

## NOTICE OF INTENT TO AWARD

THIS FUNDING ANNOUNCEMENT IS NOT A REQUEST FOR APPLICATIONS. This announcement is to provide public notice of Reclamation's intention to fund the following project activities without full and open competition.

ABSTRACT	
<b>Funding Announcement</b>	R11AS20012
<b>Project Title</b>	Peer Review of Groundwater Models used in California's Central Valley
<b>Recipient</b>	California Water and Environmental Modeling Forum (CWEMF)
<b>Principle Investigator (if applicable)</b>	Not applicable
<b>Total Anticipated Award Amount</b>	\$20,000
<b>Cost Share</b>	50%
<b>New Award or Continuation?</b>	New
<b>Anticipated Length of Agreement</b>	2 years
<b>Anticipated Period of Performance</b>	Date of Execution through September 30, 2013
<b>Award Instrument</b>	Grant
<b>Statutory Authority</b>	Public Law 111-11, Title IX, Subtitle F – Secure Water Section 9504 (b) Research Agreements (c)
<b>CFDA Number</b>	
<b>Single Source Justification Criteria Cited</b>	(4) Unique qualifications
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## OVERVIEW

The threat of long-term droughts and the uncertainty of climate change impacts on California's surface water resources have caused increased interest in groundwater. Unlike surface water, the groundwater resource, is hidden from view, is more difficult to quantify and its rate of recharge and depletion are difficult to estimate with current monitoring. Aquifer safe yield, the amount of groundwater that can be extracted over time without depleting the resource, land subsidence and

degradation of water quality are all important aspects of water resource management in California.

The water resource agencies and private consultants have relied on groundwater models to characterize groundwater resources and to estimate fluxes of water and contaminants that recharge and are withdrawn from groundwater basins. These models are difficult to compare and evaluate. For example the regional groundwater systems being simulated within these models are discretized according to the best judgment of the modeler and rarely match making direct data comparisons difficult to perform. The data that drives these models is subjected to various assumptions as it is transformed from a raw data file into a form that makes sense to a computer. These are also difficult to evaluate since they are rarely described or made explicit. The numerical algorithms that comprise the groundwater simulation model can differ also – some are more efficient and others provide a better match to theory. A model peer review is one means of comparing groundwater simulation models to provide the sort of information that water users, policy makers and the public can use to understand the capabilities of various models and to match these capabilities to issues that a model is being called upon to address.

In 2001/2002 CWEMF sponsored the peer review of the Integrated Groundwater Surface Water Model (IGSM) , a model originally developed by Dr. Young Yoon at Boyle Engineering and subsequently used by the California Department of Water Resources (DWR), Reclamation and the State Water resources Control Board (SWRCB) to simulate groundwater and surface water in the Central Valley of California. The three agencies had sponsored a training workshop in 1990 where the agency version of the model was officially released. The model was used by both agencies for a large number of applications throughout California. In the conduct of the 2001/2002 CWEMF Peer Review a number of theoretical problems were developed that addressed those features of great interest to user community including the models capability of simulating stream-aquifer interactions, tile drainage and groundwater pumping.

Since the completion of the CWEMF peer review in 2001, a significant amount of model development work has been accomplished by several agencies concerned with groundwater supply and quality issues in the Central Valley of California. These agencies include DWR, the United States Geological Survey (USGS) and Reclamation. In the intervening years, DWR has continued its development of IGSM into a new model code known as IWFM (Integrated Water and Flow Model).

The USGS has a long history of developing and improving groundwater simulation models – the most widely used of which is MODFLOW. In the past two years a new simulation package known as the “Farm Package” has been developed for MODFLOW which is especially relevant to water resource agencies such as Reclamation and DWR since, like IWFM, models can be constructed using the sort of land use data available to the agencies through their water district contractors. The new comprehensive Central Valley groundwater simulation model will take advantage of new information, data analysis methods and additional code modules beyond the Farm Package.

Reclamation has also been developing a groundwater model with many advanced features known as HydroGeoSphere (HGS) which contains many state of the art features typically available only in academic research models. HGS is a fully coupled model – it considers surface and groundwater as a single system rather than as two interacting systems as is true with IWFM and MODFLOW. HGS also contains other advanced features such as sub-gridding and sub-timing

algorithms that allow for more computational attention to be given to those features of the watershed that are more hydrologically complex or that experience greater changes in water or contaminant fluxes.

With the development of these models, each model's capabilities for performing various types of analyses and the pros and cons the various approaches taken by them when simulating the same hydrologic and biologic processes is a question that will arise especially when managers and decision makers are planning projects or evaluating the results of modeling studies. A major purpose of proposed CWEMF Peer Review is to develop information primarily intended for the non-expert audiences who have a need to be informed about each of these models capabilities with respect to simulation of a wide range of water resource management issues such as those described above.

## **RECIPIENT INVOLVEMENT**

### **Task 1 - Peer Reviewer Selection**

The CWEMF Steering Committee will select one or more peer reviewers to perform the groundwater model reviews. The selection of reviewers will follow the normal procedures used by the Steering Committee to make consensus decisions. The selected peer reviewer(s) shall be recognized scientists in the subject area of groundwater modeling and familiar with California groundwater management issues.

### **Task 2 - Model Capability Review**

The peer review shall evaluate the capabilities of the IWFM, MODFLOW and HGS models for performing the various types of analyses for which groundwater models are typically employed in California's Central Valley. The review will focus on each model's capabilities and the pros and cons of the various approaches used by these models when simulating various hydrologic, biologic and water quality processes. The intention of the review is not to identify the best model but rather to present a clear understanding of what types of applications the model is capable of performing. The peer reviewer(s) will develop responses to the type of questions that typically arise when managers, decision makers and the general public are involved water resource management issues in which groundwater models are employed to address issues typical of water resource planning and environmental assessment studies.

### **Task 3 - Reporting**

The results of the review performed in Task 2 shall be presented in a written report that shall be made publically available through the CWEMF website for download as a PDF file.

## **RECLAMATION INVOLVEMENT**

No Substantial involvement is anticipated by the Bureau of Reclamation.

**SINGLE-SOURCE JUSTIFICATION**  
(See criteria below)

**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 the following criteria:

CWEMF is uniquely qualified to perform this grant because of its recognized leadership as an objective public service organization and its past performance of other similar hydrologic and water quality modeling peer reviews. Based on its previous model peer review activities, CWEMF has developed the specific guidelines and procedures to insure that the results of the peer review will be recognized by all interested parties as being independent of bias and of the highest scientific merit.

## STATUTORY AUTHORITY

***Public Law 111-11, Title IX, Subtitle F – Secure Water Section 9504 (b) Research Agreements (c)***

*SECTION 9504 - (NOTE: 42 USC 10364) 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 -*

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