CALFED Fish Screen Funding Proposal
Reclamation District No. 108
Wilkins Slough Positive Barrier Fish Screen–
Sediment Removal Project
(October 8, 2004)

Executive Summary

In 1999, Reclamation District No. 108 (RD108) substantially completed construction of the Wilkins Slough Positive Barrier Fish Screen on the Sacramento River, about 45 miles northwest of Sacramento, California. The facility has a capacity of 830 cubic feet per second (cfs).

During summer 1999 and summer 2000, operation of this fish screen was tested for compliance with approach velocity performance criteria (approach velocity not to exceed 0.33 feet per second) from the California Department of Fish and Game and National Oceanic and Atmospheric Administration Fisheries. It was found that sediment accumulating within the structure bays, located behind the screens, was distorting the flow pattern through the screens and preventing acceptable uniform performance. Sediment accumulation was recognized during design as a potential problem with the fish screen. However, scale model testing of the fish screen by the U.S. Bureau of Reclamation (Reclamation) at its Denver, Colorado, research laboratory prior to design did not demonstrate the seriousness of the problem, nor were there any fish screen facilities in this area of the river to confirm the potential impact of sedimentation. Therefore, the magnitude of the problem and design of appropriate facilities to deal with sediment had to await the results from operation of the fish screen. During the second year of operation, in 2000, the consensus was that a sediment removal system must be installed within the structure bays and in close proximity to the fish screen in order to meet the velocity performance criteria.

During fall 2000, a sediment removal pilot study involving a prototype jetting system was successfully conducted utilizing funds available through the Anadromous Fish Screen Program. The results of the pilot study were documented in a report (CH2M HILL, 2001a) and reviewed by the Anadromous Fish Screen Program Technical Team (AFSPTT). Plans and specifications were produced during 2001 for construction of the sediment removal system (CH2M HILL, 2001b) and reviewed by AFSPTT. Although Federal funds were available for 50 percent of the Project costs, construction was delayed because State funds were not readily available.

The revised estimate of cost to construct the facilities and to complete the required performance testing is $990,000. RD108 currently has sufficient Federal funds under contract

with Reclamation to cover 50 percent of the Project costs and is applying to CALFED for the non-federal 50 percent share of funds in the amount of $495,000.

RD108 is prepared to move forward and advertise the Project as soon as CALFED funding is available, presumably by October 2004. Advertising, bidding, and awarding a construction contract would proceed in November 2004, and construction could be completed by summer 2005. Performance testing would be accomplished during the 2005 irrigation season when the irrigation system can accommodate the maximum diversion rate of 830 cfs.

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Project Description: Project Goals and Scope of Work

Problem

Reclamation District No. 108 (RD108) provides water to approximately 48,000 acres of irrigated agriculture on the west side of the Sacramento River, about 45 miles northwest of Sacramento, California (see Figure 1). RD108 operates seven pumping plants along the river that supply water to a network of irrigation canals. In 1999, RD108 substantially completed construction of the Wilkins Slough Positive Barrier Fish Screen, which has a capacity of 830 cubic feet per second (cfs).

During summer 1999 and summer 2000, the fish screen was tested and monitored for compliance with the approach velocity performance criteria required by the California Department of Fish and Game (CDFG) and the National Oceanic and Atmospheric Administration Fisheries(NOAA Fisheries). Results of these monitoring activities indicated that sediment was accumulating behind the screens. At peak diversion flows, average approach velocities on individual screen panels were in excess of the 0.33 feet per second (fps) performance criterion. The methodology and results were reviewed by the Anadromous Fish Screen Program Technical Team (AFSPTT).

This unanticipated rapid accumulation of sediment within the bays and forebay has caused a serious problem in the operation and maintenance of the fish screen facility. The deposition rate of suspended sediment and the depth of sediment within the fish screen bays have affected the uniformity of the approach velocity. Current conditions indicate that without a means to continually control deposition, sediment buildup may cause the average approach velocity associated with individual screen panels to exceed the design maximum of 0.33 fps at near-maximum pumping rates (830 cfs).

The consensus of RD108 and AFSPTT was that a sediment removal system needed to be installed within the bays of the fish screen to meet the performance criteria.

During fall 2000, a sediment removal pilot study was successfully conducted utilizing funds available through the Anadromous Fish Screen Program (AFSP). The results of the pilot study were documented in a report (CH2M HILL, 2001a) and reviewed with AFSPTT. In August 2001, plans and specifications (August 2001) were produced for construction of the sediment removal system (CH2M HILL, 2001b) and reviewed by AFSPTT.

RD108 currently has sufficient U.S. Bureau of Reclamation (Reclamation) funding to implement the Project; however, they lack the 50 percent State matching fund required by Reclamation. The 50 percent State matching funds ($495,000) is the subject of this grant to build a sediment removal system.

Justification

This is a fish screen construction proposal; response to this item is not required according to the proposal solicitation package.

Approach

The following tasks are required to implement the sediment removal system as identified in the Wilkins Slough Positive Barrier Fish Screen–Sediment Removal Plans and Specifications (CH2M HILL, 2001b):

Task 1–Bid Services

- Update the August 2001 bid documents (plans and specifications)
- Advertise for bids
- Evaluate lowest qualified bidder(s)
- Award contract

Task 2–Construction

Build the proposed system

Task 3–Services During Construction

- Provide engineering office services during construction
- Provide periodic onsite inspection

Task 4–Performance Testing

- Conduct performance testing
- Prepare report to AFSPTT

Feasibility

The described approach is both feasible and appropriate for this Project, and it can be completed in the time allotted provided required funding is available in a timely fashion. During fall 2000, RD108 conducted a pilot study for the Wilkins Slough Positive Barrier Fish Screen to determine the most effective way to remove sediment from the fish screen bays and forebay area. The study tested the feasibility of water-jetting the sediment from the floor of the fish screen bays.

The pilot study plan was reviewed with AFSPTT on August 29, 2000, in Sacramento, California, at the U.S. Fish and Wildlife Service (USFWS) office prior conducting the pilot study. Results of the pilot study were reviewed by AFSPTT and RD108 on January 8, 2001.

The pilot study indicated the following:

- Fine suspended sediments pass through the screens, resulting in an abrupt change in velocity. The velocity of flow in the river varies between 2 to 4 fps, and the velocity

within the screen bays is 0.33 fps or less. The change in velocity causes the suspended material to be deposited within the screen bays and forebay.

- Sediment accumulates in the fish screen bays at a rate of approximately 1 inch per day.
- The sediment begins to settle within 1 to 2 feet of the screen face.
- A relatively sediment-free zone should be maintained approximately 20 to 30 feet behind the screen face to prevent the approach velocity from exceeding the 0.33 fps criterion.

The results of the pilot study indicated that the proposed sediment removal system is feasible and will solve the sediment problem at the Wilkins Slough Positive Barrier Fish Screen.

The sediment removal system will provide a method for hydraulically removing the sediment accumulation from the floor of the existing fish screen structure. The system will include an H-pile supported pump platform; a 150-horsepower vertical turbine pump; approximately 1,050 feet of 12-inch diameter welded steel pipe with grooved-end fittings; 15 electrically-actuated valves; pump and valve electrical control systems; and an under-water polyvinyl chloride (PVC) pipe manifold with nozzles for jetting sediment from the floor of the fish screen structure.

Performance Measures

A monitoring program has been established in coordination with CDFG and NOAA Fisheries to evaluate the effectiveness of the sediment removal system and the performance of the Wilkins Slough Positive Barrier Fish Screen. To meet the following CDFG and NOAA Fisheries criteria for fish screens, the system will be tested after the water-jetting system is fully functional. Performance measures will include:

- Average approach velocity (water velocity perpendicular to the screen), less than or equal to 0.33 fps at the maximum diversion rate
- Minimum sweeping velocity (water velocity parallel to the screen) of two times the approach velocity
- Fish screen bays swept clean of sediment

The screen will be tested using water velocity probes during the maximum diversion rate to check for compliance.

Data Handling and Storage

A broad range of information management tools and systems will be used for this Project. The following are examples of the types of tools available to manage and provide access to Project data:

- E-mail with file attachments (Microsoft Exchange server with Microsoft Outlook client)
- Microsoft Office suite of desktop applications (Word, Excel, Access, PowerPoint)

- Additional desktop applications (e.g., Visio, Acrobat Reader, Internet Explorer, Microsoft Project, CADD, and GIS)
- Intranet-deployed reference material and project-specific web site, if appropriate and desired

Currently, the Wilkins Slough Positive Barrier Fish Screen has an automated Supervisory Control and Data Acquisition System that may be linked to the sediment removal facility water-jetting system for automatic data retrieval.

Expected Products/Outcomes

The expected products are as follows:

- An installed sediment removal system at the Wilkins Slough Positive Barrier Fish Screen
- As-built drawings of the sediment removal system
- A sediment-free zone behind the fish screens to allow the fish screen to operate at peak diversion rates in accordance with CDFG and NOAA Fisheries criteria

Work Schedule

The general schedule to implement the Project is provided below, with the assumption that obtaining the required level of funding is not a constraint:

- Update contract documents (plans and specifications) for the Wilkins Slough Positive Barrier Fish Screen–Sediment Removal Project – October 2004
- Obtain State (CALFED) matching funds for construction – June 2001 to October 2004
- Bid and Construction – November 2004 to July 2005
- Performance Testing – August 2005 to October 2005

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

ERP, Science Program, and CVPIA Priorities

This Project is linked indirectly to the CALFED Ecosystem Restoration Program (ERP) restoration priorities for the Sacramento Region. As listed on page 61 of the *ERP Draft Stage 1 Implementation Plan* and on page 29 of the *2002 ERP Proposal Solicitation Package*, consolidating and screening RD108 diversions from the Sacramento River would help achieve Strategic Goal 1, protecting at-risk species. Controlling sediment buildup at RD108 Wilkins Slough Positive Barrier Fish Screen will allow the screen to comply with design criteria during peak diversion rates.

This sediment removal system is necessary to help achieve recovery of at-risk native fish species as a step toward establishing large, self-sustaining populations of these species. This Project will directly contribute to resolving the conflict between protecting endangered

species and providing reliable supplies of water for agriculture. This Project will help achieve the recovery of the following at-risk fish species: all runs of chinook salmon, steelhead trout, and Sacramento splittail (Ecosystem Restoration Program, 2002 Proposal Solicitation Package, page 27, goal SR-2). In addition to the above-mentioned, at-risk species, this Project will also support the goal of doubling the other anadromous fish species named in the Central Valley Improvement Act (CVPIA), specifically, white and green sturgeon, American shad, and striped bass.

Construction of the sediment removal system is consistent with the identified stressors and priorities for Project funding by CALFED. The prevention of entrainment of at-risk fish species will result in a significant improvement in the aquatic habitat of the Sacramento River and the Bay-Delta system. In addition, the Project will ensure a reliable supply of water for agriculture and provide significant migratory water fowl wetland habitat.

Relationship to Other Ecosystem Restoration Projects

This Project has been discussed and coordinated with CDFG, NOAA Fisheries, and AFSPTT under the CVPIA AFSP. The pilot test design and the tests were performed in consultation and coordination with the technical team and regulatory agencies designated in the CVPIA AFSP.

Requests for Next-phase Funding

This is a request for next-phase funding.

Previous Recipients of CALFED Program or CVPIA Funding

RD108 received CALFED and CVPIA funding for the Wilkins Slough Positive Barrier Fish Screen Project (CALFED Program No. B81569). Construction was completed in 1999 and Wilkins Slough Positive Barrier Fish Screen is currently operational.

RD108 received CALFED and CVPIA funding for the design of the Combined Pumping Plant and Fish Screen Project (CALFED Contract No. ERP-02-P10-D). The 90 percent design deliverables were submitted to CALFED and the AFSPTT on July 2, 2004.

Systemwide Ecosystem Benefits

This Project will enhance the protected fish passage area at the largest diversion of RD108 on the Sacramento River, the Wilkins Slough Pumping Plant. The Project will help achieve CALFED and CVPIA objectives by helping to improve the aquatic environment of several fish species, while concurrently providing needed water supply for the applicant. This Project provides synergistic Sacramento River system benefits by allowing more fish to reach the upstream restoration projects now implemented or planned for the future. The Project will not conflict with CALFED non-ecosystem objectives, such as water quality for in-stream and delta flows, but may benefit water supply reliability for the applicant as it will reduce the entrainment of fish at the diversion facility. No impacts to third parties are anticipated.

Additional Information for Proposals Containing Land Acquisition

The sediment removal system will use the existing fish screen structure and pumping plant platform area. Therefore, no land will be required.

Qualifications

RD108 has an extensive history of successfully implementing large, complex capital improvements with the cooperation and funding support of State and Federal agencies including the Wilkins Slough Positive Barrier Fish Screen. RD108 is currently working with CDFG, NOAA Fisheries, USFWS, and Reclamation on the design of the Combined Pumping Plant and Fish Screen Project, which will prevent entrainment of fish at three pumping plants on the Sacramento River.

RD108 General Manager, Luther Hintz, will be the Project Manager. He will be assisted by Rich Jenness/Laugenour & Meikle Civil Engineers, a long-time RD108 consulting engineer; Chuck Hanson/Hanson Environmental, the senior fishery biologist, and Peter Rude/ CH2M HILL, who will manage the services during construction. Following are brief biographical sketches of the principal participants.

Luther Hintz, P.E., RD108 General Manager

Mr. Hintz joined RD108 as the General Manager on January 1, 1994. Prior to accepting this position, he worked as a consulting engineer, specializing in water resource development with the firm of Bookman-Edmonston Engineering, Inc. Mr. Hintz was the Project Manager for the Wilkins Slough Fish Screen Project. During his 32-year tenure with Bookman-Edmonston, Mr. Hintz was the manager and principal engineer in conceptual planning, design, construction management, and startup of large-scale irrigation distribution system projects in California, Arizona, and Utah.

Mr. Hintz has extensive experience in planning, construction, and operation of major water facilities involving close coordination and cooperation with Federal, State, and local resource agencies. He graduated from the University of California, Davis; he is a registered professional engineer in California and several other western states.

Richard Jenness, P.E., District Engineer

Mr. Jenness is a Registered Civil Engineer in the State of California, a consulting engineer for RD108, and President of Laugenour & Meikle, Civil Engineers. He has more than 33 years experience in the planning, design, and construction of water resource projects. Mr. Jenness has been involved in planning and designing fish guidance facilities on the Sacramento River, and he has been responsible for preparing fish screen appraisal studies and assisting in Project management of fish screen projects.

Charles Hanson, Ph.D., Senior Fishery Biologist

Dr. Hanson has more than 28 years of experience in freshwater and marine biology studies and is the Senior Biologist, Principal for Hanson Environmental, Inc. Dr. Hanson has been the senior fishery biologist and environmental permit coordinator for the Wilkins Slough Positive Barrier Fish Screen, the RD108 Fish Screen Reconnaissance Investigation, and the

Sutter Mutual Water Company's 960-cfs Tisdale Positive Barrier Fish Screen and Pump Station Feasibility Study.

Dr. Hanson has contributed to the study, design, analysis, and interpretation of fisheries, stream habitat, and stream flow (hydraulic) data collected in the evaluation of in-stream flow requirements and potential fishery impacts on salmonid spawning, production, survival, and migration success associated with water project development and operation. He has conducted site-specific evaluations of the effectiveness of various water diversion screening systems, passage facilities, and operational modifications in reducing organism losses while maintaining operational reliability of the system. Dr. Hanson has been extensively involved in incidental take monitoring and investigations of endangered species, development of recovery plans, consultations, and preparation of aquatic habitat conservation plans. He also participated in the development of adaptive management programs including the San Joaquin River Vernalis Adaptive Management Plan; he also has experience in real-time monitoring and management of power plant cooling water and other diversion operations.

Peter Rude, P.E., Construction Manager

Mr. Rude has more than 18 years of experience as an agricultural/civil engineer. He is responsible for managing multidiscipline teams for a variety of fish screen, irrigation, agricultural water supply, water reclamation, and watershed management projects.

Mr. Rude has been the Project Manager for the RD108 Combined Pumping Plant Fish Screen Project from the reconnaissance investigation through design. He was the Design Manager for a 10-month, fast-track effort from preliminary design through the award of the construction contract for the Wilkins Slough Positive Barrier Fish Screen. He also managed the construction effort and subsequent hydraulic monitoring and sediment removal facility design. At Tulare Irrigation District, Mr. Rude was the Project Manager for design, environmental documentation and permitting support, contract documents, bid services, and construction management for lining 9.7 miles of the Main Intake Canal.

Cost

1. Budget

Funding estimates for completion of this Project require a total budget of $990,000. The budget numbers do not include approximately $50,000 contributed by RD108 for administrative and legal tasks and on-site construction management.

RD108 estimates a total requirement of $990,000 for FY 2005 (January 1, 2005 through October 31, 2005) as follows:

• Bid Services	$ 30,000
• Construction	$830,000
• Services During Construction	$ 80,000
• Performance Testing	$ 50,000
Total	**$990,000** ($495,000 CALFED, $495,000 Reclamation)

2. Cost-sharing

Reclamation has committed to fund 50 percent of the Project costs; the funds are currently available. If awarded, this grant proposal would provide the State's 50 percent match.

Local Involvement

Development of the Project is proceeding with regular participation and input from AFSPTT, Reclamation, USFWS, DWR, CDFG, and NOAA Fisheries. Public meetings and hearings have been held and the Project has public support.

Compliance with Standard Terms and Conditions

RD108 will comply with the standard terms and conditions specified in the proposal solicitation package.

Literature Cited

CALFED. 2001a. *Ecosystem Restoration Program - Draft Stage 1 Implementation Plan.* August.

CALFED. 2001b. *Ecosystem Restoration Program - 2002 Proposal Solicitation Package.* August.

CH2M HILL. 2001a. *RD108 Wilkins Slough Positive Barrier Fish Screen–Sediment Removal Pilot Study*. February.

CH2M HILL. 2001b. *RD108 Wilkins Slough Positive Barrier Fish Screen–Sediment Removal Facility. Plans and Specifications*. August.

Item	Description		June 1, 2001 Construction Cost Estimate	August 1, 2004 Construction Cost Estimate	Mid Point of Construction Cost Estimate
1	Pump and Structural Platform		$89,000	$101,000	
2	Steel Piping		$247,000	$281,000	
3	Valves		$91,000	$104,000	
4	PVC Piping		$123,000	$140,000	
5	Instrumentation, Control, and Electrical		$89,000	$101,000	
6	Blowout panel bay - sediment removal		$0	$56,000	
		Total	**$639,000**	**$783,000**	**$830,000**

Notes:

1) The June 2001 construction cost estimate is based on the Final Design Drawings, dated August 2001
2) Item 6 was added based on the operations experience of RD108 since 2001 that indicates the need for the sediment removal system in the blow out panel bay.
3) The August 2004 construction cost estimate was derived using the Engineering News & Record 20 Cities Construction Cost Index (ENR CCI) of 6,318 for June 2001 and 7,188 for August 2004. This is equal to a construction cost increase of 13.8 percent.
4) The total for August 2004 was escalated 6 percent to the mid point of construction and the resulting $830,000 construction cost value used in the CALFED funding application

Grantee shall implement the project as identified in the Scope of Work, and shall be compensated in accordance with the budget outlined below:

Labor		**$ -**
Benefits		**$ -**
Travel Expenses		**$ -**
Supplies and Expendables Costs		**$ -**
Services or Consultant Costs		**$ 495,000.00**
	Task 2 $495,000.00	
Equipment Costs		**$ -**
Other Direct Costs		**$ -**
Total Direct Costs		**$ 495,000.00**
Indirect Costs		**$ -**
	TOTAL CONTRACT BUDGET	**$ 495,000.00**

CALFED Fish Screen Funding Proposal
Reclamation District No. 108 - Wilkins Slough Fish Screen Sediment Removal System
2002 Proposal Solicitation Package (revised October 8, 2004)
Form VII - Budget Justification

1. **Direct Labor Hours.** Provide estimated hours proposed for each individual.
    a. Reclamation District No. 108 (RD108) will administer the contract at no cost to CALFED. Therefore, there are no direct costs.
2. **Salary.** Provide estimated rate of compensation proposed for each individual.
    a. RD108 will administer the contract at no cost to CALFED. Therefore, there are no direct costs.
3. **Benefits.** Provide the overall benefit rate application to each category of employee proposed in the project.
    a. RD108 will administer the contract at no cost to CALFED. Therefore, there are no direct costs.
4. **Travel.** Provide purpose and estimate costs for all non-local travel.
    a. RD108 will administer the contract at no cost to CALFED. Therefore, there are no direct costs.
5. **Supplies & Expendables.** Indicate separately the amounts proposed for office, laboratory, computing, and field supplies.
    a. RD108 will administer the contract at no cost to CALFED. Therefore, there are no direct costs.
6. **Services or Consultants.** Identify the specific tasks for which these services would be used. Estimate amount of time required and the hourly or daily rate.
    a. There are four tasks associated with the budget request as follows:
        - Task 1 – Bid Services (Conducted by RD108 Consultants)
        - Task 2 – Construction (Conducted by Construction Contractor)
        - Task 3 – Services During Construction (Conducted by RD108 at no cost to CALFED and by RD108 Consultants

- Task 4 – Performance Testing (Conducted by RD108 Consultants)

b. Only Task 2 is being requested for CALFED Funding. Tasks 1, 3 and 4 will be funded by USBR. The Task 2 construction cost estimate breakdown has been provided in a separate document with this proposal. The Task 2 budget estimate is provided in Attachment A.

7. **Equipment.** Identify non-expendable personal property having a useful life of more than one (1) year and an acquisition cost of more than $5,000 per unit. If fabrication of equipment is proposed, list parts and materials required for each, and show costs separately from the other items.

   a. None anticipated for purposes of RD108 project administration. All project equipment is covered in Task 2 – Construction.

8. **Project Management.** Describe the specific costs associated with insuring accomplishment of a specific project, such as inspection of work in progress, validation of costs, report preparation, giving presentations, response to specific questions and necessary costs directly associated with specific project oversight.

   a. Project management will be done by Lu Hintz, RD108 General Manager and his staff, at no cost to the CALFED Grant.

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

   a. RD108 will administer the contract at no cost to CALFED. Therefore, there are no direct costs.

10. **Indirect Costs.** Explain what is encompassed in the overhead rate (indirect costs). Overhead should include costs associated with general office requirements such as rent, phone, furniture, general office staff, etc., generally distributed by a predetermined percentage (or surcharge) of specific costs. *[CORRECTION: If overhead costs are different for State and Federal funds, note the different overhead rates and corresponding total requested funds on Form I – Project Information, Question 17a. On Form VI – Budget Summary, fill out one detailed budget for each year of requested funds, indicating on the form whether you are presenting the indirect costs based on the Federal overhead rate or State overhead rate. Our assumption is that line items other than indirect costs will remain the same whether funds come from State or Federal sources. If this assumption is not true for your budget, provide an explanation on the Budget Justification form.]* Agencies should include any internal costs associated with the management of project funds.

    a. RD108 will administer the contract at no cost to CALFED. Therefore, there are no indirect costs.