Colorado Water Institute

Colorado

FY2013 Annual Application
under section 104 of the
Water Resources Research Act of 1984, as amended
U.S. Geological Survey
Announcement 11HQPA0002

OMB Number: 4040-0004
Expiration Date: 03/31/2012

Application for Federal Assistance SF-424

* 1. Type of Submission:	* 2. Type of Application:	* If Revision, select appropriate letter(s):
☐ Preapplication	☐ New	
☒ Application	☒ Continuation	* Other (Specify)
☐ Changed/Corrected Application	☐ Revision	

* 3. Date Received:	4. Applicant Identifier:

5a. Federal Entity Identifier:	* 5b. Federal Award Identifier (See Page 21 of this RFA - Attachment G)

State Use Only:

6. Date Received by State:	7. State Application Identifier:

8. APPLICANT INFORMATION:

* a. Legal Name:	Colorado State University

* b. Employer/Taxpayer Identification Number (EIN/TIN):	* c. Organizational DUNS:
84 6000054 5	78-597-9618

d. Address:

* Street1:	2002 Sponsored Programs
Street2:	
* City:	Fort Collins
County:	
* State:	Colorado
Province:	
* Country:	USA
* Zip / Postal Code:	80523

e. Organizational Unit:

Department Name:	Division Name:
Sponsored Programs	

f. Name and contact information of person to be contacted on matters involving this application:

Prefix:		* First Name:	Linda
Middle Name:			
* Last Name:	Monum		
Suffix:			

Title:	Senior Research Administrator
Organizational Affiliation:	
* Telephone Number:	(970) 491-0974
Fax Number:	(970) 491-6147
* Email:	Linda.Monum@colostate.edu

Application for Federal Assistance SF-424

9. Type of Applicant 1: Select Applicant Type:

I. State Controlled Institution of Higher Learning

Type of Applicant 2: Select Applicant Type:

Type of Applicant 3: Select Applicant Type:

* Other (specify):

*** 10. Name of Federal Agency:**

U.S. Geological Survey

11. Catalog of Federal Domestic Assistance Number:

15 805

CFDA Title:

Assistance to State Water Resources Research Institutes

*** 12. Funding Opportunity Number:**

11HQAP0002

* Title:

State Water Resources Research Institute Program Fiscal Year 2013 Request for Applications

13. Competition Identification Number:

N/A

Title:

N/A

14. Areas Affected by Project (Cities, Counties, States, etc.):

*** 15. Descriptive Title of Applicant's Project:**

FY 2013 Annual Application under Section 104 of the Water Resources Research Act of 1984, as amended

Attach supporting documents as specified in agency instructions.

Add Attachments | Delete Attachments | View Attachments

Application for Federal Assistance SF-424

16. Congressional Districts Of:

* a. Applicant: CO-004 * b. Program/Project: CO-004

Attach an additional list of Program/Project Congressional Districts if needed.

Add Attachment | Delete Attachment | View Attachment

17. Proposed Project:

* a. Start Date: 03/01/2013 * b. End Date: 02/28/2014

18. Estimated Funding ($):

* a. Federal	92,335.00
* b. Applicant	184,670.00
* c. State	
* d. Local	
* e. Other	
* f. Program Income	
* g. TOTAL	277,005.00

*** 19. Is Application Subject to Review By State Under Executive Order 12372 Process?**

- [ ] a. This application was made available to the State under the Executive Order 12372 Process for review on .
- [ ] b. Program is subject to E.O. 12372 but has not been selected by the State for review.
- [x] c. Program is not covered by E.O. 12372.

*** 20. Is the Applicant Delinquent On Any Federal Debt? (If "Yes", provide explanation.)**

- [ ] Yes
- [x] No

Explanation

21. *By signing this application, I certify (1) to the statements contained in the list of certifications and (2) that the statements herein are true, complete and accurate to the best of my knowledge. I also provide the required assurances** and agree to comply with any resulting terms if I accept an award. I am aware that any false, fictitious, or fraudulent statements or claims may subject me to criminal, civil, or administrative penalties. (U.S. Code, Title 218, Section 1001)**

- [x] **** I AGREE**

** The list of certifications and assurances, or an internet site where you may obtain this list, is contained in the announcement or agency specific instructions.

Authorized Representative:

Prefix:	
* First Name:	Tracey
Middle Name:	
* Last Name:	Castaneda
Suffix:	
* Title:	Research Administrator
* Telephone Number:	(970) 491-1560
Fax Number:	(970) 491-6147
* Email:	Tracey.Castaneda@colostate.edu
* Signature of Authorized Representative:	Tracey Castaneda
* Date Signed:	1/14/13

Authorized for Local Reproduction

Standard Form 424 (Revised 10/2005)
Prescribed by OMB Circular A-102

Application for Federal Assistance SF-424

*** Applicant Federal Debt Delinquency Explanation**

The following field should contain an explanation if the Applicant organization is delinquent on any Federal Debt. Maximum number of characters that can be entered is 4,000. Try and avoid extra spaces and carriage returns to maximize the availability of space.

ATTACHMENT B: **ASSURANCES - NON-CONSTRUCTION PROGRAMS**

PLEASE DO NOT RETURN YOUR COMPLETED FORM TO THE OFFICE OF MANAGEMENT AND BUDGET. SEND IT TO THE ADDRESS PROVIDED BY THE SPONSORING AGENCY.

NOTE: Certain of these assurances may not be applicable to your project or program. If you have questions, please contact the awarding agency. Further, certain Federal awarding agencies may require applicants to certify to additional assurances. If such is the case, you will be notified.

As the duly authorized representative of the applicant, I certify that the applicant:

1. Has the legal authority to apply for Federal assistance and the institutional, managerial and financial capability (including funds sufficient to pay the non-Federal share of project cost) to ensure proper planning, management and completion of the project described in this application.

2. Will give the awarding agency, the Comptroller General of the United States and, if appropriate, the State, through any authorized representative, access to and the right to examine all records, books, papers, or documents related to the award; and will establish a proper accounting system in accordance with generally accepted accounting standards or agency directives.

3. Will establish safeguards to prohibit employees from using their positions for a purpose that constitutes or presents the appearance of personal or organizational conflict of interest, or personal gain.

4. Will initiate and complete the work within the applicable time frame after receipt of approval of the awarding agency.

5. Will comply with the Intergovernmental Personnel Act of 1970 (42 U.S.C. §§4728-4763) relating to prescribed standards for merit systems for programs funded under one of the 19 statutes or regulations specified in Appendix A of OPM's Standards for a Merit System of Personnel Administration (5 C.F.R. 900, Subpart F).

6. Will comply with all Federal statutes relating to nondiscrimination. These include but are not limited to: (a) Title VI of the Civil Rights Act of 1964 (P.L. 88-352) which prohibits discrimination on the basis of race, color or national origin; (b) Title IX of the Education Amendments of 1972, as amended (20 U.S.C. §§1681-1683, and 1685-1686), which prohibits discrimination on the basis of sex; (c) Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. §794), which prohibits discrimination on the basis of handicaps; (d) the Age Discrimination Act of 1975, as amended (42 U.S.C. §§6101-6107), which prohibits discrimination on the basis of age; (e) the Drug Abuse Office and Treatment Act of 1972 (P.L. 92-255), as amended, relating to nondiscrimination on the basis of drug abuse; (f) the Comprehensive Alcohol Abuse and Alcoholism Prevention, Treatment and Rehabilitation Act of 1970 (P.L. 91-616), as amended, relating to nondiscrimination on the basis of alcohol abuse or alcoholism; (g) §§523 and 527 of the Public Health Service Act of 1912 (42 U.S.C. §§290 dd-3 and 290 ee 3), as amended, relating to confidentiality of alcohol and drug abuse patient records; (h) Title VIII of the Civil Rights Act of 1968 (42 U.S.C. §§3601 et seq.), as amended, relating to nondiscrimination in the sale, rental or financing of housing; (i) any other nondiscrimination provisions in the specific statute(s) under which application for Federal assistance is being made; and, (j) the requirements of any other nondiscrimination statute(s) which may apply to the application.

7. Will comply, or has already complied, with the requirements of Titles II and III of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (P.L. 91-646) which provide for fair and equitable treatment of persons displaced or whose property is acquired as a result of Federal or federally-assisted programs. These requirements apply to all interests in real property acquired for project purposes regardless of Federal participation in purchases.

8. Will comply, as applicable, with provisions of the Hatch Act (5 U.S.C. §§1501-1508 and 7324-7328) which limit the political activities of employees whose principal employment activities are funded in whole or in part with Federal funds.

9. Will comply, as applicable, with the provisions of the Davis-Bacon Act (40 U.S.C. §§276a to 276a-7), the Copeland Act (40 U.S.C. §276c and 18 U.S.C. §874), and the Contract Work Hours and Safety Standards Act (40 U.S.C. §§327-333), regarding labor standards for federally-assisted construction subagreements.

10. Will comply, if applicable, with flood insurance purchase requirements of Section 102(a) of the Flood Disaster Protection Act of 1973 (P.L. 93-234) which requires recipients in a special flood hazard area to participate in the program and to purchase flood insurance if the total cost of insurable construction and acquisition is $10,000 or more.

11. Will comply with environmental standards which may be prescribed pursuant to the following: (a) institution of environmental quality control measures under the National Environmental Policy Act of 1969 (P.L. 91-190) and Executive Order (EO) 11514; (b) notification of violating facilities pursuant to EO 11738; (c) protection of wetlands pursuant to EO 11990; (d) evaluation of flood hazards in floodplains in accordance with EO 11988; (e) assurance of project consistency with the approved State management program developed under the Coastal Zone Management Act of 1972 (16 U.S.C. §§1451 et seq.); (f) conformity of Federal actions to State (Clean Air) Implementation Plans under Section 176(c) of the Clean Air Act of 1955, as amended (42 U.S.C. §§7401 et seq.); (g) protection of underground sources of drinking water under the Safe Drinking Water Act of 1974, as amended (P.L. 93-523); and, (h) protection of endangered species under the Endangered Species Act of 1973, as amended (P.L. 93-205).

12. Will comply with the Wild and Scenic Rivers Act of 1968 (16 U.S.C. §§1271 et seq.) related to protecting components or potential components of the national wild and scenic rivers system.

13. Will assist the awarding agency in assuring compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. §470), EO 11593 (identification and protection of historic properties), and the Archaeological and Historic Preservation Act of 1974 (16 U.S.C. §§469a-1 et seq.).

14. Will comply with P.L. 93-348 regarding the protection of human subjects involved in research, development, and related activities supported by this award of assistance.

15. Will comply with the Laboratory Animal Welfare Act of 1966 (P.L. 89-544, as amended, 7 U.S.C. §§2131 et seq.) pertaining to the care, handling, and treatment of warm blooded animals held for research, teaching, or other activities supported by this award of assistance.

16. Will comply with the Lead-Based Paint Poisoning Prevention Act (42 U.S.C. §§4801 et seq.) which prohibits the use of lead-based paint in construction or rehabilitation of residence structures.

17. Will cause to be performed the required financial and compliance audits in accordance with the Single Audit Act Amendments of 1996 and OMB Circular No. A-133, "Audits of States, Local Governments, and Non-Profit Organizations."

18. Will comply with all applicable requirements of all other Federal laws, executive orders, regulations, and policies governing this program.

SIGNATURE OF AUTHORIZED CERTIFYING OFFICIAL	TITLE
[signature]	Research Administrator
APPLICANT ORGANIZATION	DATE SUBMITTED
Colorado State University	4/14/13

Standard Form 424B (Rev. 7-97) Back

Colorado State University

Office of the Vice President for Engagement
136 Student Services
1050 Campus Delivery
Fort Collins, Colorado 80523-1050
(970) 491-2785
FAX: (970) 491-7863

January 11, 2013

MATCHING FUNDS COMMITMENT

Sponsor: U.S. Geological Survey
Department of the Interior

State Water Resources Research Institute Program, FY 2013
USGS Announcement: 11HQPA0002, Revised December 30, 2012
Proposal Closing Date: January 15, 2013

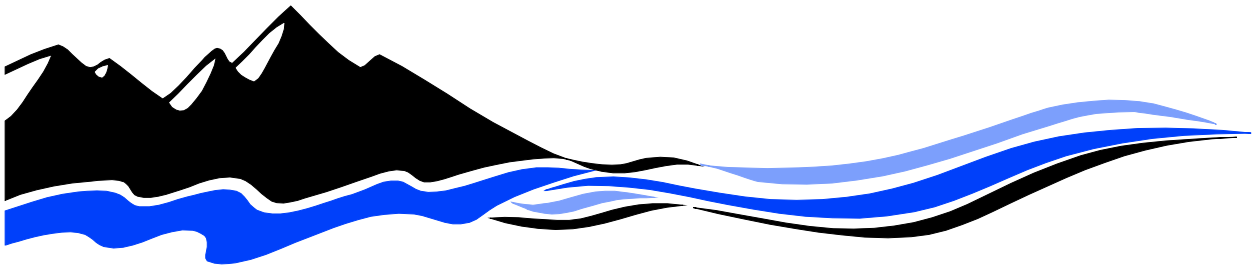
Colorado State University Commitment: $184,670 (total of Direct Costs of $96,369 and Facilities and Administrative Costs of $88,301) during fiscal year July 1, 2013 to June 30, 2014.

The Office of the Vice President for Engagement has provided the Colorado Water Institute with an annual base budget from which the FY2013 State Water Institute Program 2:1 matching commitment will be derived.

Lou Swanson
Vice President for Engagement
By Huntington D Lambert
Associate Provost

Program Administration/Management Description

State:	Colorado
Director:	Reagan Waskom Director, Colorado State University email:reagan.waskom@colostate.edu phone:970 491-6308
Administrative Personnel:	Nancy Grice Assistant to the Director email:nancy.grice@colostate.edu phone:970-491-6724



Program and Management Overview

The Colorado Water Institute (CWI) will continue to address the water information and education challenges facing Colorado over the next fiscal year, providing the unit with opportunity for growth within the university and the state. Budget challenges in Colorado provide an opportunity to match up activities already in progress through CWI with water needs in the state and the region. CWI reports to the Vice President for Engagement at Colorado State University, an administration unit charged with primary responsibilities for outreach and the formation of partnerships to further the activities of a variety of units at the university. The inclusion of CWI in this cluster acknowledges work already accomplished to connect faculty with water expertise in various institutions of higher education with policy makers, water providers, water managers, and water users throughout the state.

CWI received state appropriation for water research and will work with the Advisory Committee on Water Research Policy (ACWRP) to establish research priorities and award research project funding for the coming year. New project investigators will be funded this year, and the Director will help connect their work to the greater water community.

Two faculty research projects and one student research project were chosen for FY13 funding.

1. Addressing the agronomic feasibility of partial and full season hay fallowing as part of a Western Slope Water Bank
2. Reclaimed Wastewater Use Assessment for Municipal Reuse and Algae Growth for Oil Production (Phase 1)
3. Social Network Analysis for Water Resources Management Workshop (student project)

The connections with Colorado's water and agricultural communities make CWI uniquely suited to tasks of outreach and partnership formation, and CSU President Tony Frank has called on CWI for such services in the coming year. Discussions of water use, water policy, and water compacts were mandated by the Colorado State Legislature through a series of Water Basin Roundtables. CWI will continue to provide research-based information on a variety of related topics including agricultural water use, history of water use and rights, and water law to these roundtable participants. CWI has worked to foster the inclusion of research in the communities involved in the roundtables. These tasks will continue into the next fiscal year, as the roundtables are charged with developing priority needs within their basins and pushing projects forward for funding. This activity in support of a legislative mandate provides CWI an opportunity to highlight its contributions to the water community in Colorado as we go forward. These opportunities come with higher visibility and greater accountability for CWI. The Institute is fortunate to have a statutorily mandated Advisory Committee on Water Research Policy (ACWRP), each member has long tenure in the water management community and is in position to provide support and guidance for the Institute.

Budget Breakdown

Project Number: 2013CO-ADMIN

Project Title:

Cost Category	Federal	Non-Federal	Total
Principal Investigator(s) Salaries and Wages:	$0	$0	$0
Graduate Student(s) Salaries and Wages:	$0	$0	$0
Undergraduate Student(s) Salaries and Wages:	$3,000	$0	$3,000
Others: 0	$0	$0	$0
Total Salaries and Wages:	$3,000	$0	$3,000
Principal Investigator(s) Fringe Benefits:	$0	$0	$0
Graduate Student(s) Fringe Benefits:	$0	$0	$0
Undergraduate Student(s) Fringe Benefits:	$30	$0	$30
Others: None	$0	$0	$0
Total Fringe Benefits:	$30	$0	$30
Graduate Student(s) Tuition:	$0	$0	$0
Undergraduate Student(s) Tuition:	$0	$0	$0
Total Tuition:	$0	$0	$0
Supplies:	$2,970	$0	$2,970
Equipment:	$0	$0	$0
Services or Consultants:	$0	$0	$0
Travel:	$2,000	$0	$2,000
Other Direct Costs:	$2,000	$0	$2,000
Total Direct Costs:	$10,000	$0	$10,000
Indirect costs on federal share:	XXXXX	$4,850	$4,850
Indirect costs on non-federal share:	XXXXX	$0	$0
Total Estimated Costs:	$10,000	$4,850	$14,850
Total Costs at Institute host Colorado State University:	$10,000	$4,850	$14,850
Total Costs at other University Name of University: None	$0	$0	$0

Budget Justification

Project Number: 2013CO-ADMIN

Project Title:

Salaries and Wages for PIs. *Provide personnel, title/position, estimated hours and the rate of compensation proposed for each individual.*
NA
Salaries and Wages for Graduate Students. *Provide personnel, title/position, estimated hours and the rate of compensation proposed for each individual. (Other forms of compensation paid as or in lieu of wages to students performing necessary work are allowable provided that the other payments are reasonable compensation for the work performed and are conditioned explicitly upon the performance of necessary work. Also, note that tuition has its own category below and that health insurance, if provided, is to be included under fringe benefits).*
NA
Salaries and Wages for Undergraduate Students. *Provide personnel, title/position, estimated hours and the rate of compensation proposed for each individual. (Other forms of compensation paid as or in lieu of wages to students performing necessary work are allowable provided that the other payments are reasonable compensation for the work performed and are conditioned explicitly upon the performance of necessary work. Also, note that tuition has its own category below and that health insurance, if provided, is to be included under fringe benefits).*
150 hours of student employees up to $20 per hour.
Salaries and Wages for Others. *Provide personnel, title/position, estimated hours and the rate of compensation proposed for each individual.*
NA
Fringe Benefits for PIs. *Provide the overall fringe benefit rate applicable to each category of employee proposed in the project. Note: include health insurance here, if applicable.*
NA
Fringe Benefits for Graduate Students. *Provide the overall fringe benefit rate applicable to each category of employee proposed in the project. Note: include health insurance here, if applicable.*
NA
Fringe Benefits for Undergraduate Students. *Provide the overall fringe benefit rate applicable to each category of employee proposed in the project. Note: include health insurance here, if applicable.*
Undergraduate Students Fringe 1.0%
Fringe Benefits for Others. *Provide the overall fringe benefit rate applicable to each category of employee proposed in the project. Note: include health insurance here, if applicable.*
NA
Tuition for Graduate Students. *Provide personnel, title/position, and amount of tuition remission proposed for each individual.*
NA
Tuition for Undergraduate Students. *Provide personnel, title/position, and amount of tuition remission proposed for each individual.*
NA
Supplies. *Indicate separately the amounts proposed for office, laboratory, computing, and field supplies. Provide a breakdown of the supplies in each category.*

$3,000 requested for supplies to include annual computer license and misc office supplies: $1,500-Annual Licensing-6 FTE @ $250/each-FTE Microsoft Software Cost & Microsoft Server/IT Support Cost $ 600-Color Cartridges-3 @ $200/each $ 450-Toner Cartridges-3 @ $150/each $ 300-Paper-5 cases @ $50/each $ 150-Misc Office Supplies-pens, tape, markers, paper clips, labels, envelopes, folders, note pads, etc.
Equipment. *Identify non-expendable personal property having a useful life of more than one (1) year and an acquisition cost of more than $5,000 per unit. If fabrication of equipment is proposed, list parts and materials required for each, and show costs separately from the other items. A detailed breakdown is required.*
NA
Services or Consultants. *Identify the specific tasks for which these services, consultants, or subcontracts would be used. Provide a detailed breakdown of the services or consultants to include personnel, time, salary, supplies, travel, etc.*
NA
Travel. *Provide purpose and estimated costs for all travel. A breakdown should be provided to include location, number of personnel, number of days, per diem rate, lodging rate, mileage and mileage rate, airfare (whatever is applicable).*
$2,000 requested for travel expenses to attend NIWR annual meeting in Washington, DC.: $650-Airfare $355-Per Diem-$71/per day @5 $836-Lodging-4 nights @ $209/night $159-Mileage RT to Airport, Airport Parking, Toll Road Expenses, Taxi/Metro
Other Direct Costs. *Itemize costs not included elsewhere, including publication costs. Costs for services and consultants should be included and justified under Services or Consultants (above). Please provide a breakdown for costs listed under this category.*
$2,000 requested for other direct costs: Memberships and subscriptions/dues for state and national water organizations.
Indirect Costs. *Provide negotiated indirect (Facilities and Administration) cost rate.*
Colorado State University's negotiated indirect (Facilities and Administration) cost rate is 48.50% MTDC.

State:	CO
Project Number:	2013CO289B
Title:	Social Network Anlysis Technique for Water Resources Management Workshop
Project Type:	Education
Focus Category:	Education
Keywords:	Social Network Analysis, Socio-Ecological Systems, Adaptive Co-management
Start Date:	3/1/2013
End Date:	2/28/2014
Congressional District:	4th
PI:	Labadie, John Professor, Colorado State University email:labadie@engr.colostate.edu phone:(970)491-6898
Co-PI(s):	

Abstract

Social network analysis (SNA) is a system for studying relationships between people, groups, organizations, and other entities, as well as, network flows of information and resources. The purpose of this CWI project will be to test SNA techniques, then develop materials to provide a Fall 2013 half-day workshop in Social Network Analysis Techniques for Water Resources Management. The SNA workshop will introduce interested Colorado State University (CSU) students and faculty in engineering, natural resources, agriculture, and other scientific disciplines to complimentary analysis for social aspects of their work and research through SNA principles and techniques. As part of the researcher's dissertation entitled Decision Support System (DSS) for Adaptive Co-Management of Water and Environmental Resources, the author is developing semi-structured interviewing techniques and social network analysis (SNA) routines to define organizational ties, information and resource flows, and regulatory frameworks to better characterize the human dimensions of current conditions watershed-wide and to better plan diverse options to improve integrated water resources management (IWRM). In addition to social systems analysis, SNA will also serve as part of the DSS module for monitoring and assessment to analyze how management options that increase social network bridging ties, reduce network fragmentation, improve leadership measures of centrality, and increase in number and strength flows of resources and information work to improve sustainability and resilience of water resources management frameworks. In the student's dissertation research, SNA techniques are embedded in a process of adaptive co-management (ACM), which combines the experiential knowledge-building process of adaptive management with the flexible, shared governance approach of co-management. An introduction to ACM will also be include as a components of the workshop, as would others SNA findings from select CSU faculty and student research, as well as, worldwide research in SNA applied to natural resources problems. The Social Networking Analysis Techniques for Water Resources Management workshop could be provided as part of the CWI Fall 2013 water resources seminar series or as a separate half-day workshop. CSU faculty in sociology and other departments with SNA expertise would be involved in workshop review prior to presentation. If a lab at the CSU campus could be found with UCINET software installed, for additional preparation costs, the workshop could also be expanded to a full-day to include practical UCINET lab practice in the latter portion.

Statement of Regional or State Water problem.

I have spoken with several CSU graduate students in several science and engineering departments who would like to use SNA in interdisciplinary research to better understand the human dimensions of water resources, natural resources, and environmental management, however, there are only a few CSU semester long courses in sociology, communications, and anthropology that only briefly address SNA as part of the curriculum. The *Social Networking Analysis Techniques for Water Resources Management* workshop would specifically provide a *jump start* in natural systems-focused SNA for under-served graduate students, as well as, interested faculty and senior undergraduate students in other CSU science and engineering departments. Not only can SNA help researchers describe social, organizational, political, legal, and regulatory issues better, but it may also be used to compare successful and unsuccessful applications of IWRM, ACM, and other resource management methods. SNA also serves to more fully analyze how well alternative options improve relationships for long term sustainability and resilience, rather than focusing only on an option's technical merits. SNA is also an effective monitoring and assessment tool to gauge how well an implemented solution improves social network structure and resource and information exchange.

Statement of the results or benefits.

Increasing awareness of SNA techniques among faculty and student workshop attendees in agriculture, engineering, and natural resources disciplines will meet several objectives:

- encourage students to strive to build more sustainable, resilient socio-ecological systems,
- more analytically consider the human dimensions of apparently technical problems,
- increase interdisciplinary research activity,
- increase the flow of scientific research into practical applications, and
- better assess project outcomes to include improvements in social network structure.

Nature, scope, and objectives of the project, including a timeline of activities.

The objectives of the project are to test SNA methods, develop materials, present the SNA workshop, follow up with attendees, and compile results and lessons learned for CWI benefit.

Month	**Activities**
March 2013	Determine faculty reviewers, Finalize data collection techniques for workshop inclusion, Conduct SNA research integration from list in part 17. below.
April 2013	Outline course content, Develop graphics to describe each SNA principle
May 2013	Develop water, natural resources, and environmental application examples
June 2013	Complete SNA principles and data collection techniques section of workshop
July 2013	Develop SNA techniques portion of the workshop, UCINET based examples
August 2013	Have draft workshop materials reviewed by experts, Make revisions, Set workshop date and venue, Develop workshop marketing materials and campaign
September 2013	Make preparations for video recording of workshop and schedule any onsite example demos to include, Launch marketing campaign and adjust if needed to achieve minimum 20 attendees, Develop exit surveys and follow-up activities
October 2013	Present Workshop: *Social Networking Analysis Techniques for Water Resources Management*, Obtain survey feedback, Plan next steps with attendees
Nov. 2013	Write CWI report, Compile results of workshop exits surveys, Complete followup
Dec. 2013	Project closeout

Methods, procedures, and facilities.

SNA determines how entities are organized in relation to one another. The focus of the workshop will be to explain how SNA can be used to better evaluate organizational ties, knowledge and resource exchange, and regulatory frameworks to improve analysis, implementation, and ongoing assessment of water resources, natural resources, and environmental management practices at the watershed scale and beyond. The workshop will present SNA as part of a systematic approach to IWRM through ACM.

The SNA resources listed in part 17. below will serve as the theoretical SNA basis of the workshop. Ongoing SNA research being conducted as part of the principal investigator's dissertation case study of Bear Creek Watershed in integrated, watershed scale nutrient management will serve as the basis for more practical aspects of the workshop, which will be supplemented by research being conducted by other CSU teams in sociology, anthropology, education, communications, and human dimensions of natural resources and a review of other examples from the part 17. resource list. UCINET software main features and examples will also be briefly covered based on research experience and related tips and caveats from its several dedicated online communities.

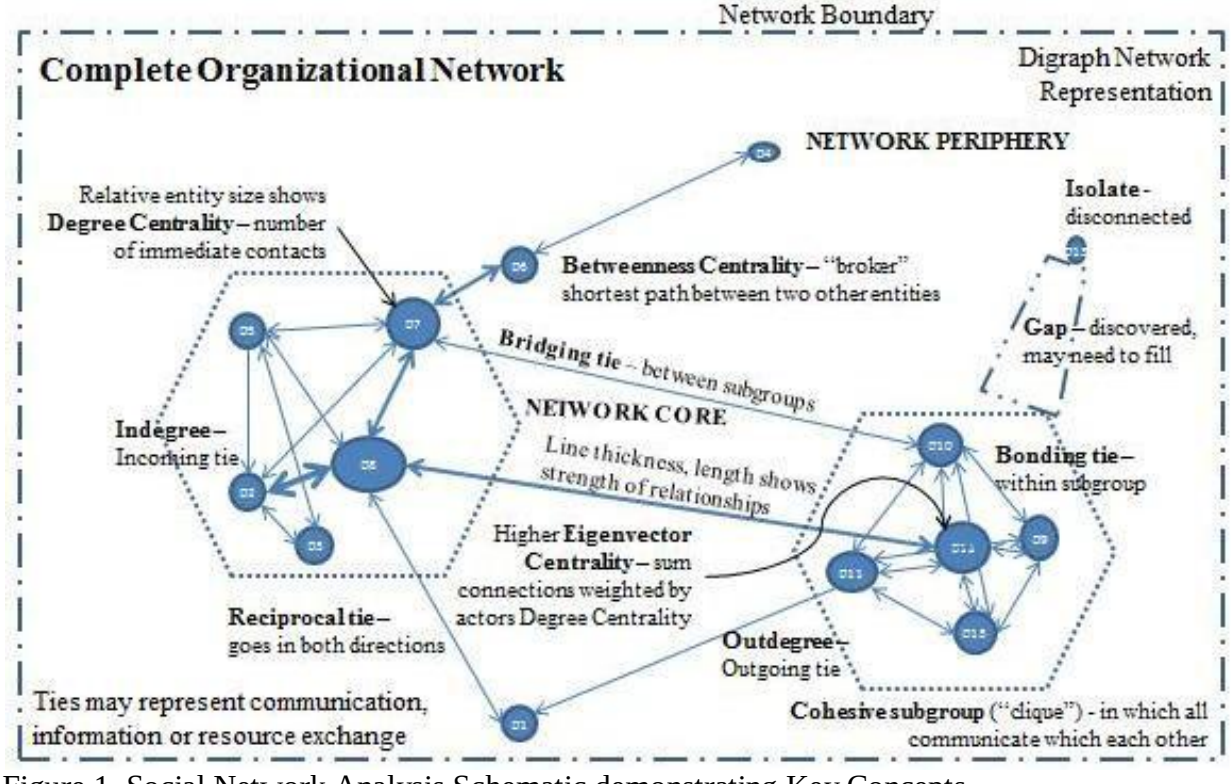


Figure 1. Social Network Analysis Schematic demonstrating Key Concepts

Related research. Several key resources will be used in developing workshop materials:

Banathy, B. 1996. Designing social systems in a changing world. Springer-Verlag, Berlin.

Bodin, O. and B. Crona. 2009. The role of social networks in natural resource governance: What relational patterns make a difference? Global Environmental Change 19 (2009): 366–374.

Bodin O. and C. Prell. eds. 2011. Social Networks and Natural Resource management: Uncovering the Social Fabric of Environmental Governance. Cambridge University Press, Cambridge, UK.

Checkland, P. 1999. Systems Thinking, Systems Practice. In Soft Systems Methodology: a 30-year Retrospective. John Wiley & Sons, Ltd. NY.

Knoke, D. and S. Yang. 2007. Social Network Analysis, Series: Quantitative Applications in the Social Sciences. Sage Publications, NY.

Ostrom, E. 2005. Understanding Institutional Diversity. Princeton University Press, Princeton, NJ.

Plummer, R., B. Crona, D. Armitage, P. Olsson, M. Tengo, and O. Yundina. 2012. Adaptive Comanagement: A Systematic Review and Analysis. Ecology and Society 17(2): 11.

Prell, C. 2012. Social Network Analysis: History, Theory, and Methodology. Sage Publications, NY.

Rodela, R. 2012. The social learning discourse: Trends, themes and interdisciplinary influences in current research. Environmental Science & Policy, 25 (January 2013): 157-166.

Walker, B., and D. Salt. 2012. Resilience Practice: Building capacity to absorb disturbance and maintain function. Island Press, Washington, D.C.

Wasserman, S. and K. Faust. 1994. Social Network Analysis: Methods and Applications. Cambridge University Press, Cambridge, UK.

Training potential. Since the *Social Networking Analysis Techniques for Water Resources Management* workshop could be repeated at different interested universities and other settings throughout Fall 2013 and beyond, training potential could be quite large, but as a minimum, a single workshop would seek a minimum of twenty students in engineering, natural resources, natural sciences, and agriculture colleges in a variety of disciplines through effective marketing.

Project Title:
Social Network Analysis Techniques for Water Resources Management Workshop

Student Attendance Goals	**Classification**	**Area of Study (Discipline)**
Workshop attendees #1-5	Masters and PhD	CSU College of Agricultural Sciences
Workshop attendees #6-10	Masters and PhD	CSU College of Engineering
Workshop attendees #11-15	Masters and PhD	CSU College of Natural Sciences
Workshop attendees #16-20	Masters and PhD	CSU College of Natural Resources
Undergraduate attendees	Sr. Undergrads	CSU Science and Engineering Depts.
Faculty attendees	Interested Faculty	CSU Science and Engineering Depts.

Investigator's qualifications

Professor Labadie is currently Coordinator for the Water Resources Planning and Management Division of the Department of Civil and Environmental Engineering. Dr. Labadie specializes in application of decision support systems, mathematical programming, knowledge-based systems, and geographic information systems to complex problems in water resources and environmental management. He has served as principal or co-principal investigator for numerous research projects totaling over $7 million in research funding from agencies including the Colorado Agricultural Experiment Station, U.S. Bureau of Reclamation, U.S. Geological Survey, U.S. Department of Agriculture; U.S. Department of Energy, National Science Foundation, and the World Bank. Dr. Labadie has developed several important computer software packages currently being applied by numerous agencies and organizations in the U.S. and abroad, including MODSIM: Generalized River Basin Network Flow Model and CSUDP: Generalized Dynamic Programming Package.

Budget Breakdown

Project Number: 2013CO289B

Project Title: Social Network Anlysis Technique for Water Resources Management Workshop

Cost Category	Federal	Non-Federal	Total
Principal Investigator(s) Salaries and Wages:	$0	$0	$0
Graduate Student(s) Salaries and Wages:	$0	$0	$0
Undergraduate Student(s) Salaries and Wages:	$4,075	$0	$4,075
Others: 0	$0	$0	$0
Total Salaries and Wages:	$4,075	$0	$4,075
Principal Investigator(s) Fringe Benefits:	$0	$0	$0
Graduate Student(s) Fringe Benefits:	$0	$0	$0
Undergraduate Student(s) Fringe Benefits:	$41	$0	$41
Others: None	$0	$0	$0
Total Fringe Benefits:	$41	$0	$41
Graduate Student(s) Tuition:	$0	$0	$0
Undergraduate Student(s) Tuition:	$0	$0	$0
Total Tuition:	$0	$0	$0
Supplies:	$40	$0	$40
Equipment:	$0	$0	$0
Services or Consultants:	$344	$0	$344
Travel:	$0	$0	$0
Other Direct Costs:	$0	$0	$0
Total Direct Costs:	$4,500	$0	$4,500
Indirect costs on federal share:	XXXXX	$2,183	$2,183
Indirect costs on non-federal share:	XXXXX	$0	$0
Total Estimated Costs:	$4,500	$2,183	$6,683
Total Costs at Institute host Colorado State University:	$4,500	$2,183	$6,683
Total Costs at other University Name of University: None	$0	$0	$0

Budget Justification

Project Number: 2013CO289B

Project Title: Social Network Anlysis Technique for Water Resources Management Workshop

Salaries and Wages for PIs. *Provide personnel, title/position, estimated hours and the rate of compensation proposed for each individual.*
NA
Salaries and Wages for Graduate Students. *Provide personnel, title/position, estimated hours and the rate of compensation proposed for each individual. (Other forms of compensation paid as or in lieu of wages to students performing necessary work are allowable provided that the other payments are reasonable compensation for the work performed and are conditioned explicitly upon the performance of necessary work. Also, note that tuition has its own category below and that health insurance, if provided, is to be included under fringe benefits).*
NA
Salaries and Wages for Undergraduate Students. *Provide personnel, title/position, estimated hours and the rate of compensation proposed for each individual. (Other forms of compensation paid as or in lieu of wages to students performing necessary work are allowable provided that the other payments are reasonable compensation for the work performed and are conditioned explicitly upon the performance of necessary work. Also, note that tuition has its own category below and that health insurance, if provided, is to be included under fringe benefits).*
163 hours @ $25 per hour for student employee salary. Additional testing of SNA methods specifically for workshop purposes-12 hrs. SNA Workshop material preparation and workshop-specific SNA research-70 hrs. SNA Workshop material review and refinement-20 hrs. SNA Workshop preparation / followup-8 hrs. SNA Workshop presentation-8 hrs. Final CWI Report with Final Workshop Materials Packet, Newsletter article, etc.-45 hrs.
Salaries and Wages for Others. *Provide personnel, title/position, estimated hours and the rate of compensation proposed for each individual.*
NA
Fringe Benefits for PIs. *Provide the overall fringe benefit rate applicable to each category of employee proposed in the project. Note: include health insurance here, if applicable.*
NA
Fringe Benefits for Graduate Students. *Provide the overall fringe benefit rate applicable to each category of employee proposed in the project. Note: include health insurance here, if applicable.*
NA
Fringe Benefits for Undergraduate Students. *Provide the overall fringe benefit rate applicable to each category of employee proposed in the project. Note: include health insurance here, if applicable.*
Undergraduate Students Fringe 1.0%
Fringe Benefits for Others. *Provide the overall fringe benefit rate applicable to each category of employee proposed in the project. Note: include health insurance here, if applicable.*
NA
Tuition for Graduate Students. *Provide personnel, title/position, and amount of tuition remission proposed for each individual.*
NA

Tuition for Undergraduate Students. *Provide personnel, title/position, and amount of tuition remission proposed for each individual.*
NA
Supplies. *Indicate separately the amounts proposed for office, laboratory, computing, and field supplies. Provide a breakdown of the supplies in each category.*
$40 requested for UCINET software, one student copy.
Equipment. *Identify non-expendable personal property having a useful life of more than one (1) year and an acquisition cost of more than $5,000 per unit. If fabrication of equipment is proposed, list parts and materials required for each, and show costs separately from the other items. A detailed breakdown is required.*
NA
Services or Consultants. *Identify the specific tasks for which these services, consultants, or subcontracts would be used. Provide a detailed breakdown of the services or consultants to include personnel, time, salary, supplies, travel, etc.*
Workshop Setup and Recording-$344
Travel. *Provide purpose and estimated costs for all travel. A breakdown should be provided to include location, number of personnel, number of days, per diem rate, lodging rate, mileage and mileage rate, airfare (whatever is applicable).*
NA
Other Direct Costs. *Itemize costs not included elsewhere, including publication costs. Costs for services and consultants should be included and justified under Services or Consultants (above). Please provide a breakdown for costs listed under this category.*
NA
Indirect Costs. *Provide negotiated indirect (Facilities and Administration) cost rate.*
Colorado State University's negotiated indirect (Facilities and Administration) cost rate is 48.50% MTDC.

State:	CO
Project Number:	2013CO290B
Title:	Assessing the agronomic feasibility of partial and full season hay fallowing as part of a Western Slope Water Bank
Project Type:	Research
Focus Category:	Agriculture, Conservation, Irrigation
Keywords:	Irrigation, Fallowing, Water Bank
Start Date:	3/1/2013
End Date:	2/28/2014
Congressional District:	2nd
PI:	Brummer, Joe email:Joe.Brummer@colostate.edu
Co-PI(s):	

Abstract

Colorado River Compact compliance in partnership with the other three Upper Basin States is a topic of growing concern within Colorado. Western Slope water users account for about 1.3 million acre feet of Colorado River Basin (CRB) water of which about 1 million are pre-1922 and exempt from Colorado River Compact administration. The populated Front Range diverts about a half-million acre feet of CRB water of which the majority are junior rights to 1922. A possible curtailment scenario is Colorado's post-1922 water rights forgoing use (or a negotiated fraction) until all of the 75 million acre feet 10-year running average non-depletion requirements to the Lower Division States are restored. A water bank approach might facilitate this arrangement by brokering short-term leases of pre-1922 agricultural rights for temporary use by post-1922 municipal and industrial - mostly Front Range - water right holders. Six irrigated alfalfa or grass hayfield sites will be established in Western Colorado to test fallowing practices likely to be used for generating conserved water for a future water bank. Testing of practices will be side-by-side with a control treatment (i.e. limited or deficit irrigation treatments next to "fully irrigated" or "business-as-usual" irrigation treatments). The test sites will be located throughout the Yampa, Colorado, and Gunnison River basins, an area that includes about 360,000 acres of irrigated grass and/or alfalfa hay. A master's level graduate student will be recruited in the Soil and Crop Sciences Department at CSU and charged with answering three basic questions about single season hay fallowing in the Upper Colorado River Basin: 1) What is the impact on hay stand life, productivity, and quality due to a single-season fallowing? 2) What is the potential range of marketable, saved (otherwise consumed) water per acre of single-season fully and partially fallowed hayfields in Western Colorado? 3) Are there any environmental benefits or concerns to fallowing hay in Western Colorado? For example, what are the implications for reducing in-stream salt and selenium concentrations in Mancos shale areas? Does fallowing make hayfields prone to weed invasion? Agronomic responses will be determined by measuring yield, species composition, ground cover, and forage quality. Soils will also be sampled and analyzed to assess changes in soil moisture, impacts to soil health, and shifts in salt and selenium on affected sites. Atmometers will be installed at each site to help estimate a range of water savings that might be eligible for leasing through a future water bank. By answering the above three questions, hay producers as well as proponents of water banking will have enough information available to confirm if this approach is worth pursing as a method to free up water to meet compact obligations and/or other uses. There are other questions that must be answered, but if the impacts to yield, forage quality, etc. are too severe or long lasting, then hay producers will be reluctant to participate in a water banking program. Many Colorado CRB water

bank discussions focus on legal framework, administration logistics, and return flow effects. This study will not focus on these aspects, only the agronomic implications.

WATER PROBLEM:

Under the 1922 Colorado River Compact, the four Upper Basin states – of which Colorado is one – may not allow the flow at Lee's Ferry to drop below a 10-year running average of 75 million acre-feet (MAF) or else be subject to curtailment. The current 10-year average is about 90 MAF, and while the threat of curtailment is not imminent, there is growing concern in Colorado that a combination of factors[1] may conspire to hasten the onset of curtailment[2].

Plenty of uncertainty exists around how Colorado and the other three Upper Basin states would respond to a curtailment or the increased risk of onset. A common idea is use of a water bank or leasing arrangement between compact exempt pre-1922 water rights – most of which are western slope agricultural rights – and post-1922 municipal water rights – most of which are in the "front range," a heavily populated ten-county region of the eastern slope.

Work on the administrative implications and legal challenges of such a bank has already commenced. As far as the agronomic means to generate water for such a water bank, the long-held assumption has been that ground would be fallowed to some degree in a similar fashion to the water leases or "fallowing agreements" found in California between large irrigation districts, like Palo Verde, and municipalities like Los Angeles and San Diego.

The challenge for Western Colorado irrigators is that annual crops that are prevalent in the Lower Basin states are outnumbered by perennial hay crops in terms of acreage and water consumption. Limited research has commenced on the agronomic impact to alfalfa and grass hay stands when strategically fallowed for the purpose of generating water for a bank. Results suggest that water can definitely be generated, but how hay responds in ensuing years – when full irrigation returns – remains unclear.

This research project *does not* attempt to answer any legal or water administration questions associated with a Colorado water bank. Instead it deals with the agronomic response of various hayfields in Western Colorado to being strategically fallowed in a manner consistent with generating water for a bank. Basic assessments of water savings and environmental benefits are also addressed in a complementary manner.

PROJECT BENEFITS:

One of the biggest questions for the irrigation community and water bank proponents is how to account for (i.e. quantify) the incidental effects of withholding irrigation water from a hayfield. Establishing agreeable terms for the water to be leased is academic in comparison to accounting for incidental costs to the landowner due to fallowing hayfields. For example, is there a recovery period when full irrigation is restored the following year or do yields bounce back immediately? Will weed control be required? Also, many other agronomic factors such as elevation, soils, and water availability vary regionally throughout the Western Slope; how might they be accounted for when pooling irrigation water from different locations in Western Colorado?

[1] These factors include the possibility of a new trans-mountain diversion project, full use of existing systems, new demands from energy development including oil shale, growth in demands and water use with increased population, and reductions in available supplies stemming from climate change.

[2] Kuhn, E. 2012. Risk Management Strategies for the Upper Colorado River Basin. *Colorado River District.*

Consequently, the primary benefit this study will provide is a baseline of agronomic knowledge for hayfield fallowing to complement the current and expanding examination of the legal, engineering, and administrative hurdles of water banking.

OBJECTIVES AND TIMELINE:

This study will use a multiple site approach in achieving the following objectives:

1. Determine the impacts to forage yield and quality and associated recovery period for fallowed and partially-fallowed alfalfa and grass hayfields in different regions of Western Colorado.

2. Refine our understanding of the amount of water that might be available for leasing through fallowing of hayfields in Western Colorado.

3. Improve our understanding of potential environmental implications for fallowing hayfields, especially in salt and selenium affected areas.

The project is designed as a two year project with potential to extend it to a third year should funding be available and warranted. This full project proposal is for March 2013 to February 2014 funding only. Preliminary reporting of the 2013 project would be submitted in time to support a second proposal for 2014.

Figure 1: 2013 Project Timeline Denotes fallowing period

Project	Full Proposal		Site Selection, Prep		Monitoring, Data Collection, Preliminary Report					2nd Year Prep	Analysis, Evaluation		1st Year Report		Start 2nd Year
Year	**2013**												**2014**		
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Student	Recruit/ Hire		With Co-PIs		Summer on West Slope				With Co-PIs						
Irrigation															
High Elev															
Low Elev															
Samples															
High Elev				Pre		1				Post					
Low Elev			Pre		1		2		3		Post				

METHODS AND PROCEDURES:

Six sites in the Upper Colorado River basin of Western Colorado will be selected to test the agronomic responses associated with fallowing perennial alfalfa and grass hayfields (Table 3). Three sites will be chosen in the lower parts of the basin to study the effects on alfalfa and three will be chosen in the upper parts of the basin to study the effects on grass hay. Four of the sites have already been selected with two yet to be determined.

In the spring of 2013, the project team will visit each site prior to irrigation commencing to establish plots for the control (i.e. "business-as-usual") and fallowing treatments (Figure 1). Hay type and age will be identical between the two treatments. Ideally, treatment plots will be side-by-side using the same irrigation technology and source water, with similar acreage and soil type. At this time, each site will be fitted with an atmometer for tracking evapotranspiration which will be used as part of the equation to estimate conserved, otherwise consumed water. A

rain gauge and data logging temperature sensor will also be installed at each site to track these important weather variables. Baseline soil samples will also be taken at this time from each treatment (i.e. control and fallowed) at each site. A minimum of 15 soil cores will be taken per treatment to a depth of 15 cm, composited, and air dried before sending to the lab for a routine soil analysis.

Table 3: Proposed Study Sites

Site Name	Hay Type	Approximate Hectares	Nearest Town	Basin
Kehmeier Farm	Alfalfa	16	Eckert	(Lower) Gunnison
Western Colorado Research Center	Alfalfa	1-3	Fruita	(Lower) Colorado
TBD	Alfalfa			(Lower)
Peterson Ranch	Grass	12	Gunnison	(Upper) Gunnison
Carpenter Ranch	Grass	12	Hayden	(Upper) Yampa
TBD	Grass			(Upper)

To implement the treatments, fields or sections of fields will be flagged where side-by-side testing should be easiest to manage and stand health and soil type are reasonably consistent across both treatments. The actual size and shape of treated areas will vary by site depending on the size and shape of each individual producer's field. Ideally, each treated area will be a minimum of 2 ha in size. For the higher elevation (above 6500 ft) "mountain meadow" sites where only one cutting of grass hay is usually taken, irrigation will be withheld for the entire growing season on the fallow treated ground (i.e. full deficit, Figure 1). On the lower elevation sites where alfalfa is being grown, the fallow treated ground will be irrigated up until the first cutting (Figure 1 - light gray boxes) after which it will receive no additional irrigation water for the rest of the season (i.e. partial deficit or limited irrigation). At all sites, the control treatment will be irrigated based on each producer's normal schedule. The amount of water applied at each site will be estimated based on each producer's irrigation records.

In 2014, full irrigation will be restored to ground fallowed in 2013, and continued on the "business-as-usual" control treatments. The objective being to determine how well hay responds after water is withheld for part or all of the previous growing season.

Prior to each cutting (1 for higher elevation and 3 to 4 for lower elevation sites), forage samples will be taken within each treatment by hand clipping 8, 0.5 m^2 quadrats to an 8 cm height (approximate cutter-bar height). In addition, forage samples will be taken at the end of the growing season to account for any regrowth that occurs following the last cutting of hay. Samples will be bagged and dried in a forced-air oven for 72 hours, then weighed and converted to yield per hectare. The samples will then be ground through a 2 mm screen using a Wiley mill in preparation for forage quality analyses. Samples will be analyzed for crude protein, neutral detergent fiber, acid detergent fiber, and neutral detergent fiber digestibility.

In addition to the baseline soil samples taken in the spring, each treatment will be sampled again at the end of the growing season at each site using the same protocol as outlined above. Samples will be analyzed for pH, electrical conductivity, organic matter content, and nitrogen, phosphorus, and potassium concentrations. Samples from the lower basin sites will also be tested for selenium concentration.

The impact on selenium and salinity in the lower basin will be estimated by first assuming a nominal system efficiency (e.g. 50 percent for gated pipe surface irrigation) and deep percolation fraction (e.g. 20 percent of the unconsumed portion). With these assumptions, the amount of percolated irrigation water per unit area prevented through fallowing can be calculated. With access to local United State Geological Survey (USGS) and Bureau of Reclamation (USBR) salt and selenium loading rate estimates, tons of salt and pounds of selenium prevented from groundwater transport to local waterways can also be estimated. Soil electrical conductivity on soil samples in 2013 and 2014 will also reveal any salt encroachment problems into hay root zones due to fallowing.

Model A[3] atmometers will be installed at each site to account for reference evapotranspiration (ET_O). The values recorded during the fallowing period will be compared to full season ET_O to determine a likely range of marketable water and the proportion of full season ET_O that is potentially accounted for by fallowing. ET_O values for the fallowing period will be grouped and averaged by upper basin and lower basin sites. The seasonal ET_O for 2013 for each of the two elevation groups will then be compared to seasonal averages for ET_O from previous years to develop a range of conserved water yields based on climatic conditions.

All of the above measurements will be continued in 2014 to establish soil and crop responses and account for water use when full irrigation is restored. Analysis of variance (ANOVA) will be used to compare soil parameters from the spring samples with the fall samples to determine any short-term impacts to the soil due to fallowing. Forage yield and quality will be compared between the control and fallowed plots using ANOVA to determine the impact on these parameters. The most meaningful comparisons will be able to be made after the 2014 growing season when soil, forage, and water use parameters can be compared between the 2 years.

Reporting

A preliminary report of initial findings will be submitted in time to support a pre-proposal for a second year's worth of funding. This report will be completed and submitted immediately prior to the deadline for 2014 pre-proposals (i.e. mid-September to mid-October).

A final and full report of 2013's findings will be completed and submitted after the irrigation season, prior to the completion of the full proposal (i.e. January to February 2014). The PI will also lead an article on the project for the Colorado Water magazine during the 2013 project period.

[3] Model E atmometers do have data logging capability, but also have a track record of being unreliable. Considering the additional expense of Model E versus Model A, this project went with Model A atmometers.

RELATED RESEARCH:

Lindenmayer, R.B. 2008. Application of limited irrigation strategies in irrigated alfalfa. M.S. Thesis, Colorado State Univ., Fort Collins, CO.

Lindenmayer, R.B., N.C. Hansen, and J.E. Brummer. 2011. Deficit irrigation of alfalfa for water-savings in the Great Plains and Inter-Mountain West: A review and analysis of the literature. Agron. J. 103:45-50.

Reich, D. 2011-2013. Quantifying and Promoting Deficit Irrigation in Commercial Peach Orchards of Western Colorado. DOI-Bureau of Reclamation. Water Conservation Field Services Program; $24,787. With co-operation of Western Colorado Research Center and Mesa Conservation District.

Reich, D. and C. Pearson. 2012-2015. Investigation of Water Savings, Water Quality benefits and Profitability of Sub Surface Drip on Alfalfa in Grand Valley. CWCB- Alternative to Agricultural Water Transfer Methods and WSRA (Colorado RT); $8,841(AAWTM) + $46,894(WSRA).

TRAINING POTENTIAL:

Students Name	Classification (Undergrad, Masters, Ph.D.)	Area of Study (Discipline)
Lyndsay Jones	Masters	Soil and Crop Sciences

INVESTIGATOR'S QUALIFICATIONS FOR
JOE E. BRUMMER

ADDRESS Department of Soil and Crop Sciences
Colorado State University
1170 Campus Delivery
Fort Collins, CO 80523-1170

PHONE (970) 491-4988

EMAIL Joe.Brummer@colostate.edu

EDUCATION

1994 Ph.D. in Agronomy, Major-Range Management, University of Nebraska
1986 M.S. in Agronomy, Major-Range Management, Oklahoma State University
1984 B.S. in Range Science, Major-Range Ecology, Colorado State University

ACADEMIC POSITIONS

2005-Present Associate Professor/Extension Forage Specialist, Soil and Crop Sciences, Colorado State University
2003-2005 Research Scientist/Scholar III, Forage Production, Colorado State University
2002-2003 Research Scientist/Scholar III/Superintendent, Forage Production, Colorado State University
1994-2002 Research Scientist/Superintendent, Forage Production, Colorado State University

OTHER POSITIONS

1987-94 Range Research Coordinator, University of Nebraska, North Platte, Nebraska
1986-87 Research Associate, Colorado State University, Fort Collins, Colorado
1984-86 Graduate Research Assistant, Oklahoma State University, Stillwater, Oklahoma
1983-84 Student Research Technician, Economic Research Service, Fort Collins, Colorado
1981 Research Assistant, Colorado State University, Springfield, Colorado
1980 Research Assistant, Colorado State University, Springfield, Colorado

CURRENT JOB DESCRIPTION

Have statewide responsibilities in the area of forage production and management with 45% of my time dedicated to research, 35% to extension outreach activities, and 20% to teaching.

COURSES TAUGHT

Forage and Pasture Management (SOCR 320) - Every spring
Integrated Forage Management (AGRI 635) - Every fall (Online), spring (Two week short course)
Managing for Ecosystem Sustainability (AGRI 632) - Every fall

HONORS AND AWARDS

2008 Certificate of Appreciation for 2 years of service as a member of the Board of Directors, Colorado Section Society for Range Management.
2004 Valued Friendship Award, Gunnison County Stockgrowers, Gunnison, Colo.
2002 Certificate of Recognition for 4 years of service to the Society for Range Management as Associate Editor of the Journal of Range Management.
2000 Certificate of Appreciation for 2 years of service as a member of the Board of Directors, Colorado Section Society for Range Management.

PROFESSIONAL ACTIVITIES

- Member of the Society for Range Management since 1984 - Active member of the Colorado Section
- Executive secretary and proceeding editor for the High Altitude Revegetation Committee since 2008
- Member and chairman of the Western Education/Extension and Research Activity Committee (WERA 1014), Intensive Pasture Management for Sustainable Livestock Production in the Western US, since 2008

GRANTS RECEIVED (As PI or Co-PI, Last 5 years)

2012	$ 25,000
2011	$1,617,385
2010	$1,069,260
2009	$ 236,976
2008	$ 146,684

PUBLICATION SUMMARY

Refereed Journal Articles = 24	Technical/Progress Reports = 68
Non-Refereed Proceedings = 28	Published Abstracts = 51
Manuals = 2	Extension Publications = 23

RECENT PUBLICATIONS

Brummer, J.E., G.E. Shewmaker, and C.L. Engel. 2012. Challenges and benefits of interseeding legumes into grass dominated stands. In: Proceedings of the 5th National Conference on Grazing Lands, December 9-12, 2012, Orlando, FL.

Brummer, J.E., M. Volt, and A.W. Cooley. 2011. Irrigated hay production, p. 81-85. In: C.H. Pearson, J.E. Brummer, B. Hammon, and M.L. Franklin (eds), Intermountain Grass and Legume Forage Production Manual (2nd ed), Colo. Agri. Exp. Stat. Tech Bull. TB11-02, Colo. State Univ., Fort Collins, CO.

Hurisso, T.T., J.G. Davis, J.E. Brummer, M.E. Stromberger, M.M. Mikha, M.L. Haddix, M.R. Booher, and E.A. Paul. 2013. Rapid changes in microbial biomass and aggregate size distribution in response to changes in organic matter management in grass pasture. Geoderma 193-194:68-75.

Meiman, P.J., N.R. Davis, J.E. Brummer, and J.A. Ippolito. 2012. Riparian shrub metal concentrations and growth in amended fluvial mine tailings. Water, Air, Soil Pollut. 223:1815-1828.

Smith, M.L., P.J. Meiman, and J.E. Brummer. 2012. Characteristics of hummocked and non-hummocked Colorado riparian areas and wetlands. Wetlands Ecol. Manage. 20:409-418.

Hurisso, T.T., J.G. Davis, J.E. Brummer, M.E. Stromberger, F.H. Stonaker, B.C. Kondratieff, M.R. Booher, and D.A. Goldhamer. 2011. Earthworm abundance and species composition in organic forage production systems of northern Colorado receiving different soil amendments. Appl. Soil Ecol. 48:219-226.

Temple. D.G., J.E. Brummer, and D.H. Smith. 2011. Use of alternative temperature expressions with Blaney-Criddle. J. Irrig. Drain. Eng. 137:573- 584.

Lindenmayer, R.B., N.C. Hansen, and J.E. Brummer. 2011. Deficit irrigation of alfalfa for water-savings in the Great Plains and Inter-Mountain West: A review and analysis of the literature. Agron. J. 103:45-50.

Budget Breakdown

Project Number: 2013CO290B

Project Title: Assessing the agronomic feasibility of partial and full season hay fallowing as part of a Western Slope Water Bank

Cost Category	Federal	Non-Federal	Total
Principal Investigator(s) Salaries and Wages:	$0	$0	$0
Graduate Student(s) Salaries and Wages:	$19,030	$0	$19,030
Undergraduate Student(s) Salaries and Wages:	$0	$0	$0
Others: 0	$0	$0	$0
Total Salaries and Wages:	$19,030	$0	$19,030
Principal Investigator(s) Fringe Benefits:	$0	$0	$0
Graduate Student(s) Fringe Benefits:	$970	$0	$970
Undergraduate Student(s) Fringe Benefits:	$0	$0	$0
Others: None	$0	$0	$0
Total Fringe Benefits:	$970	$0	$970
Graduate Student(s) Tuition:	$0	$0	$0
Undergraduate Student(s) Tuition:	$0	$0	$0
Total Tuition:	$0	$0	$0
Supplies:	$0	$0	$0
Equipment:	$0	$0	$0
Services or Consultants:	$0	$0	$0
Travel:	$0	$0	$0
Other Direct Costs:	$0	$0	$0
Total Direct Costs:	$20,000	$0	$20,000
Indirect costs on federal share:	XXXXX	$9,700	$9,700
Indirect costs on non-federal share:	XXXXX	$0	$0
Total Estimated Costs:	$20,000	$9,700	$29,700
Total Costs at Institute host Colorado State University:	$20,000	$9,700	$29,700
Total Costs at other University Name of University: None	$0	$0	$0

Budget Justification

Project Number: 2013CO290B

Project Title: Assessing the agronomic feasibility of partial and full season hay fallowing as part of a Western Slope Water Bank

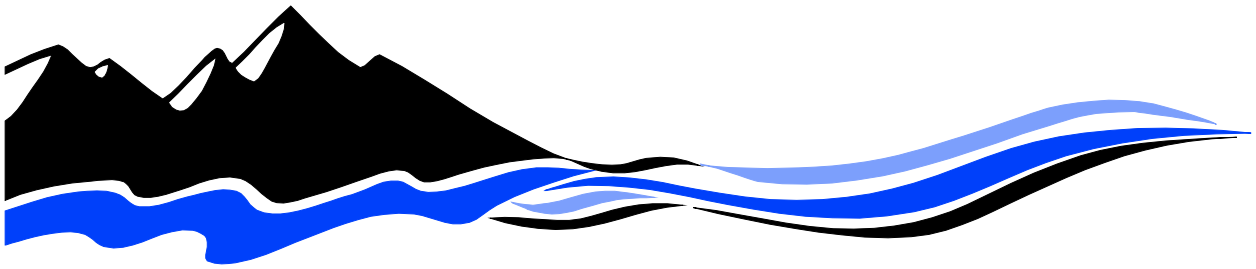
Salaries and Wages for PIs. *Provide personnel, title/position, estimated hours and the rate of compensation proposed for each individual.*
NA
Salaries and Wages for Graduate Students. *Provide personnel, title/position, estimated hours and the rate of compensation proposed for each individual. (Other forms of compensation paid as or in lieu of wages to students performing necessary work are allowable provided that the other payments are reasonable compensation for the work performed and are conditioned explicitly upon the performance of necessary work. Also, note that tuition has its own category below and that health insurance, if provided, is to be included under fringe benefits).*
Graduate Research Assistant: 12 months @ $1,586/month = $19,030
Salaries and Wages for Undergraduate Students. *Provide personnel, title/position, estimated hours and the rate of compensation proposed for each individual. (Other forms of compensation paid as or in lieu of wages to students performing necessary work are allowable provided that the other payments are reasonable compensation for the work performed and are conditioned explicitly upon the performance of necessary work. Also, note that tuition has its own category below and that health insurance, if provided, is to be included under fringe benefits).*
NA
Salaries and Wages for Others. *Provide personnel, title/position, estimated hours and the rate of compensation proposed for each individual.*
NA
Fringe Benefits for PIs. *Provide the overall fringe benefit rate applicable to each category of employee proposed in the project. Note: include health insurance here, if applicable.*
NA
Fringe Benefits for Graduate Students. *Provide the overall fringe benefit rate applicable to each category of employee proposed in the project. Note: include health insurance here, if applicable.*
Graduate Students Fringe 5.10%
Fringe Benefits for Undergraduate Students. *Provide the overall fringe benefit rate applicable to each category of employee proposed in the project. Note: include health insurance here, if applicable.*
NA
Fringe Benefits for Others. *Provide the overall fringe benefit rate applicable to each category of employee proposed in the project. Note: include health insurance here, if applicable.*
NA
Tuition for Graduate Students. *Provide personnel, title/position, and amount of tuition remission proposed for each individual.*
NA
Tuition for Undergraduate Students. *Provide personnel, title/position, and amount of tuition remission proposed for each individual.*

NA
Supplies. *Indicate separately the amounts proposed for office, laboratory, computing, and field supplies. Provide a breakdown of the supplies in each category.*
NA
Equipment. *Identify non-expendable personal property having a useful life of more than one (1) year and an acquisition cost of more than $5,000 per unit. If fabrication of equipment is proposed, list parts and materials required for each, and show costs separately from the other items. A detailed breakdown is required.*
NA
Services or Consultants. *Identify the specific tasks for which these services, consultants, or subcontracts would be used. Provide a detailed breakdown of the services or consultants to include personnel, time, salary, supplies, travel, etc.*
NA
Travel. *Provide purpose and estimated costs for all travel. A breakdown should be provided to include location, number of personnel, number of days, per diem rate, lodging rate, mileage and mileage rate, airfare (whatever is applicable).*
NA
Other Direct Costs. *Itemize costs not included elsewhere, including publication costs. Costs for services and consultants should be included and justified under Services or Consultants (above). Please provide a breakdown for costs listed under this category.*
NA
Indirect Costs. *Provide negotiated indirect (Facilities and Administration) cost rate.*
Colorado State University's negotiated indirect (Facilities and Administration) cost rate is 48.50% MTDC.

State:	CO
Project Number:	2013CO292B
Title:	Technology Transfer and Information Dissemination
Project Type:	Information Transfer
Focus Category:	None
Keywords:	Technology Transfer, Information Dissemination
Start Date:	3/1/2013
End Date:	2/28/2014
Congressional District:	4th
PI:	Waskom, Reagan Director, Colorado State University email:reagan.waskom@colostate.edu phone:970 491-6308
Co-PI(s):	

Abstract

Technology transfer activities of CWI rely heavily on the sponsorship and participation in various water meetings across Colorado by the director, the publication of Colorado Water, the bimonthly newsletter, and the various web pages where research results and other archives are available to the public. Engaging other University faculty to participate in these activities has always been an objective and a challenge for CWI. With current state and federal funding and new PIs this year, CWI will have the opportunity to infuse new research topics and new faculty faces in the water conversations around Colorado. Our newsletter, research reports and web pages will be used to keep the University contributions before the water management community. The Interbasin Compact Commission wants to make use of CWI webpages to promote water education activities and events, requiring us to renew our commitment to keeping these pages current. Participation in various regional conversations about water will be an important activity for the director of CWI. The Colorado legislature has mandated specified roundtables to discuss water policy and water use within the state. These roundtables frequently make use of the expertise and research results from the CWI community of scholars. The directors presence, or the presence of an appropriate expert, will be requested at various meetings this year, and CWI assistance with travel expenses will be an important encouragement to accomplish this interaction.



Colorado Water Institute
Technology Transfer and Information Dissemination

The Colorado Water Institute (CWI) technology transfer activities include publishing the bi-monthly newsletter, Colorado Water, as well as various websites and report series. This information is available to keep the water community and general public informed. The report series consist of Completion Reports that are published at the end of each research project and include all required deliverables specific to the research project. The Information Reports provide information on special topics, such as water related conferences. Technical Reports provide details regarding research and findings on a stated subject matter. Special Reports are publications of interest to the Colorado water community, sometimes best management practices for specific segments of water users or histories of water in Colorado. Special Reports are published periodically as our clients or interest groups require or provide them. Public education pieces called Water in the Balance are topics of general interest and are written for a non-technical audience. All publications are available to the public through the CWI online archive, and CWI often receives requests for this electronic information.

The Colorado Legislature has mandated research and specific roundtables to facilitate discussion of water policy and water use within the state. Expertise and research from the CWI community of scholars is frequently called upon. For this reason, the CWI online information database has become an important asset for the water community that must be monitored and updated as new information becomes available.

Budget Breakdown

Project Number: 2013CO292B

Project Title: Technology Transfer and Information Dissemination

Cost Category	Federal	Non-Federal	Total
Principal Investigator(s) Salaries and Wages:	$0	$0	$0
Graduate Student(s) Salaries and Wages:	$0	$0	$0
Undergraduate Student(s) Salaries and Wages:	$20,817	$0	$20,817
Others: 0	$0	$45,647	$45,647
Total Salaries and Wages:	$20,817	$45,647	$66,464
Principal Investigator(s) Fringe Benefits:	$0	$0	$0
Graduate Student(s) Fringe Benefits:	$0	$0	$0
Undergraduate Student(s) Fringe Benefits:	$208	$0	$208
Others: Fringe Benefits	$0	$11,000	$11,000
Total Fringe Benefits:	$208	$11,000	$11,208
Graduate Student(s) Tuition:	$0	$0	$0
Undergraduate Student(s) Tuition:	$0	$0	$0
Total Tuition:	$0	$0	$0
Supplies:	$0	$0	$0
Equipment:	$0	$0	$0
Services or Consultants:	$0	$0	$0
Travel:	$0	$0	$0
Other Direct Costs:	$0	$0	$0
Total Direct Costs:	$21,025	$56,647	$77,672
Indirect costs on federal share:	XXXXX	$10,197	$10,197
Indirect costs on non-federal share:	XXXXX	$27,474	$27,474
Total Estimated Costs:	$21,025	$94,318	$115,343
Total Costs at Institute host Colorado State University:	$21,025	$94,318	$115,343
Total Costs at other University Name of University: None	$0	$0	$0

Budget Justification

Project Number: 2013CO292B
Project Title: Technology Transfer and Information Dissemination

Salaries and Wages for PIs. *Provide personnel, title/position, estimated hours and the rate of compensation proposed for each individual.*
NA
Salaries and Wages for Graduate Students. *Provide personnel, title/position, estimated hours and the rate of compensation proposed for each individual. (Other forms of compensation paid as or in lieu of wages to students performing necessary work are allowable provided that the other payments are reasonable compensation for the work performed and are conditioned explicitly upon the performance of necessary work. Also, note that tuition has its own category below and that health insurance, if provided, is to be included under fringe benefits).*
NA
Salaries and Wages for Undergraduate Students. *Provide personnel, title/position, estimated hours and the rate of compensation proposed for each individual. (Other forms of compensation paid as or in lieu of wages to students performing necessary work are allowable provided that the other payments are reasonable compensation for the work performed and are conditioned explicitly upon the performance of necessary work. Also, note that tuition has its own category below and that health insurance, if provided, is to be included under fringe benefits).*
$20,817 - 1,040.85 hours up to $20/hour for student hourly and IT student hourly employees.
Salaries and Wages for Others. *Provide personnel, title/position, estimated hours and the rate of compensation proposed for each individual.*
Admin Pro: $45,647 as appropriate for outreach and educational efforts related to research output. Preparation and distribution of the CWI newsletter, which includes writing and editing articles, desktop publishing, and preparing publications for website, responding to email and website requests for information, and supervising student hourly/work-study positions.
Fringe Benefits for PIs. *Provide the overall fringe benefit rate applicable to each category of employee proposed in the project. Note: include health insurance here, if applicable.*
NA
Fringe Benefits for Graduate Students. *Provide the overall fringe benefit rate applicable to each category of employee proposed in the project. Note: include health insurance here, if applicable.*
NA
Fringe Benefits for Undergraduate Students. *Provide the overall fringe benefit rate applicable to each category of employee proposed in the project. Note: include health insurance here, if applicable.*
Undergraduate Students Fringe 1.0%
Fringe Benefits for Others. *Provide the overall fringe benefit rate applicable to each category of employee proposed in the project. Note: include health insurance here, if applicable.*
Admin Pro: 24.10%
Tuition for Graduate Students. *Provide personnel, title/position, and amount of tuition remission proposed for each individual.*
NA
Tuition for Undergraduate Students. *Provide personnel, title/position, and amount of tuition remission*

proposed for each individual.
NA
Supplies. *Indicate separately the amounts proposed for office, laboratory, computing, and field supplies. Provide a breakdown of the supplies in each category.*
NA
Equipment. *Identify non-expendable personal property having a useful life of more than one (1) year and an acquisition cost of more than $5,000 per unit. If fabrication of equipment is proposed, list parts and materials required for each, and show costs separately from the other items. A detailed breakdown is required.*
NA
Services or Consultants. *Identify the specific tasks for which these services, consultants, or subcontracts would be used. Provide a detailed breakdown of the services or consultants to include personnel, time, salary, supplies, travel, etc.*
NA
Travel. *Provide purpose and estimated costs for all travel. A breakdown should be provided to include location, number of personnel, number of days, per diem rate, lodging rate, mileage and mileage rate, airfare (whatever is applicable).*
NA
Other Direct Costs. *Itemize costs not included elsewhere, including publication costs. Costs for services and consultants should be included and justified under Services or Consultants (above). Please provide a breakdown for costs listed under this category.*
NA
Indirect Costs. *Provide negotiated indirect (Facilities and Administration) cost rate.*
Colorado State University's negotiated indirect (Facilities and Administration) cost rate is 48.50% MTDC.

Budget Summary Table

Project ID	Primary PI	Salaries and Wages		Fringe Benefits		Tuition		Supplies		Equipment		Services and Consultants		Travel		Other Costs		Total Direct Costs		Indirect Costs		Estimated Total Costs	
		Fed	Match	Fed	Match	Fed	Match	Fed	Match	Fed	Match	Fed	Match	Fed	Match	Fed	Match	Fed	Match	Fed	Match	Fed	Match
2013CO-ADMIN	Reagan M. Waskom	$3,000	$0	$30	$0	$0	$0	$2,970	$0	$0	$0	$0	$0	$2,000	$0	$2,000	$0	$10,000	$0	$0	$4,850	$10,000	$4,850
2013CO289B	John W. Labadie	$4,075	$0	$41	$0	$0	$0	$40	$0	$0	$0	$344	$0	$0	$0	$0	$0	$4,500	$0	$0	$2,183	$4,500	$2,183
2013CO290B	Joe Brummer	$19,030	$0	$970	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$20,000	$0	$0	$9,700	$20,000	$9,700
2013CO292B	Reagan M. Waskom	$20,817	$45,647	$208	$11,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$21,025	$56,647	$0	$37,671	$21,025	$94,318
Total		$46,922	$45,647	$1,249	$11,000	$0	$0	$3,010	$0	$0	$0	$344	$0	$2,000	$0	$2,000	$0	$55,525	$56,647	$0	$54,404	$55,525	$111,051