

**Idaho Water Resources Research Institute
Annual Technical Report
FY 2012**

Introduction

The Idaho Water Resources Research Institute (IWRRI) is housed at the University of Idaho. IWRRI is dedicated to supporting and promoting water and water-related research, education, and information transfer throughout Idaho. IWRRI collaborates with researchers and educators from all Idaho state universities; staff of local, state, and federal agencies; and private water interests. The IWRRI is the only mechanism in the state that provides an autonomous statewide source of support for water research and training without regard to specific topic or discipline area. This is important because Idaho's water problems cross multiple topics and disciplines and compartmental approaches to these problems are less effective. IWRRI is relied upon by state and federal agencies and private water interests to provide the objective expertise to address the needs of the state and region. The Institute has been a strong proponent of education and outreach for both youth and adult audiences. It is through education that the public can make informed public policy decisions concerning water. It is also through education that individual citizens become engaged in the process through adjustments of their own attitudes and lifestyles.

Research Program Introduction

The Idaho Water Resources Research Institutes research program is comprised of the following objectives: (1) To work with state and federal agencies and non-government organizations to identify water research needs of the state and region; (2) To promote water-related research relevant to state and regional needs; (3) To stimulate, coordinate, and provide leadership for water resources research within Idaho universities and collaborate with sister institutions in adjoining states; (4) To cooperate with and assist state and federal agencies and non-governmental organizations for the benefit of the citizens of Idaho and the region; and (5) To develop funding for needed research and encourage cooperation with other research organizations.

The projects funded during the 2012 104B Program Fiscal Year spanned a variety of water resource issues that are important to maintaining Idaho's most precious resource. These projects include: understanding the ecosystem services in our river basins; developing a conjunctive planning model for Idaho's most important water resource; developing a better understanding of water quality conditions in the Treasure Valley; and investigating the inter-relationship between salmon spawning and geomorphic changes in Idaho's high mountain streams.

An additional research activity was to be initiated in 2012, this being a project that would provide a better understanding of the sources of nutrient pollution (Phosphorous and Nitrogen) entering the Boise River. However, due to delays in setting up project accounts, the initiation of this project's activities (Project 2012 ID 182B) was delayed until March 1, 2013, and this project will be completed during the FY 2013 project year.

Developing a Conjunctive Water Resources Planning and Management Model for the Eastern Snake River Plain

Basic Information

Title:	Developing a Conjunctive Water Resources Planning and Management Model for the Eastern Snake River Plain
Project Number:	2012ID178B
Start Date:	3/1/2012
End Date:	2/28/2013
Funding Source:	104B
Congressional District:	ID 2
Research Category:	Engineering
Focus Category:	Management and Planning, Drought, None
Descriptors:	
Principal Investigators:	Jae Ryu

Publications

1. Acharya A., Ryu, J. H. 2013. Streamflow disaggregation using a relatively simple method for regulated and unregulated waterways , Journal of Hydrological Engineering (in press)
2. Sohrabi, M., Ryu, J H., Abatzoglou, J., Tracy, J. 2013. Climate extreme and its linkage to regional drought over Idaho, USA , Natural Hazards, 65:653-681
3. Ryu, J H., Contor, B., Johnson, G., Allen, R., Tracy, J. 2012. System Dynamics to Sustainable Water Resources Management in the Eastern Snake Plain Aquifer under Water Supply Uncertainty , Journal of the American Water Resources Association, 48(6), 1204-1220
4. Ryu, J H., Contor, B., Johnson, G., Allen, R., Tracy, J. 2012. System Dynamics to Sustainable Water Resources Management in the Eastern Snake Plain Aquifer under Water Supply Uncertainty , Journal of the American Water Resources Association, 48(6), 1204-1220

1. **Title:** Developing a Conjunctive Water Resources Planning and Management Model for the Eastern Snake River Plain

2. **Project Summary:**

The management and control of water supply in the Snake River Basin is critical to the economic development of the arid portions of southern Idaho. The expansion of groundwater irrigation on the Eastern Snake River Plain (ESRP) and the improved efficiencies in surface water irrigation application continue to threaten reliable water resources in groundwater discharge from the Eastern Snake Plain Aquifer (ESPA) into the Snake River Canyon. Many federal, state, and local agencies have put a lot of effort to better manage the ESPA through a Comprehensive Aquifer Management Plan (CAMP) processes. Although the Snake River Planning Model (SRPM) developed and applied by Idaho Department of Water Resources (IDWR) to better manage water resources in ESPA, the reservoir operation model is not fully incorporated in the model. In this research, we investigate the reservoir operation capability to enhance adaptive management strategies for the CAMP associate with climate change scenarios.

Climate change continues to threaten reliability of regional water resources in the western United States. Early snowmelt and water dispute potentials induce water managers and planners to develop proactive adaptive management strategies to mitigate future climate impacts. The ESPA is also facing these challenges in the sense that population growth and economic development strongly depend on reliable water resources from underground storage. Persistent water shortage and subsequent water conflict often drive scientific research and political agendas because water resources availability and aquifer management for a sustainable rural economy are of great interest. IDWR, in particular, has put a lot of efforts to develop a new water management tool to be used for managing surface water and groundwater as a single source (Vincent, personnel communication, May 27, 2011). But, the tool known as Snake River Planning Model (SRPM) (IWRB, 1972) is not yet implemented to pursue a shared-vision water resources planning among local stakeholder groups. A key limitation to the current planning model is that it does not account for the groundwater/surface water interactions that are critical to planning conjunctive management in the basin.

In this study, we propose a new modeling framework using Riverware software to characterize water flux dynamics between surface and groundwater interactions. This project has three major benefits: (1) it tests the ability of Riverware to be used to model conjunctive management as it relates to the Snake River system without the time and expense of developing a completely new reservoir operations model, (2) uncertainties in estimates of tributary underflow, natural recharge, crop selection, and irrigation methods is quantified, while (3) initiating a project that could potentially lead to the development of a new state of the art planning and management model to complement IDWR's groundwater model, the Eastern Snake Plain Aquifer Model (ESPAM). While the first benefit focuses on providing practical support to IDWR, from a scientific perspective, the second benefit is the most intriguing.

A series of research tasks has been completed over last several months. The first step in carrying out the project was to create a modeling framework in Riverware to represent the

groundwater/surface water and natural recharge components of the water budget within the Salmon Tract, which is part of ESPA region (See Figure 1). Initial inputs were assembled from the ESPAM model into a spreadsheet format linked with the model developed in Riverware.

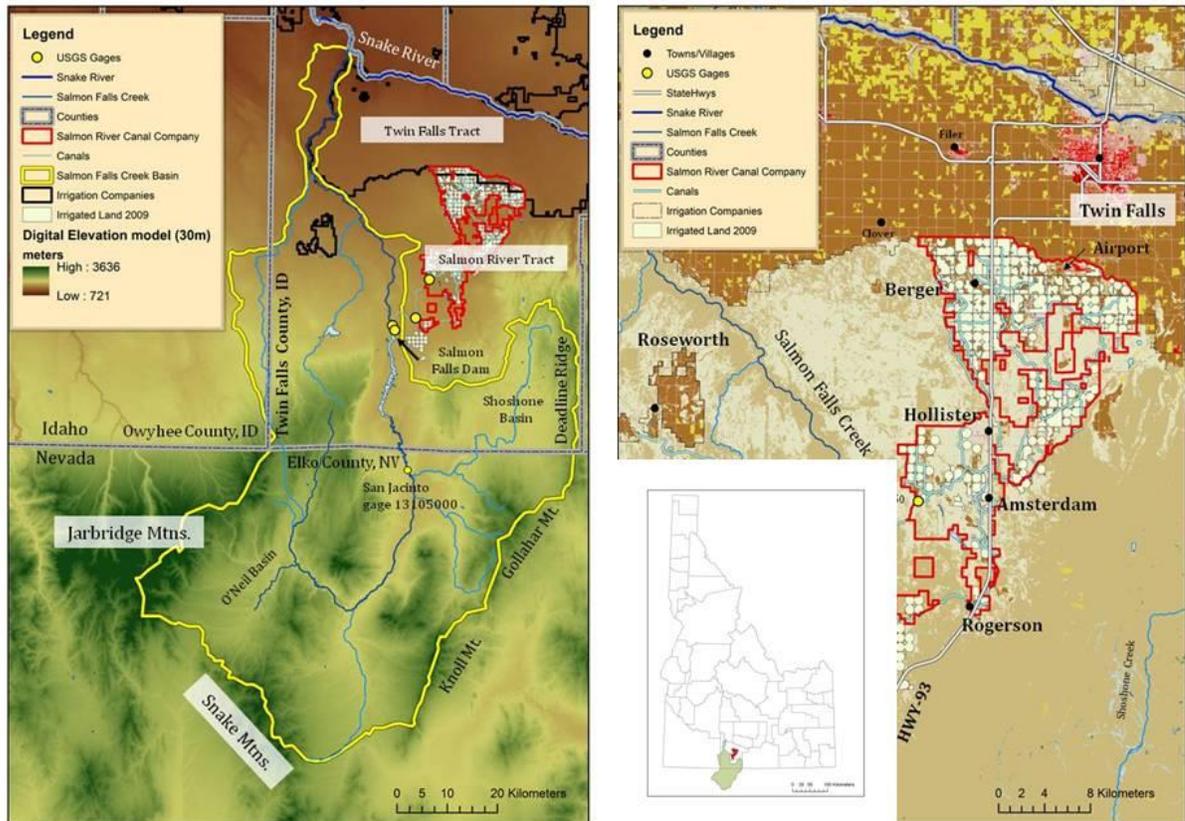


Figure 1. The Salmon Falls Creek Basin (shown in green) and Salmon Tract (shown in red outline) located in southern Idaho and northern Nevada

The best records possible would then extend ESPAM records back to 1928. During the calibration process other data sources and recharge assumptions could be applied within the response function framework to improve our understanding of how uncertainties in assumptions, inputs, and data sources affect our understanding the ESRP aquifer. The objective of the research is to produce a reasonably accurate groundwater/surface modeling framework for a future reservoir (surface-water) management model that would be directly compatible with ESPAM in Riverware settings (See Figure 2).

Smith, M.B., Koren, V., Zhang, Z., Zhang, Y., Reed, S.M., Cui, Z., Moreda, F., Cosgrove, B.A., Mizukami, N., Anderson, E.A., DMIP 2 Participants (Ryu, J.H.), 2012. "Results of the DMIP 2 Oklahoma experiments", *Journal of Hydrology*, 418-419, 17-48

Presentations (*, # indicates a graduate student and postdoc co-author, respectively)

Ryu, J.H., 2013, "Toward Visualizing Big Drought Data for Data-Intensive Decision Making", ASCE World Environmental and Water Resources Congress, May 19-23, Cincinnati, Ohio

Ryu, J.H., 2013, "Decision Support Tools for Conflict resolution and Sustainable Water Resources Planning and Management: After Pete's approach", ASCE World Environmental and Water Resources Congress, May 19-23, Cincinnati, Ohio

*Kim, Jungjin, M, Ryu, J.H., 2013, "Mapping Drought Vulnerability Driven by Future Climate Change and Variability in South Korea", ASCE World Environmental and Water Resources Congress, May 19-23, Cincinnati, Ohio

*Sohrabi, M, Ryu, J.H., 2013, "Development of Multi Scalar-Soil Moisture Drought Index", ASCE World Environmental and Water Resources Congress, May 19-23, Cincinnati, Ohio

*Kim, J.J., Hoekema, D., Ryu, J.H., 2013, "Validating Local Droughts to Enhance Climate-Resilient Agricultural Water Management in Idaho", 2013 NSF EPSCoR Tri-State Meeting, University of Nevada at Las Vegas, March 27-28, Las Vegas, Nevada

Ryu, J.H., 2012, "Decision Support Tools for Drought Monitoring Management and Forecasting in the State of Idaho", 2012 Annual Water Resources Conference, American Water Resources Association, Hyatt Regency Jacksonville Riverfront, November 12-15, Jacksonville, Florida

Ryu, J.H., 2012, "Toward Mapping Gridded Drought Indices to Mitigate Drought Impacts in a Rapid Changing Global Environment", 3rd Annual Pacific Northwest Climate Science Conference, October 1-2, Boise Centre, Boise, Idaho

Ryu, J.H., 2012, "Development of Sustainable Water Resources System Against Uncertain Future Climate and Drought for the Seomjin River System, Korea", 18th Congress of the Asia and Pacific Division of the International Association for Hydro-Environment engineering and Research , August 19-23, Jeju Island, Korea

*Hoekema, D., Ryu, J.H., 2012, "Using Satellite Imagery to Estimate Aquifer Recharge from Irrigated Agriculture", ESRI International User Conference, July 23-27, San Diego, California

Ryu, J.H., 2012, "A Decision Support Systems to Mitigate Water Conflicts amongst Agriculture, Hydro, and Municipal Water Users", Universities Council on Water Resources, July 17-19, Santa Fe, New Mexico

*Sohrabi, M., Ryu, J., 2012, “Spatial and Temporal Analysis of Climatic Extremes in the Mountainous Regions of Iran”, International Conference on Climate Change: Impacts and Responses, University of Washington, July 12-13, Seattle, Washington

*Hoekema, D., Ryu, J.H., 2012, “Calculator: Optimized Surface Water Allocation in Drought (OSWAD)”, 93rd Annual Meeting of the AAAS Pacific Division, Boise Convention Center, June 24-27, Boise, Idaho

#Acharya, A., Ryu, J.H., 2012, “Impacts of Climate Change on Hydrologic Drought in an Agriculture-dominated Watershed in the United States”, ASCE World Environmental and Water Resources Congress, May 20-24, Albuquerque, New Mexico

*Hoekema, D., Ryu, J.H., 2012, “Investigating Economic Impacts of Agricultural Drought Using System Dynamics”, ASCE World Environmental and Water Resources Congress, May 20-24, Albuquerque, New Mexico

Ryu, J.H., 2012, “Drought Monitoring, Forecasting, and Management in the 21st Century: Issues and Challenges”, ASCE World Environmental and Water Resources Congress, May 20-24, Albuquerque, New Mexico

Working Papers (*, # indicates a graduate student and postdoc co-author, respectively)

*Sohrabi, M., Ryu, J.H., Abatzoglou, J., Tracy, J. 2013. “Development of Multi Scalar-Soil Moisture Drought Index”, Journal of Hydrological Engineering

Thesis Research

David Hoekema “Economic-based System Dynamics for Conjunctive Water Management in the Eastern Snake Plain Aquifer”, Expected graduation summer 2016

Jungjin Kim “Drought Visualization using Big Data Inputs to Mitigate Climate-Driven Future Drought”, Expected start of field work June 2013

Mohammad Sohrabi “Development of Soil-Moisture Drought Index to Characterize Hydrological Drought in the Mountain West”, Expected graduation summer 2016

An Ecosystem Services Analysis of the Boise River Basin

Basic Information

Title:	An Ecosystem Services Analysis of the Boise River Basin
Project Number:	2012ID179B
Start Date:	3/1/2012
End Date:	9/30/2013
Funding Source:	104B
Congressional District:	ID 1
Research Category:	Social Sciences
Focus Category:	Economics, Ecology, Water Use
Descriptors:	
Principal Investigators:	Scott Lowe

Publication

1. Archived report (Idaho Rivers United): “Boise River Basin Ecosystem Services Assessment Project: Preliminary Analysis”. Submitted -- August 2012

Project Summary

The goal of the project was to hire undergraduate students to identify and (if possible) measure the ecosystem services provided by the Boise River Basin (BRB). This effort would include an initial review of literature (and data, if available), and an analysis of the ecosystem services associated with the BRB. Four areas of emphasis were identified: First, a large-scale identification of all *potential* ecosystem services in the BRB; second, a collection of economic analyses of the ecosystem services in the BRB; third, a review of external studies that have presented valuations for the (similar) ecosystem services identified in area of emphasis one, above; fourth, a review of existing local and regional data that can be used to address the deficiencies in measures of ecosystem services in the BRB.

The large-scale identification of the potential ecosystem services associated with the BRB included 33 major categories, which were further consolidated into three refined categories: Provisioning Services, Cultural Services, and Regulating and Supporting Services. Although there is some overlap between categories, each of these three encompasses all of the services potentially provided by an ecosystem. To ensure the ecosystem services list reflects local concerns and priorities, a group of Boise State University and University of Idaho faculty, undergraduate students, and representatives from the local non-profit community, in conjunction with the USGS and the IWRRI, held a stakeholder meeting on March 7th, 2012 to identify the ecosystem services associated with the BRB, and to begin to identify data that might be available to qualify or quantify some of these ecosystem services. The stakeholders in attendance included:

1. Idaho Rivers United
2. Trout Unlimited
3. Audubon
4. Land Trust Treasure Valley
5. Idaho Gold Prospectors Association
6. Community Planning Association of Southwest Idaho
7. Idaho Angler
8. Federation of Fly Fishers
9. Idaho City Chamber of Commerce
10. Ada County Association of Realtors
11. Idaho Fish and Game - SW Region
12. Idaho Dept of Water Resources
13. State Floodplain Manager
14. Idaho Parks and Recreation
15. Bureau of Reclamation
16. Snake River Area Office
17. City Representatives (Caldwell, Eagle, Boise)
18. Ada County Parks and Waterways
19. Idaho Power
20. United Water Idaho
21. Idaho Water District 63
22. Boise Project Board of Control
23. Ada Soil and Water Conservation District
24. Tribal nations
25. Golden Eagle Audubon Society
26. US Fish & Wildlife Service
27. Boise Smart Growth
28. Idaho Conservation League
29. Nature Conservancy
30. Bureau of Land Management
31. Army Corps of Engineers
32. Idaho Department of Environmental Quality
33. Idaho Department of Lands
34. Local Businesses (Amalgamated Sugar Company)

The stakeholders attended a 4 hour meeting in which they were presented with a brief discussion of what ecosystem services are, given the delineation of the Boise River Basin, and then were asked to brainstorm within groups about the ecosystem services that they could identify within the Boise River Basin.

We were able to hire three undergraduate students to help with the project. Together, they facilitated the stakeholder meeting, collected information from the stakeholder meeting, conducted a literature review, collected data on the BRB and developed a report for Idaho Rivers United.

Currently one of the undergraduate students (Brice Froshhauser) employed through the grant is continuing the research by focusing on the qualification and quantification of three ecosystem services associated with the BRB: local agriculture, recreation, and health. We anticipate that this research will result in a supplementary report for Idaho Rivers United. In addition, the research conducted by the undergraduate students has resulted in data and literature that was used to develop a USGS Climate Science Center proposal that is currently under consideration, a proposal that includes graduate funding for ecosystem services research at Boise State University.

Publications Resulting from the Project

Archived report (Idaho Rivers United): “Boise River Basin Ecosystem Services Assessment Project: Preliminary Analysis”. Submitted -- August 2012

Undergraduate Student Researchers supported on the project

Brice Froshhauser – BA Economics/German; current status: senior (will graduate spring 2014)

Richae Swanbeck – BBA Economics; graduated summer 2012

Jesse Rosenthal – BBA Economics; graduated spring 2013

Notable Achievements or Awards

One additional funding application was made (pending) – for the USGS Northwest Climate Science Center (FY 2014 RFP) with Jason Kreitler (PI), Nicole Vaillant, Joel Sankey and Todd Hawbaker.



Webcam screen grab from the Boise River Basin Ecosystem Services Roundtable

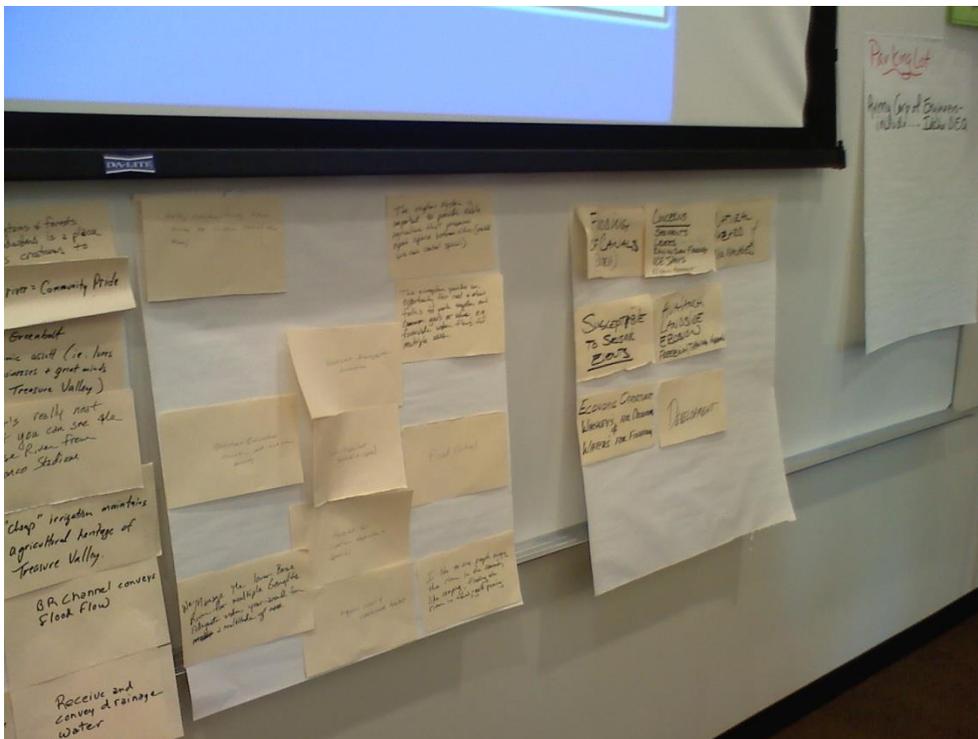


Photo of the ecosystem services brainstorming session

Characterizing Boise River Watershed Water Quality Using BASINS Modeling

Basic Information

Title:	Characterizing Boise River Watershed Water Quality Using BASINS Modeling
Project Number:	2012ID182B
Start Date:	3/1/2012
End Date:	2/28/2014
Funding Source:	104B
Congressional District:	ID 1
Research Category:	Water Quality
Focus Category:	Non Point Pollution, Water Quality, Models
Descriptors:	
Principal Investigators:	Shawn Benner

Publications

There are no publications.

Characterizing Boise River Watershed Water Quality Using BASINS Modeling

The start of this project was delayed until March 1, 2013 due to delays in setting up project accounts. This project will be completed during the 2013 Project Year and there is no progress to report during the 2012 Project Year.

The geomorphic signature of salmon: quantifying the impact of spawner density on stream bed morphology and habitat for future spawners to inform water resources management

Basic Information

Title:	The geomorphic signature of salmon: quantifying the impact of spawner density on stream bed morphology and habitat for future spawners to inform water resources management
Project Number:	2012ID183B
Start Date:	3/1/2012
End Date:	2/28/2013
Funding Source:	104B
Congressional District:	ID 1
Research Category:	Climate and Hydrologic Processes
Focus Category:	Hydrology, Ecology, Geomorphological Processes
Descriptors:	
Principal Investigators:	Alexander K. Fremier, Elowyn Yager

Publications

There are no publications.

Project Summary - A one to two page description of the work completed up to 2/29/12 for the project and any significant results produced by the project. If the project was completed during the reporting period, please note this in the summary. Also, providing one to two graphics in the summary would help the overall look of Idaho's annual report.

The geomorphic signature of salmon: Population density-dependent feedbacks are a foundational driver of ecological dynamics. However, the scientific community lacks a mechanistic understanding of density-dependent feedbacks where biology interacts with geophysical systems, largely because of the difficulty of extrapolating from laboratory studies to the field. Together with Drs. Elwyn Yager (UI) and John Buffington (RMRS), we are simulating salmon nest (termed redds) construction under experimental conditions (a hydraulic flume) to investigate how salmon density impact stream morphology.



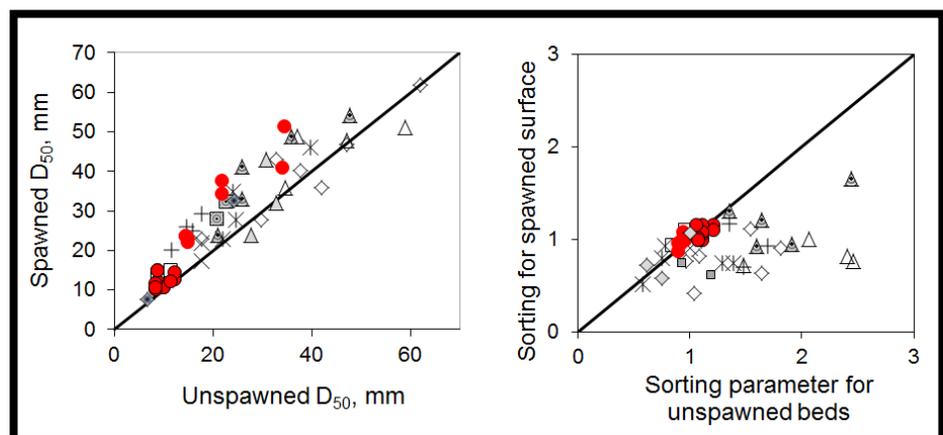
SIMULATED REDDS IN A FLUME

Over the last year we have successfully simulate redd structures in the flume to better understand how salmon alter particle orientation and grain size distributions. We first compared simulated redds to field redds. In 2012 we measured redd dimensions in Kennedy Creek to compare. The graph below shows how our simulated redd are quantitatively similar to field

measured redd (redd symbols are flume redds).

Our primary study aim is to describe the fundamental equations of sediment transport across varying densities of spawning salmon so we are currently working on a set of manuscripts to quantify how salmon alter bed 'packing'. This work will be submitted for publication early this fall. In work this fall we will again measure actual redds over a gradient of rain-to-snow melt dominated river systems to quantify the persistence of the redd structure. We expect to describe equations to predict climate impacts on hydrology patterns and changes in the fine-grained sediment that is delivered to stream beds in the presence of spawning salmon. This model system enables us to understand the complex feedbacks between organisms and their environment and has significant applied implications for restoring salmon worldwide.

Our work is funded by a USGS 104b and a USDA McIntire-Stennis grant. The USGS 104b grant supported one full year of Todd Buxton's dissertation work. He is a PhD student at UI. The grant also supported one field technician. Cindy Adams was a MS student at UI at the time.



Publications Resulting from the Project Please include refereed journal articles, archived reports, conference proceedings and web-page publications. Also note if these publications are submitted, accepted, in-press, or published.

No publications submitted yet. One web-page ScienceNews write up (see below).

Undergraduate and Graduate Student Researchers supported on the project Please provide name of student, what degree they are working on, and whether they are still working on their degree or have graduated from your programs.

Our work is funded by a USGS 104b and a USDA McIntire-Stennis grant. The USGS 104b grant supported one full year of Todd Buxton's dissertation work (Water Resources). He is a PhD student at UI. The grant also supported one field technician. Cindy Adams was a MS student at UI at the time (Environmental Science).

Notable Achievements or Awards Basically if there is something to brag about with your project, put this in. Examples are publications that resulted in awards, grad student thesis awards, projects that led to other sources of funding, etc. This is not required for each project, but having a few projects with this section filled in helps justify the national program.

Three manuscripts in preparation.

Buxton, T.*, J.M. Buffington, E.M. Yager, A.K. Fremier, M.A. Hassan. 2012. The influence of salmonid spawning on grain architecture, critical bed shear stress, and bed load transport in streams. American Geophysical Union, San Francisco, CA (presentation)

Buxton, T. J.M. Buffington, E.M. Yager, A.K. Fremier. 2013. The influence of salmon spawning on grain architecture, critical bed shear stress, and bed load transport in streams with implications for fisheries restoration and management. Western Division American Fisheries Society, Boise, ID. (presentation)

T. Buxton written up in InsideScience.org science blog (December 6, 2012) after AGU presentation. <http://www.insidescience.org/content/salmon-agents-riverbed-erosion/866>

Information Transfer Program Introduction

The Idaho Water Resources Research Institutes Outreach and Information Transfer program is comprised of the following objectives: (1) To encourage and facilitate public involvement in water resource programs within the state; and (2) To promote water education within the state at the K–12, undergraduate and graduate levels.

During the 2012 Program Year, 104B program and state funds were used to support two Outreach and Information Transfer Projects, these being the Idaho Water Resources Outreach and Engagement Effort, and the Development of the Idaho Watershed Digital Library.

Development of the Idaho Watershed Digital Library

Basic Information

Title:	Development of the Idaho Watershed Digital Library
Project Number:	2011ID175B
Start Date:	3/1/2011
End Date:	2/28/2013
Funding Source:	104B
Congressional District:	1
Research Category:	Not Applicable
Focus Category:	Management and Planning, Law, Institutions, and Policy, Methods
Descriptors:	
Principal Investigators:	Devin Becker, Jodi Haire

Publication

1. <http://www.lib.uidaho.edu/digital/iwdl/index.html>

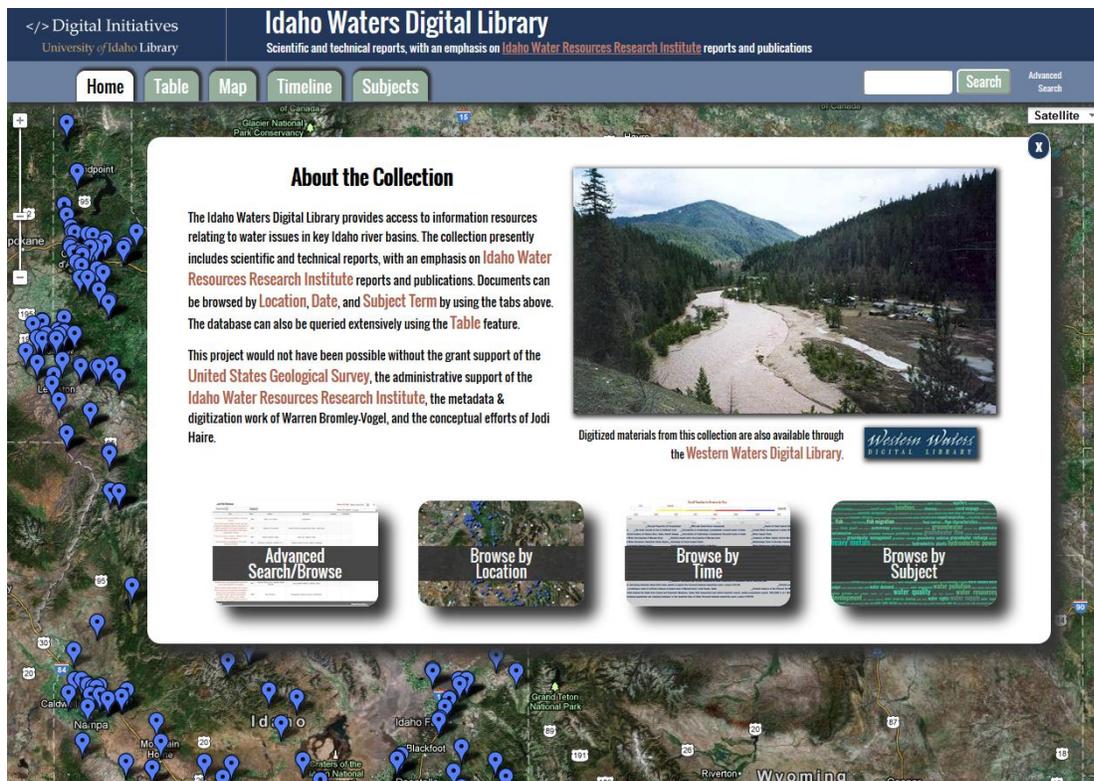
2011 ID175B – Development of the Idaho Watershed Digital ... Devin Becker

Project Summary :

This first stage of development for the Idaho Waters Digital Library (IWDL) was completed during this funding year. The Idaho Waters Digital Library provides access to information about water issues in key Idaho river basins with particular emphasis on the Coeur d'Alene and Boise Basins. The collection presently emphasizes Idaho Water Resources Research Institute (IWRI) reports and publications from 1958 to 2012. The project was initiated in 2008 by Jodi Haire, electronic resources and serials coordinator, as the basis for her master's degree in environmental science from the University of Idaho. This grant supported the expansion and re-design of the digital library itself.

To complete this project, we took a number of progressive steps. First, we purchased an Epson Feed Scanner to facilitate the scanning of documents for the collection. Then, we hired a part-time assistant, Warren Bromley-Vogel, to complete the scanning and metadata creation for the documents. Mr. Bromley-Vogel then worked diligently over the course of 8 months to digitize and describe over 430 documents, some of which were over 300 pages in length. We loaded these documents into our CONTENTdm database on a rolling basis. We then used that database as the backend for the creation of our front end digital library.

After 481 documents were in the database, we designed a new interface for the collection that allowed a user to browse the documents by related location, date of publication, and subject term. The site also includes advanced search and interactive map browsing capabilities. The images below illustrate the various pages and interfaces by which users can search and browse the collection. Users who come to the site now have a number of easy-to-use tools at their disposal, which should allow them to quickly find and read and/or download the documents they seek.



1) The Idaho Waters Digital Library homepage (<http://www.lib.uidaho.edu/digital/iwdl/index.html>)

Publications Resulting from the Project

The main publication for this project was the Idaho Waters Digital Library website itself, which can be found here: <http://www.lib.uidaho.edu/digital/iwdl/index.html>

With the release of the website, we also published a press release that went out to the University of Idaho and local press outlets. It is pasted below:

April 9, 2013

Media Contact: Beth Canzoneri, University of Idaho Library, (208) 885-6066, bcanzoneri@uidaho.edu

New Version of Idaho Waters Digital Library Increases Resources, Search Options

MOSCOW, Idaho – The University of Idaho Library’s Digital Initiatives department is pleased to announce the release of the new and improved [Idaho Waters Digital Library](#).

The Idaho Waters Digital Library provides access to information about water issues in key Idaho river basins with particular emphasis on the Coeur d’Alene and Boise Basins. The collection presently emphasizes Idaho Water Resources Research Institute (IWRRI) reports and publications from 1958 to 2012.

The project was initiated in 2008 by Jodi Haire, electronic resources and serials coordinator, as the basis for her master’s degree in environmental science from the University of Idaho.

“The Idaho Waters Digital Library was the first digital collection ever published by the University of Idaho Library,” said Devin Becker, digital initiatives librarian. “With the addition of new search features and documents, we can now offer the people of Idaho and the region enhanced access to current and historical water research.”

The collection was selected for inclusion in the [Western Waters Digital Library](#), which provides access to “digital collections of significant primary and secondary resources on water in the Western United States.”

The redesigned Idaho Waters Digital Library includes Haire’s initial work, as well as more than 400 new documents that were digitized, described and uploaded using funds from a United States Geological Survey grant administered by IWRRI.

The collection will be updated on a rolling basis with the hope that it will include a complete run of IWRRI documents by the year 2015. Questions and comments may be directed to Devin Becker at dbecker@uidaho.edu.

The University of Idaho Library’s Digital Initiatives department works to preserve, create and make accessible collections from the library, the University of Idaho and the state of Idaho via its digitization database and digital archiving services.

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About the University of Idaho

The University of Idaho inspires students to succeed and become leaders. Its land-grant mission furthers innovative scholarly and creative research to grow Idaho’s economy and serve a statewide community. From its main campus in Moscow, Idaho, to 70 research and academic locations statewide, U-Idaho emphasizes real-world application as part of its student experience. U-Idaho combines the strength of a large university with the intimacy of small learning communities. It is home to the Vandals, and competes in the Western Athletic Conference. Through the university’s \$225 million Inspiring Futures capital campaign, private giving will enhance student learning, faculty research and innovation, and a spirit of enterprise. Learn more: www.uidaho.edu.

Undergraduate and Graduate Student Researchers supported on the project: None

Notable Achievements or Awards:

While the IWDL has only been up for about three months as of the writing of this report, the web traffic and response generated by users has been encouraging. We have received positive feedback from a number of interested parties, with a special notice from directors of the The IDAH2O Master Water Steward program. We have received over 1400 pageviews and 600 unique page views during the three months the collection has

been released. If these numbers hold, we would expect over 2400 people each year to visit the collection, with many of these users becoming returning visitors.

This collection has also been selected for inclusion in the [Western Waters Digital Library](#), which provides access to “digital collections of significant primary and secondary resources on water in the Western United States.”

The Idaho Water Resources Outreach and Engagement Project

Basic Information

Title:	The Idaho Water Resources Outreach and Engagement Project
Project Number:	2012ID181B
Start Date:	3/1/2012
End Date:	2/28/2014
Funding Source:	104B
Congressional District:	ID 1 and 2
Research Category:	Not Applicable
Focus Category:	None, None, None
Descriptors:	
Principal Investigators:	John C. Tracy, Julie Scanlin

Publications

There are no publications.

Idaho Water Resources Outreach and Engagement Project Summary

A summary of this project's outputs and outcomes is given below based on the activities described in the project proposal.

Bringing Water Resources Education to the K-12 Classroom

Approximately 225 teachers were trained during 12 accredited Water Education Workshops that were delivered at locations across Idaho. In addition, IWRRI participated as an i-STEM provider at the Idaho i-STEM summer institutes in Twin Falls and Boise and continued coordinated efforts with the Boise WaterShed, Idaho Water Education Foundation and the Idaho Department of Environmental Quality on various K-12 education and outreach efforts. IWRRI also trained 12 Project WET Facilitators, initiated training and development for Climate Science coursework and made presentations to teachers at the annual Idaho Science Teachers Conference, the Idaho Environmental Education Conference and Teacher's Night Out, with an estimated 250 teacher contact.

Providing Water Resources Experiential Learning to K-12 Students

IWRRI participated in youth outreach efforts across the state, including the Water Awareness week (over 7,000 attendees) events and provided materials and support for the Youth Water Festival in Moscow, Idaho.

The Idaho Water Resources Research Seminar Series

Beyond supporting K-12 education, IWRRI provided a state wide water resources seminar series during the Fall semester of 2012, delivered via a compressed video system to Boise, Moscow, Pocatello, Idaho Falls and Coeur d'Alene (13 seminars during the year with an average attendance in all locations of 25 people per seminar). During project year 2012, IWRRI expanded its reach across the state of Idaho, through increasing its seminar and professional outreach activities in Northern Idaho through collaborations with the University of Idaho Coeur d'Alene Center.

The Idaho Travel Grant Program

During Project Year 2012, travel support was provided to the Director of the Idaho Water Resources Research Institute, faculty and researchers at the University of Idaho. Support was provided for travel to attend: the 2012 Annual UCOWR Conference in Santa Fe, New Mexico, July 17 – 20, 2012 (Director and one faculty member); the 3rd Annual Pacific Northwest Climate Conference in Boise, Idaho, October 1 and 2, 2012 (multiple faculty members and graduate students); the Columbia River Treaty Symposium, October 10-12, 2012, in Polson, Montana (Director and Graduate Student); and the 2012 Annual AWRA Conference, November 12-15, 2012, in Jacksonville, Florida (Director and one faculty member).

Support for the 3rd Annual Pacific Northwest Climate Science Conference

The Third Annual Pacific Northwest Climate Science Conference was held at the Boise Centre Conference facility in Boise, Idaho on October 1 and 2, 2012. A complete agenda of the conference is provided in the Appendix to this report, along with links to each presentation made at the conference, including papers that were presented during the poster session. Overall there were over 50 oral presentations provided at the conference.

The morning for each day of the conference consisted of Plenary Sessions. Day 1 included a welcome to the conference by the Mayor of Boise, and leaders at the University of Idaho, a key note talk by Dr. Roger Pulwarty of the National Integrated Drought Information System, followed by a session addressing climate change impacts and adaptations within the Columbia Basin. The Plenary session for Day 2 included talks addressing the latest advances in understanding Climate Variability, Assessment of Vulnerabilities to Climate Change within the Pacific Northwest, and Communicating Climate Change to a wider audience.

The afternoon sessions for each day of the conference consisted of Concurrent Technical Sessions. The afternoon of October 1st included sessions on Climate Change impacts to: the region's hydrologic systems; conservation efforts; and agricultural systems. On October 2nd, the first afternoon track addressed climate change impacts to terrestrial and aquatic systems, with the second track focusing on adaptation strategies to address climate change and how human health is being impacted by climate change.

The poster session was held on the evening of October 1st, and was well attended, with over 50 posters being presented on a range of topics including climate change impacts to: hydrology; conservation, human health, agriculture. In addition, there were several papers addressing the role of Landscape Conservation Cooperatives in addressing climate change, communication of climate change to the public and methods for assessing the vulnerability of systems to climate change.

One of the primary goals of the conference was to provide a forum where resource managers in the Pacific Northwest region could communicate their challenges related to climate change with the scientific community researching the impacts of climate change. Thus, the conference was structured to stimulate both a place and resource based exchange of information and ideas related to climate, climate impacts and adaptation. To achieve this goal, there was a balance between presentations offered by the academic community (approximately 41% of the presentations) and governmental organizations (approximately 45% of the presentations), with the remaining 4% of the presentations provided by non-governmental entities.

The conference also focused on a combination of cross-cutting topics of relevance to multiple disciplines, as well as on clear practical applications of climate change science. Of the oral presentations, approximately 49% focused on case studies or applications of known science to resource management issues, 41% focused on advances in understanding of climate change impacts across the region, and 10% addressed approaches to better educate and engage the broader public in discussions related to climate change and its impacts on human and natural systems in the Pacific Northwest.

Overall the meeting was well attended, with 196 registered attendees, with approximately 25% of the attendees being undergraduate or graduate students from Universities within the region, 10% being from non-governmental entities and the remaining attendees being fairly equally split between academic and governmental organizations (both federal and state) located within the Pacific Northwest. The general feedback from the conference attendees was positive, in regard to the content of the information provided, the venue and the format of the meeting.

Additional Activities

In addition, during the 2012 Program Year, training opportunities for water professionals were continued through interactions with the Boise Watershed Center. The Institute has continued its support of the annual Idaho Environmental Education Conference. IWRRI also has the capacity to provide

statewide distribution of professional short courses and professional development workshop as available to statewide water professionals. IWRRI continues to network and coordinated to work on a regional level with other institutes and water research entities. Finally, the IWRRI continues its support of the Idaho State Chapter of the American Water Resources Association by recruiting members and providing sponsorship and publicity for several of its events.

During the current project year, IWRRI also developed the Western States Workshop on Remote Sensing of ET Applications in the Western United States, held on October in Boise, ID, October 24 – 26, 2012; sponsored the Palouse Water Summit, held in Moscow, ID in October of 2012; and the Idaho Water Users Conference, held in Boise, ID in January 2013.

USGS Summer Intern Program

None.

Student Support					
Category	Section 104 Base Grant	Section 104 NCGP Award	NIWR-USGS Internship	Supplemental Awards	Total
Undergraduate	3	0	0	0	3
Masters	2	0	0	0	2
Ph.D.	4	0	0	0	4
Post-Doc.	1	0	0	0	1
Total	10	0	0	0	10

Notable Awards and Achievements

While the IWDL has only been up for about three months as of the writing of this report, the web traffic and response generated by users has been encouraging. We have received positive feedback from a number of interested parties, with a special notice from directors of the The IDAH2O Master Water Steward program. We have received over 1400 page views and 600 unique page views during the three months the collection has been released. If these numbers hold, we would expect over 2400 people each year to visit the collection, with many of these users becoming returning visitors.

The IDWL collection has also been selected for inclusion in the Western Waters Digital Library, which provides access to “digital collections of significant primary and secondary resources on water in the Western United States.”

A graduate student working on Project 2012ID183B, T. Buxton, was written up in InsideScience.org science blog (December 6, 2012) after his AGU presentation.
<http://www.insidescience.org/content/salmon-agents-riverbed-erosion/866>