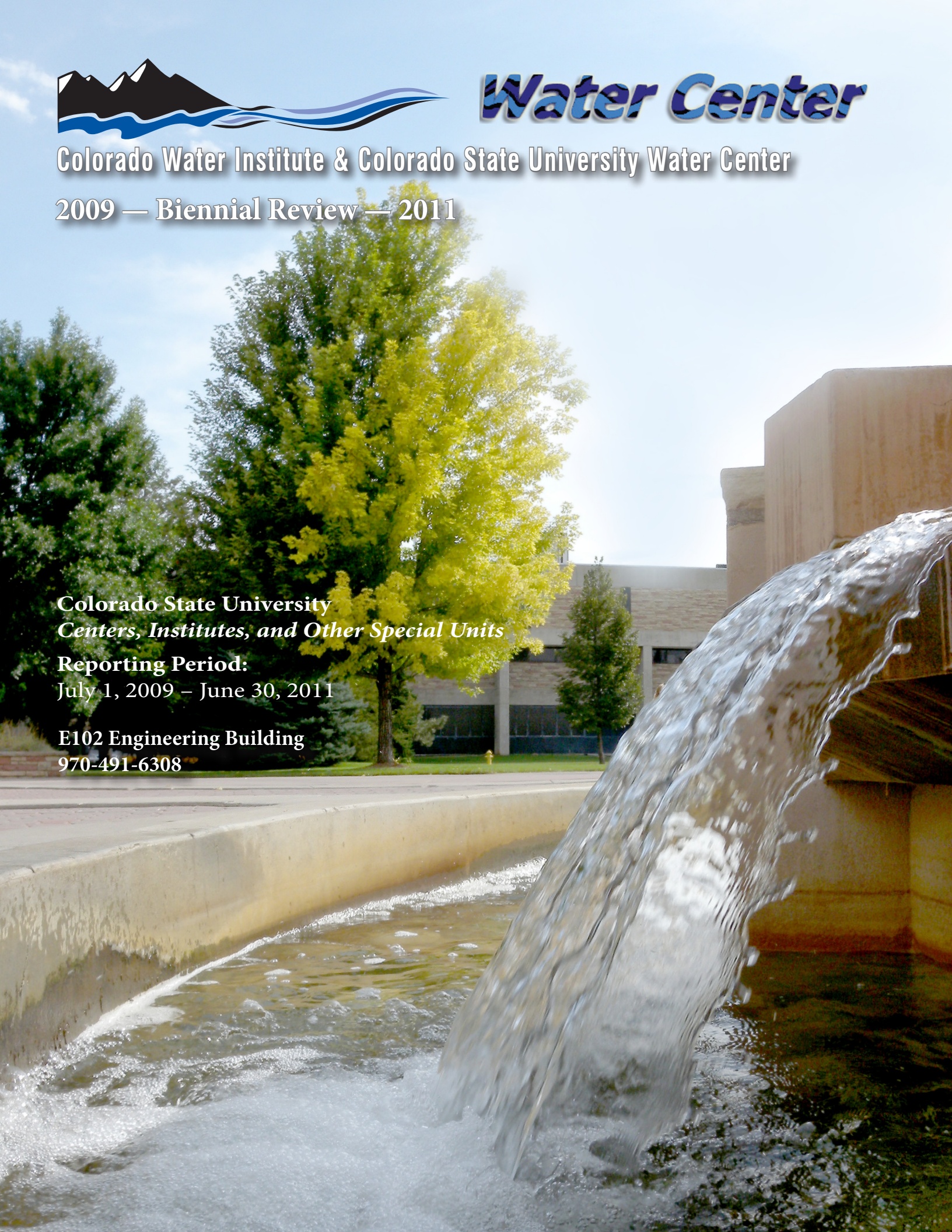


Water Center

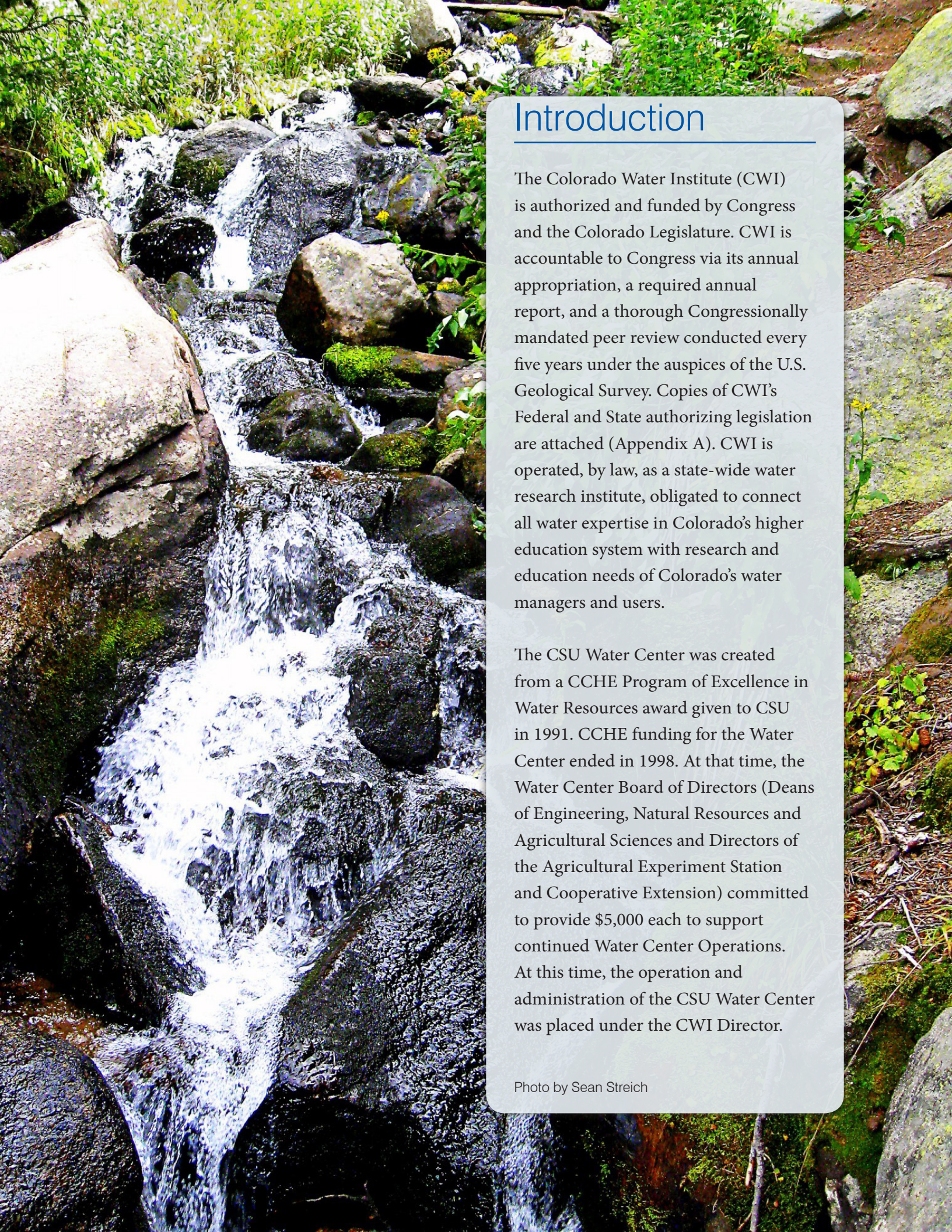
Colorado Water Institute & Colorado State University Water Center

2009 — Biennial Review — 2011

Colorado State University
Centers, Institutes, and Other Special Units

Reporting Period:
July 1, 2009 – June 30, 2011

E102 Engineering Building
970-491-6308



Introduction

The Colorado Water Institute (CWI) is authorized and funded by Congress and the Colorado Legislature. CWI is accountable to Congress via its annual appropriation, a required annual report, and a thorough Congressionally mandated peer review conducted every five years under the auspices of the U.S. Geological Survey. Copies of CWI's Federal and State authorizing legislation are attached (Appendix A). CWI is operated, by law, as a state-wide water research institute, obligated to connect all water expertise in Colorado's higher education system with research and education needs of Colorado's water managers and users.

The CSU Water Center was created from a CCHE Program of Excellence in Water Resources award given to CSU in 1991. CCHE funding for the Water Center ended in 1998. At that time, the Water Center Board of Directors (Deans of Engineering, Natural Resources and Agricultural Sciences and Directors of the Agricultural Experiment Station and Cooperative Extension) committed to provide $5,000 each to support continued Water Center Operations. At this time, the operation and administration of the CSU Water Center was placed under the CWI Director.

Photo by Sean Streich

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- **D** Outreach Team
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- **G** Undergraduate Water Minor Program Curriculum at CSU
- **H** Upper Yampa Water Conservancy District (UYWCD) John Fetcher Scholarship
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- **J** Achievement Awards

Faculty, Personnel and Clients

Faculty and Personnel

The CWI office is located in Room E-102 of the Engineering Building on the campus of Colorado State University. CWI consists of:

- Full-time Director: Dr. Reagan Waskom
- Full-time Assistant to the Director: Nancy Grice
- Full-time Research Associates: Loretta Lohman, Faith Sternlieb and Julie Kallenberger
- Extension Water Specialist: MaryLou Smith
- Part-time Technical Writing: Lindsey A. Knebel
- Part-time Office Support: Jan Wright
- Part-time web development: Joy Labadie

Students are employed part time to assist in the operation of CWI, often working to prepare themselves for a career as a Colorado water manager. A number of faculty members are affiliated with the Institute/ Center by virtue of research funding past or present, student fellowship awards, etc.

Outreach

In accordance with the CWI mission to connect all of Colorado's higher education expertise to take the research and education needs of Colorado water managers and users, the institute has Extension water personnel and programs under its purview (Appendix D):

- Denis Reich, Water Resources Specialist - Western Region
- Joel Schneekloth, Water Resources Specialist - Northern Region
- Perry Cabot, Water Resources Specialist - Southern Region

Student Employment

In addition to the students funded through water research grants and water education courses administered at CSU. The Water Center also employs in-state, out-of-state, and international undergraduate students:

- Doug Davis (Education & Human Resource Studies)
- Giovanni Didomenico (Civil Engineering)
- Katelyn Groves (Health and Exercise Science)
- Justin Hachemeister (Computer Science)
- Kevin Hackett (Applied Computing Technology)
- Zachary Hittle (Applied Computing Technology)
- Paul Rhine (Civil Engineering)
- Joe Collins (Out-of-State, Natural Resources Management)
- Jena Thompson (Out-of-State, Journalism and Technical Communication)
- Elmahdi Omar (International, Computer Science)
- Jaleela Sharaf (International, Software Engineering)

Clients

Faculty and Students

- 'Water' Faculty at Colorado State University — over 140 faculty located in 34 departments (Appendix C)
- 'Water' Faculty at Adams State College, Colorado State University-Pueblo, Colorado Mesa University, University of Colorado, Colorado School of Mines, University of Northern Colorado, Western State College, and Fort Lewis College
- Students interested in water research and education and those seeking Colorado State University 'Water' Minor (Appendix G)
- Extension agents and specialists (Appendix D)

Colorado Water Managers/Users

- Colorado Congressional Delegation
- Colorado Legislature - Members
- Colorado Department of Natural Resources
- Colorado Water Conservation Board
- Colorado State Engineer's Office
- Colorado Department of Agriculture
- Colorado Department of Public Health and Environment
- Colorado Water Congress
- Water Conservancy/Conservation Districts
- Municipal water utilities
- Agricultural irrigation companies
- Colorado 'water-using' public

CSU Water Center Board of Directors

2009-2010

Bill Farland, Vice President for Research
Hank Gardner, Associate Vice President for Research
Jeff Jahnke, Director of Colorado State Forest Service
Joseph O'Leary, Dean of Natural Resources, Warner College
Lee Sommers, Director of Agricultural Sciences
Lou Swanson, Vice Provost for Outreach & Strategic Partnership
Reagan Waskom, Director of Colorado Water Institute
Sandra Woods, Dean of Engineering
Deborah Young, Diretor of Cooperative Extension

2010-2011

Joyce Berry, Dean of Natural Resources, Warner College
Craig Beyrouty, Dean of Agricultural Science
Bill Farland, Senior Vice President for Research
Hank Gardner, Associate Vice President for Research
Jeff Jahnke, Director of Colorado State Forest Service
Lee Sommers, Director of Agricultural Experiment Station
Lou Swanson, Vice Provost for Outreach & Strategic Partnership
Reagan Waskom, Director of Colorado Water Institute
Sandra Woods, Dean of Engineering

CSU Water Center Board of Directors

2009-2010

Jim Broderick, Executive Director, Southeastern Colorado Water Conservancy District
Kathleen Curry, Livestock and Natural Resources Committee
Ralph Curtis, Rio Grande Water Conservancy District
Steve Gunderson, Colorado Department of Public Health & Environment-Water Quality Control Division
Mary Hodge, Senate Agriculture, Natural Resources & Energy Committee
James Kircher, Colorado Water Science Center, USGS
Eric Kuhn, Colorado River Water Conservancy District
James Martin, Colorado Department of Natural Resources
Dan McAuliffe, Colorado Water Conservation Board
Chris Piper, Denver Water
John Porter, Dolores Water Conservancy District
Dave Robbins, Esq, Hill and Robbins
John Stulp, Colorado Department of Agriculture
Reagan Waskom, Colorado Water Institute
Eric Wilkinson, Northern Colorado Water Conservancy District
Vacant, CO Department of Public Health & Environment

Ex Officio Members:
Jeff Jahnke, Director, Colorado State Forest Services
Lee Sommers, Colorado Agricultural Experiment Station
Lou Swanson, Vice Provost for Outreach & Strategic Initiatives
Tom Wardle, Colorado State Forest Services
Deborah Young, Cooperative Extension

2010-2011

Jim Broderick, Executive Director, Southeastern Colorado Water Conservancy District
Tom Browning, Colorado Water Conservancy Board
Ralph Curtis, Rio Grande Water Conservancy District
Alexandra Davis, Colorado Department of Natural Resources
Randy Fischer, Livestock and Natural Resources Committee
Jennifer Gimbel, Colorado Water Conservancy Board
Steve Gunderson, Colorado Department of Public Health & Environment-Water Quality Control Division
James Kircher, Colorado Water Science Center, USGS
Eric Kuhn, Colorado River Water Conservancy District
Chris Piper, Denver Water
John Porter, Dolores Water Conservancy District
Dave Robbins, Esq, Hill and Robbins
John Stulp, Colorado Department of Agriculture
Reagan Waskom, Colorado Water Institute
Bruce Whitehead, Senate Agriculture, Natural Resources & Energy Committee
Eric Wilkinson, Northern Colorado Water Conservancy District
Vacant, CO Department of Public Health & Environment

Ex Officio Members:
Jeff Jahnke, Director, Colorado State Forest Services
Lee Sommers, Colorado Agricultural Experiment Station
Lou Swanson, Cooperative Extension
Tom Wardle, Colorado State Forest Services

Goals and Objectives — Mission Statement

Colorado Water Institute Mission is Defined by:

- Federal Water Resources Research Act — 42 USC Sec. 10301 et. seq. (Appendix A) — last amended on January 11, 2007, President Bush signed this act into law (by PL 106-374) (114 STAT. 1434 and the Water Resources Research Act Amendments of 2006) (PL 109-471) – a five-year authorization extension (fiscal years 2007 through 2011).
- Colorado Legislature (Appendix A)
  - SB06-183
  - HB07-1096
  - HB08-1026
    - Bill changed name to Colorado Water Institute and expanded the mission
  - HB08-1405

CWI Mission Statement

CWI serves to connect and engage water expertise of Colorado's higher education system with research, information and education needs of Colorado's water managers and users.

CSU Water Center Mission is Defined by:

- CSU Water Center Board of Directors

CSU Water Center Mission Statement

Promote and organize CSU's water and water-related expertise in support of integrated water research and education, paying particular attention to positioning CSU to be a strong competitor in national water and water-related research competitions.

Reporting

CWI Reports to:

- Vice President for Engagement, Lou Swanson
- CWI's Advisory Committee on Water Research Policy, per SB06-183
- USGS External Research Officer (Per Federal Water Resources Research Act – annual proposal and report required)
- National Institutes for Water Resources annual report

CSU Water Center Reports to:

- CSU Water Center's Board of Directors:
  - Vice President for Research, Vice President for Engagement, Deans of Natural Resources, Engineering and Agricultural Sciences, Directors of Extension, Colorado State Forest Service, and Agricultural Experiment Station

Activities, Services, Training, and Research

Colorado Water Institute

CWI activities required to implement both Federal and State Legislation including:

1. Conducts annual state-based water research competition
2. Funds graduate students through grants
3. Provides information and outreach programs for Colorado water managers and water users
4. Cooperates with the National Institutes of Water Resources (NIWR) to promote and coordinate national level support for University water research

CSU Water Center

The CSU Water Center, on the other hand, supported by CSU alone, organizes and promotes CSU's water expertise. In particular, the CSU Water Center currently supports:

1. Administers graduate and undergraduate 'water' scholarships funded by private donors and through federal competitions
1. Administers a Water Minor program curriculum for students at CSU
1. Organizes an annual, graduate level, water resources seminar — GRAD592
2. Organizes Interdisciplinary faculty to prepare proposals for national competitions
3. Prepares materials to recruit graduate students to CSU to study water resources related topics
4. Prepares nominations of outstanding CSU 'water' faculty for state and national awards
5. Promotes CSU's annual Hydrology Days symposium that brings national and international hydrological scientists to CSU
6. Provides a venue for education, discussion and exposure of regional and global water resource issues through Spring Interdisciplinary Water Resources Seminars on CSU campus
7. Supports the CSU Water Archives via collection, identification, and promotion

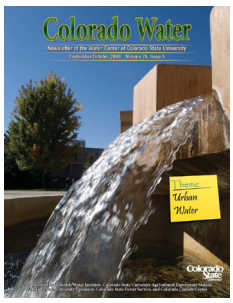
Information Dissemination

Colorado Water Newsletter

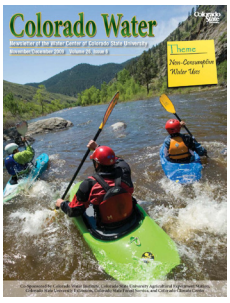
The Colorado Water newsletter, which was revamped in 2007, is published bimonthly and sent to over 2000 Colorado water managers and users, including all members of the Colorado Legislature and Colorado Congressional delegate (see all newsletters at: http://www.cwi.colostate.edu). Colorado Water features high-interest water related meetings, programs and research.

1. July/August 2009 – Natural Hazards
2. September/October 2009 – Urban Water
3. November/December 2009 – Non-Consumptive Water Uses
4. January/February 2010 – Alternatives to Ag Transfers
5. March/April 2010 – Non-stationarity
6. May/June 2010 – Student Research
7. July/August 2010 – Water Conservation
8. September/October 2010 – Economics of Water
9. January/February 2011 – Decision Support Systems
10. April/May 2011 – Student Research
11. June/July 2011 – Invasive Species

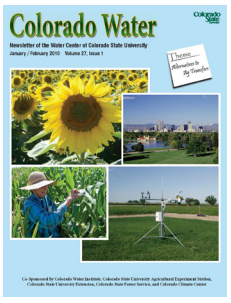
Volume 26 Issue 4
Natural Hazards



Volume 26 Issue 5
Urban Water

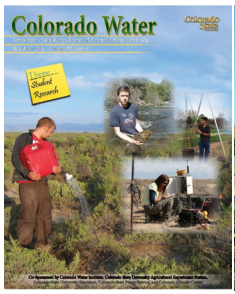


Volume 26 Issue 6
Non-Consumptive Water Uses

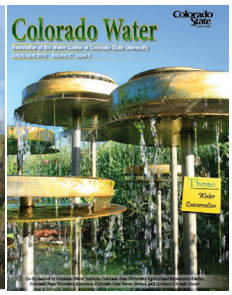


Volume 27 Issue 1
Alternatives to Ag Transfers

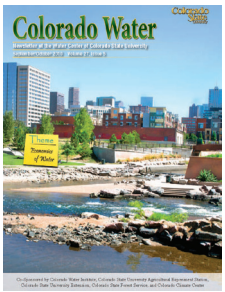
Volume 27 Issue 2
Non-stationarity



Volume 27 Issue 3
Student Research

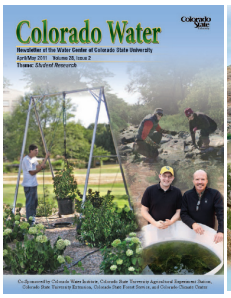


Volume 27 Issue 4
Water Conservation

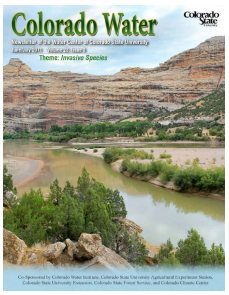


Volume 27 Issue 5
Economics of Water

Volume 28 Issue 1
Decision Support Systems



Volume 28 Issue 2
Student Research



Volume 28 Issue 3
Invasive Species

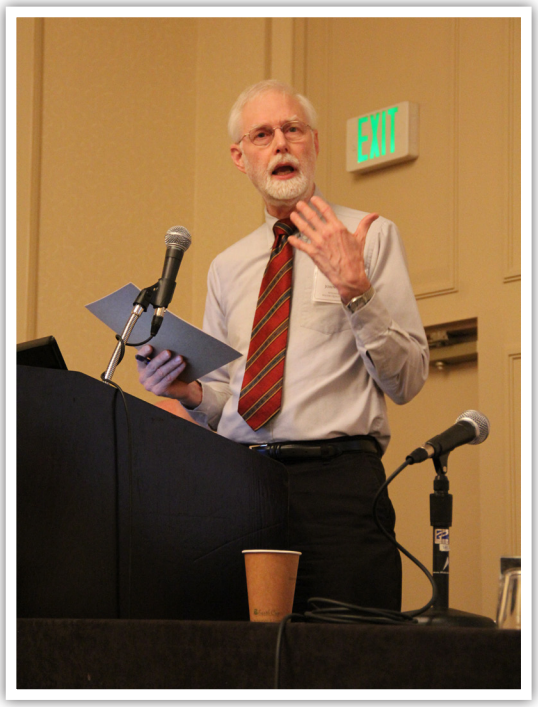
Websites

The CWI website has nearly 50,000 unique visits to the 7 websites it maintains:

- Colorado Water Institute
  http://www.cwi.colostate.edu
- Colorado State University Water Center
  http://www.watercenter.colostate.edu
- Northern Plains & Mountain Region Water
  http://www.region8water.org
- Ag Water Conservation Clearinghouse
  http://agwaterconservation.colostate.edu
- CSU Water Faculty Expertise
  http://www.cwi.colostate.edu/CSUWaterFaculty/
- Colorado Water Knowledge
  http://waterknowledge.colostate.edu
- Nutrients and Water Quality
  http://www.cwi.colostate.edu/Workshops/Region8Nutrient/

Meetings

Actively sponsored or supported water meetings in Colorado:



- Ag Water Summit
- Arkansas Basin Forum
- CFWE River Basin Tour
- Colorado Water Congress Annual Convention
- Colorado Water Workshop
- Evapotranspiration Workshop
- Hydrology Days
- Nutrients and Water Quality: A Region 8 Collaborative Workshop
- South Platte Forum
- Universities Council on Water Resource Annual Conference
- USGS Water Science Day
- Water Tables for Water Resources Archive
- Water Sharing Meetings
- Workshop on Nonstationarity
- World Water Day

Education

The Water Center facilitates water education at CSU through (Appendix I):

- Administers undergraduate 'Water' Minor - for any CSU major
- GRAD592 – Water Resources Seminar – in support of connecting CSU students with the personalities and 'real world' of water management in Colorado
- Spring Interdisciplinary Water Resources Seminar
- Hydrology Days Annual Meeting on CSU Campus
- Information for new 'water' graduate students at CSU (for recruiting high quality 'water' students to CSU)
- Lists of CSU 'water' faculty on CWI webpage
- Administers water scholarships sponsored by Colorado water organizations

Internships

The Water Center also helps match students with internship opportunities throughout the state:

CWCB

The Colorado Water Conservation Board (CWCB) and the Colorado Water Institute (CWI) have created a cooperative intern program. The purposes of this intern program are to provide the CWCB with highly qualified undergraduate and graduate student interns. Interns will be selected based on the CWCB's specified needs described below. This cooperative intern program will provide qualified students hands on experience in the conservation, development, management, and protection of Colorado's water resources.

- Andrew Baessler
- Matthew Baessler
- Craig Godbout
- Jesse Hickey
- Paul Rhine
- Annie Sligh

USGS

Water Resources Research Institute Internship at the U.S. Geological Survey

- Colin Justis
- Amir Kashipazha

Funded Water Research Projects

The institute actively facilitates and funds student and faculty research at CSU and the other 8 state funded universities (Appendix E and F). Recent projects funded include:

1. Adaptive Management of Zebra and Quagga Mussels in Colorado, Craig Bond, Colorado State University: $35,000
2. Bear Creek Watershed Project, Kimberly Gortz-Reaves (Chase), University of Colorado, Denver: $1,400
3. Large Aperture Scintillometers for Evapotranspiration (ET) Evaluation, Evan Rambikur (Chavez), Colorado State University: $4,740
4. Potential Changes in Groundwater Acquisition by Native Phreatophytes in Response to Climate Change, Julie Kray (Cooper), Colorado State University: $5,000
5. Assessing the Relative Costs/Values of New Water Supply Options, Doug Kenney, University of Colorado: $35,000
6. Impact of Limited Irrigation on Health of Four Common Shrub Species, Jason Smith (Klett), Colorado State University: $5,000
7. Ecosystem Services, Biodiversity, and Irrigation Inefficiences Year 1, Jeremy Sueltenfuss (Knight), Colorado State University: $12,500
8. Development and Validation of a Sediment Signature Approach Using ICP-MS in the Fountain Creek Watershed, William Christman (Lehmpuhl), Colorado State University, Pueblo: $4,950
9. Novel Technique for Evaluation of Dissolved Organic Material (DOM); research methodology and lab protocol development using a FluidImages FlowCam on lake water samples across the State of Colorado, Alia Khan (McKnight), University of Colorado, Boulder: $4,500
10. New Methods for Sago Pondweed Management, Scott Nissen, Colorado State University: $10,000
11. The Efficacy of the Use of Moringa Oleifera Seeds to Remove Metabolites of Cyanobacteria from Drinking Water, Victor Sam (Omur-Ozbek), Colorado State University: $4,980

Collaboration

CWI represents CSU in national, state, local and university water organizations

National:

1. Advisory Board - USDA Corn Climate Change CAP
2. National Institutes for Water Resources (President-Elect 2012)
3. National Co-Chair USDA-CSREES National Integrated Water Program (2006 - Present)
4. Board of Directors – Universities Council on Water Resources (2007 - Present)
5. APLU Board on Natural Resources (Chair 2010 - 2011)
6. APLU Water Resources Section (Chair 2009 - Present)
7. ICIWaRM Core Team (UNESCO Category II Center)
8. Served on review panel for NRI Water and Watersheds, ARS Water Programs and NRCS CEAP program

State:

1. CWCB Value of Water Campaign Subcommittee
2. CSU Respresentative to South Platte Roundtable and InterBasin Compact Committee
3. IBCC Public Education Committee
4. Executive Committee - Flaming Gorge Project Assessment
5. Co-Chair Ag Impact Task Force of the Water Availability Task Force
6. Organizing Committee - South Platte Forum
7. Board of Trustees - Colorado Foundation for Water Education (2002 – Present)
8. Board of Directors – Colorado Water Congress (2007 – Present)
9. Chair of Education Committee for the Colorado Foundation for Water Education
10. Colorado Governor's Water Availability Task Force (2002 – Present)
11. Colorado Energy Water Consortium Board of Directors (2011 - Present)

University

1. CSU Library - Water Resources Archive Water Tables Committee
2. Provosts - Water Rapid Response Team
3. Executive Committee - Center for Collaborative Conservation
4. Center for Ag Energy Advisory Board
5. Cooperative Extension Water Program Team
6. CAS Managed Ecosystems Strategic Planning Team
7. Co-Chair Cooperative Extension Drought Team
8. Colorado Ag Water Alliance

Local:

1. Board of Directors - Colorado Water Innovation Cluster
2. Fort Collins Water Supply Community Working Group
3. City of Fort Collins Water Board (2003 – Present)

Budget Summary

July 1, 2009 to June 30, 2011
Colorado Water Institute — CSU Water Center

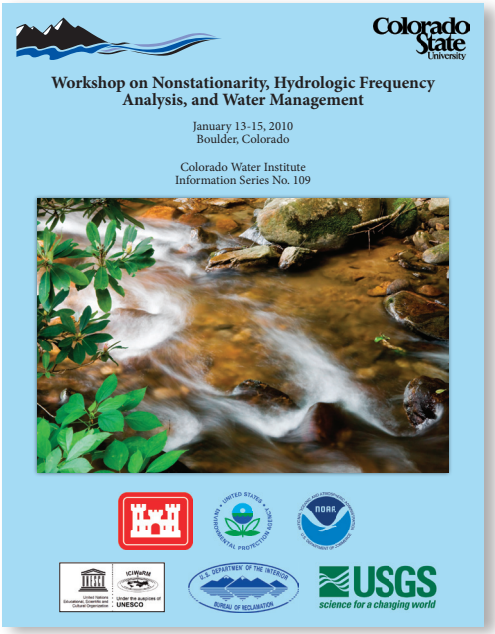
Income	Funding	Source	Description	Amount
	CSU Water Center	MOU: Agricultural Experiment Station, College of Agriculture, College of Engineering, College of Natural Resources, Extension	$5,000 general operating funds from colleges and agencies	$ 50,000
	CWI	USGS - NIWR 104(b)	2:1 match required on 104B, 1:1 match required on 104G, overhead costs allowed as match on all monies	$ 184,670
	CWI	Vice President for Engagement office provides budget which we use to match USGS and provide full-time director and other direct costs		$ 402,998
	Other funding sources	Research - Various non-profit sponsors, NIWR, CWCB, Walton Family Foundation, EPA, Great Western Institute, Cadmus Group Inc., Cache la Poudre, AES, NCWCD, CDPHE, USDA-CREES		$ 3,519,540
			TOTAL Income	**$ 4,157,208**
Expenses				
		Salaries		$ 1,024,453
		Other direct costs	Phone, supplies, computers, software, peripherals, postage, professional development, etc	$ 497,414
		Colorado Water production		$ 80,000
		Travel		$ 102,415
		Research		$ 1,953,379
		Education		$ 499,546
			TOTAL Expenses	**$ 4,157,208**

Accomplishments and Contributions

Reports and Publications

Research reports are prepared for each CWI water research projects and for those with high public interest, a 'Water in the Balance', short and concise, research summary is published and distributed widely. Recent topics that warranted wide spread distribution of research results include: In the past two years, over 200 Completion Reports and over 100 Information Series Reports have been available in their entirety on the internet for immediate access at no charge to our customers.

1. CR212 - Development of Characterization Approaches and a Management Tool for the Ground Water-Surface System in the Vicinity of a Sutherland Reservoir and Gerald Gentlemen Station Lincoln County, Nebraska
2. CR213 - Long Range Forecasting of Colorado Streamflows Based on Hydrologic, Atmospheric and Oceanic Data
3. CR214 - Examining the Impact of Shallow Groundwater on Evapotranspiration from Uncultivated Land in Colorado's Lower Arkansas River Valley
4. CR215 - Risk Assessment and Forecasting of Indian Summer Monsoon for Agricultural Drought Impact Planning
5. CR216 - Occurrence of Steroid Sex Hormones in the Cache la Poudre River, and Pathways for their Removal in the Environment
6. CR217 - Detecting Trends in Evapotranspiration in Colorado
7. CR218 - Transport Relationships Between Bedload Traps and a 3-Inch Helley-Smith Sampler in Coarse Gravel-Bed Streams and Development of Adjustment Functions
8. CR219 - Simultaneous Water Quality Monitoring and Fecal Pollution Source Tracking in the Colorado Big Thompson Water Project
9. CR220 - Direct Determination of Crop Evapotranspiration in the Arkansas Valley with a Weighing Lysimeter
10. CR221 - Irrigation Practices, Water Consumption & Returen Flows in Colorado's Lower Arkansas River Valley



11. CR222 - Hydrologic Analysis and Process-Based Modeling for the Upper Cache la Poudre Basin
12. IS108 - Proceedings, South Platte Forum, 20th Annual, "1989 to 2009: A River of Odyssey"
13. IS109 - Proceedings, Workshop on Nonstationarity, Hudrologic Frequency Analysis and Water Management
14. IS110 - Proceedings, South Platte Forum, 21st Annual, "High Stakes Games in the South Platte"
15. IS111 - Nutrients and Water Quality: A Region 8 Collaborative Workshop -- Workshop Summary and Recommendations
16. SR18 - Federal Bureaucracy and Locality: A Case Study of the Uncompahgre Valley Water Users' Association's Management of its Water Commons
17. SR21 - Quantification Task: A Description of Agriculture Production and Water Transfers in the Colorado River Basin
18. SR22 - Agricultural/Urban/Environmental Water Sharing: Innovative Strategies for the Colorado River Basin and the West

CSU Water-Related Accomplishments

Many of the distinguished members of the CSU Water Faculty have been recognized for their acheivement through, university, government and private awards (Appendix J). Recipients of these awards include:

- Nolan Doesken -Sixth annual Friends of the South Platte Award
- Dr. Kurt Fausch- Award of Excellence from the Colorado-Wyoming Chapter of the American Fisheries Society and the 2010 Outstanding Alumnus Award
- Dr. Jose Salas- The Prestigious Ven Te Chow Award
- Loretta Lohman- NPS Lifetime Achievement Award
- Patricia J. Rettig, CSU Libraries Assistant Professor - 2010 Colorado State University Libraries Faculty Award for Excellence
- Robert Ward, Former CWI Director- 2010 Elizabeth Jester Fellows Award
- Dr. Evan Vlachos, - Honorary doctorate in Civil Engineering from the Aristotle University of Thessaloniki
- Catherine Thomas - Western Agricultural Economics Association's Outstanding Master's Thesis Award
- Joseph Vassios - Outstanding Graduate Student Award
- Michael Manfredo, Jerry Vaske and Esther Duke, CSU Department of Human Dimensionsof Natural Resources- Wildlife Society Book of the Year Award
- Thomas Borch, Assistant Professor CSU Department of Soil and Crop Sciences - Faculty Early Career Development (CAREER) Award
- Jose 'Pepe' Salas, professor , CSU civil and environmental engineering - U.S. Department of the Interior Partners in Conservation Award.

House Bill 1177

With passage of HB1177, an act to organize water roundtables in Colorado for the purpose of developing widely accepted solutions to Colorado's water problems, CWI and the CSU Water Center organized:

1. In concert with Cooperative Extension and under the leadership of the CWI Director, organized a team of Extension personnel to connect CSU's water knowledge to needs of each of the nine roundtables
2. Organized GRAD592, CSU's annual water seminar, to issues surrounding HB 1177
3. Worked to develop the draft IBCC Compact Charter for the Colorado DNR
4. Participate as a member of the IBCC Public Education work group
5. Colorado Agricultural Water Summit meeting

CSU Water-Related Grant Activity

One of the functions of the Colorado Water Institute is to track and publish water-related sponsored research awards in the *Colorado Water* newsletter. During the last 2 years, $27,345,123 have been awarded to 279 CSU projects from various sponsors. (Appendix B)

CWI Grants and Contracts

Funded Projects

Title	Sponsor	Amount
Developing a Decision Support System for the South Platte Basin	Various "Non-Profit" Sponsors	$ 20,000.00
Geolem Internship - USGS - WRRI Student Internship	DOI-USGS-Geological Survey	$ 25,000.00
Agricultural Water Conservation Clearinghouse	Colorado Water Conservation Board	$ 10,000.00
CWCB/CWI Cooperative Intern Program	Colorado Water Conservation Board	$ 5,162.00
Adjoint Modeling to Quantify Stream Flow Changes Due to Aquifer Pumping	NIWR 104G	$ 117,847.00
CWCB/CWI Cooperative Intern Program	Colorado Water Conservation Board	$ 14,220.00
Workshop on Nonstationarity, Hydrologic Frequency Analysis, and Water Management	DOI-USGS-Geological Survey	$ 94,734.00
Agricultural/Urban/Environmental Water Sharing in the	Walton Family Foundation	$ 114,828.00
Colo State Univ/FY 10 Water Pollution Workshop	EPA-Environmental Protection Agency	$ 56,065.00
Regional Water Conservation Plan Southeastern Colorado Water Conservancy District for Colorado Water Conservation…	Great Western Institute	$ 16,264.00
Western States Source Water and Groundwater Protection Forum	Cadmus Group, Inc.	$ 1,000.00
Development of a Correction Function for the 3-inch, Thin-Walled, Helley-Smith Sampler Deployed on Coarse Gravel Beds	DOI-USGS-Geological Survey	$ 21,416.00
Investigation of the Effects of Whitewater Parks on Aquatic Resources in Colorado	Colorado Water Conservation Board	$ 25,000.00
Irrigation Practices, Water Consumption & Return Flows in Colorado's Lower Arkansas River Valley	Colorado Water Conservation Board	$ 48,477.00
Hydrologic Analysis and Process-Based Modeling-1014020	Cache la Poudre	$ 5,000.00
Ecosystem Services, Biodiversity, and Irrigation Inefficiences Year1	AES	$ 12,500.00
Water Quality Impacts of the Mountain Pine Beetle Infestation in the Rocky Mountain West: Heavy Metals and Disinfection Byproducts	NIWR 104G	$ 140,162.00
New Methods for Sago Pondweed Management	Colorado Water Conservation Board	$ 20,000.00
Determination of Consumptive Water Use by Alfalfa in	Colorado Water Conservation Board	$ 300,000.00
Willow Creek Water Quality Study	Northern Colorado Water Conservancy	$ 21,010.00
Geolem Internship-USGS-WRRI	USGS	$ 45,000.00
OMS Internship-USGS-WRRI	USGS	$ 30,000.00
NPS Outreach Coordinator	CDPHE	$ 450,855.00
Integrating Water Research, Extension, and Education in the Northern Plains and Mountains Region	USDA-CREES	$ 1,825,000.00
CWCB/CWI Cooperative Intern Program	Colorado Water Conservation Board	$ 100,000.00
104B State Water Resources Research Institute Program Fiscal Year 2010	DOI-USGS-Geological Survey	$ 92,335
104B State Water Resources Research Institute Program Fiscal Year 2011	DOI-USGS-Geological Survey	$ 92,335
	Total	**$ 3,704,210.00**

Plans for the Next 2 Years

- CWI will continue to seek state, federal and private funding with the support of Colorado's water management community
- CWI will work to mentor new faculty in Colorado water issues and management
- CWI will develop an active research and outreach effort on water conservation for Colorado
- CSU Water Center is initiating a coordinated effort to restore and strengthen its abilities to support international water activities and engagement at Colorado State University
- CSU Water Center will seek to integrate water research, teaching and outreach efforts of the Agricultural Experiment Station, Cooperative Extension, State Forest Services and other units
- CSU Water Center will work to further the Colorado "Water Innovation Cluster"
- CSU Water Center will further the development of a Distance Education MSc in Watershed Management
- CWI will act as a liaison for state water needs.
- CWI will develop and promote interdisciplinary seminars, conferences and other events to engage higher education faculty, state water managers and stakeholders.
- CWI will develop and leverage external funding and transmit the information and results throughout the state.
- CWI will facilitate mentoring opportunities for future water managers and leaders.

Appendices

State and Federal Legislation

Note: Chapter 109 - Water Resources Research (42 USC 10301) was amended by the Water Resources Research Act Amendments of 2000 (Public Law 106-374) (114 STAT. 1434 and the Water Resources Research Act Amendments of 2006 (Public Law 109-471). President Bush signed this Act into law on January 11, 2007.

TITLE 42 — THE PUBLIC HEALTH AND WELFARE
(42 USC Sec. 10301 et. seq.)

CHAPTER 109 — WATER RESOURCES RESEARCH

Sec. 10301. Congressional findings and declarations

The Congress finds and declares that -

(1) the existence of an adequate supply of water of good quality for the production of materials and energy for the Nation's needs and for the efficient use of the Nation's energy and water resources is essential to national economic stability and growth, and to the well-being of the people;

(2) the management of water resources is closely related to maintaining environmental quality, productivity of natural resources and agricultural systems, and social well-being;

(3) there is an increasing threat of impairment to the quantity and quality of surface and groundwater resources;

(4) the Nation's capabilities for technological assessment and planning and for policy formulation for water resources must be strengthened at the Federal, State, and local governmental levels;

(5) there should be a continuing national investment in water and related research and technology commensurate with growing national needs;

(6) it is necessary to provide for the research and development of technology for the conversion of saline and other impaired waters to a quality suitable for municipal, industrial, agricultural, recreational, and other beneficial uses;

(7) the Nation must provide programs to strengthen research and associated graduate education because the pool of scientists, engineers, and technicians trained in fields related to water resources constitutes an invaluable natural resource which should be increased, fully utilized, and regularly replenished; and

(8) long-term planning and policy development are essential to ensure the availability of an abundant supply of high quality water for domestic and other uses; and

(9) the States must have the research and problem-solving capacity necessary to effectively manage their water resources.

[Source: Pub. L. 98-242, title I, Sec. 102, Mar. 22, 1984, 98 Stat. 97; Pub. L. 104-147, Sec. 1, May 24, 1996, 110 Stat. 1375.]

[Amendments: 1996 - Par. (2). Pub. L. 104-147, Sec. 1(1), inserted ", productivity of natural resources and agricultural systems," after "environmental quality". Pars. (8), (9). Pub. L. 104-147, Sec. 1(2)-(4), added pars. (8) and (9).]

Sec. 10302. Congressional declaration of purpose

It is the purpose of this chapter to assist the Nation and the States in augmenting their water resources science and technology as a way to -

(1) assure supplies of water sufficient in quantity and quality to meet the Nation's expanding needs for the production of food, materials, and energy;

(2) discover practical solutions to the Nation's water and water resources related problems, particularly those problems related to impaired water quality;

(3) assure the protection and enhancement of environmental and social values in connection with water resources management and utilization;

(4) promote the interest of State and local governments as well as private industry in research and the development of technology that will reclaim waste water and to convert saline and other impaired waters to waters suitable for municipal, industrial, agricultural, recreational, and other beneficial uses;

(5) promote more effective coordination of the Nation's water resources research program;

(6) promote the development of a cadre of trained research scientists, engineers, and technicians for future water resources problems; and

(7) encourage long-term planning and research to meet future water management, quality, and supply challenges.

[Source: Pub. L. 98-242, title I, Sec. 103, Mar. 22, 1984, 98 Stat. 97; Pub. L. 101-397, Sec. 1(a), Sept. 28, 1990, 104 Stat. 852; Pub. L. 104-147, Sec. 2, May 24, 1996, 110 Stat. 1375.]

[References In Text: This chapter, referred to in text, was in the original "this Act", meaning Pub. L. 98-242, Mar. 22, 1984, 98 Stat. 97, known as the Water Resources Research Act of 1984. For complete classification of this Act to the Code, see Short Title note set out under section 10301 of this title and Tables.]

[Amendments: 1996 - Par. (5). Pub. L. 104-147, Sec. 2(1), struck out "to" before "promote" and "and" after "program;". Par. (6). Pub. L. 104-147, Sec. 2(2), substituted "; and" for period at end. Par. (7). Pub.

L. 104-147, Sec. 2(3), added par. (7). 1990 - Par. (5). Pub. L. 101-397 substituted "to promote more effective coordination of" for "coordinate more effectively".]

Sec. 10303. Water resources research and technology institutes

(a) Establishment; designation of site by State legislature or Governor

Subject to the approval of the Secretary of the Interior (hereafter in this chapter referred to as the "Secretary") under this section, one water resources research and technology institute, center, or equivalent agency (hereafter in this chapter referred to as the "institute") may be established in each State (as used in this chapter, the term "State" includes the Commonwealth of Puerto Rico, the District of Columbia, the Virgin Islands, Guam, American Samoa, the Commonwealth of the Mariana Islands and the Federated States of Micronesia) at a college or university which was established in accordance with the Act approved July 2, 1862 (12 Stat. 503) (7 U.S.C. 301 et seq.), or at some other institution designated by act of the legislature of the State concerned. If there is more than one such college or university in a State established in accordance with such Act of July 2, 1862, the institute in such State shall, in the absence of a designation to the contrary by act of the legislature of the State, be established at the one such college or university designated by the Governor of the State. Two or more States may cooperate in the establishment of a single institute or regional institute, in which event the sums otherwise allocated to institutes in each of the cooperating States shall be paid to such single or regional institute.

(b) Scope of research; other activities; cooperation and coordination

Each institute shall -

(1) plan, conduct, or otherwise arrange for competent applied and peer reviewed research that fosters –
- (A) improvements in water supply reliability;
- (B) the exploration of new ideas that –
  - (i) address water problems; or
  - (ii) expand understanding of water and water-related phenomena;
- (C) the entry of new research scientists, engineers, and technicians into water resources fields; and
- (D) the dissemination of research results to water managers and the public.

(2) cooperate closely with other colleges and universities in the State that have demonstrated capabilities for research, information dissemination, and graduate training in order to develop a statewide program designed to resolve State and regional water and related land problems.

Each institute shall also cooperate closely with other institutes and other organizations in the region to increase the effectiveness of the institutes and for the purpose of promoting regional coordination.

(c) Grants; matching funds

From the sums appropriated pursuant to subsection (f) of this section, the Secretary shall make grants to each institute to be matched on a basis of no less than 2 non-Federal dollars for every 1 Federal dollar, such sums to be used only for the reimbursement of the direct cost expenditures incurred for the conduct of the water resources research program.

(d) Submission and approval of water research program; requisite assurances

Prior to and as a condition of the receipt each fiscal year of funds appropriated under subsection (f) of this section, each institute shall submit to the Secretary for his approval a water research program that includes assurances, satisfactory to the Secretary, that such program was developed in close consultation and collaboration with the director of that State's department of water resources or similar agency, other leading water resources officials within the State, and interested members of the public. The program described in the preceding sentence shall include plans to promote research, training, information dissemination, and other activities meeting the needs of the State and Nation, and shall encourage regional cooperation among institutes in research into areas of water management, development, and conservation that have a regional or national character.

(e) Evaluation of water resources research program

The Secretary shall conduct a careful and detailed evaluation of each institute at least once every 3 years to determine that the quality and relevance of its water resources research and its effectiveness at producing measured results and applied water supply researc*h* as an institution for planning, conducting, and arranging for research warrants its continued support under this section. If, as a result of any such evaluation, the Secretary determines that an institute does not qualify for further support under this section, then no further grants to the institute may be made until the institute's qualifications are reestablished to the satisfaction of the Secretary.

(f) Authorization of appropriations in general

(1) There is authorized to be appropriated to carry out this section, to remain available until expended, $12,000,000 for each of fiscal years 2007 through 2011.

(2) Any sums appropriated under this subsection but which fail to be obligated by the close of the fiscal year for which they were appropriated shall be transferred by the Secretary and available for obligation during the succeeding fiscal year under the terms of subsection (g) of this section.

(g) Additional appropriations where research focused on water problems of interstate nature

(1) There is further authorized to be appropriated to the Secretary of the Interior the sum of $6,000,000 for each of fiscal years 2007 through 2011 only for reimbursement of the direct cost expenses of additional research or synthesis of the results of research by institutes which focuses on water problems and issues of a regional or interstate nature beyond those of concern only to a single State and which relate to specific program priorities identified jointly by the Secretary and the institutes. Such funds when appropriated shall be matched on a not less than dollar-for-dollar basis by funds made available to institutes or groups of institutes, by States or other non-Federal sources. Funds made available under this subsection shall remain available until expended.

(2) Research funds made available under this subsection shall be made on a competitive basis subject to the merit of the proposal, the need for the information to be produced, and the opportunity such funds will provide for training of water resources scientists or professionals.

(h) Coordination

(1) In general

To carry out this chapter, the Secretary -

(A) shall encourage other Federal departments, agencies (including agencies within the Department of the Interior), and instrumentalities to use and take advantage of the expertise and capabilities that are available through the institutes established by this section, on a cooperative or other basis;

(B) shall encourage cooperation and coordination with other Federal programs concerned with water resources problems and issues;

(C) may enter into contracts, cooperative agreements, and other transactions without regard to section 5 of title 41;

(D) may accept funds from other Federal departments, agencies (including agencies within the Department of the Interior), and instrumentalities to pay for and add to grants made, and contracts entered into, by the Secretary;

(E) may promulgate such regulations as the Secretary considers appropriate; and

(F) may support a program of internships for qualified individuals at the undergraduate and graduate levels to carry out the educational and training objectives of this chapter.

2) Reports

The Secretary shall report to Congress annually on coordination efforts with other Federal departments, agencies, and instrumentalities under paragraph (1). As part of the annual budget submission to Congress, the Secretary shall also provide a crosscut budget detailing the expenditures on activities listed under subsection (a)(1) and a report which details the level of applied research and the results of the activities authorized by this Act, including potential and actual –

(A) increases in annual water supplies;
(B) increases in annual water yields;
(C) advances in water infrastructure and water quality improvements; and
(D) methods for identifying, and determining the effectiveness of, treatment technologies and efficiencies.

(3) Relationship to State rights

Nothing in this chapter shall preempt the rights and authorities of any State with respect to its water resources or management of those resources.

[Source: Pub. L. 98-242, title I, Sec. 104, Mar. 22, 1984, 98 Stat. 98;Pub. L. 101-397, Sec. 1(b)-(h), (m), Sept. 28, 1990, 104 Stat. 852, 853; Pub. L. 104-147, Sec. 3-6, May 24, 1996, 110 Stat. 1376.]

[References In Text: Act approved July 2, 1862, referred to in subsec. (a), is act July 2, 1862, ch. 130, 12 Stat. 503, as amended, popularly known as the "Morrill Act" and also as the "First Morrill Act", which is classified generally to subchapter I (Sec. 301 et seq.) of chapter 13 of Title 7, Agriculture.]

[Amendments: 2006 – Pub. L. 109-471, Section 2(a) substituted "As part of the annual budget submission to Congress, the Secretary shall also provide a crosscut budget detailing the expenditures on activities listed under subsection (a)(1) and a report which details the level of applied research and the results of the activities authorized by this Act, including potential and actual – (A) increases in annual water supplies; (B) increases in annual water yields; (C) advances in water infrastructure and water quality improvements; and (D) methods for identifying, and determining the effectiveness of, treatment technologies and efficiencies."]

[Amendments: 2006 – Pub. L. 109-471, Section 2(b), Evaluation of Water Resources Research Program substituted: "3…at producing measured results and applied water supply research."

[Amendments: 2006 – Pub. L. 109-471, Section 2(c), Authorization of Appropriations substituted: "There is authorized to be appropriated to carry out this section, to remain available until expended, $12,000,000 for each of fiscal years 2007 through 2011."]

[Amendments: 2006 – Pub. L. 106-47, Section 2(d), Additional Appropriations Where Research Focused on Water Problems of Interstate Nature substituted: "$6,000,000 for each of fiscal years 2007 through 2011."

[Amendments: 2000 – Pub. L. 106-374, Section 1 substituted "$9,000,000 for fiscal year 2001, $10,000,000 for fiscal years 2002 and 20003, and $12,000,000 for fiscal years 2004 and 2005, ".]

[Amendments: 2000 – Pub. L. 106-374, Section 2 substituted "$3,000,000 for fiscal year 2001, $4,000,000 for fiscal years 2002 and 2003, and $6,000,000 for fiscal years 2004 and 2005 ".]

[Amendments: 1996 - Subsec. (c). Pub. L. 104-147, Sec. 3, substituted "2 non-Federal dollars for every 1 Federal dollar" for "one non-Federal dollar for every Federal dollar during the fiscal years ending September 30, 1985, and September 30, 1986, one and one-half non-Federal dollars for each Federal dollar during the fiscal years ending September 30, 1987, and September 30, 1988, and two non-Federal dollars for each Federal dollar during the fiscal year ending September 30, 1989 and thereafter".

Subsec. (f)(1). Pub. L. 104-147, Sec. 4, substituted "of $5,000,000 for fiscal year 1996, $7,000,000 for each of fiscal years 1997 and 1998, and $9,000,000 for each of fiscal years 1999 and 2000" for "of $10,000,000 for each of the fiscal years ending September 30, 1989, through September 30, 1995,".

Subsec. (g)(1). Pub. L. 104-147, Sec. 5, substituted "of $3,000,000 for each of fiscal years 1996 through 2000" for "of $5,000,000 for each of the fiscal years 1991, 1992, 1993, 1994, and 1995".

Subsec. (h). Pub. L. 104-147, Sec. 6, added subsec. (h). 1990 - Subsec. (a). Pub. L. 101-397, Sec. 1(b), substituted "Federated States of Micronesia" for "Trust Territory of the Pacific Islands".

Subsec. (b). Pub. L. 101-397, Sec. 1(c), inserted "promoting" after "for the purpose of" in last sentence.

Subsec. (b)(1). Pub. L. 101-397, Sec. 1(d), amended par. (1) generally. Prior to amendment, par. (1) read as follows: "plan, conduct, or otherwise arrange for competent research with respect to water resources, including investigations and experiments of either a basic or practical nature, or both; promote the dissemination and application of the results of these efforts; and provide for the training of scientists and engineers through such research, investigations, and experiments, and".

Subsec. (c). Pub. L. 101-397, Sec. 1(e), substituted for period at end "and thereafter, such sums to be used only for the reimbursement of the direct cost expenditures incurred for the conduct of the water resources research program."

Subsec. (e). Pub. L. 101-397, Sec. 1(f), amended subsec. (e) generally, substituting provisions directing that evaluation be conducted at least once every 5 years for provisions directing evaluation within two years after establishment of institute and at least once every four years thereafter and striking out provisions relating to composition and function of evaluation team and setting forth criteria for determination.

Subsec. (f)(1). Pub. L. 101-397, Sec. 1(g), substituted "September 30, 1989, through September 30, 1995," for "September 30, 1985, through September 30, 1989".

Subsec. (f)(2). Pub. L. 101-397, Sec. 1(h), substituted reference to subsec. (g) of this section for reference to section 10305 of this title.

Subsec. (g). Pub. L. 101-397, Sec. 1(m), added subsec. (g).]

Sec. 10304. Research concerning water resource-related problems deemed to be in national interest

(a) Grants; matching funds

(1) In addition to the grants authorized by section 10303 of this title, the Secretary is authorized to make grants, on a dollar-for-dollar matching basis, to the institutes established under such section, as well as other qualified educational institutions, private foundations, private firms, individuals, and agencies of local

or State government for research concerning any aspect of a water resource-related problem which the Secretary may deem to be in the national interest. Such grants shall be made with such advice and review by peer or other expert groups of appropriate interdisciplinary composition as the Secretary deems appropriate on the basis of the merits of the project and the need for the knowledge such project is expected to produce upon completion.

(2) Research funded under this section should to the extent possible utilize the best qualified graduate students so the Nation profits from the education and training benefits resulting from the use of the latest in technological developments in solving water problems.

(b) Applications for grants

Each application for a grant under this section shall state the nature of the project to be undertaken, the period during which it will be pursued, the qualifications of the personnel who will direct and conduct it, the importance of the project to the Nation as well as to the region and State concerned, its relation to other research projects previously or currently being pursued, and the extent to which it will provide an opportunity for the training of water resources scientists.

(c) Authorization of appropriations

There is authorized to be appropriated to the Secretary the sum of $10,000,000 for the purpose of carrying out this section for each of the fiscal years ending September 30, 1985, through September 30, 1995, such sums to remain available until expended.

[Source: Pub. L. 98-242, title I, Sec. 105, Mar. 22, 1984, 98 Stat. 100; Pub. L. 101-397, Sec. 1(i), (j), Sept. 28, 1990, 104 Stat. 853.]

[Amendments: 1990 - Subsec. (a)(3). Pub. L. 101-397, Sec. 1(i), struck out par. (3) which read as follows: "In cases where the Secretary determines, in accordance with criteria established by him, that research under this section is of a basic nature which would not otherwise be undertaken, the Secretary may approve grants under this section with a matching requirement other than that specified in paragraph (1) of this subsection."

Subsec. (c). Pub. L. 101-397, Sec. 1(j), substituted "$10,000,000" for "$20,000,000" and "1995" for "1989".

Sec. 10305. Development of water-related technology

(a) Grants; matching funds

(1) The Secretary shall make grants in addition to those authorized under sections 10303 and 10304 of this title for technology development concerning any aspect of water resources including water-related technology which the Secretary may

deem to be of State, regional, or national importance. Activities funded under this section may be carried out by educational institutions, private firms, foundations, individuals, or agencies of State or local government. Care shall be taken to protect proprietary information of private individuals or firms associated with the technology.

(2) The Secretary may establish any condition for the matching of funds by the recipient of any grant or contract under this section which the Secretary considers to be in the best interest of the Nation considering the information transfer and technology needs of the Nation. However, in the case of institutes established by section 10303 of this title no match greater than that required under section 10303 of this title may be required.

(b) Applications for grants

Each application for a grant under this section shall state the nature of the project to be undertaken, the qualifications of the personnel who will direct and conduct it, facilities of the organization performing any technology development, the importance of the project to the Nation, region, and State concerned, and the potential benefit to be accrued.

(c) Authorization of appropriations

There is authorized to be appropriated to the Secretary the sum of $6,000,000 for the purpose of carrying out this section for each of the fiscal years ending September 30, 1990, through September 30, 1995; such sums to remain available until expended.

[Source: Pub. L. 98-242, title I, Sec. 106, Mar. 22, 1984, 98 Stat. 100; Pub. L. 101-397, Sec. 1(n), Sept. 28, 1990, 104 Stat. 853.]

[Amendments: 1990 - Pub. L. 101-397, in amending section generally, in subsec. (a)(1) struck out provision directing that grant be made on basis of merit and feasibility of project, in subsec. (a)(2) inserted provisions relating to match in the case of institutes established by section 10303 of this title, and in subsec. (c) substituted provisions authorizing $6,000,000 appropriation for fiscal years 1990 through 1995, for provisions authorizing the same sum for fiscal years 1985 through 1989, and struck out provisions authorizing obligation of funds under this section and par. (1) and (2) designations.]

Sec. 10306. Administrative costs

From the sums appropriated pursuant to this chapter, not more than 7.5 per centum shall be utilized for administrative costs.

[Source: Pub. L. 98-242, title I, Sec. 107, Mar. 22, 1984, 98 Stat. 101.]

Sec. 10307. Types of research and development

The type of research and development to be undertaken under the authority of sections 10304 and 10305 of this title and to be encouraged by the institutes established under section 10303 of this title shall include the following:

(1) Aspects of the hydrologic cycle;

(2) Supply and demand for water;

(3) Demineralization of saline and other impaired waters;

(4) Conservation and best use of available supplies of water and methods of increasing such supplies;

(5) Water reuse;

(6) Depletion, contamination, and degradation of groundwater supplies;

(7) Improvements in the productivity of water when used for agricultural, municipal, and commercial purposes;

(8) The economic, legal, engineering, social, recreational, biological, geographic, ecological, and other aspects of water quality and quantity problems;

(9) Scientific information dissemination activities, including identifying, assembling, and interpreting the results of scientific and engineering research on water resources problems; and

(10) Providing means for improved communication of research results, having due regard for the varying conditions and needs for the respective States and regions.

[Source: Pub. L. 98-242, title I, Sec. 108, Mar. 22, 1984, 98 Stat. 101; Pub. L. 101-397, Sec. 1(k), (l), Sept. 28, 1990, 104 Stat. 853.]

[Amendments: 1990 - Par. (6). Pub. L. 101-397, Sec. 1(k), which directed that ", contamination," be inserted after "depletion", was executed by making the insertion after "Depletion" to reflect the probable intent of Congress. Par. (8). Pub. L. 101-397, Sec. 1(l), inserted "quality and quantity" after "water".]

Sec. 10308. Patent policy

Notwithstanding any other provision of law, the Secretary shall be governed by the provisions of sections 5908 (except subsections (l) and (n)) and 5909 of this title with respect to patent policy and to the definition of title to and licensing of inventions made or conceived in the course of work performed, or under any contract or grant made, pursuant to this chapter. Subject to such patent policy, all research or development

contracted for, sponsored, cosponsored, or authorized under authority of this chapter shall be provided in such manner that all information, data, and know-how, regardless of their nature or mediums, resulting from such research and development shall (with such exceptions and limitations, if any, as the Secretary may find to be necessary in the interest of national defense) be usefully available for practice by the general public.

[Source: Pub. L. 98-242, title I, Sec. 109, Mar. 22, 1984, 98 Stat. 101.]

Sec. 10309. New spending authority; amounts provided in advance

Any new spending authority described in subsection (c)(2)(A) or (B) of section 651 of title 2 which is provided under this chapter shall be effective for any fiscal year only to such extent or in such amounts as are provided in advance in appropriations Acts.

[Source: Pub. L. 98-242, title I, Sec. 111, Mar. 22, 1984, 98 Stat. 101.]

NOTE: This bill has been prepared for the signature of the appropriate legislative officers and the Governor. To determine whether the Governor has signed the bill or taken other action on it, please consult the legislative status sheet, the legislative history, or the Session Laws.

HOUSE BILL 07-1096

BY REPRESENTATIVE(S) Fischer, Curry, Kefalas, McNulty, Labuda, McGihon, Buescher, Gibbs, Hodge, Looper, and Swalm;
also SENATOR(S) Bacon, Isgar, and Johnson.

CONCERNING THE FUNDING OF THE COLORADO WATER RESOURCES RESEARCH INSTITUTE, AND MAKING AN APPROPRIATION THEREFOR.

Be it enacted by the General Assembly of the State of Colorado:

SECTION 1. 39-29-109 (7), Colorado Revised Statutes, is amended to read:

39-29-109. Severance tax trust fund - created - administration - use of moneys - definitions - repeal. (7) (a) Subject to the maintenance of the end balance requirement of paragraph (f) of subsection (1.5) of this section and a two-year reserve pursuant to sub-subparagraph (A) of subparagraph (III) of paragraph (c) of subsection (1) of this section, five hundred thousand dollars from the operational account of the severance tax trust fund shall be appropriated for fiscal year 2006-07 AND ONE HUNDRED FIFTY THOUSAND DOLLARS FROM THE OPERATIONAL ACCOUNT OF THE SEVERANCE TAX TRUST FUND SHALL BE APPROPRIATED FOR FISCAL YEAR 2007-08 for purposes specified in article 35 of title 23, C.R.S.

Capital letters indicate new material added to existing statutes; dashes through words indicate deletions from existing statutes and such material not part of act.

(b) This subsection (7) is repealed, effective ~~July 1, 2007.~~ JULY 1, 2008.

SECTION 2. Appropriation. In addition to any other appropriation, there is hereby appropriated, out of any moneys in the operational account of the severance tax trust fund created in section 39-29-109 (1) (a) (II), Colorado Revised Statutes, not otherwise appropriated, to the department of higher education, for allocation to the water resources institute established pursuant to article 35 of title 23, Colorado Revised Statutes, for the fiscal year beginning July 1, 2007, the sum of one hundred fifty thousand dollars ($150,000), or so much thereof as may be necessary, for the implementation of this act.

SECTION 3. Safety clause. The general assembly hereby finds,

determines, and declares that this act is necessary for the immediate preservation of the public peace, health, and safety.

Andrew Romanoff SPEAKER OF THE HOUSE OF REPRESENTATIVES	Joan Fitz-Gerald PRESIDENT OF THE SENATE
Marilyn Eddins CHIEF CLERK OF THE HOUSE OF REPRESENTATIVES	Karen Goldman SECRETARY OF THE SENATE

APPROVED_____

Bill Ritter, Jr.
GOVERNOR OF THE STATE OF COLORADO

NOTE: This bill has been prepared for the signature of the appropriate legislative officers and the Governor. To determine whether the Governor has signed the bill or taken other action on it, please consult the legislative status sheet, the legislative history, or the Session Laws.

HOUSE BILL 08-1026

BY REPRESENTATIVE(S) Fischer, Kefalas, McGihon, Solano, Levy, Butcher, Carroll M., Borodkin, Curry, Frangas, Gagliardi, Gallegos, Green, Labuda, Marostica, Massey, McFadyen, Merrifield, Pommer, and Scanlan; also SENATOR(S) Schwartz, Bacon, Tochtrop, and Williams.

CONCERNING THE COLORADO WATER RESOURCES RESEARCH INSTITUTE, AND, IN CONNECTION THEREWITH, CHANGING THE NAME OF THE INSTITUTE TO THE COLORADO WATER INSTITUTE, EXPANDING THE DUTIES OF THE INSTITUTE, AND AUTHORIZING THE INSTITUTE AS A CONTRACTING ENTITY FOR WATER RESEARCH.

Be it enacted by the General Assembly of the State of Colorado:

SECTION 1. 23-31-801, Colorado Revised Statutes, is amended to read:

23-31-801. Colorado water institute - creation. (1) There is hereby created the Colorado water ~~resources research~~ institute, referred to in this part 8 as the "institute", for the FOLLOWING purposes:

(a) ~~of~~ Developing, implementing, and coordinating water and water-related research programs ~~in the state~~ IN COLLABORATION WITH OTHER STATE INSTITUTIONS OF HIGHER EDUCATION and transferring the

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Capital letters indicate new material added to existing statutes; dashes through words indicate deletions from existing statutes and such material not part of act.

results of research and new technologies to potential users;

(b) CREATING AND OPERATING A WATER RESEARCH INFORMATION AND EDUCATION CENTER AS A STATEWIDE CLEARINGHOUSE AND ARCHIVE FOR WATER RESOURCES, WATER QUALITY, AND WATER-RELATED POLICY ISSUES, INCLUDING THE TRAINING OF FUTURE GENERATIONS OF WATER SCIENTISTS, MANAGERS, PLANNERS, AND EDUCATORS; AND

(c) CONDUCTING SCIENTIFIC RESEARCH AND POLICY ANALYSIS IN AREAS INCLUDING, BUT NOT LIMITED TO, WATER DEVELOPMENT AND STORAGE AND SURFACE WATER AND GROUND WATER HYDROLOGY, WATER RESOURCES MANAGEMENT, WATER QUALITY AND AQUATIC HABITAT MANAGEMENT AND PROTECTION, WATER HISTORY AND PALEOHYDROLOGY, DROUGHT PLANNING AND MITIGATION, AND CLIMATE CHANGE AND ADAPTATION.

(2) The institute shall be a unit of the Colorado state university under the supervision and control of the university's administration and the board of governors of the Colorado state university system.

(3) The principal administrative officer of the institute shall be a director, who shall be appointed by the president of the Colorado state university with the approval of the board of governors of the Colorado state university system and who shall be under the direct supervision of the president of Colorado state university or a vice-president thereof designated by the president. To meet the purposes of the institute, the director, with the advice of the advisory committee established pursuant to section 23-31-802, shall develop appropriate policies and procedures for identification of priority research problems; for collaborating with water MANAGERS AND user associations, DROUGHT AND CLIMATE CHANGE PLANNING ORGANIZATIONS, other universities, federal, state, and local government agencies, and the general assembly in the formulation of its research program; for selection of projects to be funded; and for the dissemination of information and transfer of technology ~~which~~ THAT is produced by the research.

(4) It is the duty of the institute to:

(a) Consult with state and local government agencies, water MANAGERS AND user associations, DROUGHT AND CLIMATE CHANGE

PLANNING ORGANIZATIONS, WATER QUALITY PLANNING ORGANIZATIONS, the general assembly, and other potential users of research in identifying and prioritizing ~~water problems for research~~ THE STATE'S WATER SCIENTIFIC AND POLICY-RELATED RESEARCH NEEDS;

(b) Negotiate and administer contracts with other ~~universities~~ STATE INSTITUTIONS of ~~the state~~ HIGHER EDUCATION for the conduct of research projects;

(c) Disseminate new information and facilitate transfer and application of new technologies as they are developed;

(d) Provide for liaison between Colorado and the federal research funding agencies as an advocate for ~~Colorado~~ COLORADO'S water research needs;

(e) Facilitate and stimulate SCIENTIFIC research AND POLICY ANALYSIS that:

(I) Deals with policy issues facing the general assembly;

(II) Supports state water, PUBLIC HEALTH, AND WATER QUALITY PROTECTION agencies' missions with WATER research on WATER-RELATED problems encountered and expected, INCLUDING BUT NOT LIMITED TO THE EFFECTS OF CLIMATE CHANGE ON WATER QUALITY, WATER AVAILABILITY, RUN-OFF TIMING, DROUGHT PLANNING, AND FUTURE COMPACT COMPLIANCE;

(III) Provides water planning and management organizations with tools to increase efficiency and effectiveness of water planning and management;

(IV) ENGAGES AND TRAINS FUTURE GENERATIONS OF THE STATE'S WATER PROFESSIONALS AND EDUCATORS; AND

(V) EXAMINES THE INTERCONNECTIONS BETWEEN CLIMATE CHANGE, WATER SUPPLY, AND WATER QUALITY AND PROVIDES TOOLS NEEDED BY WATER MANAGERS AND POLICYMAKERS FOR ADAPTING TO GLOBAL CLIMATE CHANGE;

(f) ESTABLISH AND MAINTAIN A CLEARINGHOUSE AND ARCHIVE OF

WATER RESEARCH, WATER QUALITY, AND CLIMATE PROJECTION DATA.

(5) The institute is authorized to employ such professional, clerical, and other personnel needed to carry out the provisions of this part 8.

(6) The institute is authorized to expend state funds appropriated by the general assembly for cost-sharing on projects funded with federal or private moneys.

(7) STATE FUNDS GRANTED, APPROPRIATED, OR OTHERWISE MADE AVAILABLE FOR WATER RESEARCH CONDUCTED AT THE STATE'S INSTITUTIONS OF HIGHER EDUCATION MAY PASS THROUGH THE ADMINISTRATIVE CONTROL OF THE INSTITUTE IF THE GRANT, APPROPRIATION, OR OTHER FUNDING DOCUMENT SO SPECIFIES. IF PARTICULAR FUNDS ARE SO RESTRICTED, THE INSTITUTE MAY SERVE AS AN ADMINISTRATIVE ENTITY OF SUCH FUNDS FOR STATE AGENCIES THAT SEEK TO UTILIZE COLORADO UNIVERSITIES OR COLLEGES FOR WATER RESEARCH. AS SUCH, THE INSTITUTE SHALL HAVE THE POWER TO ACCEPT GRANTS, DONATIONS, APPROPRIATIONS, AND OTHER FUNDING FROM ANY ENTITY. THE INSTITUTE MAY PROVIDE OVERSIGHT FOR SUCH FUNDING BY ENSURING RESEARCH PROJECTS COMMENCE AND ARE COMPLETED WITHIN THE SCOPE OF AGREEMENTS, INVOICES, CONTRACTS, PURCHASE ORDERS, INTERGOVERNMENTAL AGREEMENTS, OR OTHER FISCAL DEVICES USED TO FUND RESEARCH. THE INSTITUTE IS AUTHORIZED TO ASSESS A FEE TO IMPLEMENT ITS ADMINISTRATIVE AUTHORITY. SUCH FEE MAY NOT EXCEED TWENTY PERCENT OF THE TOTAL COST OF THE PROJECT BEING ADMINISTERED BY THE INSTITUTE. THE ADVISORY COMMITTEE CREATED IN SECTION 23-31-802 SHALL ANNUALLY REVIEW AND ESTABLISH THE ADMINISTRATION FEE.

SECTION 2. 23-31-802, Colorado Revised Statutes, is amended to read:

23-31-802. Advisory committee on water research policy. (1) There is hereby created the advisory committee on water research policy, ~~that~~ WHICH shall consist of at least ~~ten~~ ELEVEN members. EIGHT OF THE MEMBERS SHALL BE appointed by the director of the institute. THE REMAINING MEMBERS SHALL BE THE EXECUTIVE DIRECTOR OF THE DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT, THE EXECUTIVE DIRECTOR OF THE DEPARTMENT OF NATURAL RESOURCES, AND THE COMMISSIONER OF AGRICULTURE, OR THEIR DESIGNEES.

(2) APPOINTED members of the advisory committee shall serve terms of four years. Members shall serve without compensation and are not entitled to reimbursement of expenses incurred in the performance of their duties.

(3) The advisory committee shall recommend policy guidelines for implementing the functions of the institute; SHALL CONFER WITH STATE GOVERNMENTAL AGENCIES, NONGOVERNMENTAL AGENCIES, AND STATE INSTITUTIONS OF HIGHER EDUCATION TO SET COLORADO'S WATER RESEARCH PRIORITIES; and shall evaluate the programs of the institute. The advisory committee shall also advise and counsel the director of the institute and shall make recommendations to assist the director in carrying out the purposes of this part 8.

SECTION 3. 23-31-803, Colorado Revised Statutes, is amended to read:

23-31-803. Water research fund. (1) There is hereby established in the state treasury the water research fund, referred to in this part 8 as the "fund". The fund shall consist of FEES RECEIVED BY THE INSTITUTE PURSUANT TO SECTION 23-31-801 (7) AND gifts, grants, and donations accepted by the institute. The moneys in the fund are hereby continuously appropriated to the institute, and the institute may expend moneys from the fund for any purpose consistent with this article. Any interest derived from the deposit and investment of moneys in the fund shall be credited to the fund. At the end of any fiscal year, all unexpended and unencumbered moneys in the fund shall remain therein and shall not be credited or transferred to the general fund or any other fund.

(2) ~~It is the intent of the general assembly that no general fund dollars be appropriated for the water resources research institute.~~

SECTION 4. Safety clause. The general assembly hereby finds,

determines, and declares that this act is necessary for the immediate preservation of the public peace, health, and safety.

Andrew Romanoff SPEAKER OF THE HOUSE OF REPRESENTATIVES	Peter C. Groff PRESIDENT OF THE SENATE
Marilyn Eddins CHIEF CLERK OF THE HOUSE OF REPRESENTATIVES	Karen Goldman SECRETARY OF THE SENATE

APPROVED_____

Bill Ritter, Jr.
GOVERNOR OF THE STATE OF COLORADO

NOTE: This bill has been prepared for the signature of the appropriate legislative officers and the Governor. To determine whether the Governor has signed the bill or taken other action on it, please consult the legislative status sheet, the legislative history, or the Session Laws.

An Act

HOUSE BILL 08-1405

BY REPRESENTATIVE(S) Fischer, Buescher, Curry, Frangas, Green, Kefalas, King, Labuda, Madden, McFadyen, McGihon, and Merrifield; also SENATOR(S) Shaffer, Bacon, Boyd, Gibbs, Johnson, Romer, Schwartz, and Tochtrop.

CONCERNING THE FUNDING OF THE COLORADO WATER INSTITUTE, AND MAKING AN APPROPRIATION THEREFOR.

Be it enacted by the General Assembly of the State of Colorado:

SECTION 1. 39-29-109 (7), Colorado Revised Statutes, is amended to read:

39-29-109. Severance tax trust fund - created - administration - use of moneys - definitions - repeal. (7) (a) (I) Subject to the maintenance of the end balance requirement of paragraph (f) of subsection (1.5) of this section and a two-year reserve pursuant to sub-subparagraph (A) of subparagraph (III) of paragraph (c) of subsection (1) of this section, five hundred thousand dollars from the operational account of the severance tax trust fund shall be appropriated for fiscal year 2006-07 and one hundred fifty thousand dollars from the operational account of the severance tax trust fund shall be appropriated for fiscal year 2007-08; for purposes specified in article 35 of title 23, C.R.S., AS SAID ARTICLE EXISTED PRIOR TO ITS

Capital letters indicate new material added to existing statutes; dashes through words indicate deletions from existing statutes and such material not part of act.

REPEAL IN 2007.

(II) SUBJECT TO THE MAINTENANCE OF THE END BALANCE REQUIREMENT OF PARAGRAPH (f) OF SUBSECTION (1.5) OF THIS SECTION AND A TWO-YEAR RESERVE PURSUANT TO SUB-SUBPARAGRAPH (A) OF SUBPARAGRAPH (III) OF PARAGRAPH (c) OF SUBSECTION (1) OF THIS SECTION, FOR THE 2008-09 FISCAL YEAR, FIVE HUNDRED THOUSAND DOLLARS FROM THE OPERATIONAL ACCOUNT OF THE SEVERANCE TAX TRUST FUND SHALL BE APPROPRIATED TO THE WATER RESEARCH FUND CREATED IN SECTION 23-31-803 (1), C.R.S., TO BE USED FOR PURPOSES SPECIFIED IN PART 8 OF ARTICLE 31 OF TITLE 23, C.R.S.

(b) This subsection (7) is repealed, effective ~~July 1, 2008~~ JULY 1, 2010.

SECTION 2. 23-31-803 (1), Colorado Revised Statutes, as amended by House Bill 08-1026, enacted at the Second Regular Session of the Sixty-sixth General Assembly, is amended to read:

23-31-803. Water research fund. (1) There is hereby established in the state treasury the water research fund, referred to in this part 8 as the "fund". The fund shall consist of fees received by the institute pursuant to section 23-31-801 (7), APPROPRIATIONS MADE TO THE FUND PURSUANT TO SECTION 39-29-109 (7), C.R.S., and gifts, grants, and donations accepted by the institute. The moneys in the fund are hereby continuously appropriated to the institute, and the institute may expend moneys from the fund for any purpose consistent with this article. Any interest derived from the deposit and investment of moneys in the fund shall be credited to the fund. At the end of any fiscal year, all unexpended and unencumbered moneys in the fund shall remain therein and shall not be credited or transferred to the general fund or any other fund.

SECTION 3. 39-29-109.3 (2), Colorado Revised Statutes, as enacted by House Bill 08-1398, enacted at the Second Regular Session of the Sixty-sixth General Assembly, is amended BY THE ADDITION OF A NEW PARAGRAPH to read:

39-29-109.3. Operational account of the severance tax trust fund - repeal. (2) Subject to the requirements of subsections (3) and (4) of this section, if the general assembly chooses not to spend up to one hundred

percent of the moneys in the operational account as specified in subsection (1) of this section, the state treasurer shall transfer the following:

(j) (I) FOR THE STATE FISCAL YEAR COMMENCING JULY 1, 2008, FIVE HUNDRED THOUSAND DOLLARS TO THE WATER RESEARCH FUND CREATED IN SECTION 23-31-803 (1), C.R.S.

(II) THIS PARAGRAPH (j) IS REPEALED, EFFECTIVE JULY 1, 2010.

SECTION 4. 23-31-803 (1), Colorado Revised Statutes, as amended by House Bill 08-1026, enacted at the Second Regular Session of the Sixty-sixth General Assembly, is amended to read:

23-31-803. Water research fund. (1) There is hereby established in the state treasury the water research fund, referred to in this part 8 as the "fund". The fund shall consist of fees received by the institute pursuant to section 23-31-801 (7), TRANSFERS MADE TO THE FUND PURSUANT TO SECTION 39-29-109.3 (2) (j), C.R.S., and gifts, grants, and donations accepted by the institute. The moneys in the fund are hereby continuously appropriated to the institute, and the institute may expend moneys from the fund for any purpose consistent with this article. Any interest derived from the deposit and investment of moneys in the fund shall be credited to the fund. At the end of any fiscal year, all unexpended and unencumbered moneys in the fund shall remain therein and shall not be credited or transferred to the general fund or any other fund.

SECTION 5. Appropriation. In addition to any other appropriation, there is hereby appropriated, out of any moneys in the operational account of the severance tax trust fund created in section 39-29-109, Colorado Revised Statutes, not otherwise appropriated, to the water research fund, created in section 23-31-803, Colorado Revised Statutes, for the fiscal year beginning July 1, 2008, the sum of five hundred thousand dollars ($500,000), for the work of the Colorado research institute at Colorado state university in the department of higher education, for the implementation of this act.

SECTION 6. Effective date. (1) This act shall take effect upon passage; except that:

(a) Sections 1, 2, and 5 of this act shall not take effect if House Bill

08-1398 is enacted at the Second Regular Session of the Sixty-sixth General Assembly and becomes law.

(b) Sections 3 and 4 of this act shall take effect only if House Bill 08-1398 is enacted at the Second Regular Session of the Sixty-sixth General Assembly and becomes law.

SECTION 7. Safety clause. The general assembly hereby finds,

determines, and declares that this act is necessary for the immediate preservation of the public peace, health, and safety.

Andrew Romanoff SPEAKER OF THE HOUSE OF REPRESENTATIVES	Peter C. Groff PRESIDENT OF THE SENATE
Marilyn Eddins CHIEF CLERK OF THE HOUSE OF REPRESENTATIVES	Karen Goldman SECRETARY OF THE SENATE

APPROVED_____

Bill Ritter, Jr.
GOVERNOR OF THE STATE OF COLORADO

Appendix B

CSU Water-Related Grant Activity

Last Name	First Name	Sponsor	Project	Amount
Abt	Steven R	USDA-USFS-Rocky Mountain Research Station	Bedload Transport in Gravel-bed Rivers & Channel Change	$75,063
Bestgen	Kevin R	DOI-BLM-Bureau of Land Management	Hornyhead Chub Distribution, Abundance, and Habitat Use in the Lower Laramie River Drainage	$20,000
Bestgen	Kevin R	DOI-Bureau of Reclamation	Abundance Estimates for Colorado Pikeminnow in the Green River Basin, Utah and Colorado	$14,115
Bestgen	Kevin R	DOI-Bureau of Reclamation	Evaluating Effects of Non-Native Predator Fish Removal on Native Fishes in the Yampa River	$23,967
Bestgen	Kevin R	DOI-Bureau of Reclamation	Yampa and Middle Green CPM & RBS Larval Survey	$44,000
Bestgen	Kevin R	Wyoming Game & Fish Department	Big Sandy River Larval Dispersal	$96,643
Bestgen	Kevin R	Wyoming Game & Fish Department	Hornyhead Chub Investigations	$63,580
Bledsoe	Brian	NSF - National Science Foundation	Field Characterization of the Hydraulics of Steep Channels	$49,532
Cabot	Perry Edmund	Colorado Water Conservation Board	The Effect of Land Fallowing and Water Rights Leasing on Corn Yield, Nutrient Needs, and Economics in the Lower Arkansas River Valley of Colorado	$80,349
Cabot	Perry Edmund	Lower AR Valley Water Conservancy District	The Effect of Land Fallowing and Water Rights Leasing on Corn Yield, Nutrient Needs, and Economics in the Lower Arkansas River Valley of Colorado	$2,320
Chavez	Jose L	Monsanto	Remote Sensing-based Crop Water Stress Determination of Limited Irrigated MON87460 Transgenic Drought Tolerant Corn Hybrids	$43,677
Davies	Stephen P	New Mexico State University	Afghanistan Water, Agriculture and Technology Transfer Program (AWATT)	$1,025,655
Fausch	Kurt D	DOI-BLM-Bureau of Land Management	A Field Test of Effects of Grazing Management Systems on Invertebrate Prey that Support Trout Populations in Central Rocky Mountain Streams	$15,600
Fausch	Kurt D	The Nature Conservancy	Review of Water Management Scenarios for the North Fork Poudre River	$10,000
Fiege	Mark T	DOI-NPS-National Park Service	Environmental History of the Kawuneeche Valley and the Headwaters of the Colorado River, Rocky Mountain National Park	$49,994
Garcia	Luis	Various "Non-Profit" Sponsors	Developing a Decision Support System for the South Platte Basin	$10,000
Gates	Timothy K	Colorado Dept of Public Health and Environment	Data and Models for Planning of Nonpoint Source Selenium Management in the Lower Arkansas River Basin, Colorado	$501,735
Goodridge	Lawrence	Scientific Methods, Inc.	Rapid Concentration of Viruses from Drinking Water	$23,539
Hansen	Neil	DOI-Bureau of Reclamation	Demonstrating Limited Irrigation Technology as an Approach to Sustain Irrigated Agriculture While Meeting Increasing Urban Water Demand in Colorado	$68,465
Hawkins	John A	DOI-Bureau of Reclamation	Middle Yampa Smallmouth Bass and Northern Pike	$55,200
Johnson	Brett Michael	DOI-Bureau of Reclamation	Chemically Fingerprinting Nonnative Fishes in Reservoirs	$36,504
Lee	Brook L	USDA-USFS-Rocky Mountain Research Station	Effects of Mountain Pine Beetle and Forest Management on Water Quantity, State Forests	$56,825
Myrick	Christopher A	DOI-USFWS-Fish & Wildlife Service	A Pilot Project Testing the Use of Copper and Copper-Based Compounds to Prevent the Upstream Movement of New Zealand Mudsnail	$25,647
Myrick	Christopher A	DOI-USGS-Geological Survey	Developing Barriers to the Upstream Migration of New Zealand Mudsnail Phase III	$5,000
Niemann	Jeffrey D	DOI-Bureau of Reclamation	Implementing a Framework to Assess Uncertainty in Hydraulic and Hydrologic Models	$35,000
Oad	Ramchand	New Mexico State University	Afghanistan Water, Agriculture and Technology Transfer Program (AWATT)	$755,567
Pilon-Smits	Elizabeth AH	NSF-Biological Sciences	Ecological Aspects of Plant Selenium Hyperaccumulation: Below and Beyond	$124,651
Reardon	Kenneth F	University of Colorado	Bioconversion of Extracted Algal Biomass into Ethanol	$50,000
Roesner	Larry A	ACR, LLC	Graywater - Wetlands Monitoring and Recycling for Urban Watersheds	$49,900
Schneekloth	Joel	Monsanto	Response of Drought Tolerant Genetics to Water Stress	$65,701
Snyder	Darrel E	DOI-Bureau of Reclamation	Identification and Curation of Larval and Juvenile Fish	$99,332
Spencer	William P	USDA-Foreign Agricultural Service	Cochran Fellowship Training Program in Irrigation/Algeria and Tunisia/July 2009	$19,946
Waskom	Reagan M	USDA-CSREES-Cooperative State Research Education and Extension	Coordinated Regional Water Resources Programming for the Northern Plains and Mountains Region	$67,000
Westra	Philip	Monsanto	Field Production of Tissues and Grain from Drought Tolerant Corn	$47,880
Wohl	Ellen E	National Science Foundation	ARRA RAPID: Pre-Disturbance Surveys of Wood Loads in Headwater Streams of the Colorado Front Range	$30,435

Anderson	David G	DOI-USFWS-Fish & Wildlife Service	Monitoring Non-Native Species & Native Species; Native Species Taxonomy Studies	35,000
Bartolo	Michael E	Colorado Onion Association	Biology of Onion Thrips, Alternative Production Practices and Irrigation Practices - Arkansas Valley	2,500
Bauerle	William L	HRI-Horticultural Research Institute	A Systematic Approach to Solve Nursery and Landscape Water Management: Initial Industry Application	25,000
Bestgen	Kevin R	DOI-Bureau of Reclamation	Floodplain Inundation & Entrainment Studies (Project No. FR-BW TOPO)	31,800
Bestgen	Kevin R	DOI-Bureau of Reclamation	Population Estimate of Humpback Chub in Black Rock	4,000
Brown	Cynthia S	DOI-USGS-Geological Survey	Temperature Effects on the Southern Limit of Russian Olive (Elaeagnus angustifolia) in Western North America	44,511
Carcasson	Martin	Bohemian Foundation	CSU Center for Public Deliberation	17,290
Chavez	Jose L	Central Colorado Water Conservancy Dist	Wireless In-field Soil Water Content Monitoring Project	39,703
Cotrufo	Maria Francesca	USDA-USFS-Rocky Mtn. Rsrch Station - CO	Salt Cedar & Russian Olive Demonstration Act (HR2720) Science Assessment & Ongoing Invasive Species (Salt Cedar ...	123,500
Culver	Denise R	Colorado State Water Conservation Board	Identification & Assessment of Important Wetlands in the North Platte River Watershed	37,000
Demott	Paul J	NSF - National Science Foundation	Ice Nuclei and Ice Initiation in Mid-Latitude Clouds in Springtime: Background and Dust-Affected	28,472
Fontane	Darrell G	Water Resources University (Vietnam)	Presentation of an Introduction to Civil Engineering Course for the Water Resources University, Hanoi, Vietnam	12,519
Gao	Wei	USDA-CSREES-Coop State Rsrch Edu & Ext	Global Change/Ultraviolet Radiation, CO	1,312,660
Goemans	Christopher G	FRICO-Farmers Reservoir and Irrigation C	Alternatives to Water Transfers in the South Platte Basin using the Farmers Reservoir and Irrigation Company System	57,689
Kummerow	Christian D	NASA - Natl Aeronautics & Space Admin.	Optimal Estimation of Precipitation Profiles with Multiresolution Overlapping Radiometer and Radar Observations	30,000
Kummerow	Christian D	DOC-NOAA-Natl Oceanic & Atmospheric Admn	Development of an Improved Climate Rainfall Dataset from SSM/I	109,817
Lemly	Joanna	Colorado Division of Wildlife	Basinwide Wetland Profile of the North Platte River Basin in Colorado	180,568
Liston	Glen E	NASA - Natl Aeronautics & Space Admin.	Improving the Representation of Global Snow Cover, Snow Water Equivalent, and Snow Albedo in Climate Models by Applyin...	124,989
McDonald	Sandra K	Colorado Department of Agriculture	Regional Pilot - Aquatic Pesticide Applicator Guide	83,096
Myrick	Christopher A	DOI-Bureau of Reclamation	Barrier Design Criteria for White Sucker & Burbot	46,499
Nissen	Scott J	Colorado State Water Conservation Board	New Methods for Sago Pondweed Management	20,000
Poff	N LeRoy	DOI-USGS-Geological Survey	Effects of Water Management & Climate Change on the Dynamics of Native & Invasive Wetland & Riparian Plants in the ?	86,316
Roesner	Larry A	Water Environment Research Foundation	Linking Stormwater BMP Systems Performance to Receiving Water Protection to Improve BMP Selection and Design	244,789
Sibold	Jason Scott	DOI-NPS-National Park Service	Investigation into the Relationships Between Disturbance History and Mountain Pine Beetle Outbreak Severity and ...	13,991
Stednick	John D	Northern Colorado Water Conservancy Dist	Willow Creek Water Quality Study	21,010
Theobald	David M	USDA-USFS-Forest Research	Western Riparian Threats Assessment	20,000
Thornton	Christopher I	Erosion Prevention Products	Overtopping Tests on Two Articulating Concrete Block Systems	4,800
Waskom	Reagan M	Colorado State Water Conservation Board	Agricultural Water Conservation Clearinghouse	10,000
Willson	Bryan D	Solix Biofuels, Inc.	Algae to Biodiesel - Phase One; Lab and Reactor Development	205,359
Winkelman	Dana	DOI-Bureau of Reclamation	Population Dynamics Modeling of Introduced Smallmouth Bass, Upper Colorado River Basin	32,424
Zabel	Mark D	DOI-NPS-National Park Service	Evaluation of Water and Soil Samples from Rocky Mountain National Park for Chronic Wasting Disease Prions	54,027
Arabi	Mazdak	USDA Cooperative State Research Education & Extension Service	A Multi Criteria Decision Tool for the Assessment and Planning of Watershed Management Practices	$615,000
Bagley	Calvin F	U.S. Army Corps of Engineers	Watershed Basin Survey, Analysis and Modeling at Fort Richardson, Alaska	$237,940
Bauder	Troy A	Colorado Department of Agriculture	Training and Education for Agricultural Chemicals and Groundwater Protection	$185,000
Bauerle	William L	USDA Agricultural Research Service	Measurement and Modeling Plant Water Use to Quantify Nursery Water Requirements	$48,780
Bestgen	Kevin R	Wildlife and Conservation Biology, U.S. Bureau of Reclamation	Demographic Estimates and Monitoring for Razorback Sucker in the Colorado and Green River Basins, Utah & Colorado	$83,603
Caspari	Horst W	Colorado Department of Agriculture	Viticulture and Enology Programs for the Colorado Wine Industry	$194,114

Cooper	David Jonathan	U.S. Army Corps of Engineers	What Is A Hydrophyte? How Conifers, Herbaceous Dicots and Bryophytes Grow in Upland and Wetland Environments	$81,856
Cooper	David Jonathan	Yellowstone Park Foundation	Vanishing Wetlands of Yellowstone National Park's Northern Range: Watershed, Soils and Vegetation	$50,070
Cooper	David Jonathan	USDA-USFS-Rocky Mountain Research Station-Colorado	Water and Carbon Storage in Peatlands of the Rocky Mountains: Ecosystem Indicators of Climate Change	$122,000
Doesken	Nolan J	U.S. Bureau of Reclamation	Walking Through the Water Year	$40,000
Fausch	Kurt D	Colorado Division of Wildlife	Plains Fish Translocation Success	$30,000
Fausch	Kurt D	Wildlife and Conservation Biology, Wyoming Game & Fish Department	Climate Change Tool for Cutthroat	$58,677
Homann	Richard L	USDA-USFS-Forest Research	ARRA: High-Priority Forest Rest/Fuels Mitigation	$6,250,010
Johnson	Brett Michael	Wildlife and Conservation Biology, National Park Service	Evaluate Lake Trout Suppression Strategies for Blue Mesa Reservoir	$10,000
Johnson	Brett Michael	Colorado Division of Wildlife	Evaluate Lake Trout Suppression Strategies for Blue Mesa Reservoir	$141,000
Julien	Pierre Y	U.S. Bureau of Reclamation	Sediment Modeling Analysis Support	$72,000
Kampf	Stephanie K	U.S. Department of Energy	Climate Change Impacts to Hydropower Generation in Pacific Northwest River Basins	$130,392
Khosla	Rajiv	USDA Natural Resources Conservation Service	Innovative Active Remote Sensing and Site-Specific Management Zones for Enhancing Nutrient Use Efficiency and Water Quality	$74,847
Kumar	Sunil	U.S. Geological Survey	A Modeling System for Invasive Species	$99,348
Kummerow	Christian D	NASA	The Next Generation Rainfall Retrieval Algorithm for Use by TRMM and GPM	$84,000
Labadie	John W	Colorado Springs Utilities	Efficiency and Performance Improvement of Colorado Springs Utilities MODSIM Daily Model for Water Supply Yield Analysis	$34,239
Lee	Brook L	USDA-USFS-Rocky Mountain Research Station - Colorado	Effects of Mountain Pine Beetle and Forest Management on Water Quantity, State Forest	$50,694
Lemly	Joanna	Wildlife and Conservation Biology, Colorado Division of Wildlife	Statewide Wetland Strategies	$78,092
Lemly	Joanna	Wildlife and Conservation Biology, USDA-USFS-Forest Research	Wetland Condition Assessment on the Rio Grande National Forest	$28,366
Loftis	Jim C	National Park Service	Status and Trends of Impaired, Threatened, and Outstanding National/State Resource Waters	$232,101
Lyon	Margarette J	Wildlife and Conservation Biology, USDA-USFS-Forest Research	White River National Forest Fen Inventory	$15,026
Neupauer	Roseanna	U.S. Geological Survey	Adjoint Modeling to Quantify Stream Flow Changes Due to Aquifer Pumping	$117,847
Paschke	Mark W	National Park Service	Year 2 & 3 - Restoration of Native Plant Communities Following Saltcedar and Russian Olive Removal	$107,421
Qian	Yaling	Denver Water Department	Soil Testing Five Years after Irrigation with Recycled Water	$38,949
Ramirez	Jorge A	U.S. Army Research Office	Quantifying the Complex Hydrologic Response of Anephemeral Desert Wash	$65,000
Sanders	Thomas G	National Park Service	Mod 1: Integration of NPS/USGS Water Resources Science Applicable to Management of Protected Areas	$142,537
Stednick	John D	USDA-USFS-Rocky Mountain Research Station - Colorado	Determining Water Chemistry and Flow from GLEES Catchments	$12,000
Theobald	David M	USDA-USFS-Rocky Mountain Research Station - Colorado	Assessment of Watershed Condition in Colorado with Implications for Fuels Management	$50,000
Valliant	James C	Lower Arkansas Valley Water Conservancy District	The Effect on Corn Yield, Nutrient Needs and Economics when Fallowing Land in the Arkansas River Valley	$10,020
Wohl	Ellen E	USDA-USFS-Forest Research	Environmental Flow Strategy Validation Project	$45,000
Wohl	Ellen E	USDA-USFS-Forest Research	White River Analysis	$75,000
Andales	Allan A	Natural Resources Conservation Services	Using the ASCE Standardized Reference Evapotranspiration Equation and Appropriate Crop Coefficients	$74,617
Bau	Domenico A	Department of Energy	Multi-Objective Optimization Approaches for the Planning of Carbon Geological Sequestration Systems	$299,960
Chavez	Jose L	Agricultural Research Service	Crop Evapotranspiration Determination Using Eddy Covariance Fluxes, High Resolution Remote Sensing Imagery and a Surface Tmeperature Approach	$40,000
Cooper	David J	National Park Service	Developing a Wetland Delineation & Restoration Plan for Sand Creek, GRSA	$12,000
Cotton	William R	National Science Foundation	Collaborative Research: Inhibition of Snowfall by Pollution Aerosols	$157,744
Culver	Denise R	Wildlife and Conservation Biology, Environmental Protection Agency	Colorado State University 2009 Wetland Program Development Grant: Teller County	$153,951
Davies	Stephen P	New Mexico State University	Afghanistan Water, Agriculture and Technology Transfer Program	$435,589

Fausch	Kurt D	Wildlife and Conservation Biology, National Science Foundation	RiverWebs: Optimizing a Documentary on Stream Ecology for Science Teachers in the U.S. & Japan	$18,777
Fausch	Kurt D	Wildlife and Conservation Biology, National Science Foundation	RiverWebs: Optimizing a Documentary on Stream Ecology for Science Teachers in the U.S. & Japan	$30,339
Garcia	Luis	Various “Non-Profit” Sponsors	Developing a Decision Support System for the South Platte Basin	$10,000
Garcia	Luis	Agricultural Research Service	Module Development for OMS	$40,000
Garcia	Luis	Bureau of Reclamation	Development of Crop Coefficients for the South Platte Based on Multi-Temporal High-Resolution Remote Sensing of ET	$50,000
Gates	Timothy K	Bureau of Reclamation	Toward Optimal Water Management in Colorado’s Lower Arkansas River Valley, Monitoring and Modeling	$50,000
Gates	Timothy K	Lower AR Valley Water Conservancy	Monitoring and Modeling Toward Optimal Management of the Lower Arkansas River	$20,000
Julien	Pierre Y	Korea Institute of Construction Technology	Study on Physical Evaluation for the Abandoned Channel Restoration	$64,000
Kampf	Stephanie K	Christopher Reynolds Foundation, Inc.	Improved Water Management to Protect Biodiversity in the Ciego de Avila Conservation Reserve Area	$18,000
Myrick	Christopher A	Wildlife and Conservation Biology	Colorado Springs Utilities Flathead Chub Swimming Performance	$10,000
Niemann	Jeffrey D	Bureau of Reclamation	Implementing a Framework to Assess Uncertainty in Hydraulic and Hydrologic Models	$20,000
Oad	Ramchand	New Mexico State University	Afghanistan Water	$218,424
Oad	Ramchand	New Mexico Interstate Stream Commission	Decision Support Systems for Efficient Irrigation Management in the Middle Rio Grande	$175,271
Sharvelle	Sybil E	Water Environment Research Foundation	Landscape Irrigation Using Household Graywater Experimental Study	$24,000
Thornton	Christopher I	Erosion Prevention Products	Overtopping Tests on Two Articulating Concrete Block Systems	$20,695
Waskom	Reagan M	Coop State Research	Education & Extension Coordinated Regional Water Resources Programming for the Northern Plains and Mountains Region	$600,000
Winkelman	Dana	Colorado Division of Wildlife Population and Community	Level Effects of Endocrine Disrupting Compounds on Eastern Great Plains Fishes	$180,000
Bauerle	William L	University of Maryland	Precision Irrigation and Nutrient Management for Nursery, Greenhouse and Green Roof Systems: Wireless Sensor Network...	$249,542
Bestgen	Kevin R	DOI-USFWS-Fish & Wildlife Service	Monitoring Non-Native Species & Native Species; Native Species Taxonomy Studies	$37,500
Bledsoe	Brian	NSF-GEO-Geosciences	CAREER: Stream Restoration, Ecological Engineering and Nutrient Retention of Streams in Urban and Agricultrual Settings	$61,484
Bradley	Thomas Heenan	University of Colorado Boulder - C2B2	Lifecycle Sustainability Assessments for Microalgal Biofuel Production	$34,817
Cooper	David Jonathan	DOD-ARMY-Corps of Engineers	Watershed to Local Scale Characterization & Functioning of Intermittent and Ephemeral Streams on Military Lands	$540,658
Cotton	William R	University of Miami	Improving Cloud and Precipitation Physics in a Seamless Regiona-Global Climate Model	$132,699
Doesken	Nolan J	University of Colorado	Subcontract -- Climate Support to The Western Water Assessment (WWA)	$25,000
Garcia	Luis	USDA-ARS-Agricultural Research Service	Delivery of a Prototype Field-to-Watershed Scale Model for CEAP using an Enhanced OMS	$41,388
Labadie	John W	Colorado Springs Utilities	Efficiency and Performance Improvement of Colorado Springs Utilities MODSIM Daily Model for Water Supply Yield Analysis	$9,089
Liston	Glen E	NSF - National Science Foundation	Collaborative Research: Norwegian-United States IPY Scientific Traverse: Climate Variability and Glaciology in East...	$50,801
Oad	Ramchand	New Mexico State University	Afghanistan Water, Agriculture and Technology Transfer Program (AWATT)	$40,000
Poff	N LeRoy	Camp Dresser McKee	Colorado Basin Watershed Flow Evaluation Tool	$27,280
Sanford	William E	Regenesis Management Group	Development of Field-Scale Project to Quantify Change in Irrigation Return Flows due to Limited Irrigation	$29,791
Venayagamoorthy	Subhas K	Colorado Dept Public Health & Environ	Baffle Factors of Small System Disinfection Contact Basins	$10,000
Waskom	Reagan M	Walton Family Foundation	Initiative: Innovative Strategies for Agricultural/Urban/Environmental Water Sharing in the Colorado Rive...	$114,828
Zeidler	James A	DOD-ARMY-Corps of Engineers	Aquatic & Fisheries Project Management Tasks For Fort Leonard Wood, Missouri	$198,894
Abt	Steven R	USDA-USFS-Rocky Mtn. Rsrch Station - CO	Bedload Transport in Gravel-bed Rivers & Channel Change	$74,313
Berrada	Abdelfettah	National Sunflower Association	Evaluation of Sunflower in Dryland Crop Rotations	$10,450

Bestgen	Kevin R	DOI-Bureau of Reclamation	Floodplain Inundation & Entrainment Studies (Project No. FR-BW TOPO)	$30,870
Bestgen	Kevin R	DOI-Bureau of Reclamation	Yampa & Middle Green CPM & RBS Larval Survey (Project No. 22f)	$94,219
Cabot	Perry Edmund	Southeast Colorado Resource Conser & Dev	Oilseed Cropping as a Strategy for Sustained Farming in a Region Impacted by Agricultural Water Transfers	$20,500
Chavez	Jose L	Central Colorado Water Conservancy Dist	Irrigated Agriculture Water Conservation Tool	$29,242
Culver	Denise R	EPA-Environmental Protection Agency	Tools for Colorado Wetlands: Essential Information for Identification, Assessment, and Conservation	$198,001
Doesken	Nolan J	Colorado State Water Conservation Board	Evaluation and Integration of Selected Drought Triggers and Indices -- Their Role and Use in Colorado's Drought ...	$50,000
Fausch	Kurt D	DOI-USGS-Geological Survey	Tools to Assess Effects of Uncertain Climate Change Scenarios on Colorado River Cutthroat Trout	$70,000
Givens	Geoffrey H	North Slope Borough (Alaska)	Statistical Methods for the Study of Spatio-Temporal Patterns of Bowhead Whale Presence and Migration in...	$153,742
Hawkins	John A	DOI-Bureau of Reclamation	Middle Yampa Smallmouth Bass & Northern Pike	$264,413
Hobbs	Nicholas Thompson	DOI-USGS-Geological Survey	Development of a River Ecosystem Forecasting Framework	$14,332
Klett	James E	DOI-USGS-Geological Survey	2010CO220B-Impact of Limited Irrigation on Health of Four Common Shrub Species	$5,000
Liston	Glen E	NSF - National Science Foundation	IPY: Collaborative Research: A Prototype Network for Measuring Arctic Winter Precipitation and Snow Cover (Snow-Net)	$93,000
Maloney	Eric D	NSF - National Science Foundation	Intraseasonal Variability of the West African Monsoon	$214,165
Pearson	Calvin H	Flux Farm Foundation	Evaluation of Plant Species and Production Inputs for Sustainable Biomass and Bioenergy Production in Western Colorado	$30,690
Poff	N LeRoy	State University of New York	Impact of Climate Change and Variability on the Nation's Water Quality and Ecosystem State	$43,333
Qian	Yaling	USGA-US Golf Association/Green Section R	Salinity Management in Effluent Water Irrigated Turfgrass Systems	$28,420
Snyder	Darrel E	DOI-Bureau of Reclamation	Identification & Curation of Larval & Juvenile Fish (Project No. 15)	$116,679
Thornton	Christopher I	Urban Drainage & Flood Control District	Hydraulic Model Study: Type C and D Grate Inlets for Highway Median Storm Drainage	$29,705
Venayagamoorthy	Subhas K	DOD-NAVY-ONR-Office of Naval Research	Dynamics and Modeling of Turbulent Mixing in Oceanic Flows	$43,910
Venkatachalam	Chandrasekaran	NASA - Natl Aeronautics & Space Admin.	Global Observations and Precipitation Microphysics: Interpretation, Precipitation Estimation and ...	$150,247
Waskom	Reagan M	DOI-USGS-Geological Survey	Workshop on Nonstationarity, Hydrologic Frequency Analysis, and Water Management	$82,400
Waskom	Reagan M	DOI-USGS-Geological Survey	Program Administration Project	$44,235
Waskom	Reagan M	DOI-USGS-Geological Survey	Technology Transfer & Information Dissemination	$38,100
Waskom	Reagan M	EPA-Environmental Protection Agency	Colo State Univ/FY 10 Water Pollution Workshop	$56,065
Berrada	Abdelfettah	National Sunflower Association	Boosting Sunflower Production in SW Colorado with Supplemental Irrigation	$9,000
Bestgen	Kevin R	Wyoming Game & Fish Department	Big Sandy River Larval Dispersal	$85,340
Bestgen	Kevin R	Colorado Division of Wildlife	Eastern Plains Native Fish Investigations	$7,374
Bestgen	Kevin R	DOI-Bureau of Reclamation	Monitoring Effects of Flaming Gorge Dam Releases on the Lodore and Whirlpool Canyon Fish Communities	$61,211
Bestgen	Kevin R	DOI-Bureau of Reclamation	Evaluating Effects of Non-Native Predator Fish Removal on Native Fishes in the Yampa River (Project No. 140)	$85,976
Bledsoe	Brian	CDM	Mapping Geomorphic Settings in the Colorado River Basin for Environmental Flow Analysis	$12,117
Brick	Mark A	Colorado Dry Bean Admin. Committee, Colorado Department of Agriculture	Irrigation Efficiency of Three Water Delivery Systems on Diverse Dry Bean Market Classes of Dry Edible Bean	$44,000
Chavez	Jose L	Regenesis Management Group	Crop Water Stress Index and Evapotranspiration Monitoring using Remote Sensing Techniques	$78,836
Davies	Stephen P	New Mexico State University	Afghanistan Water, Agriculture and Technology Transfer Program (AWATT)	$338,545
Fausch	Kurt D	DOI-USGS-Geological Survey	Tools to Assess Effects of Uncertain Climate Change Scenarios on Colorado River Cutthroat Trout	$35,000
Fiege	Mark T	FRICO-Farmers Reservoir and Irrigation C	A History of Farmers Reservoir and Irrigation Company, Brighton, Colorado	$14,335
Grigg	Neil S	Water Research Foundation	Retrospective Analysis of Performance of Dual Distribution Systems	$150,000
Grigg	Neil S	Water Research Foundation	Integration of Cost of Failure with Asset Risk Management	$150,000
Johnson	Brett Michael	DOI-Bureau of Reclamation	Chemically Fingerprinting Nonnative Fishes in Reservoirs (Project No. C-18/19)	$46,597

Laituri	Melinda J	The Nature Conservancy	Mapping Irrigation in the Colorado River Basin Potential Uses for Water Sharing	$9,200
McKay	John K	NSF-Biological Sciences	A Course in Plant Breeding for Drought Tolerance - June 14-23, 2010 at Colorado State University (CO)	$23,435
Oad	Ramchand	New Mexico State University	Afghanistan Water, Agriculture and Technology Transfer Program (AWATT)	$586,711
Pearson	Calvin H	DOI-Bureau of Reclamation	An Automatic Gate Valve Actuator for Gated Pipe to Increase Efficiency of Furrow Irrigation	$24,993
Rathburn	Sara L	DOI-NPS-National Park Service	Hydrologic & Sediment Transport Monitoring: Planning for Channel Restoration Along Lulu Creek & Colorado River,?	$6,505
Reardon	Kenneth F	OptiEnz Sensors, LLC	Multichannel Optical Biosensor for Detection of Contaminants in Water and Food	$50,000
Roesner	Larry A	Water Environment Research Foundation	Linking Stormwater BMP Systems Performance to Receiving Water Protection to Improve BMP Selection and Design	$153,169
Sale	Thomas C	DOD - US Department of Defense	Basic Research Addressing Contaminants in Low Permeability Zones	$973,748
Sanford	William E	Regenesis Management Group	Quantifying Changes in Irrigation Return Flow Due to Limited Irrigation & Other Crop Optimizing Techniques	$102,622
Schneekloth	Joel	Monsanto	Response of Drought Genetics to Water Stress	$54,258
Sharvelle	Sybil E	Water Environment Research Foundation	Innovation and Research for Water Infrastructure for the 21st Century	$195,000
Thornton	Christopher I	Tetra Tech, Inc.	Hydraulic Model Study: River Training Works at M&T Pumping Plant, Sacramento River	$256,000
Winkelman	Dana	DOI-Bureau of Reclamation	Population Dynamics Modeling of Introduced Smallmouth Bass, Upper Colorado River Basin	$60,641
Bauder	Troy A	Colorado Department of Agriculture	Training and Education for Agricultural Chemicals and Groundwater Protection	$185,000
Bauerle	William L	USDA-ARS-Agricultural Research Service	Measurement and Modeling Plant Water Use to Quantify Nursery Water Requirements	$48,780
Belisle	John T	Immuno & Path, HHS-NIH-NIAID-Allergy & Infect Diseases	RP-010 Treatment of Acute West Nile Virus Disease and Neurological Sequelae	$248,398
Bestgen	Kevin R	Wildlife & Conservation Biology, DOI-USFWS-Fish & Wildlife Service	Monitoring Non-Native Species & Native Species; Native Species Taxonomy Studies	$25,000
Bestgen	Kevin R	Wildlife & Conservation Biology, Wyoming Game & Fish Department	Hornyhead Chub Investigations	$30,910
Browne	Katherine E	NSF - National Science Foundation	A Double Dunk: How the Oil Spill is Affecting Katrina-Impacted Residents	$35,023
Brummer	Joe E	Utah State University	Reducing Nitrogen Fertilizer Inputs to Irrigated Pastures and Hayfields by Interseeding Legumes	$49,849
Cooper	David Jonathan	DOI-NPS-National Park Service	Vanishing Wetlands of Yellowstone National Park's Northern Range: Watersheds, Hydrology, Soils, and Vegetation Past	$15,021
Cooper	David Jonathan	DOI-NPS-National Park Service	Evaluate Reference Meadows and Develop Restoration Concepts for Halstead Meadow	$57,205
Fausch	Kurt D	Wildlife & Conservation Biology, Wyoming Game & Fish Department	Climate Change Tool for Cutthroat	$87,571
Funk	William Christopher	Colorado Division of Wildlife	Population Genetic Analysis of Arkansas Darter (Etheostoma cragini) in Colorado: Characterization of Population	$42,501
Goemans	Christopher G	Colorado State Water Conservation Board	Feasibility Study to Assess the Potential of Urban Water Conservation to Meet Colorado's Future Water Supply Needs	$26,670
Graham	James J	DOI-USGS-Geological Survey	Improving Web Site Capabilities for the Global Invasive Species Information Network (GISIN)	$74,576
Hansen	Neil	Alliance for Sustainable Energy-NREL	Biomass Production Potential in Central Great Plains Cropping Systems	$74,972
Johnson	Brett Michael	Wildlife & Conservation Biology, DOI-NPS-National Park Service	Tracking Brown Trout and Lake Trout Predation on Kokanee at Curecanti National Recreation Area	$19,975
Johnson	Jerry J	Colorado Sorghum Producers	Getting Sorghum Going in Colorado - 2010	$15,000
Julien	Pierre Y	Korea Institute of Construction Technolo	Restoration of Abandoned Channels	$49,308
Kampf	Stephanie K	DOE-US Department of Energy	Climate Change Impacts to Hydropower Generation in Pacific Northwest River Basins	$106,627
Knapp	Alan Keith	MTU - Michigan Technological University	Interactive Effects of Altered Rainfall Timing and Elevated Temperature on Soil Communities and Processes	$21,227
Larson	Kevin	Oklahoma State University	Expanding Production Area and Alternative Energy Crop Market of Proso Millet for Water Deficient Lands	$28,105
Lemly	Joanna	Wildlife & Conservation Biology, USDA-USFS-Forest Research	Wetland Mapping for the Medicine Bow-Routt National Forest	$16,000
Loftis	Jim C	DOI-NPS-National Park Service	Assessment of Aquatic Invasive Species in National Park Waters	$45,000
Moore	Chester G	Immuno & Path, City of Fort Collins	West Nile Virus Testing, City of Fort Collins, Colorado	$37,409

Myrick	Christopher A	Wildlife & Conservation Biology, Wyoming Game & Fish Department	Development of Barriers and Passage Requirements for Native and Nonnative Fishes in the Green River System	$24,000
Myrick	Christopher A	Colorado Division of Wildlife	Evaluation & Development of Fish Passage Designs	$11,000
Noon	Barry R	Wildlife & Conservation Biology, DOI-NPS-National Park Service	2010 Occupancy of Beaver (Castor canadensis) and Beaver-Habitat Relationships in Rocky Mountain National Park, Colorado	$7,055
Poff	N LeRoy	DOI-USGS-Geological Survey	Effects of Water Management and Climate Change on the Dynamics of Native and Invasive Wetland and Riparian Plants in	$91,575
Ramirez	Jorge A	USDA-USFS-Forest Research	Enhanced Assessment of Vulnerability of US Water Supply to Shortage	$40,000
Ramirez	Jorge A	NSF - National Science Foundation	WATER-IGERT: Integrated Water Atmosphere and Ecosystem Education and Research	$134,682
Reardon	Kenneth F	CSURF-CSU Research Foundation	Multichannel Optical Biosensor for Detection of Contaminants in Water and Food	$75,000
Stednick	John D	Colorado Division of Wildlife	Monitoring Impacts of Irrigation Recharge Projects on Main Stem South Platte Native Fish Populations	$85,675
Swift	David M	DOI-NPS-National Park Service	Investigation of Nitrogen Deposition into Loch Vale	$10,000
Waskom	Reagan M	Colorado Dept Public Health & Environ	NPS Outreach Coordinator	$22,000
Waskom	Reagan M	Colorado State Water Conservation Board	CWCB/CWI Cooperative Intern Program	$7,044
Winkelman	Dana	Colorado Division of Wildlife	Evaluation & Control of Whirling Disease in the White River, CO	$20,000
Bauder	Troy A	USDA-NRCS-Natural Resources Consvtn Srv	Demonstrating Conservation Tillage Methods and Benefits Under Furrow Irrigation	$73,906
Brick	Mark A	Colorado Department of Agriculture	Irrigation Efficiency of Three Water Delivery Systems on Diverse Dry Bean Market Classes of Dry Edible Bean	$33,000
Cabot	Perry Edmund	USDA-NRCS-Natural Resources Consvtn Srv	Strategies for Permanent Fallowing of Previously Irrigated Cropland Under Groundwater Pumping Restrictions in the Sa...	$24,306
Caldwell	Elizabeth D	DOD-ARMY-Corps of Engineers	Stormwater Modeling - Circle Loop for Fort Richardson, Alaska	$52,300
Collett	Jeffrey L	DOI-NPS-National Park Service	Nitrogen Deposition in the Rocky Mountain Region	$679,629
Cooper	David Jonathan	DOI-NPS-National Park Service	Wetland Ecological Integrity Monitoring in Glacier National Park	$44,219
Doesken	Nolan J	NSF - National Science Foundation	The Community Collaborative Rain, Hail and Snow (CoCoRaHS) Network: Enhancements to Increase Participation for Ten...	$230,626
Doherty Jr	Paul F	Exxon Mobil Corporation	2010 Exxon Mobil: Piceance Basin Wildlife and Habitat Studies	$40,188
Fassnacht	Steven	DOI-NPS-National Park Service	Understanding the Historical & Potential Future Effects of Climate Change on Water-Dependant Cultural & Natural Res?	$71,270
Fausch	Kurt D	USDA-USFS-Forest Research	Developing a Tool to Assess Effects of Climate Change on Colorado River Cutthroat Trout	$25,000
Fausch	Kurt D	NSF - National Science Foundation	OPUS: RiverWebs-Crossing Boundaries to Explore the Hidden Mysteries of Streams	$205,041
Garcia	Luis	USDA-Foreign Agricultural Service	2010 Global Research Alliance Fellowship	$25,213
Liston	Glen E	NSF - National Science Foundation	Collaborative Research-AON: A Snow Observing Network to Detect Arctic Climate Change -- SnowNet-II	$409,463
Loftis	Jim C	DOI-NPS-National Park Service	Compilation and Development of National Park Service Water Resources Databases and Tools	$224,000
Nissen	Scott J	USDA-NRCS-Natural Resources Consvtn Srv	Improving Tamarisk Control Following Fire Using Integrated Management Strategies	$72,210
Nissen	Scott J	Colorado State Water Conservation Board	Tamarisk Grant - Russian Knapweed Management & Riparian Restoration along the Delores & Ark Rivers	$15,000
Norton	Andrew P	Three Rivers Alliance	Assessing Vegetation Change Following Russian Olive Control	$9,000
Poff	N LeRoy	Camp Dresser McKee	Yampa Basin Watershed Flow Evaluation Tool	$14,301
Pritchett	James G	Alliance for Sustainable Energy-NREL	Energy-Water nexus in a Drying West: A Case Study Analysis and Methodology	$21,196
Culver	Denise R	USDA-USFS-Forest Research	Wetland Mapping and Survey for White River National Forest	$52,500
Doesken	Nolan J	Colorado State Water Conservation Board	Improvement of lysimeter operations and consumptive use quantification in high-altitude, irrigated meadows ...	$20,978
Doesken	Nolan J	Colorado State Water Conservation Board	Monitoring Weather Conditions and their Effects on Evaporation Rates in Northeastern Colorado with the Colorado ...	$20,000
Gates	Timothy K	MWH Global	Assessment of the Impacts of the Arkansas Valley Conduit and Excess Capacity Master Contract on Ground Water, Return...	$24,438
Johnson	Brett Michael	DOI-NPS-National Park Service	Tracking Lake Trout Diet and Trophic Interactions in Blue Mesa Reservoir Using Stable Isotopes	$10,000

Laituri	Melinda J	Environmental Defense Fund	Colorado River Basin Governance Geospatial Layer for Agricultural Water Users	$38,457
Myrick	Christopher A	Great Plains Fish Habitat Partnership	Improving Fish Passage Structures for Great Plains Fishes - Great Plains Fish Habitat Partnership	$30,841
Sanders	Thomas G	DOI-NPS-National Park Service	Water Rights Activity Assessment, and Water Rights Records Research and Management in Protection of Water and Aquatic ...	$14,700
Winkelman	Dana	DOI-USGS-Geological Survey	Population Level Effects of a Contaminant of Emerging Concern on a Great Plains Resident Species within EPA Regi...	$18,868
Abt	Steven R	USDA-USFS-Rocky Mtn. Rsrch Station - CO	Bedload Transport in Gravel-Bed Rivers and Channel Change	$85,667
Aloise-Young	Patricia A	R. W. Beck	Customer Messaging to Support Smart Meter Fort Collins	$17,337
Berrada	Abdelfettah	National Sunflower Association	Boosting Sunflower Production in SW Colorado with Supplemental Irrigation	$8,000
Bestgen	Kevin R	DOI-Bureau of Reclamation	Abundance Estimates for Colorado Pikeminnow in the Green River Basin, Utah & Colorado	$85,189
Bestgen	Kevin R	DOI-Bureau of Reclamation	Identification & Curation of Larval & Juvenile Fish (Project No. 15)	$116,679
Bestgen	Kevin R	DOI-Bureau of Reclamation	Abundance Estimates for Colorado Pikeminnow in the Green River Basin, Utah & Colorado	$85,189
Clements	William H	Colorado Division of Wildlife	Mesocosm Experiment to Investigate Effects of Iron on Benthic Communities	$11,928
Cooper	David Jonathan	DOD-ARMY-Corps of Engineers	Watershed to Local Scale Characterization & Functioning of Intermittent and Ephemeral Streams on Military Lands	$193,106
Cox	Amanda L	North American Tube Products	Evaluation of Hydraulic Capabilities of the E-tube Sediment Retention Device	$26,560
Hawkins	John A	DOI-Bureau of Reclamation	Middle Yampa Smallmouth Bass & Northern Pike	$22,640
Johnson	Frank P	Colorado Division of Water Resources	Determine Consumptive Water Use by Alfalfa in the Arkansas Valley in KS v CO Litigation	$25,000
Kummerow	Christian D	NASA - Natl Aeronautics & Space Admin.	AMSR-E Precipitation and its Relationship to Aqua Products	$169,687
Lemly	Joanna	EPA-Environmental Protection Agency	CSU 2010 WPDG: Lower South Platte River Basinwide Wetland Profile	$140,000
Lemly	Joanna	Tetra Tech, Inc.	National Wetland Condition Assessment Sampling in Colorado and Wyoming	$138,825
Moore	Chester G	City of Fort Collins	West Nile Virus Testing, City of Fort Collins, 2011	$25,469
Oad	Ramchand	Water Resources University (Vietnam)	Capacity Building of Vietnam Water Resources University	$60,529
Pott	Richard M	State of Colorado-Governors Energy Offic	ARRA: GEO Energy and Water Efficiency Grant - Residence Hall Showerhead Replacement	$46,870
Reardon	Kenneth F	CSURF-CSU Research Foundation	Multichannel Optical Biosensor for Detection of Contaminants in Water and Food	$75,000
Sale	Thomas C	General Electric Corporation	CSU - GE Environmental Research Collaboration Proposal for 2010	$130,000
Twitchell	John	USDA-USFS-Rocky Mtn. Rsrch Station - CO	Effects of Mountain Pine Beetle and Forest Management on Water Quantity, State Forest	$110,468
Wilson	Kenneth R	Colorado Division of Wildlife	Statewide Aquatic Sonar Research Technician Training	$6,670

CSU ‘Water’ Faculty

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Bartolo, Michael
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Bauder, Troy
Extension Specialist, Soil & Crop Sciences

Berrada, Abdel
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Cabot, Perry
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Davis, Jessica
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Professor, Agric & Resource Economics

Green, Timothy
Research Hydrologist, Civil & Environmental Engineering

Hansen, Neil
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Jha, Ajay
Research Scientist II, Agric & Resource Economics

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Associate Professor, Library

Newman, Steven
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Pritchett, James
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Campbell, Sue Ellen
Professor, English

Cheng, Tony
Assistant Professor, Forest Rangeland Watershed Stwrd

Fernandez-Gimenez, Maria
Associate Professor, Forest Rangeland Watershed Stwrd

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Hoag, Dana
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Kroll, Stephan
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Leisz, Stephen
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Mumme, Stephen
Professor, Political Science

Orsi, Jared
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Peek, Lori
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Rolston, III, Holmes
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Fausch, Kurt
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Johnson, Brett
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Myrick, Christopher
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Poff, LeRoy
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Snyder, Darrell
Research Associate, Fish, Wildlife & Conservation Biology

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Biomedical Engineering

Cotton, William
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Denning, A. Scott
Associate Professor, Atmospheric Science

Doesken, Nolan
State Climatologist, Atmospheric Science

Ramírez, Jorge
Professor, Civil & Environmental Engineering

Randall, David
Professor, Atmospheric Science

Rutledge, Steven
Professor, Atmospheric Science

Stephens, Graeme
Professor, Atmospheric Science

Thompson, David W.
Associate Professor, Atmospheric Science

Vonder Haar, Thomas
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Ham, Jay
Professor, Soil & Crop Sciences

Kelly, Eugene
Professor, Soil & Crop Sciences

Knight, Richard
Professor, Human Dimensions Of Natural Resources

Education and Outreach

Grice, Nancy
Assistant to the Director, Colorado Water Institute / Water Center

Kallenberger, Julie
Research Associate, Colorado Water Institute / Water Center

Kendall, Patricia
Professor/Ext. Specialist, Food Science & Human Nutrition

Reid, Robin
Director, Acad Computing & Network Serv

Smith, MaryLou
Policy & Collaboration, Colorado Water Institute / Water Center

Sternlieb, Faith
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Warnock, Andrew
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Catton, Kimberly
Resch Sci/Scholar I, Civil & Environmental Engineering

Charlie, Wayne
Professor, Civil & Environmental Engineering

Woods, Sandra
Dean, Dean of Engineering

Fluvial Geomorphology / Sediment Transport

Bledsoe, Brian
Associate Professor, Civil & Environmental Engineering

Niemann, Jeffrey
Assistant Professor, Civil & Environmental Engineering

Rathburn, Sara
Associate Professor, Geosciences

Wohl, Ellen
Professor, Geosciences

Yang, Chih
Resch Sci/Scholar III, Civil & Environmental Engineering

Forest Ecology

Binkley, Dan
Professor, Forest Rangeland Watershed Stwrd

Rideout, Douglas
Professor, Forest Rangeland Watershed Stwrd

Smith, Frederick (Skip)
Professor, Forest Rangeland Watershed Stwrd

Geosciences

Borch, Thomas
Assistant Professor, Soil & Crop Sciences

Charlie, Wayne
Professor, Civil & Environmental Engineering

Harry, Dennis
Professor, Geosciences

Rathburn, Sara
Associate Professor, Geosciences

Sanford, William
Associate Professor, Geosciences

Shackelford, Charles
Professor, Civil & Environmental Engineering

Groundwater

Bau, Domenico
Assistant Professor, Civil & Environmental Engineering

Durnford, Deanna
Professor, Civil & Environmental Engineering

Ronayne, Michael
Assistant Professor, Geosciences

Sale, Thomas
Research Scientist, Civil & Environmental Engineering

Sanford, William
Associate Professor, Geosciences

Shackelford, Charles
Professor, Civil & Environmental Engineering

Horticulture and Landscape

Bauerle, Bill
Associate Professor, Horticulture & Landscape Arch

Klett, James
Professor, Horticulture & Landscape Arch

Koski, Anthony (Tony)
Professor, Horticulture & Landscape Arch

Newman, Steven
Professor of Floriculture, Horticulture & Landscape Arch

Qian, Yaling
Associate Professor, Horticulture & Landscape Arch

Hydraulics

Abt, Steven
Professor, Major General, Civil & Environmental Engineering

Cox, Amanda
RS/Scholar II, Civil & Environmental Engineering

Gates, Timothy
Professor, Civil & Environmental Engineering

Grigg, Neil
Professor, Civil & Environmental Engineering

Julien, Pierre
Professor, Civil & Environmental Engineering

Roesner, Larry
Professor, Civil & Environmental Engineering

Salas, Jose (Pepe)
Professor, Civil & Environmental Engineering

Thornton, Christopher
Assistant Professor , Civil & Environmental Engineering

Venayagamoorthy, Subhas
Assistant Professor, Civil & Environmental Engineering

Yang, Chih
Resch Sci/Scholar III, Civil & Environmental Engineering

Hydrochemistry

Pilon-Smits, Elizabeth
Associate Professor, Biology

Tessari, John
Associate Professor, Env & Rad Health Sci

Hydrology

Arabi, Mazdak
Assistant Professor, Civil & Environmental Engineering

Bau, Domenico
Assistant Professor, Civil & Environmental Engineering

Cabot, Perry
Extension Specialist, CSU Extension

Chávez, José
Assistant Professor, Civil & Environmental Engineering

Fassnacht, Steven
Associate Professor, Forest Rangeland Watershed Stwrd

Green, Timothy
Research Hydrologist, Civil & Environmental Engineering

Kampf, Stephanie
Assistant Professor, Forest Rangeland Watershed Stwrd

MacDonald, Lee
Professor, Forest Rangeland Watershed Stwrd

Niemann, Jeffrey
Assistant Professor, Civil & Environmental Engineering

Patterson, Glenn
Research Associate, Civil & Environmental Engineering

Ramírez, Jorge
Professor, Civil & Environmental Engineering

Salas, Jose (Pepe)
Professor, Civil & Environmental Engineering

Sale, Thomas
Research Scientist, Civil & Environmental Engineering

Irrigation and Drainage

Andales, Allan
Assistant Professor, Soil & Crop Sciences

Bartolo, Michael
Senior Research Scientist, Arkansas Valley Research Ctr

Chávez, José
Assistant Professor, Civil & Environmental Engineering

Garcia, Luis
Department Head, Civil & Environmental Engineering

Gates, Timothy
Professor, Civil & Environmental Engineering

Hansen, Neil
Associate Professor, Soil & Crop Sciences

Koski, Anthony (Tony)
Professor, Horticulture & Landscape Arch

Oad, Ramchand
Professor, Civil & Environmental Engineering

Podmore, Terence
Professor, Civil & Environmental Engineering

Schneekloth, Joel
Reg. Water Resource Spec., CSU Extension

Library Materials

Culbertson, Mike
Associate Professor, Library

Level, Allison
Associate Professor, Library

Rettig, Patricia
Head Archivist, Library

Limnology

Johnson, Brett
Professor, Fish, Wildlife & Conservation Biology

Management and Planning

Bright, Alan
Associate Professor, Human Dimensions Of Natural Resources

Cheng, Tony
Assistant Professor, Forest Rangeland Watershed Stwrd

Donnelly, Maureen
Associate Professor, Human Dimensions Of Natural Resources

Fontane, Darrell
Professor, Civil & Environmental Engineering

Grigg, Neil
Professor, Civil & Environmental Engineering

Jha, Ajay
Research Scientist II, Agric & Resource Economics

Labadie, John
Professor, Civil & Environmental Engineering

Laituri, Melinda
Associate Professor, Forest Rangeland Watershed Stwrd

Models / Computer Data Management / GIS

Andales, Allan
Assistant Professor, Soil & Crop Sciences

Arabi, Mazdak
Assistant Professor, Civil & Environmental Engineering

Dean, Denis
Associate Professor, Forest Rangeland Watershed Stwrd

Fontane, Darrell
Professor, Civil & Environmental Engineering

Hiemstra, Christopher
Research Scientist II, CIRA

Kampf, Stephanie
Assistant Professor, Forest Rangeland Watershed Stwrd

Khosla, Raj
Associate Professor, Soil & Crop Sciences

Labadie, John
Professor, Civil & Environmental Engineering

Laituri, Melinda
Associate Professor, Forest Rangeland Watershed Stwrd

Leisz, Stephen
Professor, Anthropology

Nuckols, John (Jay)
Professor, Env & Rad Health Sci

Roesner, Larry
Professor, Civil & Environmental Engineering

Ronayne, Michael
Assistant Professor, Geosciences

Sibold, Jason
Professor, Anthropology

Stephens, Graeme
Professor, Atmospheric Science

Venayagamoorthy, Subhas
Assistant Professor, Civil & Environmental Engineering

Wilson, Kenneth
Department Head, Fish, Wildlife & Conservation Biology

Non-Point Source Pollution Control

Bauder, Troy
Extension Specialist, Soil & Crop Sciences

Bledsoe, Brian
Associate Professor, Civil & Environmental Engineering

MacDonald, Lee
Professor, Forest Rangeland Watershed Stwrd

Stednick, John
Professor, Forest Rangeland Watershed Stwrd

Pedology

Kelly, Eugene
Professor, Soil & Crop Sciences

Recreational Resources

Cottrell, Stuart
Associate Professor, Human Dimensions of Natural Resources

Donnelly, Maureen
Associate Professor, Human Dimensions Of Natural Resources

Loomis, John
Professor, Agric & Resource Economics

Manfredo, Michael
Department Head, Human Dimensions Of Natural Resources

Thompson, Jessica
Assistant Professor, Human Dimensions of Natural Resources

Resource Economics

Goemans, Christopher
Assistant Professor , Agric & Resource Economics

Goldstein, Josh
Assistant Professor, Human Dimensions of Natural Resources

Hoag, Dana
Professor, Agric & Resource Economics

Kroll, Stephan
Assistant Professor, Agric & Resource Economics

Rideout, Douglas
Professor, Forest Rangeland Watershed Stwrd

Seidl, Andrew
Associate Professor, Agric & Resource Economics

Snow Hydrology / Glaciers

Doesken, Nolan
State Climatologist, Atmospheric Science

Fassnacht, Steven
Associate Professor, Forest Rangeland Watershed Stwrd

Hiemstra, Christopher
Research Scientist II, CIRA

Statistics / Risk / Uncertainty

Loftis, Jim
Professor, Civil & Environmental Engineering

Stream and Riparian Zone Biology / Wetlands

Bestgen, Kevin
Director, Larval Fish Lab, Fish, Wildlife & Conservation Biology

Cooper, David
SR Resch Sci/Scholar, Forest Rangeland Watershed Stwrd

Fausch, Kurt
Professor, Fish, Wildlife & Conservation Biology

Kondratieff, Boris
Professor of Entomology, Bioagric Sciences & Pest Mgmt

Meiman, Paul
Assistant Professor, Forest Rangeland Watershed Stwrd

Poff, LeRoy
Professor, Biology

Toxicology and Microbiology

Clements, William
Professor, Fish, Wildlife & Conservation Biology

Dandy, David
Professor, Chemical and Biological Engineering

Goodridge, Lawrence
Assistant Professor, Animal Sciences

Pilon-Smits, Elizabeth
Associate Professor, Biology

Ramsdell, Howard
Associate Professor, Env & Rad Health Sci

Reardon, Kenneth
Professor , Chemical & Biological Engineering

Reif, D.V.M., John
Professor, Env & Rad Health Sci

Stromberger, Mary
Associate Professor, Soil & Crop Sciences

Water and Waste Water Treatment

Borch, Thomas
Assistant Professor, Soil & Crop Sciences

Carlson, Kenneth
Associate Professor, Civil & Environmental Engineering

Duff, William
Professor, Mechanical Engineering

Linden, James
Professor Emeritus, Chemical & Biological Engineering

Omur-Ozbek, Pinar
Res. Assistant Professor, Civil & Environmental Engineering

Reich, Denis
Water Resources Specialist, CSU Extension

Sharvelle, Sybil
Assistant Professor, Civil & Environmental Engineering

Water Conservation

Kallenberger, Julie
Research Associate, Colorado Water Institute / Water Center

Klett, James
Professor, Horticulture & Landscape Arch

Schneekloth, Joel
Reg. Water Resource Spec., CSU Extension

Waskom, Reagan
Director, Colorado Water Institute / Water Center

Water Quality Management / Monitoring

Davis, Jessica
Professor, Soil & Crop Sciences

Kondratieff, Boris
Professor of Entomology, Bioagric Sciences & Pest Mgmt

Linden, James
Professor Emeritus, Chemical & Biological Engineering

Loftis, Jim
Professor, Civil & Environmental Engineering

Nuckols, John (Jay)
Professor, Env & Rad Health Sci

Omur-Ozbek, Pinar
Res. Assistant Professor, Civil & Environmental Engineering

Qian, Yaling
Associate Professor, Horticulture & Landscape Arch

Self, James
Research Scientist, Soil & Crop Sciences

Stednick, John
Professor, Forest Rangeland Watershed Stwrd

Watershed Restoration and Management

Paschke, Mark
Associate Professor, Forest Rangeland Watershed Stwrd

Patterson, Glenn
Research Associate, Civil & Environmental Engineering

Savidge, Julie
Associate Professor, Forest Rangeland Watershed Stwrd

Schultz, Courtney
Assistant Professor, Forest Rangeland Watershed Stwrd

Vaske, Jerry
Professor, Human Dimensions Of Natural Resources

Wallace, George
Associate Professor, Human Dimensions Of Natural Resources

Wilson, Kenneth
Department Head, Fish, Wildlife & Conservation Biology

Wildlands Hydrology

Cooper, David
SR Resch Sci/Scholar, Forest Rangeland Watershed Stwrd

Outreach Team

Extension Specialists Focus on Water Under CWI

Lindsey A. Knebel, Editor, Colorado Water Institute

Perry Cabot, Joel Schneekloth, and Denis Reich are water outreach specialists at Colorado State University who work under Extension and, in 2010, began receiving direction from the Colorado Water Institute (CWI).

"It seemed logical to take the interest in water at CSU and blend it with Extension," explains Cabot. Extension specialists conduct research and outreach in the field and connect information and research with local communities that might benefit from it.

"Water is a fairly technical and local subject, so local politics are involved," says Cabot, and those local issues can't always be dealt with from one location in the state – i.e., a university. "In order for the university to have a real relationship with water stakeholders, we have to be local." He points to the Colorado Water Conservation Board's model of having statewide input with members that represent all parts of Colorado – water outreach needs to have the same statewide presence, he says.

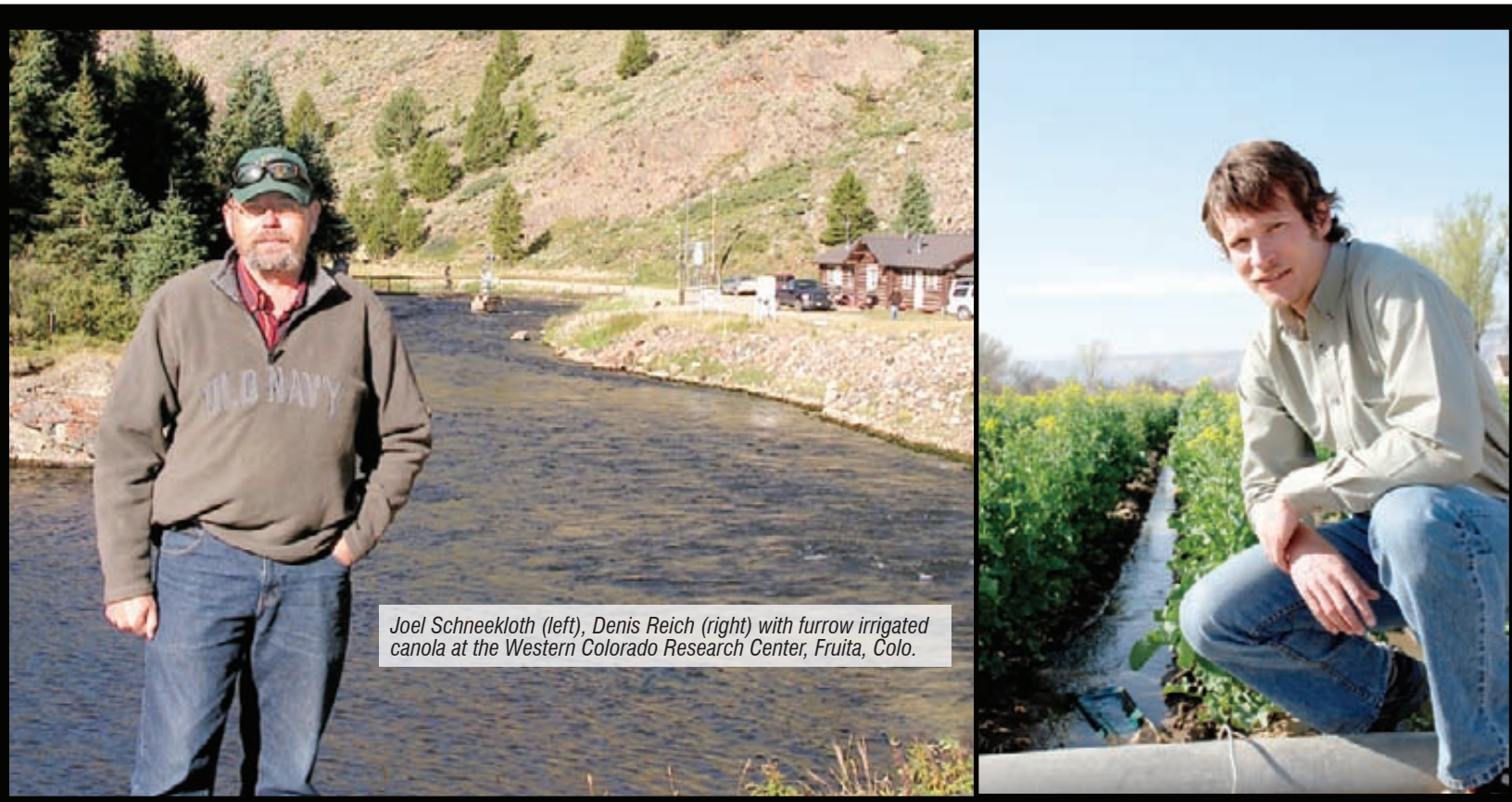
According to Schneekloth, one of the biggest changes the team experienced from the switchover is their ability to collaborate with each other on water topics in the state. "[Now] we can look at similarities between our regions that we can work on statewide," says Schneekloth. He says that already, a few grants have been put in to look at statewide water issues thanks to their collaboration.

Cabot, Reich, and Schneekloth answer to different parts of the state – Schneekloth looks into water issues mainly in the High Plains and the South Platte, Reich looks into issues west of the Continental Divide (including the Colorado, San Juan, Gunnison, North Platte, and Yampa river basins), and Cabot takes on water issues in the Rio Grande and Arkansas river basins in southern Colorado. Their regions tend to overlap frequently, however, due to water transfers between basins and the difficulty of defining fixed basin boundaries.

The team also shares similar directives for their extension work. These fall into three general categories: supporting the efficient and optimal use of water, maintaining water quality, and promoting education.

Each of the three specialists exercises these directives to different lengths depending on the specific needs of their regions. Reich, for example, says that water quality is a major concern to stakeholders on the western slope of the state, where water is used in recreation and public lands. A large part of the concerns there, says Reich, are to protect wild and scenic river segments and endangered species. "Every stakeholder group is slightly different," he says.

In Cabot's region, efficient and optimal uses of water tend to be of import. Cabot explains the idea of a water gap in Colorado – the shortage between what water demand



Joel Schneekloth (left), Denis Reich (right) with furrow irrigated canola at the Western Colorado Research Center, Fruita, Colo.

will grow to in the future and how much water the state can supply. "We focus a lot on this gap," says Cabot. Conservation is important, he says, and education is one of the methods he uses to promote the efficient use of water in places like agricultural and landscape irrigation, as well as K-12 groups.

Speaking at public events, promoting research, and conducting their own applied research projects are just part of the variety of job duties that Cabot, Reich, and Schneekloth perform as outreach specialists. Cabot explains that a typical week might consist of grant-writing, facilitating public meetings, attending water summits and roundtable discussions, conducting research, teaching a seminar, and talking over the phone about various research projects. All three also stay in touch with the CSU water community to share research ideas and results.

An important part of that day-to-day work, says Cabot, even in the age of new technologies that promote long-distance communication, is connecting face-to-face with stakeholders. "Nothing will ever substitute the face-to-face partnerships that Extension prides itself on," says Cabot.

"We're on the forefront of water issues," says Schneekloth. "We have producers', commodity groups', and organizations' ears, and we also have ears on what the issues are so we can bring them back to CSU."

Reich also touts the advantages of getting to know stakeholder groups on a local level. Because of his local involvement, says Reich, he was able to connect a district in his region with a grant program he discovered. "I don't think they would have otherwise known about that funding," says Reich.

"It takes years to build that trust with local partners," says Cabot. "Local endeavors, relationship-building, local politics – you can't do this when you only interact with them once a year."

Local, small-scale research is a key part of the team's work in outreach. According to Cabot, all three have developed small research programs geared specifically towards local issues in their regions. Cabot is working on a biofuel project, for example, which is growing in popularity with agriculture because oil seeds require less water to produce, and they are valuable as a fuel source.

In addition to creating their own research projects, the team also serves as an "extension" of CSU research. "We have a lot of water research going on at the university," says Cabot, "and unfortunately, we don't have as much extension as we would like to get the results of our research out to the state. We are trying to cast a much larger net to bring more researchers into CSU water programs, recognizing that folks on campus don't have the mobility to travel."

Perry Cabot reports on an agricultural project in February, 2011 at the Seventh Annual Arkansas Valley Farm/Ranch/Water Symposium and Trade Show.

Photo by Bette McFarren

Reich is working with CSU researchers to connect selenium research with stakeholders on the western slope. "Selenium inhibits the growth of certain fish populations when it is expelled from irrigated soils," explains Reich. His work, then, is to translate the findings from CSU research to agencies working with the western slope's water on a local level.

The switchover for Cabot, Reich, and Schneekloth to working under the Colorado Water Institute has been in effect for less than one year, but the arrangement has been successful thus far. "CSU Extension and CWI both have the role and responsibility to bring research-based information to bear on the water problems and decisions facing our state and our stakeholders," says Reagan Waskom, CWI Director. "It only makes sense that we work together to increase our efficiency and impact."

Student Research Awards

CWI Announces Funded Student Projects

The Colorado Water Institute is pleased to announce the funding of 3 undergraduate student projects this year. This program is intended to encourage and support graduate and undergraduate student research in disciplines relevant to water resources issues and to assist Colorado institutions of higher education in developing student research expertise and capabilities. It is intended to help students initiate research projects or to supplement existing student projects in water resources research. The FY10 student projects are listed below.

Shear Resistance of the Nuisance Diatom Didymosphenia Geminata

James Cullis, Department of Civil, Environmental & Architectural Engineering, University of Colorado
Faculty Sponsor: Diane McKnight

Abstract

Didymosphenia geminata is a nuisance diatom species that can form large amounts of stalk material that covers the streambed (Larnard et al. 2006). These blooms impact the aesthetic value and biodiversity of mountain streams across many parts of North America particularly the Rocky Mountain states. In recent years there has been an increase in nuisance blooms, as well as spreading to new watersheds (Spaulding and Elwell 2007). D. geminata tends to prefer regulated flow conditions downstream of reservoirs (Kirkwood et al. 2009). Studies in Boulder Creek, CO (Cullis 2009; Miller et al. 2009) and elsewhere (Kilroy et al. 2005; Kirkwood et al. 2007) have shown that elevated shear stress and bed disturbance are important in controlling growth.

Impact of Limited Irrigation on Health of Four Common Shrub Species

Jason Smith, Horticulture and Landscape Architecture, Colorado State University
Faculty Sponsor: Dr. James Klett

Abstract

Throughout much of Colorado the demand for water has increased and the available water supply has decreased. It is increasingly more important to conserve water wherever possible. One possible way to conserve water in planted landscapes is to plant low water use plants. Unfortunately little research has been conducted on determining the water use of common plant species that are used in urban landscapes and that are distributed throughout nurseries and garden centers in the Rocky Mountain region. As a result, a shrub water study was initiated in 2005 at Colorado State University to monitor the responses of some common landscape shrubs when subjected to four different irrigation regimes (0%, 25%, 50%, and 100%) based on the evapotranspiration rates of Poa pratensis (Kentucky bluegrass). The shrub species studied thus far include Acer ginnala (Amur maple), Amelanchier alnifolia (serviceberry), Caryopteris incana (blue mist spirea), Chamaebatiaria millefolium (fernbush), Cornus sericea (redosier dogwood), Hydrangea arborescens 'Annabelle (Annabelle hydrangea), Perovskia atriplicifolia (Russian sage), Physocarpus opulifolius 'Monlo' (Diablo® ninebark), Rhus trilobata (three leaf sumac), Salix pupurea (arctic blue willow), Syringa meyeri (Meyer lilac), and Syringa vulgaris (common lilac). Data collection occurred each growing season and the types of data that were collected included soil moisture, plant heights and widths, predawn leaf water potentials, daily water use (using plants grown in lysimeters), visual ratings, end of season leaf areas, and end of season leaf fresh and dry weights.

Evaluation of Herbicide Combinations for Control of Sago Pondweed (Stukenia pectinata) in Irrigation Canals

Joseph Vassios, Department of Bioagricultural Sciences and Pest Management, Colorado State University
Faculty Sponsor: Scott Nissen

Abstract

Sago pondweed (Stuckenia pectinata) is a submerged, perennial aquatic species that is native to Colorado. When present in standing water, sago pondweed is not usually problematic; however, irrigation canals across Colorado provide optimal growing conditions for sago pondweed. When sago pondweed is present the efficiency of water delivery can be severely impacted. Sago pondweed reaches maximum growth in July and August when water demand is highest.

CWI Announces Funded Student Projects

The Colorado Water Institute is pleased to announce the funding of 6 undergraduate student projects this year. This program is intended to encourage and support graduate and undergraduate student research in disciplines relevant to water resources issues and to assist Colorado institutions of higher education in developing student research expertise and capabilities. It is intended to help students initiate research projects or to supplement existing student projects in water resources research. The FY11 student projects are listed below.

Aquifer Storage and Recovery Optimization

Ane Maurer, Civil and Environmental Engineering, Colorado State University
Faculty Sponsor: Tom Sale

Abstract

Increasing demands for water and finite resources are driving a need for more efficient water storage systems. An emerging strategy is aquifer storage and recovery (ASR). With ASR seepage and evaporation loses can be minimized. Furthermore, peak capacities of key infrastructure elements such as surface water storage, water treatment plants, and pipelines can be reduced. Unfortunately, resolving necessary infrastructure, timing of aquifer storage and recovery is a complex process. Key factors governing infrastructure and operations include timing of water delivery, water quality, and timing of demands.

The Efficacy of the Use of Moringa Oleifera Seeds to Remove Metabolites of Cyanobacteria from Drinking Water

Victor Sam, Civil and Environmental Engineering, Colorado State University
Faculty Sponsor: Pinar Omur-Ozbek

Abstract

The proposed work aims to study the occurrence and removal of the cyanobacterial metabolites microcystin-LR, geosmin and 2-MIB in source waters (1,2). Microcystins are potent hepatoxins which can cause severe cases of gastro-enteritis and hepato-enteritis (i.e. liver damage) (3,1). Geosmin (trans-1,10-dimethyl-trans-9-decalol) and 2-MIB (2-methylisoborneol) are odorous compounds that causes earthy and musty odors in drinking water, respectively (2). Recently it was shown that microcystins usually co-occur with such taste-and-odor compounds (4). Since geosmin and 2-MIB can be detected by the human nose at very low concentrations (2), the surveillance of harmful toxins may be easily performed due to the co-occurrences of the metabolites.

Environmental Impacts of Ag-to-Urban Water Rights Transfers in the South Platte River Basin

Meagan Smith, Civil Engineering, Colorado State University
Faculty Sponsor: Dr. Mazdak Arabi

Abstract

Colorado's population is projected to increase nearly 40% by the year 2030; resulting in an estimated increase in water demand between 300,000 and 600,000 acre-feet (CWCB, 2004). While conservation will be heavily relied upon, transfers of water out of irrigated agriculture are anticipated to meet the majority of new demands. The South Platte River Basin is projected to lose as many as 226,000 irrigated acres by 2030 (CWCB, 2005). In recent years, however, there has been a greater push to keep water in

agriculture whenever possible. This stems from the growing awareness of the public benefits of agriculture beyond its economic output; including the values associated with access to locally produced foods, open space, and wildlife habitat.

Large Aperture Scintillometers for Evapotranspiration (ET) evaluation

Evan Rambikur, Civil and Environmental Engineering, Colorado State University
Faculty Sponsor: Jose Chavez

Abstract

Irrigation water management can be more effective and accurate when the crop consumptive use (CU), or ET, is known. This allows for more intelligent application of water by irrigators in arid and semi-arid regions. This is one reason for much needed research on different methods of evaluating ET. Local estimates of ET can be made directly by precision-weighing lysimeters. In addition, through measurement of the structure parameter of the refractive index of air (turbulence), the sensible heat flux, and subsequently ET, can be determined using a Large Aperture Scintillometer (LAS, Kipp and Zonen, The Netherlands) and the land surface energy balance (EB) equation. This LAS-EB method allows for spatially averaged estimates of crop or vegetation ET over a range of approximately 100m to 4.5km. Therefore, the instrumentation can potentially be validated by point estimates of ET (e.g. Lysimeter) and used to validate regional estimates of ET (e.g. Remote Sensing (RS) based). Further validation of LASEB ET estimates could be conducted using a soil water budget, where moisture deficit (soil moisture) and precipitation parameters can both be sensor monitored.

Variables Controlling Reservoir Sedimentation in the Colorado Front Range

Umit Duru, Department of Geosciences, Colorado State University
Faculty Sponsor: Ellen Wohl

Abstract

Sediment deposition can alter the storage capacity and operation of a reservoir. Numerous studies have been done on reservoir sedimentation, but site- and region-specific characteristics of sediment yield limit extrapolation of results between sites. One challenge in understanding reservoir sedimentation is that sediment yield to a reservoir varies spatially and temporally as sediment supply, storage, and mobilization from the contributing watershed change. This variability partly reflects regional characteristics such as lithology, rate of sediment generation, and mechanisms of sediment movement. The objective of this research is to evaluate the relative importance of parameters influencing sedimentation rate within and between reservoirs in the Front Range. The null hypothesis is that reservoir sedimentation correlates most strongly with the magnitude (spatial extent, frequency) of disturbance that alters land cover (e.g., forest fire) because disturbance can mobilize large volumes of sediment from the watershed. Increased disturbance by forest fire results in enhanced sedimentation in numerous sites across the Front Range. The alternate hypothesis is that reservoir sedimentation correlates most strongly with drainage area, relief, or elevation. The research will develop a GIS-based statistical model to determine the factors most important for reservoir sedimentation in the Front Range.

Novel Technique for Evaluation of Dissolved Organic Material (DOM); research methodology and lab protocol development using a FluidImages FlowCam on Lake water samples across the State of Colorado

Alia Khan, Civil and Environmental Engineering, University of Colorado, Boulder
Faculty Sponsor: Diane McKnight

Abstract

Previous research suggests that production of nonhumic DOM can be related to chlorophyll-a concentrations. In recent years, increases in dissolved organic carbon (DOC) concentrations in surface waters have been documented in many northern temperate regions and the underlying processes of the affects of increasing DOC on aquatic ecosystems and drinking water quality are not yet fully understood. Furthermore, DOC has been directly correlated to the formation of potentially carcinogenic, chlorinated disinfection by-products (DBP's). Characterization of the relationship between varying DOC qualities (such as terrestrial versus humic, or certain types of algal species) to DBP formation is not yet fully understood. Part of this reason is due to the complexity and time consumption for source identification of DOC quality.

Faculty Research Awards

CWI Announces Funded Faculty Projects

The Colorado Water Institute was fortunate to receive additional funds from the State of Colorado in FY10 to expand the research portfolio. Under section 104(b) of the Water Resources Research Act, CWI is to "plan, conduct, or otherwise arrange for competent research..." that fosters the entry of new scientists into water resources fields, the preliminary exploration of new ideas that address water managers and the public. The research program is open to faculty in any institution of higher education in Colorado that has "demonstrated capabilities for research, information dissemination, and graduation training... to resolve State and regional water nad related land problems."

The general criteria used for proposal evaluation included:

- Scientific merit
- Responsiveness to RFP
- Qualification of investigators
- Originality of approach
- Budget
- Extent to which Colorado water managers and users are collaborating

A call for proposals went out last July. A peer review process and ranking by the CWI Advisory Committee resulted in funding one project for FY10. For more information on this project, contact the PI or Reagan Waskom at CWI. Special thanks to the individuals who provided peer reviews of the project proposals.

Paleohydrology of the Lower Colorado River Basin

PI: Balaji Rajagopalan, University of Colorado

Co-PIs: Jeffrey Lukas, Western Water Assessment
Jose Salas, Colorado State University

Other Investigators: Connie Woodhouse, University of Arizona
David Meko, University of Arizona
Lisa Wade, University of Colorado

Abstract

The State of Colorado draws a substantial portion of its water supply from the Colorado River. The reliability of this supply is a function of natural hydrologic variability, upon which anticipated changes in future climate will be superimposed. Thus, it is extremely important to understand the range of this natural variability in the basin streamflows so as to obtain a robust estimate of the water supply risk and consequently, devise effective management and planning strategies. Observed flow data that are limited in time (~100 years) cannot provide the full range of variability, even with stochastic models built on them. Paleohydrologic reconstructions of annual flow using tree rings, however, provide much longer (500-1000+ years) records of past natural variability, and thus a much richer sampling of potential flow sequences, including severe and sustained droughts of greatest concern to water resource managers. Such reconstructions are available for the combined Upper Colorado River basin flows, but there is no equivalent dataset for the Lower Basin. In this research we propose to develop a paleohydrologic reconstruction of the total Lower Basin streamflow. We will use all the existing tree-ring data and naturalized streamflow records, with a suite of statistical methods. The reconstructions from the different methods will be combined to provide an ensemble of flows in each year, thus providing an effective characterization of the uncertainty. A rich variety of streamflow ensembles will be generated for the entire basin using this and existing reconstructions for the Upper Basin to explore the basin-wide water supply risk, focusing on implications for the water resources of the State of Colorado.

104(g) Funded Faculty Projects

Adjoint Modeling to Quantify Stream Flow Changes Due to Aquifer Pumping

PI: Roseanna Neupauer, University of Colorado

Abstract

With growing populations and increased demand for water, it is necessary to ensure that increased pumping of aquifers does not reduce flows in rivers to levels that would limit the availability of water for drinking water supply, irrigation, and riparian habitat. Analytical solutions and numerical simulations have been used to quantify stream depletion, which is the change in stream flow due to pumping. Typically, in these approaches, the location of the pumping well is assumed to be known; thus they can be inefficient as a tool for siting new well locations. The goal of the proposed research is to develop an adjoint-based modeling approach that can be used in practice to quantify stream depletion due to aquifer pumping. In a single simulation of an adjoint model, stream depletion is calculated for a well at any location in the aquifer; thus, it is computationally efficient when the number of well locations or possible well locations is large. The new modeling approach will be developed so that it can be used with standard groundwater flow simulators, and therefore can be readily applied in practice. The proposed research includes rigorous development of the adjoint equation for calculating stream depletion in confined and unconfined aquifers with various models of groundwater/surface water interaction, numerical simulations to verify the adjoint equation, development of pre-processing codes to convert input files for standard groundwater flow simulations into input files for adjoint simulations, and development of training material and presentation of a training workshop to train groundwater modelers on the new methodology. The applications of the adjoint modeling approach to quantify stream depletion include management of surface water and groundwater resources, selection of locations of new groundwater withdrawal wells that limit the impact on stream flows, optimization of groundwater pumping rates at multiple wells to reduce the impact on stream flows, and determination of non-tributary groundwater.

Undergraduate Water Minor Program Curriculum at CSU

Colorado State University

Water "Minor"

Interdisciplinary Studies Program in Water Resources at CSU
Program Requirements

Core Courses				
Course	**Title**	**Cr**	**AUCC**	**Sem.**
AREC 342[P]	Economic Analysis-Water Resource Development	3		F
AREC 442[P]	Water Resources Economics	3		S
GR 342	Geography of Water Resources	3		F
LAND 220[P] / LIFE 220[P]	Fundamentals of Ecology[1]	3		F
SOC 461[P]	Sociology of Water Resources	3		F, S, SS
WR 304	Principles of Watershed Management[2]	3	3A	F, S
	Electives	3		
	Total	**21**		

Elective Courses			
Course	**Title**	**Cr**	**Sem.**
AREC 340[P] / ECON 340[P]	Introduction: Economics of Natural Resources	3	S
AREC 346[P] / ECON 346[P]	Economics of Outdoor Recreation	3	F
AREC 375[P]	Agricultural Law	3	F, S
ATS 350	Introduction to Weather and Climate	2	F, S
BZ 315[P]	Marine Ecology	3	F
BZ 321[P]	Aquatic Vascular Plants	3	F
CIVE 322[P] / ENVE 322[P]	Basic Hydrology	3	F, S
CIVE 413[P]	Environmental River Mechanics	3	S
CIVE 423[P]	Groundwater Engineering	3	S
CIVE 440[P]	Nonpoint Source Pollution	3	F
GR 210	Physical Geography	3	S
POLS 361[P]	U.S. Environmental Politics and Policy	3	F, S, SS
PSY 316[P]	Environmental Psychology	3	F, S, SS
SOC 320[P]	Population-Natural Resources and Environment	3	F
SOCR 370[P]	Irrigation Principles	2	S
WR 416[P]	Land Use Hydrology	3	F
WR 417[P]	Watershed Measurements	3	F
WR 418[P]	Land Use and Water Quality	3	S

[P] This course has at least one prerequisite. Check the Courses of Instruction section of the catalog or http://catalog.colostate.edu to see the course prerequisites.

[1] BZ 440 or ERHS 446 or MIP 300 may be substituted for LAND 220/ LIFE 220.

[2] CIVE 322/ENVE 322 or WR 416 may be substituted for WR 304.

Water is critical to the economic, societal, and environmental well-being of all humans. This is particularly so in the Western United States where a rich and evolving water management history continues to unfold. Western water management is complex and affects individual lives and communities in diverse ways.

In semi-arid Colorado, water is available at all times during the year only if it is "controlled" in some manner by humans. Such control also influences the amount and timing of water available for maintaining ecosystem health. Colorado balances the competing needs for water using a water management system that includes such concepts as: appropriation doctrine, water allocation, water rights, beneficial use of water, and minimum stream flows. Many organizations are involved in managing Colorado's water including the State Engineer's Office, Colorado Water Conservation Board, conservancy/conservation districts, water utilities, ditch companies, and federal agencies.

Water management in the western United States and Colorado is not guided by any one discipline, but rather utilizes knowledge from many disciplines. New uses of water — for meeting ecological and recreational needs, for example — are competing with more established uses, such as municipal and agricultural, in ways that demand skills not previously required of water managers.

Today's water professional needs a grasp of the history of water management in the West: the legal and administrative structure established to allocate and control the distribution of water; the economics of water development and protection; the relationship of water development and protection; the relationship of water to ecological conditions; and land-use impacts on water quality and water use. Students planning careers in water resources need to have an area of specialization (a university major) as well as a head start in understanding these complex aspects of modern western water management.

Colorado State University is recognized as one of the world's leading institutions of higher education for water professionals, with over 130 faculty who apply their disciplines to water and who offer more than 150 water-oriented courses each year. The majors offered at Colorado State University, from fishery and wildlife biology to civil engineering to sociology, offer students interested in a career in water management the disciplined rigor needed to be successful.

The purpose of Colorado State University's Water Resources Interdisciplinary Studies Program (WRISP) is to offer undergraduate students, regardless of their major, and opportunity to introduce themselves to the many dimensions of water management. By taking advantage of the outstanding water expertise available at Colorado State University, students can familiarize themselves with the many dimensions of Colorado's water management system. In this way students can better prepare themselves for careers in water management or graduate study in a water-related area.

WRISP students will complete 21 credits in core and elective courses that are particularly relevant to today's water manager. Completion of the program is certified on the student's academic record.

Reagan Waskom
Director

Colorado State University

Colorado Water Institute
CSU Water Center

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www.cwi.colostate.edu

Key Advisor List

The following faculty are available to discuss how current or future undergraduate's discipline (major) relates to water resources.

College of Agricultural Sciences

Agricultural and Resource Economics
John Loomis, B325 Clark Building
Soil and Crop Sciences
Soils- Grant Cardon, C108 Plant Sciences
Crops- Dan Smith, C106 Plant Sciences

College of Applied Human Sciences

....

College of Business

....

College of Engineering

Agricultural Engineering
Jim Loftis, 100 Glover Building
Chemical Engineering
Vince Murphy, 148 Glover Building
Civil Engineering
Jose Salas, B103 Engineering Building
Engineering Science
Reagan Waskom, E102 Engineering Building

College of Liberal Arts

English
John Calderazzo, 315 Eddy Building
History
Mark Fiege, B340 Clark Building
Philosophy
Holmes Rolston III, 50 Eddy Building
Political Science
Sandy Davis, C335 Clark Building
Sociology
David Freeman, C224 Clark Building
Technical Journalism
Marilee Long, C230 Clark Building

College of Natural Sciences

Biology
Paul Kugrens, E340 Anatomy - Zoology Building
Statistics
Hari Iyer, 202 Statistics Building

College of Veterinary Medicine & Biomedical Sciences

Environmental Health
Jay Nuckols, 147 Enironmental Halth
Microbiology
Don Klein, B209 Microbiology

Warner College of Natural Resources

Watershed Science
Freeman Smith, 334 Natural Resources
Fishery and Wildlife Biology
Will Clements, 236 Wagar Building
Forestry
Don Crews, 102 Natural Resources
Natural Resources Recreation and Tourism
Glenn Haas, 233 Forestry
Natural Resource Management
Don Crews, 102 Natural Resources
Range Ecology
Robert Woodmansee, 239 Natural Resources

Program Requirements

Core Courses

Course	Title	Cr	AUCC	Sem.
AREC 342[P]	Water Law, Policy, and Institutions	3		F
AREC 442[P]	Water Resource Economics	3		S
GR 342	Geography of Water Resources	3		F
LAND 220[P] / LIFE 220[P]	Fundamentals of Ecology[1]	3		F
SOC 461[P]	Sociology of Water Resources	3		F, S, SS
WR 304	Principles of Watershed Management[2]	3	3A	F, S
	Electives	3		
	Total	**21**		

Elective Courses

Course	Title	Cr	Sem.
AREC 340[P] / ECON 340[P]	Introduction: Economics of Natural Resources	3	S
AREC 346[P] / ECON 346[P]	Economics of Outdoor Recreation	3	F
AREC 375[P]	Agricultural Law	3	F, S
ATS 350	Introduction to Weather and Climate	2	F, S
BZ 315[P]	Marine Ecology	3	F
BZ 321[P]	Aquatic Vascular Plants	3	F
CIVE 322[P] / ENVE 322[P]	Basic Hydrology	3	F, S
CIVE 413[P]	Environmental River Mechanics	3	S
CIVE 423[P]	Groundwater Engineering	3	S
CIVE 440[P]	Nonpoint Source Pollution	3	F
GR 210	Physical Geography	3	S
POLS 361[P]	U.S. Environmental Politics and Policy	3	F, S, SS
PSY 316[P]	Environmental Psychology	3	F, S, SS
SOC 320[P]	Population-Natural Resources and Environment	3	F
SOCR 370[P]	Irrigation Principles	2	S
SOCR 371[P]	Irrigation of Field Crops	1	F
WR 416[P]	Land Use Hydrology	3	F
WR 417[P]	Watershed Measurements	3	F
WR 418[P]	Land Use and Water Quality	3	S

[P] This course has at least one prerequisite. Check the Courses of Instruction section of the catalog or http://catalog.colostate.edu to see the course prerequisites.

[1] BZ 440 or ERHS 446 or MIP 300 may be substituted for LAND 220/ LIFE 220.

[2] CIVE 322/ENVE 322 or WR 416 may be substituted for WR 304.

For further information, please contact:

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Water Center

Upper Yampa Water Conservancy District (UYWCD)
John Fetcher Scholarship

Upper Yampa Water Conservancy District John Fetcher Scholarship Awarded

The Upper Yampa Water Conservancy District (UYWCD) funds an annual scholarship named in honor of John Fetcher in support of CSU students preparing for careers in water-related fields. The scholarship program is administered by the CSU Water Center and provides financial assistance to committed and talented students who are pursuing water-related careers at CSU. The UYWCD $3,000 scholarship is open to any major at CSU. Criteria require the recipient to be a full-time student enrolled at CSU with a minimum GPA of 3.0. The scholarship duration is one year.

The UYWCD John Fetcher Scholarship recipient for the 2009-10 academic year is Luke Javernick. Luke is a senior in the Department of Civil and Environmental Engineering at Colorado State University and plans to pursue a master's degree in hydrology. He is currently the vice president of the CSU chapter of the American Society of Civil Engineers (ASCE), is a member of the American Concrete Institute, and is involved with Tau Beta Pi.

Luke's interest in engineering developed at an early age—while most five-year-olds were playing, he spent his days landscaping with his father. After many years of pursing an aviation career, Luke realized how much he missed the challenges and unique projects that landscaping offered. So he began researching his options and decided to study civil engineering, which he says has proven to be the best decision he ever made.

Luke is a nontraditional student and has been married to his wife, Tiffany, for over three years. Both Luke and Tiffany grew up in Canon City, Colorado, and they hope to stay in Colorado and raise a family. In the future, after developing a solid engineering foundation and passing the Principles and Practice of Engineering (PE) exam, Luke aspires to one day become a city or county engineer.

The CSU Water Center and Colorado Water Institute congratulate Luke and wish him success in his future academic studies and career. The ongoing support of CSU students by the UYWCD is acknowledged and greatly appreciated.

The Upper Yampa Water Conservancy District (UYWCD) funds an annual scholarship named in honor of John Fetcher in support of CSU students preparing for careers in water-related fields. The scholarship program is administered by the CSU Water Center and provides financial assistance to committed and talented students who are pursuing water-related careers at CSU. The UYWCD $3,000 scholarship is open to any major at CSU. Criteria require that the recipient must be a full-time student enrolled in a waterrelated major at a public university within the state of Colorado and with a minimum GPA of 3.0. The scholarship duration is one year. The UYWCD John Fetcher Scholarship recipient for the 2011-12 academic year is Eric Gardunio. Eric Gardunio is a graduate student in the Department of Fish, Wildlife and Conservation Biology at Colorado State University who is studying invasive burbot and white suckers. Eric is specifically focused on describing the swimming and jumping capabilities of these fishes to limit their spread in the Upper Colorado River Basin. His work will define guidelines for creating barriers to the dispersal of these invaders in the Upper Colorado River Basin. This work is highly relevant to the Yampa River, as both burbot and white suckers pose threats to the endangered fishes of the Yampa River basin through predation, competition and hybridization.

Eric is a young professional focused on creating a career in fisheries biology which will give me the opportunity to positively impact the fisheries resources of the western United States. He has had an extensive amount of experience in this field, and has had the opportunity to learn a great deal about fisheries management as a result. He hopes to further his opportunities to positively impact native biota, while providing sport fisheries opportunities as a full time fish biologist following the completion on my graduate thesis.

Eric was born in Grand Junction, Colorado, and as a child was lucky to get to experience the natural wonders of western Colorado. This experience as a child is a large part of what encouraged his pursuance of a natural resources related profession. Growing up fishing in western Colorado provided him the interest to pursue fisheries as a career. He hopes in the future to facilitate work with kids to expose them to the wonders of the natural world, and to hopefully instill an interest in its preservation. He has worked with the Boys and Girls Club of Larimer County to put on Kids Fishing Days with our American Fisheries Society CSU Sub-unit, and hopes to continue his involvement with kids and natural resources. This work along with his dedication to his Sub-unit resulted in his receiving of the Outstanding Service Award from the CSU Sub-unit of AFS in 2008.

He is the first individual from his father's side of the family to receive an undergraduate degree, and also is pursuing a graduate education. His parents raised him to value education, and in that they encouraged him to spend time outside, which facilitated his involvement in an education path that he loves.

The CSU Water Center and Colorado Water Institute congratulate Eric and wish him success in his future academic studies and career. The ongoing support of CSU students by the UYWCD is acknowledged and greatly appreciated.

Water Center Educational Activities

GRAD592
Interdisciplinary Water Resources Seminar

Fall 2009 Theme: **Environmental Protection and Water Management: Are They Compatible?**
Mondays at 4:00 PM, Clark A 206

The purpose of the 2009 Interdisciplinary Water Resources Seminar (GRAD 592) is to examine how the environment is protected as water supplies are developed and managed in Colorado. More specifically, the seminar will:

- Examine environmental laws, institutions and policies that affect water development
- Understand current approaches to environmental protection and water management
- Discuss the evolution of environmental protection and public participation in water management
- Examine current Colorado water case studies to understand the management of public water supply, growth, environmental mitigation, endangered species needs, water quality protection and other topics.

Aug. 24 **Organizational Meeting**—First Day of Class

Aug. 31 **Environmental History as a Tool in Water Resource Protection and Management**—Mark Fiege & Jared Orsi

Sept. 7 *Labor Day*—No class

Sept. 14 **US Department of Interior & Bureau of Reclamation's Role in Water & Environmental Management**—Bennet Raley

Sept. 21 **Conservation Priorities and Environmental Flow Quantification: Colorado's Non-Consumptive Needs Assessment**—John Sanderson

Sept. 28 **State's Role in Water Quality Protection & Management**—Steven Gunderson

Oct. 5 **Resolving Transboundary Environmental Issues**—Jennifer Pitt

Oct. 12 **Negotiating Better Environmental Governance in the Platte River Basin: Implementing the Endangered Species Act**—David Freeman

Oct. 19 **Holistic Management of the Colorado River System**—Taylor Hawes

Oct. 26 **Public Participation in Water Management - Case Study: Bear Creek Watershed**—Russ Clayshulte

Nov. 2 **Water Management & the Environment: Programs & Priorities for the Western Governors**—Tom Iseman

Nov. 9 **Legal Tools & Legal Constraints in Environmental Protection**—Melinda Kassen

Nov. 16 **35 Years of The Clean Water Act - Are We There Yet?**—Ayn Schmidt

Nov. 23 *Thanksgiving Break*—No class

Nov. 30 **Instream Flow Protection Program & Wild & Scenic Designations to protect Colorado Waters**—Ted Kowalski

Dec. 7 **Student Discussion & Participation**—Final Class

Dec. 14 *Final Exams*—No class

Presentations will be posted online each week if available. http://www.cwi.colostate.edu/grad592.asp

All interested faculty, students, and off-campus water professionals are encouraged to attend.
For more information, contact Reagan Waskom at reagan.waskom@colostate.edu or visit the CWI web site.

Colorado State University - GRAD592
Interdisciplinary Water Resources Seminar

Fall 2010 Theme

Moving from Conflict to Collaboration in Water Resource Issues

Mondays at 4:00 PM, Wagar Building - Room 231, CSU Campus

Starting with the 9/13/2010 lecture, note the room change

8/23	**Moving from Destructive to Constructive Water Conflicts** (NR Room 109) David Freeman, Professor Emeritus, Department of Sociology, CSU Reagan Waskom, Director, Colorado Water Institute
8/30	**Water Law and How We Have Historically Handled Water Conflicts in Colorado and the West** (NR Room 109) Greg Hobbs, Colorado Supreme Court Justice
9/6	Labor Day — No class
9/13	**Communicating and Managing Conflict about Complex Environmental Issues** Jessica Thompson, Assistant Professor, Warner College of Natural Resources, CSU
9/20	**Conflict Stages and Approaches to Resolution--from Litigation to Arbitration, Mediation and Collaboration** Joseph P. McMahon, P.E., J.D.
9/27	**Colorado's Interbasin Compact Committee and the Basin Roundtables Process—Does it Promote Stakeholder Collaboration on Colorado Water Issues?** Alexandra Davis, Colorado Department of Natural Resources, IBCC Chair Melinda Kassen, Trout Unlimited, IBCC Member
10/4	**Resolving Water Conflicts Between States through Interstate Compacts** Tanya Heikkila, Associate Professor, University of Colorado Denver, School of Public Affairs
10/11	**Case Study: The Republican River Dispute** Dick Wolfe, State Engineer, Colorado Department of Natural Resources
10/18	**Case Study: The Arkansas River Dispute** David Robbins, Water Attorney, Hill and Robbins Law Firm
10/25	**Shared Vision Process—How the Army Corps of Engineers is Using Computer-Aided Dispute Resolution in Northern Colorado's Halligan-Seaman Deliberations** Bill Werick, Werick Solutions and Mark Lorie, U.S. Army Corps of Engineers
11/1	**Interest Based Negotiation vs. Positional Bargaining—How Things Could Have Played out Differently on the South Platte** P. Andrew Jones, Water Attorney, Lind, Lawrence and Ottenhoff
11/8	**Demonstration of Interest Based Facilitated Dialogue: Would the Northern Integrated Supply Project (NISP) Be a Benefit or a Detriment to Agriculture?** MaryLou Smith, Facilitator, Colorado Water Institute
11/15	**Public Deliberation as a Conflict Resolution Tool: Framing the NISP/Agriculture Issue for Public Deliberation** Dr. Martin Carcasson, Director, CSU Center of Public Deliberation
11/22	Thanksgiving Break — No class
11/29	**Class Participation/Facilitated Deliberation on the NISP/Agriculture Issue** Dr. Martin Carcasson and Leah Sprain, CSU Center of Public Deliberation
12/6	**Continued Class Participation/Facilitated Deliberation/Debriefing on the NISP/Agriculture Issue** Dr. Martin Carcasson and Leah Sprain, CSU Center of Public Deliberation
12/13	Final Exams — No class

All interested faculty, students, and off-campus water professionals are encouraged to attend.

For more information, contact Reagan Waskom at reagan.waskom@colostate.edu or visit the CWI web site.

CWI Website: http://www.cwi.colostate.edu

Spring 2010
Interdisciplinary Water Resources Seminar

Sponsored by: CSU Water Center, USDA-ARS, Civil and Environmental Engineering, and Forest, Rangeland, and Watershed Stewardship

Wednesdays from Noon to 1:00 PM

February 3 **LSC Room 228**	**Tim Scheibe**, Pacific Northwest National Laboratory, Hydrology Group **2010 Darcy Distinguished Lecture--Flow and Reactive Transport: From Pores to Porous Media to Aquifers**
February 10 LSC Room 210	**Faith Sternlieb**, Colorado Water Institute, CSU **Planning for CSU's first World Water Day Celebration**
February 17 **LSC Virginia Dale**	**Mark Williams**, Institute of Arctic and Alpine Research, CU **Potential Climate Impacts on the Hydrology of High Elevation Catchments, Colorado Front Range**
February 24 LSC Room 210	**Jim Ascough**, Agricultural Systems Research, USDA-ARS **Spatially Distributed Modeling using the Component-Based AgroEcoSystem Model**
March 3 LSC Room 210	**Dennis Harry**, Geosciences, CSU **Opportunities and Adventures in Hydrogeophysics**
March 10 LSC Room 210	**David Theobald**, Human Dimensions of Natural Resources, CSU **Assessing Threats to Colorado Watersheds**
March 17	**No Seminar** **Spring Break**
March 24	**No Seminar** **Hydrology Days (LSC Cherokee Park Room); www.hydrologydays.colostate.edu**
March 31 LSC Room 210	**Tom Sale**, Civil and Environmental Engineering, CSU **Emerging Concepts in Subsurface Contaminant Transport and Remediation**
April 7 LSC Room 210	**Tim Steele**, TDS Consulting **Clear Creek Long Range Planning**
April 14 **LSC Room 224**	**Thijs Kelleners**, Renewable Resources, University of Wyoming **Measurement and Modeling of Water Flow, Heat Transport, and Gaseous Exchange in Rangeland Soils**
April 21 LSC Room 210	**Domenico Bau**, Civil and Environmental Engineering, CSU **Anthropogenic Uplift of Venice by Seawater Injection into Deep Aquifers**
April 28 LSC Room 210	**Mike Coleman**, Civil and Environmental Engineering, CSU **Soil Moisture Estimation**
May 5 LSC Room 210	**Romano Foti**, Civil and Environmental Engineering, CSU **Vulnerability of U.S. Water Supply to Shortage under Current and Future Climatic and Economic Conditions**

* Room may be changed if needed. Check weekly announcements.

All interested faculty, students, and off-campus water professionals are encouraged to attend.
For more information, contact Reagan Waskom at reagan.waskom@colostate.edu or visit the CWI web site.

Spring 2011
Interdisciplinary Water Resources Seminar

Sponsored by: CSU Water Center, USDA-ARS, Civil and Environmental Engineering, and Forest, Rangeland, and Watershed Stewardship

Thursdays from 12:00 to 1:00 PM

January 27 **LSC Room 208**	**Mazdak Arabi & Jorge Ramirez** **Joint Lecture: Building a Better Water Future in Education, Research, and Economic Development**
February 2 **LSC Room 224-226**	**Steve Silliman** **Darcy Lecture- Characterization of a Complex, Sole-Source Aquifer System in Benin, West Africa**
February 10 **LSC Room 208**	**Robert Ward & Mark Fiege** **Joint Lecture: History of the Poudre River**
February 17 **LSC Room 208**	**Steven Fassnacht & Mike Gillespie** **Operational Measurements of Snowpack Properties across the Cache la Poudre Watershed: Monitoring and Research to Increase Our Understanding of the Basin**
February 24 **LSC Room 228**	**Dennis Ojima & Brad Udall** **Climate, Water, and Ecosystems: The Changing Socio-Ecological Systems of the West**
March 3 **LSC Room 208**	**Deborah Entwistle, Carl Chambers & John Stednick** **Watershed Analysis on National Forest Lands**
March 10 **LSC Room 208**	**Stephanie Kampf & Jeffrey Niemann** **Basin and Catchment-Scale Hydrologic Regimes in the Cache la Poudre**
March 17	**No Seminar** **Spring Break**
March 24	**No Seminar** **Hydrology Days Mar. 21-23; www.hydrologydays.colostate.edu**
March 31 **LSC Room 208**	**John Bartholow & Brian Bledsoe** **Crafting a Flow Recommendation for the Cache la Poudre River through Fort Collins**
April 7 **LSC Room 208**	**George Varra** **Water Management on the Poudre River**
April 14 **LSC Room 208**	**Ken Carlson & Keith Elmund** **The Built Environment of the Cache la Poudre River**
April 21 **LSC Room 208**	**Ellen Wohl** **Geomorphology of the Poudre River**
April 28 **LSC Room 220-222**	**Boris Kondratieff & Ashley Ficke** **Biomonitoring of the Poudre River**
May 5 **LSC Room 228**	**Panel: Reagan Waskom, Mazdak Arabi, Jorge Ramirez, & Colorado Water Innovation Cluster** **Discussion of Poudre Watershed Monitoring Plan**

* Room may be changed if needed. Check weekly announcements.

All interested faculty, students, and off-campus water professionals are encouraged to attend.

For more information, contact Reagan Waskom at reagan.waskom@colostate.edu or visit the CWI web site.

Achievement Awards

20th Annual South Platte River Forum

by Laurie Schmidt, Colorado Water Institute

On October 21-22, 2009, 180 attendees gathered for the 20th annual South Platte Forum in Longmont, Colorado. With the theme *1989 to 2029: A River Odyssey*, the two-day meeting took a look back at the Forum's evolution over the past 20 years, as well as a look forward at water issues and challenges on the horizon.

Robert Ward, former director of the Colorado Water Institute, kicked off the meeting with a brief history of the Forum, noting the gradual change in the meeting's tone during its first five years. "In the first year, we were simply trying to get both sides in the same room, but by the fifth year—any subject was open for discussion," he said. Colorado State Senator Brandon Shaffer followed up with a discussion of challenges facing the state, including a skyrocketing state population that he said will triple water consumption rates by 2050. "We need to improve efficiency, increase conservation efforts, and plan for water storage projects," he said.

The meeting's first session focused on Colorado water law. Justice Gregory Hobbs provided a look back at Colorado Supreme Court water decisions, and Paul Frohardt, Colorado Water Quality Control Commission, examined changes in water quality policy. David Getches, dean of the University of Colorado Law School, discussed the unique challenges posed by the intersection of Colorado's growing population and hotter, drier climate conditions, saying that a combination of management, cooperation, and planning is essential to survival. "It is about scarcity, not business as usual," he said. "We may be entitled to it, but if nature doesn't provide it—it's not there."

Justice Gregory Hobbs (left), Diane Hoppe, and Jon Altenhofen catch up during the morning break at the 2009 South Platte Forum.

State climatologist Nolan Doesken, recipient of the 2009 Friends of the South Platte Award, and South Platte Forum coordinator Jennifer Brown at the 2009 South Platte Forum.

The final morning session, titled *Scenic Overlook*, included retrospective discussions by Jeris Danielson, a 20-year state engineer, and Alan Berryman, a 20-year division engineer. Max Dodson, retired assistant regional administrator for EPA Region 8, talked about "180-degree turns," including the dramatic "renaissance" of the South Platte River as an environment that provides resources for diverse interests. We face difficult challenges, such as population growth, climate change, new pollutants, and infrastructure deterioration, Dodson said, "but there will be continuing successes in improving and maintaining the aquatic environment."

During the lunch break, state climatologist Nolan Doesken was honored with the sixth annual Friends of the South Platte Award in recognition of his contributions to the South Platte River Basin and the South Platte Forum. Doesken was presented with a framed "South Platte Sunset" photo donated by Colorado photographer John Fielder. Following the award presentation, Denver Water manager Chips Barry gave the keynote address titled *From the DNR to Denver Water* and discussed how the Two Forks decision changed the culture and approach at Denver Water.

In an afternoon session titled *River Trippin',* the discussion turned to the subject of river conservation and native fish protection. Jay Skinner, wildlife manager with the Colorado Division of Wildlife (CDOW), provided an overview of the CDOW's efforts to assist the IBCC basin roundtables in prioritizing fish and wildlife values in the South Platte Basin. Next, Ryan Fitzpatrick, also of the CDOW, identified reasons for

CSU Professor Receives Two Awards

Kurt Fausch receives the Colorado-Wyoming Chapter of the American Fisheries Award of Excellence for his work on stream ecology.

Dr. Kurt Fausch, professor in the Department of Fish, Wildlife, and Conservation Biology at CSU, was recently honored with two awards for lifetime achievement. Fausch won the Award of Excellence from the Colorado-Wyoming Chapter of the American Fisheries Society and the 2010 Outstanding Alumnus Award awarded by the College of Agriculture and Natural Resources at Michigan State University, where he earned his M.S. and Ph.D.

Fausch is internationally known for his research, teaching, and outreach on stream ecology, with an emphasis on conservation and management of stream fishes. His work with students and colleagues was recently chronicled in the documentary film RiverWebs, which aired on PBS to more than 70 million homes in 2009 and is currently showing again.

Dr. Jose Salas Awarded the Prestigious Ven Te Chow Award

Dr. Jose 'Pepe' Salas, a Colorado State University civil and environmental engineering professor, was recently awarded the prestigious new Ven Te Chow award from the American Society of Civil Engineers. The award is presented annually to individuals in recognition of a lifetime spent on "...exceptional achievement and significant contribution in research, education, and practice" in the field of hydrologic engineering. The award, which will be presented May 16-20 in Providence, Rhode Island, is the most visible and prestigious award given in Salas' chosen field of hydrology.

Salas is being recognized for his 35 years of experience and significant contributions to hydrology in the areas of probabilistic and stochastic characterization of hydrologic processes, flood forecasting, regional drought analysis, frequency analysis, and education efforts through books and publications, as well as his modeling of the Colorado River, the Nile, and the Great Lakes Basin.

Lohman Receives NPS Lifetime Achievement Award

Colorado NPS Program Staff

Early in the day, before most people have even thought of the news or what it holds concerning water, articles are being reviewed, categorized, and stored for retrieval by water professionals across the state and beyond. Loretta Lohman accomplishes this task, placing the articles under the Current News link at www.npscolorado.com.

Lohman serves as the nonpoint source (NPS) information and education coordinator for the Colorado NPS program. She has held this position for over 10 years, providing consultation and resources to spread the message about managing NPS.

Lohman, who oversees the NPS Colorado Web site, is quick to tell anyone using the site, "If something is needed or not working right, just let me know and I'll work it out."

That dedicated, "can-do" spirit was recognized at the Sustaining Colorado Watersheds conference in October, when Lohman received the 2010 NPS Lifetime Achievement award. Managers, colleagues and family were present to offer perspectives and congratulations on her professional accomplishments.

Annually, individuals and organizations are recognized for exceptional water quality accomplishments that address NPS pollution. The Colorado NPS program, which is part of the Colorado Department of Public Health and Environment's Water Quality Control Division, presents this award. Lohman was the sole recipient this year.

"Information and education efforts have a critical role in meeting the state's needs of NPS management," says Lucia Machado, Colorado NPS coordinator. "Loretta's valued background and dedication has provided the program with a solid foundation over the years."

Lohman completed bachelor and doctorate degrees in political science and American History, respectively, at the University of Denver. Her master's is in social science from the University of Northern Colorado. Lohman applied her education to consulting, teaching and research. Much of her work has focused on the state's water issues. She has authored over 60 publications and articles throughout her career; most deal with water reuse, economics, and the Colorado River.

The oldest of three, Lohman was raised in a home that valued education – from regular trips to the library to the expectation of earning a college degree. Her parents also instilled the importance of valuing diversity and assisting those less fortunate.

At the recent award presentation, Lohman's brother and his wife described instances that typify how Loretta cares and appreciates others.

In accepting the award, and in true fashion, Lohman quickly turned the spotlight to the many volunteers who play key roles managing Colorado's water resources, especially in the fields of water quality and NPS.

Archivist Patricia J. Rettig Receives Faculty Award for Excellence

Colorado State University Libraries Assistant Professor Patricia J. Rettig has been selected as the recipient of the 2010 Colorado State University Libraries Faculty Award for Excellence. This award recognizes a member of the Libraries faculty for outstanding contributions to the Libraries, to the University, and/or to the library profession.

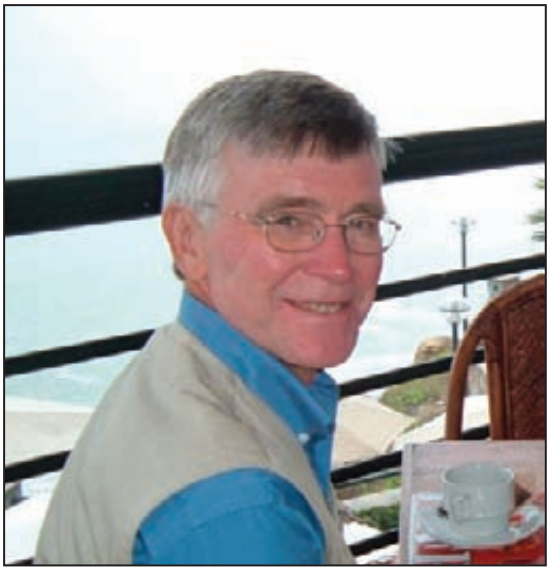
Rettig, the Head Archivist for the Water Resources Archive since 2005, has been recognized not only for her practice of librarianship, but also for her many scholarly and creative contributions to the profession. Rettig joined the University Libraries as a Project Cataloger in 2000 and became an Archivist in 2001. During her years of service with University Libraries Archives and Special Collections, she has built the Water Resources Archive from a small assortment of boxes to a premier collection of archival records documenting all aspects of water in the Rocky Mountain West. Following her initial efforts to arrange and describe the existing archival collections, Rettig created a display to showcase the Water Resources Archive and took it on the road to water conferences, ditch company meetings, and other gatherings, introducing Colorado's water community to the Archive's holdings.

Through careful cultivation of relationships with civil engineers, historians, water lawyers, and other key individuals in the water community, Rettig has facilitated the donation of dozens of new collections to the Archive, most notably the highly significant Papers of Delph E. Carpenter and Family. She has worked tirelessly to make these unique materials available to a worldwide research community through online finding aids and digitized materials

In addition to her articles for peer-reviewed journals, Rettig has contributed to the Colorado Water newsletter on a regular basis, educating members of the water community about the holdings and activities of the Water Resources Archive. Finally, her thorough planning, visually pleasing and informative exhibit design, and successful execution of the annual Water Tables fundraising event have resulted in higher visibility for the Water Resources Archive, donation of new archival collections, and funding to assist in the preservation of these collections. Rettig deserves recognition for excellence in building and making accessible unique holdings of the CSU Libraries to water researchers throughout the world.

Rettig is a member of the American Library Association, the Society of American Archivists, and the Society of Rocky Mountain Archivists.

Former CWI Director Robert Ward Receives 2010 Elizabeth Jester Fellows Award



Dr. Robert C. Ward, retired professor and director of the Colorado Water Institute at Colorado State University, is the recipient of the 2010 Elizabeth Jester Fellows Award. This award recognizes individuals for outstanding achievement, exemplary service, and distinguished leadership in the field of water-quality monitoring. Dr. Ward is dedicated to improving the state of the science of water quality monitoring through the delivery of quality education, development of coherent water monitoring systems, and promotion of the development of water quality information that the public and decision makers can understand, trust, and use to further improve water resources. He taught two generations of students in operations research, engineering design, and water quality monitoring during his 35-year tenure at CSU and through his "Short Course on Water Quality Monitoring Network Design." His seminal text on this topic and the monitoring network design he helped develop in New Zealand stand as testament to his work. His profession of goal-oriented monitoring was reflected in the Interim Task Force on Monitoring products, as well as the National Water Quality Monitoring Council's (NWQMC) Framework for Water Quality Monitoring. Internationally he has served on the scientific Organizing Committee for four Europe-wide conferences on water quality monitoring.

Evan Vlachos Receives Honorary Doctorate

Lindsey A. Knebel, Editor, Colorado Water Institute

In March, Evan Vlachos, who has been a lawyer, professor, researcher, and consultant in urban planning, water resource planning and management, forecasting and futurism, technology assessment and demography, and other areas for over 40 years, was presented with an honorary doctorate in Civil Engineering from the Aristotle University of Thessaloniki (AUTH) in Greece. Following the award, Vlachos and CSU President Tony Frank attended and signed an international memorandum of understanding (IMOU) that called for a partnership between the universities on certain water-related projects. Vlachos emphasized that the event signifies an emphasis on integrated, interdisciplinary, and transnational research and communication between the universities.

Vlachos was born in Greece, and he earned a law degree there before coming to the U.S. and earning a Master's and Ph.D. in Sociology as well as a Certificate of Russian Studies. In his career, Vlachos' work included directing the Environmental Resources Center, acting as Associate Director of the International School for Water Resources, and serving as member and chairman of the Environmental Advisory Board, the U.S. Army Corps of Engineers, and the Advisory Panel on Environmental and Earth S&T in NATO, Brussels, to name a few, and he has authored many books and articles. Vlachos' interests when he first came to the U.S. were sociology and the environment, which quickly grew into studying and learning about water and other related issues. He explains that receiving an honorary doctorate in Civil Engineering is a tremendous honor for someone who studied as a lawyer and sociologist.

The IMOU signing took place during a Water Day meeting, during which President Frank made a speech, and the two universities discussed water issues. The IMOU included the following as tentative joint projects between CSU and AUTH:

- Transboundary hydrodiplomacy (with focus on the Balkans and Circum-Mediterranean areas) and special attention to transboundary aquifers;
- Water Resources Planning and Management, with emphasis on new techniques, as well as, methodological advances and models;
- The increasing number of extreme hydrological events and their consequences for water-scarce and water-stressed hydrological regimes;
- The use of scenarios for outlining options in comprehensive planning and management;
- Exchanges of students and faculty for improving ties with the Unesco ICIWaRM program at CSU and AUTH; and
- Comparative drought and desertification studies affecting the agricultural economies of Colorado and Greece.

Vlachos explains that CSU has experience in agriculture and a reputation in the water field, and AUTH has a central location in Europe with many similar agreements with around 200 European universities. The agreement would also bring more international students to each university, strengthening international ties and increasing knowledge.

Vlachos discusses growing up in Greece, saying that especially in the islands, fresh water was scarce. "Water is a sacred thing," he says, and it's important for historians and anthropologists, who understand older, traditional ways of dealing with water scarcity, to be involved. Such an integrated approach is necessary for water resources.

ICIWaRM, the International Center for Integrated Water Resources Management, where CSU participates as a founding member, is an example of an integrated and international approach to water. ICIWaRM was established in 2007 by organizations "sharing an interest in the advancement of the science and practice of integrated water resources management around the globe," according to its website.

Vlachos expresses his hope that this international approach to water issues will continue with CSU, which has been known for its involvement in water. "We're engineering the planet," he says.

Evan Vlachos, center, is pictured with CSU President Tony Frank, AUTH President Ioannis Mylopoulos, and surrounded by members of the Department of Civil Engineering of AUTH.

Cathy Thomas Wins Master Thesis Award

Cathy Thomas, a master's student in Agricultural and Resource Economics has just been awarded the Western Agricultural Economics Association Master's Thesis Award. They will present her award at their annual meeting in Banff, Alberta, Canada. The thesis is entitled "A Cost-Benefit Analysis of Preventative Management for Zebra and Quagga Mussels in the Colorado-Big Thompson System."

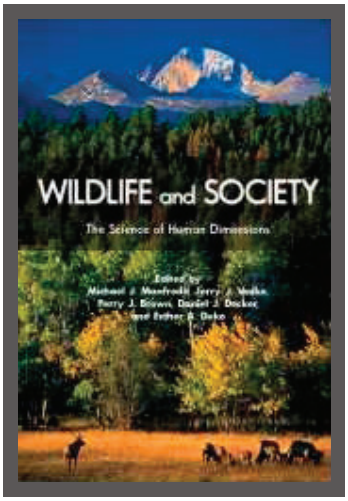
CSU Student Joseph D. Vassios Receives Award

Colorado State University Ph.D. candidate Joe Vassios was recently honored with the annual Outstanding Graduate Student Award from Aquatic Plant Management Society. Vassios says the graduate work he was recognized for has focused on "examining the absorption and translocation of the aquatic herbicides triclopyr, fluridone, and penoxsulam in two aquatic plant species, hydrilla and Eurasian watermilfoil." In addition to this research, Vassios has been active in CSU Professor Scott Nissen's aquatic plant management research program. He's also been "evaluating current and new methods for control of sago pondweed in irrigation canals and new control methods for Eurasian watermilfoil in lakes, ponds, and irrigation canals."

Vassios plans to graduate in fall 2011, and says he hopes to pursue an industry career in the aquatic plant management field. He holds a Bachelor of Science in Soil and Crop Sciences and a Master of Science in Bioagricultural Sciences and Pest Management, both from CSU.

CSU Faculty Receive Wildlife Society Book of the Year Award

A book co-authored by three CSU faculty members in the Department of Human Dimensions of Natural Resources is the 2009 recipient of The Wildlife Society's Wildlife Publication Award. The book, titled *Wildlife and Society: The Science of Human Dimensions*, was recognized in the outstanding edited book category. The authors were acknowledged in September at the Wildlife Society's 16th Annual Conference in Monterey, California.



The book addresses a growing area of study known as the human dimensions of fish and wildlife management. The field of study includes issues such as understanding public demands for wildlife recreation, managing conflict among competing wildlife interests, educating the public about wildlife, ensuring the safety of people who encounter wildlife, and controlling poaching while helping create sustainable subsistence hunting.

"During most of the 20th century, biology informed sound wildlife management decisions. Increasingly, however, it is recognized that managing wildlife means managing people. That is where the social sciences can provide help," said Michael J. Manfredo, head of the Department of Human Dimensions of Natural Resources and of the Department of Forest, Rangeland and Watershed Stewardship at CSU. "The problems of wildlife management almost always involve the behavior of humans." Manfredo co-authored the book with Jerry J. Vaske and Esther A. Duke, also of CSU's Department of Human Dimensions of Natural Resources; Perry J. Brown of the University of Montana; and Daniel J. Decker of Cornell University.

Wildlife and Society: The Science of Human Dimensions offers perspectives branching from a variety of academic disciplines and presents views of professionals from the United States, Europe, Africa, and Latin America. These distinctive elements make the book an important new reference for professionals and community members concerned with environmental conservation and fish and wildlife management. The book was recently translated and released in Japan.

**This article was adapted from a September 22, 2009, CSU news release.*

CSU Professor Receives NSF Award

Thomas Borch, assistant professor of environmental soil chemistry in the Department of Soil and Crop Sciences at Colorado State University, has received a Faculty Early Career Development (CAREER) Award from the National Science Foundation. The honor is considered one of the most prestigious for up-and-coming researchers in science and engineering.

Borch will use the nearly $500,000, five-year grant to investigate how climate change, and especially the projections of increased precipitation and flooding, may impact important biogeochemical cycles, such as those related to iron. Iron minerals are among the most important reactive solids in earth surface environments, acting as natural filters of inorganic contaminants and nutrients, sorbents for organic matter, and poising the redox potential of groundwater. Lack of biologically available iron in soils can also lead to iron deficiency anemia which is a major public health and financial problem in Central Asia, with primary impact on woman and children.

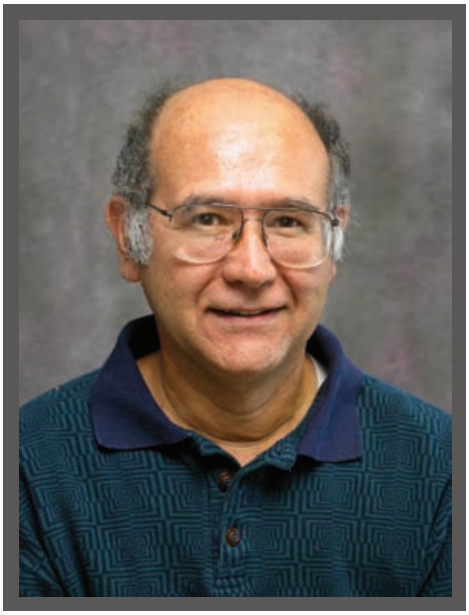
Iron minerals are responsible, in part, for stabilization of organic matter in soils. Consequently, any changes in iron chemistry may also result in changes in the atmospheric carbon dioxide concentration and the global climate. In high-elevation watersheds of the Rocky Mountains, more than 95% of spring snowmelt infiltrates through soils and moves along shallow groundwater flow paths before merging with stream water. In fact, one-sixth of the world's population depends on water released from seasonal snowpacks and glaciers, so an improved understanding of the soil processes that sustain the supply of clean water from mountain headwaters is critical to current and future human natural resource demands.

"This award will allow us to initiate a new important research area in environmental biogeochemistry at CSU; attract high-caliber postdoctoral researchers, graduate, and undergraduate students; and develop a set of new courses targeting undergraduate students interested in environmental biogeochemical processes from the molecular scale to field scale," said Borch.

Borch earned his doctorate degree in environmental soil chemistry from Montana State University and his Master of Science and Bachelor of Science degrees in environmental chemistry from the University of Copenhagen. He joined Colorado State University in 2005 to initiate a program in environmental soil chemistry.

This article adapted from a June 5, 2009, CSU news release.

CSU Professor Honored by Interior Secretary Ken Salazar



Interior Secretary Ken Salazar recently honored Jose 'Pepe' Salas, a Colorado State University civil and environmental engineering professor, with the U.S. Department of the Interior Partners in Conservation Award. Salas and his colleagues at three other universities received the award for helping to develop new operational guidelines for the Colorado River.

Honored with Salas were representatives of the University of Colorado, the University of Arizona, and the University of Nevada, Las Vegas. Together with the U.S. Bureau of Reclamation and a variety of other government agencies, Salas and his partners helped develop Colorado River Interim Guidelines, which has been praised as the most important agreement among the seven basin states since the original 1922 compact. States signing the agreement were Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming.

Salas has served as principal investigator on two projects funded by the U.S. Bureau of Reclamation in connection with the Colorado River Basin. His activities on these projects included:

- Using innovative record extension techniques for updating the data base of naturalized flows of the Colorado River system
- Developing new approaches for reconstructing streamflows of the Colorado River based on tree-ring indices
- Developing potential scenarios of streamflows that may occur in the Colorado in future years
- Characterizing multi-year droughts using simulation and mathematical techniques
- Testing the effects of stochastic streamflows on the operations of the Colorado River system, particularly the effects on reservoir levels and outflows of the two major lakes, Lake Powell and Lake Mead

**This article was adapted from a June 30, 2009, CSU news release.*