Table 1.

b. Schedule Milestones: See Table 2.

c. Third Party Impacts: Does not apply.

Table 1. Cost Estimate for Fish Passage Assessment

Phase and Task Description	Direct	Direct	Overhead	Other	Total
	Labor Hours	Salary Totals	G & A Expense, Fee		
Phase 1: Preliminary Assessment					
1.1 Assemble detailed topography	168	\$3,130.32	\$6,874.69	\$1,752.00	\$11,757.01
1.2 Assemble stage and flow data	132	\$3,604.90	\$7,916.94	\$1,314.00	\$12,835.84
1.3 Develop topographic database	400	\$8,014.94	\$17,502.10	\$4,599.00	\$30,216.04
1.4 Evaluate fish passage problems	140	\$2,764.23	\$6,070.69		\$8,834.92
1.5 Prepare Preliminary Report	200	\$4,664.26	\$10,243.46		\$14,907.72
1.6 Attend Meetings	48	\$1,700.83	\$3,735.30		\$5,436.13
Phase 2: Refine Assessment					
2.1 Conduct field surveys	328	\$6,433.06	\$14,128.02	\$954.84	\$21,515.92
2.2 Conduct aerial surveys	56	\$1,437.20	\$3,156.32	\$8,760.00	\$13,353.51
2.3 Refine topographic database	120	\$2,127.51	\$4,672.35	\$1,314.00	\$8,113.86
2.4 Measure physical attributes during flooding	152	\$3,215.69	\$7,062.17	\$1,557.09	\$11,834.94
2.5 Monitor fish occurrence and passage	312	\$5,622.37	\$12,347.63	\$4,308.83	\$22,278.83
2.6 Re-evaluate fish passage problems	52	\$1,405.66	\$3,087.05		\$4,492.70
2.7 Prepare final report	164	\$3,731.73	\$8,195.48		\$11,927.22
Totals	2,272	\$47,852.70	\$105,092.20	\$24,559.76	\$177,504.66

1-007945

Table 2. Schedule Milestones

Tasks	Date																								
	1998			1999												2000									
	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J			
Phase 1: Preliminary Assessment																									
Task 1-1. Assemble Detailed Topography																									
Task 1-2. Assemble Stage and Flow Data																									
Task 1-3. Develop Topographic Database																									
Task 1-4. Evaluate Fish Passage																									
Task 1-5. Prepare Preliminary Report																									
Task 1-6. Attend Meetings																									
Phase 2: Refine Assessment																									
Task 2-1. Conduct Field Surveys																									
Task 2-2. Conduct Aerial Surveys																									
Task 2-3. Refine Topographic Database																									
Task 2-4. Measure Physical Attributes																									
Task 2-5. Monitor Fish Passage																									
Task 2-6. Reevaluate Fish Passage																									
Task 2-7. Prepare Final Report																									

Note: "F" indicates that beginning and completion of the task is dependent on occurrence of a flood event.

VI. Applicant Qualifications

Corporate Overview

JSA has the depth and breadth of expertise and long-term stability needed to fulfill project objectives. Staff biologists are qualified in terrestrial and aquatic ecology, fisheries, wildlife management, wetland biology, habitat evaluation, and vegetation management. Staff engineers have worked extensively on water projects, Sacramento and San Joaquin River hydrology, and flood control issues. Staff geographers are familiar with available topographic and geomorphic data for the Sacramento and San Joaquin River basins and with state-of-the-art topographic and geomorphic database programs. JSA's staff has developed avenues of communication supported by a long history of working cooperatively with state and federal agencies, including DWR, FWS, DFG, BOR, ACOE, and NMFS.

JSA is a multidisciplinary environmental planning and natural resources management firm headquartered in Sacramento, California. Formed in 1970, JSA maintains a full-time staff of over 170 professionals that includes environmental specialists, biologists, planners, economists, attorneys, and engineers. As an employee-owned company, each professional is personally committed to the highest quality client service. JSA staff adheres to a problem-solving philosophy and believes that the keys to high-quality client service are scientific accuracy and decision-oriented work products. JSA's diverse experience includes over 3,000 environmental and natural resources reports and studies throughout the western United States. Clients include federal, state, and local governments; special districts; private organizations, such as land developers, corporations, and nonprofit organizations; and engineering and law firms.

Staff Organization

Warren Shaul will manage the proposed project and apply his extensive experience evaluating fisheries issues for Central Valley species to provide clear direction in meeting project objectives. He is a Senior Environmental Scientist and project manager with JSA where he has worked for more than 10 years. He will ensure integration of physical and biological project elements, including focusing field activities on necessary data needs, and will be responsible for project schedule and product deadlines.

Mr. Shaul first recognized the importance of floodplain habitat to juvenile chinook salmon and splittail during his field sampling in the Sutter Bypass in 1992 and 1993. Since then, he has documented passage problems and habitat use in the Sacramento and Yolo Bypasses and the floodplains of the Sacramento, Feather, and American Rivers. Mr. Shaul has more than 20 years of experience in fish population modeling, statistical designs, and fishery management. He has developed methods by which to assess impacts from proposed water management changes on anadromous fishes in the Sacramento and San Joaquin River basins. His methods interface with hydrologic, water quality, and project operations and planning models. Mr. Shaul has expert knowledge of the life-history and environmental requirements of fishes throughout the Sacramento-San Joaquin River system.

Mr. Shaul received an M.S. in fisheries from Oregon State University, Corvallis, in 1984 and a B.S. in biology from Humboldt State University, Arcata, California in 1972.

Tom Cannon will coordinate project activities both within JSA and between appropriate resource agencies. He is a Senior Environmental Scientist and project manager and has extensive experience working with agency and stakeholder interests on fisheries restoration issues. Mr. Cannon will ensure appropriate coordination with resource agencies on data needs and acquisition and, through his biostatistical background, provide quality control for field research and data analysis.

Since 1994, Mr. Cannon has extensively observed floodplain habitat use by juvenile chinook salmon and splittail, increasing his understanding of the importance of floodplain habitat. He serves as lead aquatic and estuarine ecologist for Sacramento-San Joaquin River Delta ecosystem analyses, primarily for large federal and state water resources and ecosystem restoration projects. Mr. Cannon has more than 25 years of experience modeling and managing complex estuarine systems, designing broad-based and integrated environmental monitoring programs for aquatic species, implementing large-scale sampling designs for large rivers and estuaries, and directing large-scale database design, development, and analysis programs. He provided a lead role in developing CAIFED ecosystem objectives.

Mr. Cannon received an M.P.H. in biostatistics from the University of Michigan in 1972, an M.A. in biology from Northern Michigan University in 1971, and a B.S. in fisheries from the University of Michigan in 1969.

Russ T. Brown, Ph.D., will lead development of the stage and flow database and integration of data into the topographic database for evaluation of fish passage issues. Dr. Brown is a Senior Environmental Scientist specializing in the application and interpretation of hydrologic and water quality models. He uses reservoir, riverflow, and temperature models to support fisheries and other water resources investigations and applies watershed hydrology and runoff models to describe erosion, sediment movement, and adsorbed pollutant transport. Dr. Brown's creative ability to integrate and interpret available field data will provide an increased understanding of floodplain inundation and linkage to biological attributes. His familiarity with available hydrologic data for Central Valley rivers and appropriate agency contacts will be an asset to the project.

Dr. Brown received a Ph.D. in civil engineering from the Massachusetts Institute of Technology (MIT) in 1978, an M.S. in ocean engineering from MIT in 1974, and a B.S. in civil and environmental engineering from the University of California, Irvine, in 1972.

Kelly Berger will lead development of the topographic database. He has over 12 years of experience managing GIS and is an expert at applying GIS technology to natural resources management and environmental analysis programs. Mr. Berger's GIS project experience includes spotted owl habitat analysis, beaver habitat analysis, watershed management and modeling programs, and urban impact analysis. He has produced GIS needs assessments for the Indian Natural Resources Agencies (through the U.S. Agency for International Development), South Tahoe Public Utility District, and the Tahoe Regional Planning Agency. Mr. Berger received a

B.A. in geography (emphasis in environmental planning) from the University New Mexico, Albuquerque, in 1986.

Andrew M. Fulks will coordinate topographic data needs and refinement of the topographic data information. Mr. Fulks is a licensed landscape architect in California (Number 4237) and an Environmental Specialist with experience in riparian revegetation, planting design, construction drawing preparation, and photorealistic simulation. He has prepared landscape restoration plans, landscape architectural construction drawings (i.e., AutoCAD), and photorealistic simulations of proposed flood control measures. He has also prepared conceptual and working drawings for a variety of habitat restoration and recreation projects in California. Mr. Fulks received a B.S. in landscape architecture from the University of California, Davis, in 1994.

Beth Campbell will lead the fish field studies. She is a fishery biologist with more than 10 years of experience in fisheries research. She has led or participated in studies of northern California stream fishes in the Coast Range, Central Valley (i.e., spring-run chinook salmon), and Sierra Nevada and has participated in a population study of fishes in the Sacramento-San Joaquin Delta estuary. Through her association with Mr. Shaul and Mr. Cannon, Ms. Campbell is especially familiar with floodplain habitat use by juvenile chinook salmon. Ms. Campbell received a B.S. in fisheries management from Ohio State University in 1985 and an M.S. in zoology from the University of Wisconsin in 1989. She has completed her dissertation and will receive her Ph.D. from the University of California, Davis, in September 1998.

Pete Rawlings will develop information on vegetation and wildlife potentially affected by actions to improve fish passage conditions in floodplain and floodbasin habitat of the Sacramento and San Joaquin River basins. Mr. Railings is a wildlife biologist with more than 17 years of experience in wildlife management and related fields. He is experienced in designing and conducting wildlife inventories, developing wildlife management plans, designing habitat restoration and mitigation plans, using GIS in environmental planning, and preparing National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) documents. During his 8 years at JSA, Mr. Railings has applied his wildlife management expertise to a wide range of projects, including water storage and flood control projects. He has participated in developing and applying habitat evaluation procedures (HEP), prepared biological assessments for federally listed threatened and endangered species, and developed mitigation plans for state- and federally listed species. As a result of his participation in wetlands restoration planning for waterfowl, Mr. Railings is thoroughly familiar with issues associated with managing Central Valley wetlands. Mr. Railings received a B.S. in wildlife management in 1978 from Humboldt State University, Arcata, California.

VI. Compliance with Standard Terms and Conditions

Noncollusion and nondiscrimination forms are attached. We will comply with all terms and conditions.

Agreement No. _____

Exhibit _____

**NONCOLLUSION AFFIDAVIT TO BE EXECUTED BY
BIDDER AND SUBMITTED WITH BID FOR PUBLIC WORKS**

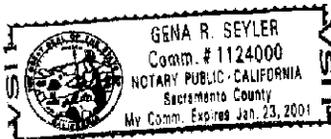
STATE OF CALIFORNIA)
)ss
COUNTY OF Sacramento)

Albert I. Herson , being first duly sworn, deposes and
(name)
says that he or she is President of
(position title)
Jones & Stokes Associates
(the bidder)

the party making the foregoing bid that the bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the bid is genuine and not collusive or sham; that the bidder has not directly or indirectly induced or solicited any other bidder to put in a false sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that the bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other bidder, or to secure any advantage against the public body awarding the contract of anyone interested in the proposed contract; that all statements contained in the bid are true; and, further, that the bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid.

DATED: July 2, 1998

By Albert I. Herson
(person signing for bidder)



(Notarial Seal)

Subscribed and sworn to before me on
July 1, 1998
Gena R. Seyler
(Notary Public)

COMPANY NAME

Jones & Stokes Associates

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

CERTIFICATION

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

OFFICIAL'S NAME

Albert I. Herson

DATE EXECUTED

July 2, 1998

EXECUTED IN THE COUNTY OF

Sacramento

PROSPECTIVE CONTRACTOR'S SIGNATURE

PROSPECTIVE CONTRACTOR'S TITLE

President

PROSPECTIVE CONTRACTOR'S LEGAL BUSINESS NAME