Water Resources Education & Research at the University of Idaho

Idaho Water Resources Research Institute
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IDAHO WATER RESOURCES RESEARCH INSTITUTE

Water of the West WoW

CENTER FOR ECOHYDRAULICS RESEARCH

University of Idaho
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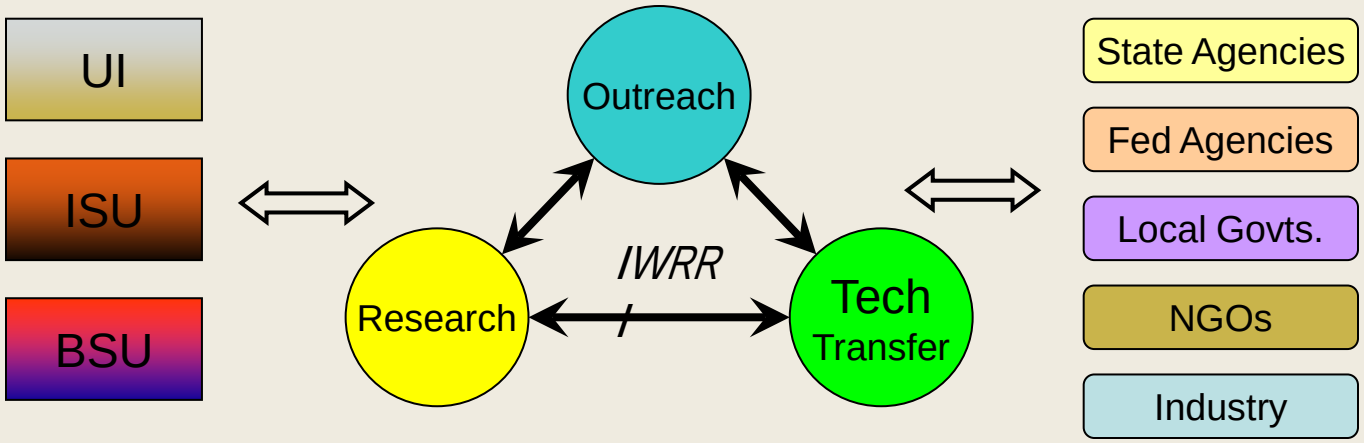
Water Resources: A State-Wide Strength

- Second largest diverter of water for agriculture in the US, second only to California.
- Largest source of energy production in Idaho is hydropower.
- More water is diverted for aquaculture than the rest of the US combined.
- More than 93,000 miles of streams in Idaho.
- Over 3000 miles of world class white water – more than the rest of the contiguous US combined (source: American Rivers)
- Each year more than 420,000 anglers fish Idaho streams. (Idaho's population is 1.4 million)
- Water resources are still able to be developed in Idaho.

Background

1963 – IWRRI Created by the Idaho Legislature to:

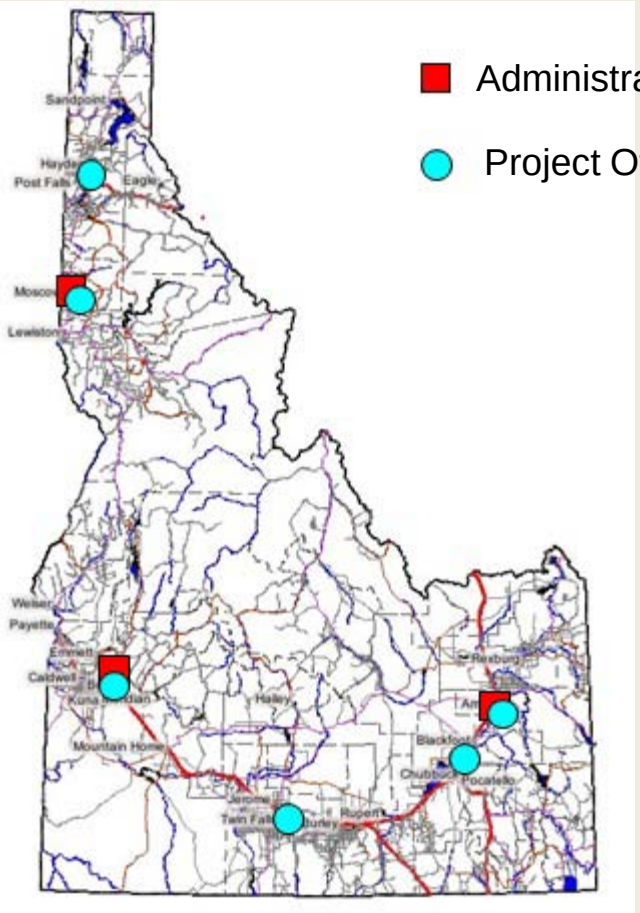
- Develop meaningful solutions for Idaho's water problems through interdisciplinary research;
- Provide high-quality natural resource educational support
- Transfer information and technologies to agencies, organizations, and individuals involved in water use, management and protection.



Background

IWRRI has offices in Boise, Idaho Falls and Moscow and funds additional research in Kimberly and Pocatello.

IWRRI Research is conducted throughout the state, region, nation and world.



Outreach Activities

K – 12 Teacher Education: Julie Scanlin Coordinator

- Project Wet
- Idaho Water Camp
- Stream Walk

IWRRI Hydrology Seminar Series

Approximately 20 Seminars per year over CV System
This semester Seminar is on Tuesday's at 12:30 PM.

- Boise – Idaho Water Center
- Idaho Falls – Idaho Science Center
- Pocatello – Idaho State University Campus
- Moscow – University of Idaho Campus
- Coeur d'Alene – University of Idaho Campus

Outreach Activities

Regional Conferences and Workshops

- Palouse Basin Water Summit – 2005 - 2010
- Idaho Water Resources Research Symposia, November 28-29, 2006
- The Energy-Water Nexus, A Science and Technology Summit, June 2007 (jointly with INL and Washington)
- University Council on Water Resources Annual Conference, July 2007
- University of Idaho President's Sustainability Symposium, October 2008
- Exempt Well Conference, May 2011 (jointly with Colorado, Montana, Oregon and Washington)

Education Activities

IWRRI Higher Education Mission

Supporting the development and coordination of Water Resources education at Idaho's Research Institutions (primarily graduate education)

Programs that have recently been developed

- University of Idaho
  - Waters of the West (2006)
  - Integrated Water Resources Degree Program (2007)

- Boise State University
  - Masters of Hydrology (2006)

Waters of the West
Interdisciplinarity in Water Resources

Steering Committee:

Jan Boll ***CALS***

Erik Coats ***ENGR***

Barbara Cosens ***LAW***

Fritz Fiedler ***ENGR***

Chuck Harris ***CNR***

- Gary Johnson ***COS***
- Brian Kennedy ***CNR***
- Tim Link ***CNR***
- Markus Tuller ***CALS***
- Barbara Williams ***CALS***
- Manoj Shrestha ***CLASS***

Waters of the West (WoW)

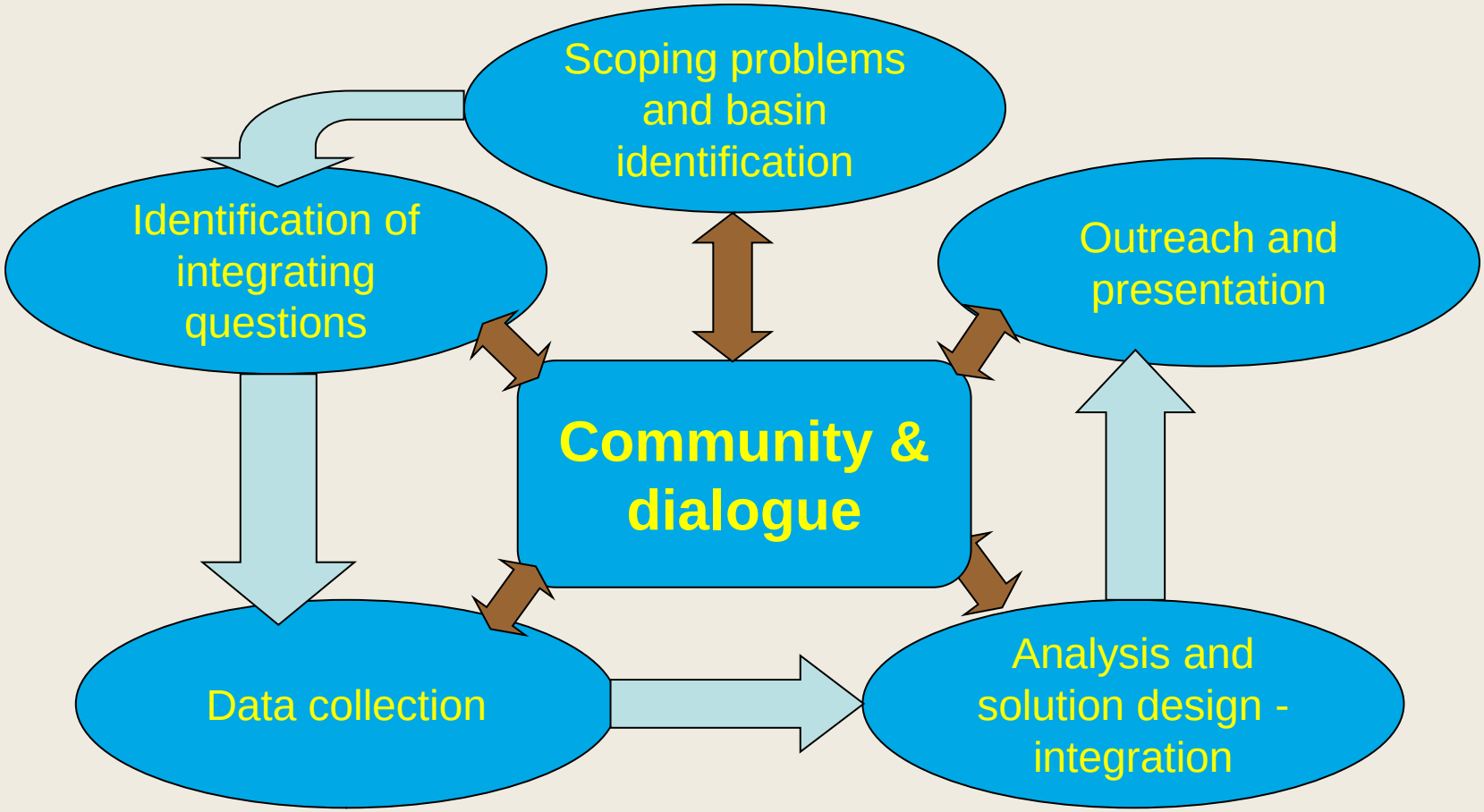
What we are/do:

- A diverse group of UI faculty representing fields of study including engineering, physical, natural resources & social sciences, and law
- Provide science/information/analysis to support decision making processes in water resources

We fulfill the land grant mission:

- **Research, Education & Outreach**

Integrative Process – General Framework

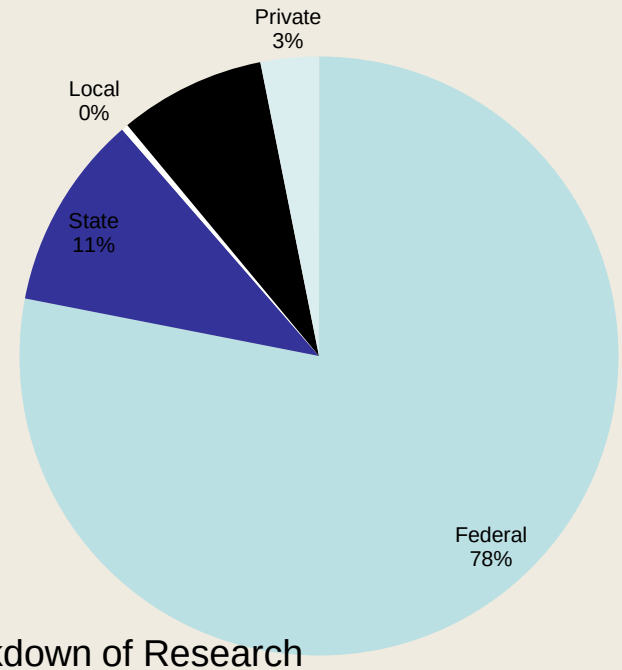


Water Resources Graduate Program

M.S. and Ph.D. degrees in Water Resources with option areas:

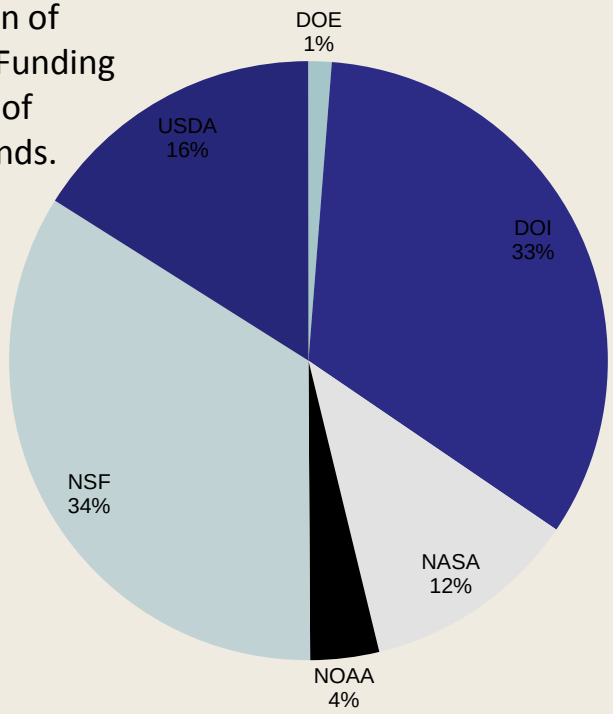
- *WR Engineering & Science*
- *WR Science & Management*
- *WR Law, Management & Policy*
- *Concurrent M.S./J.D. & Ph.D./J.D.*

University of Idaho Water Research Activities



Breakdown of Research Funding by source of funds.

Breakdown of Research Funding by source of federal funds.



- 60 faculty and staff in seven colleges engaged in water resources research, outreach and educational activities;
- Over $5 million in research grant and contract awards secured annually.

International Water Research Activities
Center for Ecohydraulics Research

Mission Statement

- To pursue research
- To provide education at all levels
- To provide an independent scientific forum

For furthering the understanding and simulation of fundamental linkages between physical processes, management actions and ecological response for the preservation, restoration and sustainable management of aquatic resources.

CENTER FOR ECOHYDRAULICS RESEARCH

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Unique Experimental Research Equipment

The high gradient tilting flume.

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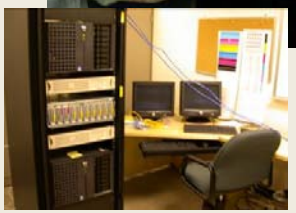
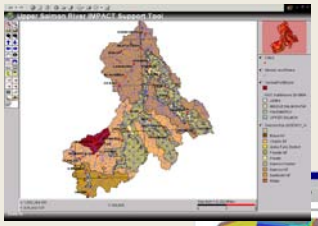
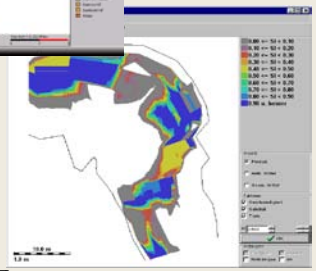


Cyber-Infrastructure
- Computational Center
- Mobile Classroom
- Database/Data Mining
- Computer Simulation





Field Sensors
- Field Equipment
- Real-time Simulation
- Real-time Visualization

Stream Laboratory
- Unique Experimental Flume
- Equipped Laboratory
- Custom Research Equipment

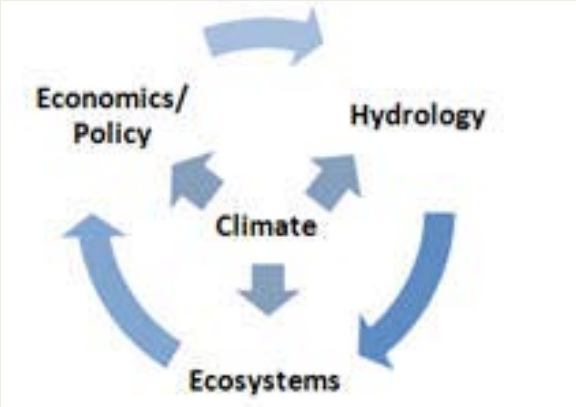
National Water Research Activities: Water Resources in a Changing Climate

Science Management Team

- Dr. Von Walden: Lead Researcher, University of Idaho
- Dr. Rick Allen: University of Idaho Research Liaison
- Dr. Colden Baxter: Idaho State University Research Liaison
- Dr. Sian Mooney: Boise State University Research Liaison

Idaho EPSCOR II Round VI

- Focus of research is the impact that climate change will have on water resources management in snowmelt driven montaine watersheds.
- Research is funded at $3,000,000 per year for a 5 year period.



Water Resources in a Changing Climate

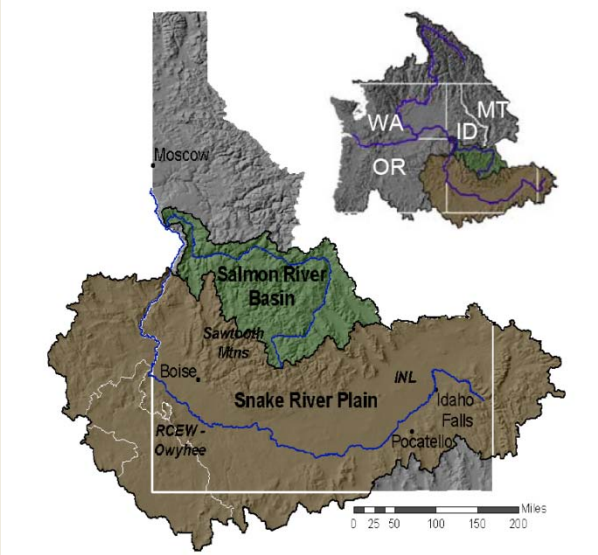
Research Objectives:

Understanding Water Resources in the Snake and Salmon River Basins

- Explore connections between surface water and groundwater in the Snake River Plain.
- Understand how projected climate change might affect the timing and magnitude of mountain snow packs and snowmelt.

Understanding the Ramifications of Future Change on Economics and Policy

- Develop adaptive and mitigation strategies to deal with changes in the timing and variability of water
- supply on land use, economic production, urban growth, and water management.
- Determine how changes in water availability affect conjunctive use of water and the relative value of surface water and groundwater rights.



Understanding the Effects of Climate Change on Natural Ecosystems

- Predict shifts in natural ecosystems as a response to future climate change.
- Explore the complex, integrated relationships between climate, hydrology, fire, insects, ecology, and changing landscapes.

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Environmental Engineering & Biotechnology @ UI

Erik R. Coats, P.E., Ph.D. (ecoats@uidaho.edu)

- Full-service environmental engineering laboratory
  - Bioreactor operations & testing
  - Water quality analyses
  - Advanced instrumentation
  - Molecular: proteomics, transcriptomics, PCR, DGGE
  - Computer controlled facilities
- Scale model research facilities

- Research focused on sustainable, advanced water & waste treatment technologies
- Ongoing research….
  - Bio-converting organic wastes (dairy manure, etc.) to bio-plastics
  - An advanced 2-stage anaerobic digestion process for producing electricity
  - Enhanced biological nutrient removal from wastewater
  - Reduce GHG and nutrient emissions

Coats' lab-example bioreactor installation

Coats' Scale Model Advanced Wastewater Treatment Facility (5,000 gallons) – demonstration of our ability to move research from the lab to the field

Snake Plain Ground-Water Banking Project

Bryce Contor, Gary Johnson, Stacey Taylor; UI-Idaho Falls

IWRRI and the U.S. Bureau of Reclamation are exploring concepts of groundwater banking and its potential application to the Eastern Snake Plain Aquifer. Banking offers tools to reduce conflict and move water to new uses while supporting existing uses.

The Eastern Snake Plain Aquifer at Thousand Springs, Idaho

Photo: U.S. Geological Survey

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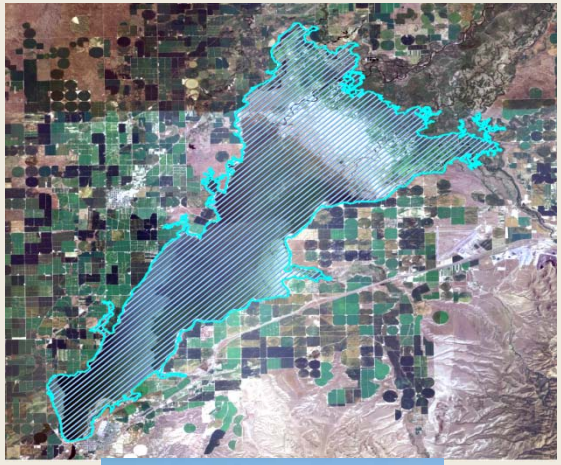
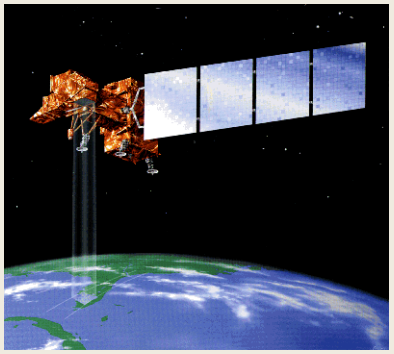
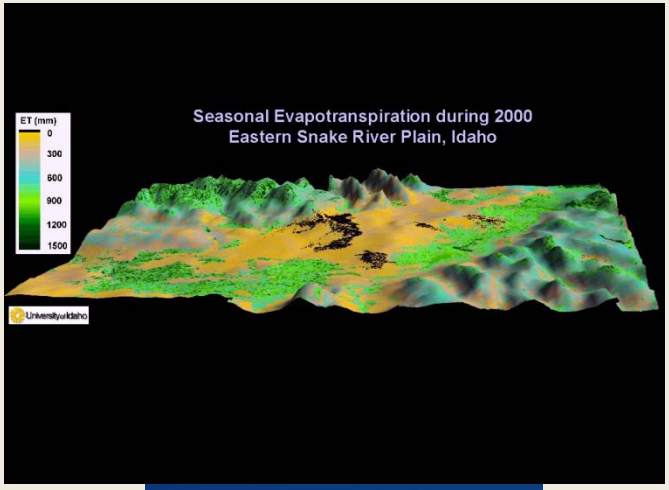
Using Landsat to Determine Evapotransporation

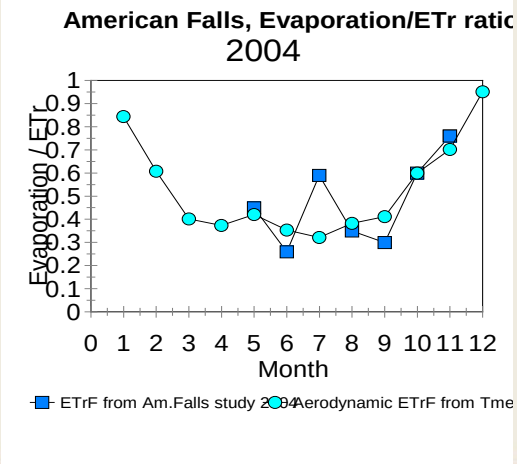
Richard G. Allen, UI – Kimberly

Results have been used to solidify estimates of ET for calibrating the Eastern Snake River Plain Ground Water Model to determine total ground-water pumping.









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New Initiatives

Sustainability of metropolitan water systems

- Natural Resource
- Infrastructure
- Governance
- Collaboration between IWRRI & CAES EPI

Integrated Water Resource Management

- Led by WoW Initiative
- Focus on headwater drainages of the Columbia River Basin
- IGERT Proposal Submitted on 07/01/11