

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	09SS10WTR003
Project Title	Model analysis of integrated surface- and ground-water hydrologic response to climate change
Recipient	University of Idaho Idaho Water Resources Research Institute 205 Morrill Hall Moscow ID 83844-3011 208-885-6429
Principle Investigator / Program Manager	
Total Anticipated Award Amount	\$203,000
Cost Share	N/A
New Award or Continuation?	New Award
Anticipated Length of Agreement	4 years
Anticipated Period of Performance	January 1, 2009 to December 31, 2012
Award Instrument	Cooperative Agreement / Cooperative Ecosystem Studies Unit (CESU)
Statutory Authority	Consolidated Appropriations Act, 2009 -- SEC. 205. . . . the Secretary is also authorized to enter into grants or cooperative agreements with universities or non-profit research institutions to fund water use efficiency research.
CFDA # and Title	15.507 – Water Efficiency Research
Single Source Justification Criteria Cited	(4) - Unique Qualifier
Reclamation Point of Contact	By mail: Bureau of Reclamation Pacific Northwest Regional Office Attn: Mr. Bryant Lyndaker 1150 N. Curtis Road Boise, ID 83706 By Phone: 208-378-5138 By E-mail: blyndaker@pn.usbr.gov

OVERVIEW

Background:

Concerns for the effects of climate change on water supply and demand have put pressure on Reclamation to increase reservoir storage. However conservation, regulation, and market-based water trading are also seen as viable strategies for responding to these changes. Increasing reservoir storage is an example of the supply management approach to water management (i.e. water demand is fixed so supply must be increased). Conservation, regulation, and water trading are examples of demand management approaches (i.e. water supply is fixed so demand must be reduced). Coupled hydrologic and economic models are essential tools for addressing questions of where and when supply management and/or demand management approaches are most appropriate for meeting the challenges of global climate change.

While surface water and groundwater hydrologic models have long been used as tools for water management decision making, economic modeling is relatively new. Economic models which maximize the utility of a single commodity by maximizing the utility of a social welfare function or net social payoff function are known as partial equilibrium models. Partial equilibrium economic models can be used to maximize the utility of water by determining equilibrium positions between water supply and demand for different water using entities, including agricultural irrigation entities, municipal and industrial (M&I) supply entities, hydropower entities, and environmental and recreational entities. At equilibrium, the quantities of water supplied to and demanded by these entities differ because of differences in (exogenously determined) supply-costs, transportation-costs and demand-prices. As such, partial equilibrium models are a means by which the relative economic valuation of water to different economic sectors can be incorporated into the water management decision making process.

In addition, they are a means by which the un-priced economic impacts of large storage projects (referred to by economists as externalities) can also be incorporated into the decision process. Economic externalities are a common result of large storage projects; examples include raised groundwater levels, increased drain returns, new recreational features, and improved wildlife and aquatic habitat. All of which are generally un-priced.

The modeling approach of this proposal builds on the Boise Valley spatial water allocation modeling work conducted under S&T project proposal # 5330 in 2007 and 2008. The model developed as part of this S&T project demonstrated a methodology for coupling a conjunctive groundwater model with a partial equilibrium economic model. The MODFLOW and GFLOW software packages were used to model hydrologic interactions between irrigation districts, canal diverters, drain water irrigators and groundwater pumpers in the Boise Valley. The GAMS software package was used to model the economics of water supply and demand for these entities. Model scenarios were developed to investigate management options associated with new water conservation measures and market-based water trading between these water suppliers and demanders. The development and application of the conjoined Boise Basin spatial water allocation model will take place in three phases.

Phase I will involve an investigation to determine which existing Boise river-reservoir models have the greatest potential to link with the existing Boise Valley conjunctive groundwater model and the partial equilibrium economic model. The Phase I investigation will allow for the fact that more than one river and reservoir modeling option exists, and that there is a need for future flexibility in developing these conjoined modeling tools. The linkage between a selected river-reservoir model and the conjunctive groundwater model will also be accomplished in Phase I. It is anticipated that the river-reservoir model, which will include irrigation demands and reservoir operations, will be linked to the conjunctive groundwater model via sub-surface river gain and loss calculations. Phase I is expected to be completed by the end of 2009.

Phase II will involve developing the linkage between the selected river-reservoir model and the partial equilibrium economic model. River-reservoir model linkage to the partial equilibrium economic model will occur in the same way that the current conjunctive groundwater model is linked, via development of hydrologic response functions and conversion of response functions to price-quantity water supply functions. The fully developed Boise Basin spatial water allocation model, with linkages between the river-reservoir model, the conjunctive groundwater model, and the partial equilibrium economic model is expected to be completed in 2011.

Phase III will involve application of the fully developed Boise Basin spatial water allocation model. Scenarios representing Regional water supply and demand conditions likely to result from climate change, including decreased precipitation, decreased streamflow, reduced aquifer recharge, and increased competition among water users will be developed. Various management responses to these changes in water supply and demand, including new reservoir storage, new conservation measures, water rights re-distribution, and market-based water trades, will then be imposed on these model scenarios. Model visualization tools will be developed to aid in the presentation and understanding of spatial water allocation model results. Phase III will be completed in 2012.

RECIPIENT INVOLVEMENT

The current proposal will expand on this basic spatial water allocation model by including water management options associated Reclamations operation of the Boise River and reservoir system. This will be accomplished by linking the current Boise Valley MODFLOW hydrologic model and GAMS partial equilibrium economic model with a Boise River and reservoir storage and distribution model. The conjoined models will then be used to represent various climate change scenarios with altered Boise Basin water supply and demand conditions.

The University of Idaho, over the past four years, has put together an inter-departmental team of researchers that is able to provide this unique combination of modeling expertise. This project involves a further expansion of the basin-wide coupled hydrologic and economic model to include not only conjunctive groundwater and surface water interactions, but also river-reservoir operations. Collaboration between Reclamation hydraulic engineers and University of Idaho hydrologists and economists will be essential for meeting the objectives of this new study.

RECLAMATION INVOLVEMENT

The Bureau of Reclamation will be involved in this project in a management role. Reclamation will provide technical support, per review, and technical advice. This agreement is part of the Cooperative Ecosystem Studies Units (CESU) network of cooperative units established to provide research, technical assistance, and education to resource and environmental managers. Specifically, the Pacific Northwest CESU (agreement number 05 FC 10 1192).

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 the following criteria:

(4) UNIQUE QUALIFICATIONS

The University of Idaho participants have tremendous experience with the modeling systems used in this study. Given their expertise, having them perform the task of coupling the different models into one would minimize the time and problems that would arise if the work was done by someone else. The University has developed a close working relationship with Reclamation based on their expertise and proximity to the project location with their Idaho Water Center, located in Boise, Idaho.

The development of coupled hydrologic and economic models requires in-depth theoretical knowledge of both conjunctive hydrologic modeling and partial-equilibrium economic modeling. University of Idaho researchers Garth Taylor, Bryce Contor, Leroy Stodick and RD Schmidt provide this unique combination of hydrologic and economic modeling expertise, which is unavailable at other universities. Their collaboration with Reclamation hydraulic engineers will be essential for meeting the objectives of this research project.

Garth Taylor (Univ. of Idaho economist) and Bryce Contor (University of Idaho hydrologist) developed an water demand and production calculator (IDEP) which generates agricultural and M&I demand-price functions that are specific to Idaho (IWRRI, 2008). Leroy Stodick (University of Idaho systems analyst) developed the GAMS-based partial- equilibrium economic model that calculates water supply and demand, and water prices which maximize the economic utility (sum of producer and consumer surplus) of water.

STATUTORY AUTHORITY

Consolidated Appropriations Act, 2008 -- SEC. 204 (Public Law 110-161). The Secretary of the Interior, acting through the Commissioner of the Bureau of Reclamation . . . Provided further, that this section shall not supercede any existing project-specific funding authority: Provided further, that the Secretary is also authorized to enter into grants or cooperative agreements with universities or non-profit research institutions to fund water use efficiency research.

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