

NOTICE OF INTENT TO AWARD

This Funding Announcement is not a request for applications. This announcement is to provide public notice of the Bureau of Reclamation's intention to fund the following project activities without full and open competition.

ABSTRACT	
Funding Announcement	R12AC80881
Project Title	Integrated Bubble, Sound, and Light Modeling for Modeling Fish Deterrence
Recipient	University of Iowa
Principal Investigator / Program Manager	Dr. Larry Weber 323C C. Maxwell Stanley Hydraulics Laboratory The University of Iowa Iowa City, IA 52242-1585 Telephone: (319) 335-5597
Anticipated Federal Amount	\$90,000.00
Cost Share	None
Total Anticipated Award Amount	\$90,000.00
New Award or Continuation?	New Award
Anticipated Period of Performance	April 30, 2012 – September 23, 2013
Award Instrument	Cooperative Agreement
Statutory Authority	Section 9504(b), Omnibus Public Lands Management Act of 2009, (Public Law 111-11)
CFDA # and Title	15.560 – SECURE Water Act – Research Agreements
Single Source Justification Criteria Cited	(4) Unique Qualifications
Reclamation Point of Contact	Michelle Maher 303-445-2025; mmaher@usbr.gov

OVERVIEW

Over the next three years, the U.S. Army Corp of Engineers (USACE) and the Bureau of Reclamation (Reclamation) are developing a method to determine the deterrence efficiency of a non-physical barrier (NPB) located on river bifurcations in California. Modeling of a bubble-plume curtain, sound, and modulated intense light (MIL) with the NPB placed at the opening of one arm of the riverine bifurcation is necessary to predict fish deterrence efficiency before NPB deployment or adjustment. An Individual Based Model (IBM) is being proposed to model fish deterrence. The IBM will need hydraulics from a computational fluid dynamics (CFD) model of river hydraulics near the NPB. The CFD model will need the bubble, sound, and light sub-models (encapsulated sound and reflected light due to a bubble curtain). Background sound due to bed sediment movement at high flows (rolling gravel) and background light due to changing daylight level (or city lights at night), turbidity, and other variables may be inputs. Sound, background sound, MIL, and ambient light needs to be represented at each node of the CFD model mesh. This research cooperative agreement calls for the development of bubble, sound, and light equations and related numerical modules that can be integrated and embedded within a CFD hydraulic model of rivers. Specifically, the proposed research cooperative agreement would be to develop bubble, sound, and light governing equations for insertion into an integrated framework (IFW) for a CFD hydraulic model coupled to a Individual Based Model (IBM) of a fish and a Eulerian Lagrangian Agent Method (ELAM) of streamflow for predicting deterrence efficiency of juvenile Chinook salmon at a non-physical barrier (NPB) at the Head of Old River (HOR) and Georgianna Slough (GS) of the San Joaquin River Basin.

RECIPIENT INVOLVEMENT

The University of Iowa under the supervision of Larry Weber (University of Iowa, Iowa Institute of Hydraulic Research (IIHR)-Hydroscience and Engineering director) is responsible for all oversight and administration of University of Iowa staff required for field work, mathematical modeling studies, and physical modeling studies. The University is responsible for developing a series of computer modules that capture the physics of bubble transport, sound and light in water either numerical or analytical form as it relates to NPB-CFD-IBM-ELAM modeling of fish deterrence in a riverine environment. The University will provide a final IFW report of the integrated bubble-plume, sound, and light, and bubble equations and computer modules for release to the public.

RECLAMATION INVOLVEMENT

Substantial involvement on the part Reclamation is anticipated for the successful completion of the objectives to be funded by this award. In particular, Reclamation will be responsible for the following:

Review and approval (by mathematical and physical modelers) of integrated final IFW modeling code subroutines of bubble, sound, and light equations for the NPB-CFD-IBM-ELAM modeling for operation in a Microsoft Windows personal computing (PC) environment and review of a final (100 percent) report of the IFW. Reclamation is responsible for the oversight and administration of the project agreement.

SINGLE-SOURCE JUSTIFICATION

DEPARTMENT OF THE INTERIOR SINGLE SOURCE POLICY REQUIREMENTS

Department of the Interior Policy (505 DM 2) requires a written justification which explains why competition is not practicable for each single-source award. The justification must address one or more of the following criteria as well as discussion of the program legislative history, unique capabilities of the proposed recipient, and cost-sharing contribution offered by the proposed recipient, as applicable.

In order for an assistance award to be made without competition, the award must satisfy one or more of the following criteria:

- (1) Unsolicited Proposal – The proposed award is the result of an unsolicited assistance application which represents a unique or innovative idea, method, or approach which is not the subject of a current or planned contract or assistance award, but which is deemed advantageous to the program objectives;
- (2) Continuation – The activity to be funded is necessary to the satisfactory completion of, or is a continuation of an activity presently being funded, and for which competition would have a significant adverse effect on the continuity or completion of the activity;
- (3) Legislative intent – The language in the applicable authorizing legislation or legislative history clearly indicates Congress' intent to restrict the award to a particular recipient of purpose;
- (4) Unique Qualifications – The applicant is uniquely qualified to perform the activity based upon a variety of demonstrable factors such as location, property ownership, voluntary support capacity, cost-sharing ability if applicable, technical expertise, or other such unique qualifications;
- (5) Emergencies – Program/award where there is insufficient time available (due to a compelling and unusual urgency, or substantial danger to health or safety) for adequate competitive procedures to be followed.

Reclamation did not solicit full and open competition for this award based on the following criteria:

(4) UNIQUE QUALIFICATIONS

Single Source Justification Description:

Investigation of competing universities with hydraulic or bubble dynamics background indicated that University of Iowa IIHR has the past performance as well as the unique and total capability for developing and integrating final IFW modeling code subroutines of bubble, sound, and light equations for the NPB-CFD-IBM-ELAM modeling for operation in a Microsoft Windows PC environment and completion of a final (100 percent) report of the IFW.

The University of Iowa, College of Engineering, IIHR-Hydroscience and Engineering is a world-renowned center for education, research, and public service focusing on hydraulic engineering and fluid mechanics. Having worked with Reclamation on various projects over the past ten years, University of Iowa onsite staff (Larry Weber, IIHR director and professor of civil and environmental engineering and graduate staff) have successfully worked with Reclamation CFD modeling staff (Yong Lai) and are familiar with Reclamation needs including “specialized” CFD modeling needs. The University of Iowa would have the capability to publish a paper for dissemination of the bubble, sound, and light equation information to the public. Conversations with the United States Army Corp of Engineers (USACE) staff (Dr. David L. Smith and Dr. Andrew Goodwin) have indicated that the University of Iowa IIHR staff and hydraulic laboratory facilities have the unique capability needed to complete the project. The IIHR hydraulics laboratory facility on the banks of the Iowa River in Iowa City, Iowa is a world class and state-of-the-art research facility that includes eight annexes, laboratories, and shops. The University of Iowa IIHR has both mathematical (computer CFD) modeling and physical (laboratory) modeling capabilities to specifically investigate bubble, sound, and light equations for incorporation into a CFD model that will be used to provide the hydraulics for an Individual Based Model (IBM) to be used in environmental fishery studies.

STATUTORY AUTHORITY

Section 9504(b), Omnibus Public Lands Management Act of 2009, (Public Law 111-11):

SEC. 9504. WATER MANAGEMENT IMPROVEMENT.

(b) Research Agreements-

(1) **AUTHORITY OF SECRETARY-** The Secretary may enter into 1 or more agreements with any university, nonprofit research institution, or organization with water or power delivery authority to fund any research activity that is designed--

(A) to conserve water resources;

(B) to increase the efficiency of the use of water resources; or

(C) to enhance the management of water resources, including increasing the use of renewable energy in the management and delivery of water.

(2) **TERMS AND CONDITIONS OF SECRETARY-**

(A) **IN GENERAL-** An agreement entered into between the Secretary and any university, institution, or organization described in paragraph (1) shall be subject to such terms and conditions as the Secretary determines to be appropriate.

(B) **AVAILABILITY-** The agreements under this subsection shall be available to all Reclamation projects and programs that may benefit from project-specific or programmatic cooperative research and development.