Colorado Water

Newsletter of the Water Center at Colorado State University

February 2006

Robert Ward accepts an plaque of appreciation from David Robbins on behalf of the Colorado Water Congress at the 2006 Colorado Water Congress Convention.

INSIDE:

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WATER ITEMS AND ISSUES . . .

COLORADO WATER
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EDITORIAL

Water Research Informs the Dialog

Reagan M. Waskom
Colorado Water Resources Research Institute

If we have learned anything from the on-going efforts of the Colorado Water Conservation Board's Statewide Water Supply Investigation, it is that significant water supply problems loom on the near horizon for Colorado. The magnitude and complexity of these problems will require creative approaches, open dialog and our best thinking to resolve. Water research remains a vital aspect of addressing the many challenges we face in Colorado. While good science is only one of the tools that must be utilized, research-based information provides an objective platform from which we can enter into negotiation, policy, and dispute resolution regarding water resources.

Colorado State University recently hosted a Water Dialogue on December 13, entitled "Creating and Sustaining Constructive Conversations about Water." The meeting focused on how we can best sustain constructive dialogs about the future of water supplies in Colorado. Participants discussed both the history and the current efforts to resolve Colorado water issues, with an eye on the newly created Roundtables. Faculty from higher education outlined how their scholarly activities potentially inform the process. It was agreed that both the Roundtable and Interbasin Compact Committee process initiated by HB1177 will necessarily rely on good science, good data, and a fair measure of good will.

HB1177 Roundtable members are a recognized source of expertise that will be critical to the success of the process. In this edition of *Colorado Water*, Elizabeth McVicker, a South Platte Roundtable member, offers her perspective on the HB1177 process, as well as a look at how her basin Roundtable has progressed. We will accept newsletter submissions by other Roundtable and IBCC members as this process unfolds.

One of the primary roles of CWRRI is to help focus and coordinate efforts of higher education in responding to the information needs of both the public and the professional water community. Through the sustained efforts of Dr. Robert Ward, various University faculty and a committed water community in Colorado, the Institute has managed to fulfill its role in spite of a static federal budget and no direct funding from the state. In the past, the Institute has been able to offer a research competition open to faculty at all of the institutions of higher education in Colorado. Due to dwindling state and federal funds available for the research competition, we are currently only able to offer a competition for annual graduate student fellowship to engage in high priority water research topics relevant to Colorado.

This past year, CWRRI had three outstanding graduate student fellows. Kathleen DeJong of the Colorado School of Mines has been working with Bob Siegrist on understanding pathways of organic wastewater contaminants in the hydrologic cycle. Jennifer Thorvaldson has worked with James Pritchett of Colorado State University on estimating the economic impact on rural Colorado communities as agricultural irrigation water is transferred to meet urban demands. Julia Keedy has been working with Pepe Salas and the Colorado River District on hydrologic analysis and modeling of the upper Colorado River system. This year CWRRI will be able to fund just two graduate research fellows, Kathleen DeJong of the Colorado School of Mines and Jenny Thorvaldson of Colorado State University who will will continue the projects begun last year, pending approval of funding from the USGS.

The CWRRI is authorized by the Colorado Legislature every ten years; our current authorization will expire at the end of 2006. We are moving forward to obtain reauthorization during this legislative session, and hope to have the support of the water community in this process.

As our readers are aware, Professor Robert Ward retired as the Director of CWRRI and the CSU Water Center in December of 2005. At his retirement celebration held on December 13, Robert's many contributions to Colorado State University and the state of Colorado were noted by his friends and colleagues. Among the legacies Dr. Ward left at CSU was a genuine desire to connect the resources of higher education to the information needs of water managers and decision makers in Colorado. As Interim Director, I plan to remain on this course and look forward to serving you in this capacity. Please call or email me if I can be of any assistance or if you have input on water research needs.

Living in the Rocky Mountain West: Water in 2025

by Lyn Kathlene

Director, Colorado Institute of Public Policy, Colorado State University

The Rocky Mountain West continually faces complicated and rapidly changing water policy challenges. The Colorado Institute of Public Policy (CIPP) at Colorado State University released, in January 2006, a water paper that provides a new starting point for considering water issues as they impact basins, regions, and the state of Colorado.

In an environment of resource scarcity, many in the water community have already placed themselves in positions that advocate for particular solutions. There are ongoing debates about the challenges, strategies, and their associated issues, but rarely are the *underlying values and beliefs* examined. Instead of embracing common interests, we have tended to harden against the various positions that others hold.

Ultimately, issues of water policy in the West are about people and the diverse beliefs and values that they hold. The relationship among these interests and society's ability to find policy solutions is strong, but not always evident.

Yet, most conversations about water do not start with beliefs. Conversations tend to start with either a definition of the problem or with favored solutions. The first narrows the consideration of acceptable solutions (Stone, 2002), while the second has the effect of constructing the problem to fit the solution (Rockefort & Cobb, 1994). Both approaches limit our understanding of the underlying interests that tend to drive policy choices. Values are left unexamined by stakeholders, despite their dominant role in determining a group's favored definition of the problems (Guess & Farnham, 1989; Rockefort & Cobb, 1994). Open discussion of how different groups frame underlying causes is needed to foster constructive dialogue, cooperative problem solving, and innovative solutions (Giandomenico, 1989).

Recognizing the full range of beliefs and values is not just a useful starting point for tackling today's challenges; it is a pragmatic starting point. Searching for commonalities, understanding personal assumptions, and knowing how others understand situations can foster innovative strategies.

To illustrate how beliefs and values are connected to water challenges, the paper highlights the results of two surveys given to 84 water stakeholders in Colorado (For more information about the survey see the August issue of *Colorado Water*.) The first survey gathered information about the varied interests—beliefs and values—held by stakeholders in the water community. The second survey addressed their perceptions of the water challenges faced by Colorado and the Rocky Mountain West today and in the future. The stakeholders included people representing environmental, agriculture, recreation, and urban interests as well as water providers, elected officials, and researchers.

Understanding our commonalities

In the survey of *beliefs* among Colorado stakeholders, three areas of overwhelming agreement emerged:

- *Water is fundamental to the economy*. No matter where you live in the state, what type of work you do, or what your vision is for a secure water future, everyone agrees about interdependency between water and a healthy economy.
- *An appropriated right does not mean water will be available for use.* Whether one is a senior or junior water rights holder, there is no misunderstanding about what a water right means. Droughts, interstate compacts, other upstream or downstream water rights all affect the physical and legal availability of water.

- *Agricultural water is the prime target for water transfers to urban and recreational uses*. All participants in the survey agree that whether you own it or want it, agricultural water is the most likely source for shifting water to new demands.

Beyond the three areas of consensus, five separate beliefs are held by a majority of participants:

- *Money has become the means for allocating water*.
- *The market is not always the appropriate method for allocating water*.
- *Protecting existing individual water rights is important*, and this is the case whether one believes the system is broken or not.
- *Water court decisions have been favorable to agricultural interests*, a belief that those inside and outside the agricultural community hold.
- *Current water law is quite functional*—it is neither outdated nor unable to handle new demands.

Recognizing that people across a wide spectrum hold some beliefs in common is essential to productive conservations. If nothing else, we can all agree that our respective economic interests—be they private gain or public good—are somehow dependent, to a greater or lesser extent, upon water. While we differ on which interests should be prioritized, it is useful to realize that different positions oftentimes are rooted in the same value.

Understanding our differences

Effective decision-making requires that we understand the differences that exist within the water community. Understanding is accepting that another person's beliefs are "true" *for that individual*, even if it is contrary to one's own personal beliefs and values (Flick, 1998). Understanding does not mean agreeing with an interest, nor does it require that we surrender our own beliefs and values.

Ultimately, solutions arise from a thoughtful consideration of our differences. From our common beliefs, we can begin to discuss where we diverge. The survey of Colorado water stakeholders also unveiled five areas of significant disagreement:

- The *"use it or lose it" doctrine* is seen by some to encourage wasteful use of water while others believe it has no detrimental impact.
- There is a strong division of opinion on whether there is a *connection between land use and water planning*.
- Some respondents believe the *recent drought proved the inadequacies of the current water system*, while some felt just the opposite.
- Some respondents think there is *plenty of water if used wisely*, while others see a shortage and think *new water needs to be developed*.
- There is significant disagreement as to whether or not *environmental claims have limited legal recognition*.

The Colorado survey reveals that there are six distinct combinations of beliefs about water. The six types of beliefs, reflected in the clustering of survey statements, are described in detail in the CIPP water white paper. The labels reflect the group's value and belief orientation:

- Statewide economic growth
- Environmental concerns
- Living within our limits
- Stay the course
- Broken system
- State rights

The belief types allow for an examination of commonalities and differences across the water community as well as the ability to locate yourself and others with respect to each other. However, more important than finding one's own beliefs is examining the beliefs of others. When reviewing these stakeholder belief types, you are able to consider:

- Who am I?
- Do I know people in the other types?
- Do I see new information?

- Do I see commonalities I did not know or had not considered before?
- Do I see differences between myself and others that I can better appreciate, even if I do not agree with them?
- How can this information help me/my region/my basin as we deliberate about the future of water?

Facing our challenges

The second survey addressed perceptions of the water challenges Colorado and the Rocky Mountain West face today and will face in the future. Survey respondents articulated three distinct views of current and future challenges:

Balancing consumptive use needs, which include the following priorities:

- Accommodating municipal growth without harming the long-term viability of agriculture.
- Solving problems through effective partnerships-–local, regional, basin, federal, private, and public.
- Increasing cooperation among basins and states where water is a shared resource.
- Preparing for future severe droughts.
- Balancing private property rights and public interest.
- Protecting water quality.

Water sustainability, which include the following priorities:

- Maintaining water quantity and quality while the population continues to grow.
- Incorporating conservation and efficiency in existing water user operations.
- Integrating water supply for consumptive use, environmental use, and recreational use.

Institutional streamlining, which include the following priorities:

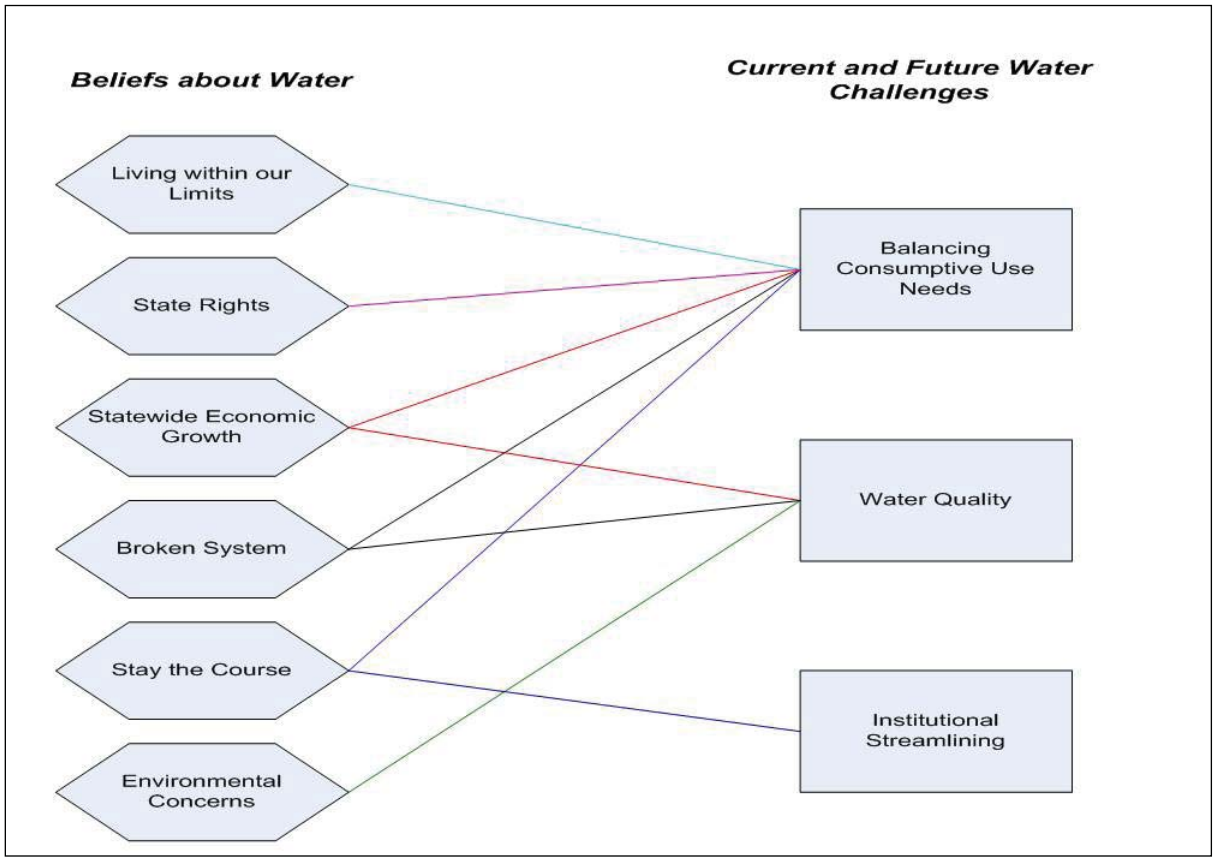
- Developing institutional responses to political and legal barriers for better management of water.
- Addressing federal regulations that are impediments to solving state problems.
- Streamlining the water development process.
- Solving problems through effective partnerships—local, regional, basin, federal, private, and public.
- Preparing for future droughts.
- Incorporating conservation and efficiency in existing water user operations.

Overall, very few commonalities emerged across these challenge types. If we primarily focus on perceptions of the challenges we face, opportunities for cooperation are limited. In taking positions on the existing water problems of the West, we align within groups more associated with battles than with the interconnected issues of today. Fortunately, we know that these positions stem from some of our common values and beliefs.

Figure 1 shows the complex relationship between beliefs and challenges. The lines between the belief types and challenge types indicate that a significant proportion of people who hold certain types of beliefs identified certain challenges. Here we see that there are multiple paths groups can take to get to the same position. For example, all but one group identifies *Balancing Consumptive Use Needs* as the major challenges we are facing. If the conversations begin with and periodically come back to values and beliefs throughout deliberations of the problems we face, common values can emerge along with an appreciation of differences, thereby allowing a wider range of positions to be accommodated.

Taken together, the surveys reveal overlapping and diverging beliefs and values within the water community, which are linked in complex ways to the challenges we face. If conversations within the water community begin with and periodically come back to values and beliefs, common values can emerge, allowing for a wider range of positions and, ideally, more enduring solutions. When we think about water in the West, our minds often turn to images of conflict. It is difficult to identify a river, dam, aquifer, or canal that has not been at the center of a bitter contest.

Figure 1. Water Survey: Relationship between Beliefs and Challenges



But it is just as western to collaborate as it is to fight. Collaboration has brought the West its greatest achievements and still holds the greatest promise for its future. History of collaboration is rich, ranging from the West-Hispano communities of northern New Mexico to the Union Colony in Greeley, which claims distinction as the first successful communal farming endeavor in Colorado. Westerners have also fashioned an astonishing array of compacts, agreements and negotiations. The Colorado River Compact—as the forebearer and perhaps most well-known of these arrangements—is just one of many such examples (Tyler, 2003).

But the water community still does not embrace dialogue and cooperation among all interests as the first and fundamental step toward addressing challenges. We have begun to talk about the potential for such approaches, but have yet to implement them in an effective manner.

The potential for cooperation within the water community is not the end all. It really is only the beginning of a process. In the first issue of the Colorado Water Congress newsletter, *Colorado Water Rights*, published in 1982, Wayne Aspinal wrote:

> "…there never has been, there is not today, and there never will be a *status quo* in the administration of water rights under the doctrine of appropriation. The old adage to the effect that we live in an ever-changing world certainly applies to the administration of the distribution of water in Colorado."

We are constantly adapting to new approaches, working with new coalitions, and finding common ground via solutions we had not considered previously. The CIPP paper touches on the po-

tential for one of these approaches—articulating beliefs and values—to move us in the direction of better addressing current and future challenges. As citizens of the West and as stewards of our most precious resource, we are obligated to consider every possible means to successfully approach water issues.

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DeJong and Thorvaldson Selected for CWRRI Fellowships for 2006-2007

Graduate students Jennifer Thorvaldson and Kathleen DeJong were selected as Colorado Water Resources Research Institute (CWRRI) Graduate Fellows for 2006-2007. These graduate students submitted proposals to the Fellowship competition of CWRRI, and their propsoals were selected by the Advisory Committee on Water Research Policy at the regular November meeting.

Both Fellows are continuing projects begun last year under the auspices of CWRRI. The funding for this fellowship comes from the base funding from USGS for water research institutes. Those proposals were due on January 15, 2006 and official notification of the award is expected by March 1.

DeJong is a Ph.D candidate at Colorado School of Mines (CSM). Her project, "Occurrence and Fate of Pharmaceuticals, Endocrine Disrupting Compounds and other Organic Wastewater Contaminants in Onsite Wastewater Systems and Implications for Water Quality Management" addresses the issue of emerging contaminants, and is in progress under the supervision of Dr. Robert Siegrist at CSM.

Thorvaldson, from Colorado State University (CSU) is a master's candidate who will continue working on her project "Colorado's Evolving Irrigated Agriculture: Economic Accounting Impact Analysis" as she begins doctoral studies. The project explores the economic impacts of the reduction of irrigated agriculture on rural communities in Colorado. Eric Schuck (CSU) is the advisor for Thorvaldson's work.

Correction

On page 5 of the the December issue of *Colorado Water,* the byline incorrectly identified co-author David M. Merritt. Dr. Merritt is a research scientist affiliated with the Natural Resource Ecology Laboratory, the Rocky Mountain Research Station, and the United States Forest Service. Colorado is fortunate to have two David Merritts working in water, and we incorrectly attributed authorship to the David Merritt from the Colorado River Water Conservation District. Please accept our apology for any inconvenience our error may have caused.

HB 1177: Colorado Water For the 21st Century
An Update for January 2006

by Elizabeth R. McVicker
Center of Colorado Water Conservancy District
Member of South Platte Basin Roundtable

The August 2005 issue of *Colorado Water* presented a detailed accounting on the parameters, aspirations, and possibilities of House Bill 05-1177, known as the "Colorado Water for the 21st Century Act." As stated on the webpage of the Department of Natural Resources, the Act is "based upon the premise that Coloradans must work together to address the water needs within our entire state [and]…that we will be willing to work together to do so." To date, that cooperation and collaboration is in full force as the Roundtables progress toward the goals articulated by the Act.

The nine basin Roundtables established by the Act correspond to the major river basins of the state with the addition of the Denver Metro area and are as follows: the Arkansas, the Colorado, the Dolores/San Juan/San Miguel, Gunnison, the Metro area, the North Platte, the Rio Grande, the South Platte, and the Yampa/White. The Act directs the Roundtables to develop basin-wide consumptive and non-consumptive water supply needs assessments, an analysis of available unappropriated water, and propose structural and nonstructural projects and methods for meeting the basin's water supply needs. The Act clearly preserves Colorado's prior appropriation system, and the Roundtables operate within the parameters of water rights created under that system and contract rights. With repeated emphasis in clear statutory language, the Act "encourages locally driven collaborative solutions to water supply challenges" and relies on the cooperation between the individual members of each Roundtable and then, likewise, cooperation between the various basins.

Since August, the nine different basin Roundtables have met on a monthly basis to carry forth the dictates of the Act. Thus far, the work of the Roundtables has been primarily procedural: members have been appointed and elected per the guidelines of the Act which directs that members will include individuals with expertise in environmental, recreational, local governmental, industrial, and agricultural matters. Each Roundtable has adopted by-laws, operating procedures, goals and objectives, and by the end of January, each Roundtable will have selected leadership positions. Some Roundtables have decided to establish sub-Roundtables, or sub-committees, to address and resolve issues within the Roundtable as it works towards achieving the goals articulated in the Act. These goals include: to develop a basin-wide water needs assessment, to propose methods for meeting the basin's water needs, and to make recommendations as to how the Roundtable can serve as a forum for public education and involvement.

The Act specifically directs the Roundtables to use the data from the ongoing Statewide Water Supply Initiative (SWSI). The Roundtables have already benefited from the work of SWSI from fall presentations of the work accomplished by SWSI in Phase I of the initiative. Key points of these presentations included an overview of the quantity of water in the various basins, an assessment of the needs from now to 2030, and an examination of how SWSI will assist the Roundtables in finding in-basin solutions. These presentations were sobering in that they helped members of the Roundtables see the gravity of the responsibilities that come with complying with the hopes articulated in HB 1177. According to SWSI, by the year 2030, the population of Colorado will be 7.1 million people, and the state's eight major water basins will need an additional 63,000 acre-feet of new water to meet

projected demands, 53 percent more water than is being used today, and there will be a gap between water needs and water supplies of 20 percent. Meanwhile, 400,000 – 500,000 acres will change from irrigated land to non-irrigated land. The entire work of SWSI can be seen at www.cwcb.state.co.us.

The SWSI process, like the Roundtable process, began with representatives from many different areas and moved forward with a foundation based on a respect for local planning. Like the Roundtable process, SWSI is built on a consensus-building forum. SWSI has also provided a good role model to the members of the Roundtables by highlighting the amount of study required to stay educated and updated on Colorado water law. The Department of Natural Resources (DNR) has provided excellent guidance in assisting members of Roundtables to find useful readings and information sources. These recommendations range from studies of comparative hydrology to basics of Colorado water law to the various state compacts to essential readings on negotiations.

The focus on negotiations is crucial for the progress of the Roundtables and to the ultimate goals articulated by the "Colorado Water for the 21st Century Act." In addition to establishing the Roundtables, the Act also dictates the creation of an Interbasin Compact Committee whose task it is to negotiate interbasin compacts regarding use of Colorado's water resources. By July 1, 2006, this Committee will adopt an Interbasin Compact Charter to govern and guide negotiations between the nine permanent basin Roundtables created by the Act. One of the most important steps that the Roundtables took in the late fall of 2005 was to appoint representatives to the Interbasin Compact Committee (IBCC). These 27 members (two appointed by each Roundtable, six appointed by the Governor, one appointed by each the Senate and House Ag. Committee and Russell George, the Director of Compact Negotiations) are charged with the task of negotiating interbasin compacts regarding the use of Colorado's water resources. Their ability to build consensus while maintaining the strong positions held by those who have appointed them will bring the visions articulated in the Act to reality. The Roundtable members took time and made a thorough effort to identify the qualities and skills desired for IBCC Representatives. The IBCC members must possess integrity, must be trustworthy, and must be visionary problem solvers who can translate ideas from the individual Roundtables to the statewide discussion. The IBCC members should have strength of character while possessing undeniable diplomatic skills. Holding close to the words of the Act, the IBCC reps should also understand and appreciate the structure of the Appropriation Doctrine as well as the history of how the state has arrived at the threshold of the future, presenting the challenges that it does. An appreciation of not only the State's water law but also of environmental and land use planning law, interstate compacts, and the economic realities of diverse economies in urban and rural areas is a further requirement of all IBCC reps. Accordingly, the Roundtables have appointed exceptional representatives who are political realists as well as "deal makers."

The primary activity with which the IBCC reps will be involved in the spring is the formation of the Charter. The Charter, the creation of which is dictated by the Act, must include details on how the interbasin negotiation process will operate and, specifically, how the representatives will facilitate the process of the interbasin compact negotiations that the Act envisions. Once the charter is completed, the representatives will be responding to issues and recommendations coming out of Roundtables. Therefore, the skill sets outlined above which the Roundtables articulated as crucial to the role of an IBCC representative can be seen to be keenly operative as applied to the responsibilities and obligations they must carry out:

1) how will the representatives actually structure these multilateral negotiations, and then
2) how will they actually negotiate water agreements.

These interbasin compacts will be as important to

Colorado's future as the interstate compacts created in the past century have been to our neighboring states.

The term of office of the IBCC representatives is not designated in the Act. Each individual Roundtable can determine that term as it sees fit. The strength of these negotiations, like the progress made in the individual Roundtables, lies in building trust and consistency between individuals. Thus, longer terms for IBCC reps may enhance the progress of achieving the long-term goals articulated in the Act and envisioned by the Roundtables.

The DNR has continued to play a pivotal role in the progress of the Roundtables and the accomplishments made toward the legislative dictates of 1177. Eric Hecox, Manager of Interbasin Compact Negotiations, attends all Roundtable meetings and is pivotal in providing a link of communications between the Roundtables as well as in providing a broader perspective of the work that the Roundtables must accomplish. Nevertheless, the role of the DNR has become more and more transparent as the Roundtable meetings progress. DNR provides logistical support for the Roundtable and IBCC meetings which includes arranging and paying for venues and food, distributing meeting materials, and assisting in creating agendas. DNR will facilitate IBCC activities and will assist in contracting with a facilitator to help with the development of the charter. DNR has introduced the Roundtables to the CSU Cooperative Extension individuals who will provide resource services and facilitators to each Roundtable and,

IBCC Representatives

Roundtable/Appointing Authority	Name	
Director of Compact Negotiations	Russell George	
Arkansas	Alan Hamel	Jeris Danielson
Colorado	Stan Cazier	Carlyle Currier
Dolores/San Juan/San Miguel	John Porter	Jenny Russell
Gunnison	Bill Trampe	Marc Catlin
Metro	Doug Scott	Chips Berry
North Platte	Kent Crowder	Carl Trick
Rio Grande	Steve Vandiver	Raymond Wright
South Platte	Eric Wilkinson	Mike Shimmin
Yampa/White	Darryl Steele	Dan Birch
Governor	Eric Kuhn Meinda Kassen Wayne Venderschuere	Rita Crumpton T. Wright Dickinson
Senate Ag. Committee	Jim Isgar	

likewise, will integrate the CSU Cooperative Extension services into the IBCC facilitation process. Most importantly, DNR assists with the communications and dissemination of information of the Roundtables and IBCC by maintaining a database of memberships, maintaining an Interbasin Compact Process website, and distributing notices, agendas, and minutes.

As early spring waxes toward summer, the agendas of the Roundtables will encompass important information-gathering and decision-making. Every Roundtable will benefit from the presentation of the CSU Water White Paper and Values Study. This presentation will assist the Roundtables in conducting an interest assessment, in which they will define and articulate their underlying beliefs and values about water. An in-depth examination of SWSI information will assist the members in outlining the water challenges faced by each basin and then prioritizing the challenges in order to guide an analysis of possible alternatives. During the summer and fall of 2006, SWSI will present findings of its Phase II study and, with the help of staff from the Colorado Water Conservation Board (CWCB), the Roundtables will analyze alternatives in order to refine recommendations that will be made to IBCC on projects and processes.

The hopes that are embraced by the "Colorado Water for the 21st Century Act" are on a fast-track, given the dedication of Russell George, the Department of Natural Resources, and the individual members of each of the nine basin Roundtables. Every member visualizes a future different from the present. Instead of a continuation of past trends, which have splintered our state and exhausted our resources with lengthy legal battles, each member and each Roundtable is dedicated to transitional change through a disciplined and structured decision process. All are working toward an agreement that will function in behalf of the entire state. As Russell George wrote in a comparison of the work done by Delph Carpenter in negotiating the Colorado River Compact, "HB 1177 has set up a process…that will require leadership to expand traditional thought process beyond parochial squabbles and demands. Consensus building, as well as patience will be required to accomplish a comprehensive solution to water needs across the state [so that] all of the citizens of Colorado will be serviced." That process is in fact underway, in keeping with the spirit of the Act.

References

Colorado Revised Statute 37-75-104(1)(a)
Division of Natural Resources web page: www.dnr.state.co.us/hb1177/index.asp
Statewide Water Supply Initiative at the website of the Colorado Water Conservation: www.cwcb.state.co.us .

Research Experiences for Undergraduates Program in Water Research at Colorado State University
Summer 2006

Fifteen select undergraduate students will undertake individual research projects in water research, under the supervision of a CSU faculty member, over the course of 8 weeks. Participation includes weekly workshops, seminars, field excursions, and discussion on water research topics. Students will present results at the end of program symposium.

REU students will receive stipend of $3,000 for participation. Housing will also be provided.

Eligibility Requirements

* At least a junior standing in appropriate major at time of application with good academic standing
* Must have at least one semester left prior to graduation as of June 1, 2006
* Complete and submit online application form with a copy of transcripts and two letters of reference
* One to two page essay describing student's interest in water research

For more information or to apply online go to: http://WaterREU.colostate.edu/

South Platte Basin Roundtable Update

By Elizabeth R. McVicker
Center of Colorado Water Conservancy District,
Member of South Platte Basin Roundtable

The South Platte Basin Roundtable represents the largest of the nine designated basins created by HB 1177, the "Colorado Water for the 21st Century Act." Because of the South Platte's lengthy course and many tributaries, its basin contains extremely rural as well as extremely urban areas. The 55 currently appointed and elected members of the roundtable were recruited from counties, municipalities, water districts, water rights owners, interest groups (including environmental, recreational, and agricultural) and water providers from the top of the Rocky Mountains to the Nebraska border (Sedgwick, Phillips, Yuma, Kit Carson, and Cheyenne Counties.)

The Basin encloses the most irrigated acres in the state and also has the highest requirements for irrigation (see box); at the same time, nearly two-thirds of the increase in the state's demand for water to meet the needs of municipal and industrial uses will be in the South Platte Basin. By the year 2030, it is anticipated that the entire South Platte Basin will have a "demand shortfall" of more than 90,000 acre-feet, with the highest demand shortfall of 50,300 acre-feet in the South Metro area (See Statewide Water Supply Initiative (SWSI) at www.cwcb.state.co.us.).

Despite the sobering predictions and the formidable challenges that lie ahead, the South Platte Basin Roundtable has kept pace with the objectives and goals of HB 1177 and, most notably, has rallied to the spirit of the Act. The members have come together from a vast array of backgrounds, bringing with them strong interests, opinions, and positions along with a willingness to work for the good of our state and the future of our children. The

South Platte Basin Roundtable Mission Statement

Our mission is to support and encourage the development of voluntary, sustainable, integrated water mechanisms necessary to meet the growing water needs of the South Platte Basin within the framework of Colorado's constitution and statutes.

South Platte Basin Irrigation Facts

Irrigated land in South Platte basin (excluding Denver Metro Area) in 2000: 1,027,000 acres

Water required to irrigate in South Platte basin in 2000: 1,798,000 acre-feet

See Statewide Water Supply Initiative (SWSI) at www.cwcb.state.co.us.

Municipal and industrial water users: all of the water use of "a typical municipal system, including residential, commercial, industrial, irrigation, and firefighting.

Self-Supplied industrial users: Large industrial water users that have their own water supplies or lease raw water from others.

See Statewide Water Supply Initiative (SWSI) at www.cwcb.state.co.us.

individuals who have been appointed or elected to this Roundtable include multi-generational farmers and elected representatives such as county commissioners, and board members of municipalities and water districts.

In its December meeting, the members took time to introduce themselves and to explain the issues and concerns of their constituents. Although their constituencies are as diverse as the Upper South Platte Water Conservancy District at the River's headwaters to Phillips County in the far eastern part of the state, dozens of members expressed similar concerns, undoubtedly echoing the same preoccupations of the other eight roundtables. Among these were: the sustainability of agriculture; the problems of augmentation, return flow, and abandoned wells; issues related to burgeoning populations and the shift from rural to urban uses; and fears of exhausted surface supplies, over appropriation and waning aquifers. The representative of the environmental and recreational interests was not alone in stating a desire to focus on maintaining stream and riparian health, maximizing conservation efforts, and respecting the rights of all water rights holders.

Many members gave a nod to the need of working with governmental entities, be that the National Forest Service, the National Parks Service, or, of course, the State Governments of Colorado, Nebraska and Wyoming. The South Platte Basin runs through federal land included in the National Forest and National Park Systems. The members of the South Platte Basin Roundtable must be well versed with the demands of the 1923 South Platte River Compact and the 1942 Republican River Compact. A recent agreement between Wyoming, Colorado and Nebraska dealing with compliance with the Endangered Species Act will require the members of the Roundtable to work in concert with these states as well. Most poignantly noted among these introductions was a recognition of the opportunity afforded by the negotiations in and among the roundtables to assure that the future of our state and of our very own children and grandchildren see adequate supplies of quality water for growth and sustainability.

The South Platte Basin Roundtable has attended to the procedural requirements of the Act, per Colorado Revised Statute 37-75-104(2)(a)(II) and (4)(a)(V) & (VI), the roundtable has appointed 10 at-large members, three non-voting members, and has adopted by-laws. The seriousness and optimism with which the possibilities of the Act have been met were evidenced by the fact that more than 10 individuals vied for a spot as a non-voting member! In recognition of the importance that the most populated Metro areas of the state hold for the South Platte Basin, the roundtable appointed these non-voting memberships to Denver Water, Colorado Springs, and Aurora. Doug Kemper from Aurora has resigned, as he has taken a position as executive director of the Colorado Water Congress. The roundtable will vote on his replacement in its January meeting including the important step of appointing two representatives to the Interbasin Compact Committee. The members chose Eric Wilkinson, a member of the Colorado Water Conservancy Board, and Mike Shimmin, a water attorney who has represented clients in water

Counties in the South Platte River Basin

Upper Mountain Counties: Teller, Park, Clear Creek, and Gilpin
High Plains Counties: Phillips, Yuma, Kit Carson, Lincoln and Cheyenne
Lower Platte Counties: Sedgwick, Logan, Morgan, and Washington
Northern reaches Counties: Larimer, Boulder, and Weld
Denver Metro area: Adams, Denver and Jefferson
South Metro area: Arapahoe, Elbert, Douglas and a small portion of El Paso

rights matters from across the state and who is an at-large member on the roundtable.

The South Platte Basin Roundtable will hold its fourth meeting at the end of January. The members look forward to focusing on more substantive issues, such as developing a basin-wide water needs assessment. This assessment will be performed in cooperation with local governments and area water providers, among others. The roundtable will look at both consumptive and nonconsumptive needs, and given the over-appropriated nature of the River, will move on to propose projects or non-structural methods for meeting water supply needs. In the January meeting, the roundtable will be briefed on any water bills that may be up in the legislature and will continue finding time in the agenda for presentations aimed at educating the members on important issues, such as augmentation and return flows as well as the findings of Phase II of SWSI.

The South Platte Basin Roundtable eagerly embraces the guiding philosophy set by the Department of Natural Resources—namely, that its purpose, like the purpose of the Act, is "based upon the premise that Coloradans must work together to address the water needs within our entire state [and]…that we will be willing to work together to do so." (www.dnr.state.co.us/hb1177/index.asp) This Roundtable embodies that vision.

26th Annual American Geophysical Union

Hydrology Days
March 20-March 22, 2005

Cherokee Park Room in the Lory Student Center
Colorado State University, Fort Collins, CO

Hydrology Days Award Lecture
Frontiers in Hydrologic Sciences:
Complexity and Organization in Hydrology
by Professor Rafael L. Bras of Massachusetts Institute of Technology

Borland Lecture in Hydrology
Hydromorphology: Hydrology in an Evolving World
by Professor Upman Lall of Columbia University

Borland Lecture in Hydraulics
Impulse Waves, Shore Instabilities and Tsunamis
by Professor Willi H. Hager of ETH, Zurich

Paper abstract submittal deadline: February 10, 2006

Registration fees: $100 by February 24, 2006; $150 after February 24, 2006
Free registration to students

For more information on programs, paper submittal, or to register, go to:
http://hydrologydays.colostate.edu/

While Living in Historic Times, Consider Your Contribution

by Patricia J. Rettig
Head Archivist, Water Resources Archive, Colorado State University Libraries

Residents in today's Colorado are living in historic times, witnessing "a turning point in history," as Eric Wilkinson, general manager of the Northern Colorado Water Conservancy District, phrased it. From Wilkinson and other speakers, a distinctly historical theme emerged during the CSU Water Dialogue in December, showing, significantly, that today's water leaders are drawing on the past to help understand the present and the future.

Robert Ward, director of the Colorado Water Resources Research Institute and organizer of the Water Dialogue, began the day-long discussion about current water issues with a historical overview of people in higher education who have contributed to water resources development in Colorado. From Ralph Parshall (1881-1959) to Daryl Simons (1918-2005), CSU professors have helped get the state to where it is today.

Russ George, director of the Department of Natural Resources, spoke about Delph Carpenter (1877-1951), creator of the interstate river compact concept, as his inspiration for the interbasin compact idea. With water roundtables across the state working toward an Interbasin Compact Committee, George is leading the state into uncharted territory, though with Carpenter's compacts as an example.

Eric Wilkinson and other members of his panel spoke about the role of the federal government in Colorado water. Wilkinson outlined the changing relationship of the federal government to state water control from the establishment of the Bureau of Reclamation through the 1950s and 1960s as the Colorado-Big Thompson project was brought online. That changing relationship has to be considered as there are further developments in Colorado's water resources.

Few people in the state can speak more eloquently and intelligently about the history of Colorado water than Supreme Court Justice Greg Hobbs. As the lunch keynote speaker, he discussed the history of water conversations in Colorado. He detailed some of the past water leaders—distant and recent—including Elwood Mead (1858-1936) and Hank Brown (b. 1940). Justice Hobbs also mentioned how the public is educated every 20 to 25 years about water issues, meaning, whenever drought occurs.

Afternoon speakers focused less on the past and more on the present, such as current university research related to water issues as well as competing water uses like rural/urban and west/east slope. However, current research builds on the past, and competing water uses are nothing new, so history was not entirely absent.

Justice Greg Hobbs provides the keynote address for the Colorado State University Water Dialogue.

The day ended with an event marking a historic change in its own right: the retirement reception for Robert Ward. Various speakers recounted his career accomplishments and recognized his contributions to the state. While Colorado adapts to this change in leadership, Dr. Ward will now have more time for promoting water history in the state, one of his avid interests.

Your Contribution

It was fascinating to hear so many people talk about history as part of a day focused on very current events. The concept of water roundtables within the state, held with the aim of creating an interbasin compact charter, was the key "turning point in history" being discussed. There has been nothing like it in the state, and no one knows quite where the process will lead. Everyone following its progress is a witness to history. Rarely is there such a public sense of watching history happen. Indeed, not only watching, but making it happen.

This opportunity should not be taken lightly. It is clear from the Water Dialogue that people depend on the past to figure out the future. Without documentation of the past, what would we do today? Could Russ George—or anyone else—have studied what Delph Carpenter did in the 1920s to apply it to the state today? Could past examples like Elwood Mead and Ralph Parshall have taught us that we all play a part in determining the future? Does knowing about significant events, such as the formation of the Colorado Water Conservation Board (1937) or the Colorado Water Congress (1957), help us understand causes behind such moves? Without these—and many more—historical examples, we certainly would not have the understanding of the "big picture" that we do today.

Books, government documents, and even websites help preserve that history so current and future generations can learn from it. However, it is archives that collect and preserve the raw materials that document the details of life as it occurs. Archives hold a professor's raw research data and the correspondence exchanged between legislators. Archives hold the meeting minutes of grass-roots organizations and the operational records of small businesses. These repositories of history hold all this and so much more—but only if the creators of these materials save them and care about them.

In these historic times, think what it is that you or your water-related organization or business is doing. Realize that people 20 or 50 or 100 years from now will want to understand these times just as we want to understand past times. Take action to save your documentation—from meeting minutes to field books to maps, photographs, videotapes, email and more. The correspondence of yesterday is now manifested as email; hand-collected data of days past is gathered now in electronic databases. Take steps to hold on to the significant parts of this to make it available to historians, researchers, or the general public of the future. Do not assume that someone else will do it. We do not all have to be famous to contribute to history. Take steps to make your contribution now.

If there are neglected documents of importance you know of that should be cared for, give an archives a call. While repositories exist all over the state, the Water Resources Archive at Colorado State University is the only one actively working to document water resources across the state. Having the papers of Delph Carpenter and Ralph Parshall, the records of the Colorado Water Resources Research Institute, and nearly 30 other individuals and organizations makes the Water Resources Archive the location of choice for water-related archival collections. Please contact the Archive for advice and assistance in doing your part to preserve Colorado's water history in these historic times.

To find out more about how you can help in the preservation of Colorado's water heritage—past and present—see the Water Resources Archive website [http://lib.colostate.edu/archives/water/] or contact the author (970-491-1939 or Patricia.Rettig@colostate.edu) at any time.

River Network's National River Rally 2006
May 5-9
The Mount Washington Resort
Bretton Woods, NH

Participants will gather with watershed organizers from around the country, network, share expertise, trade experiences and celebrate achievements with staff, volunteers, and board members of river, watershed and tribal groups. Participants can choose from nearly 100 workshops.

Find out more about the rally at www.rivernetwork.org/rally

MEETING BRIEFS

Colorado State University Water Dialogue About Roundtable Process

The HB1177 Roundtable process has the potential to change our approach to water dialog and negotiation in Colorado. In the spirit of enhancing water communication in Colorado, Colorado State University organized a one-day Water Dialogue on December 13, 2005, on the CSU campus in Fort Collins. Conference co-sponsors included the Colorado Water Resources Research Institute (CWRRI), Colorado Institute of Public Policy (CIPP), Colorado Water Congress, and the Colorado Department of Natural Resources. The purpose of the Water Dialogue was to bring new perspectives and thoughts about water to all participants – perspectives and ideas that can further enhance and enrich the Water Roundtable discussions and interbasin negotiations.

Robert Ward receives a retirement gift presented by David Robbins (Chair of the Advisory Committee on Water Research Policy for the Colorado Water Resources Research Institute.)

One hundred and twenty water scholars, managers, policy makers, and students examined the rapid changes taking place in our society and the resulting impacts and pressures on Colorado's limited water resources. CSU President Larry Penley, described a number of new water activities on the part of CSU and the University's commitment to continued engagement in discovery and outreach relevant to the current water issues and future challenges in Colorado. DNR Director, Russ George, followed with a keynote address on the implementation of the Water Roundtables and the current progress in the formation of the Interbasin Compact Committee.

The Water Dialogue program was divided into two major segments: a morning session which focused on current efforts to enhance water negotiations and dialogue, both within Colorado and between Colorado and the federal government; and an afternoon session that highlighted the experiences of higher education faculty and key water leaders in enriching Colorado water dialogues in a constructive manner.

David Robbins, Eric Wilkinson and Robert Ward formed a panel to discuss the role of the federal government in seeking water agreements as Colorado enters into discussions about its future water supplies. It was noted by one participant that the federal government does not have a formal seat on either the Roundtables or the IBCC.

Justice Greg Hobbs offered his observations on the history of water dialog in Colorado. He reviewed the efforts of leaders such as Hank Brown as he struggled to find a workable compromise on the Wild and Scenic designation for the Poudre River. It took a number of years, negotiations and much persistence to achieve that designation which allowed a framework for both preservation and additional development. Justice Hobbs re-

Reagan Waskom introduces Dan Smith, Luis Garcia, Lou Swanson, and Kurt Fausch during the faculty panel portion of the CSU Water Dialogue.

viewed the past efforts of Delph Carpenter, Wayne Aspinall, Elwood Mead, Jack Taylor and other great leaders as he spoke of Colorado's legacy of negotiation, compromise and struggle to allocate scarce water resources.

A panel of CSU faculty members, including Lyn Kathlene, Dan Smith, Kurt Fausch, Luis Garcia and Lou Swanson described their efforts to mesh the theory of university research with the needs of Colorado water managers and users. The discussions included both existing and potential research and noted the new ideas emerging from university-based water-related research.

Other Water Dialogue participants included Commissioner Don Ament, who offered comments on prospects to maximize beneficial use of Colorado's water resources and John McClow, who offered a perspective on the Roundtable process from the Gunnison basin. The day was wrapped up by James Pritchett and Mark Squillace, who summarized the day's dialogue. In the end, it is clear that there is, and must be, a role for federal agencies, the research community, stakeholders, water professionals and the public in untangling the complexity of water policy, law, history and management as we seek collaborative solutions to the allocation and preservation of this limited resource.

Proceedings of the CSU Water Dialogue's talks and discussions will be published by CWRRI and will be available online at

http://cwrri.colostate.edu/

Robert Ward visits with Brian Werner and Don Carlson (both with Northern Colorado Water Conservancy District) during Ward's retirement reception after the Water Dialogue.

The International Soil and Water Conservation Society Annual Meeting - July 2006
Keystone, Colorado
For more information go to:
http://www.swcs.org/en/swcs_international_conferences/2006_international_conference/

Editor's note: The following three articles are transcribed from the presentations made by the CSU panel of professors. Lou Swanson also participated in this panel, and his comments were published in the August 2005 issue of Colorado Water.

Dryland Cropping

by Danny H. Smith, Professor
Colorado State University Dept. of Soil and Crop Sciences

Thank you Reagan. When I got the assignment from Reagan, he mentioned that I should look at some of the best examples of how Soil and Crop Sciences research has contributed to agricultural production in the state and how some of that expertise might be able to interface with the water roundtable process. My own personal research background over the last 10 or 15 years has been largely associated with consumptive water use by forage crops in Colorado; mostly confined to mountain meadow regions. We've been trying to come up with simplified accounting methods in the realm of micrometeorology whereby we can accurately account for water demand by mountain meadows, using techniques that rely only on temperature.

Thinking more broadly, expertise beyond the realm of traditional water management research would likely provide greater benefit to these roundtables. The kind of expertise they're going to need occurs at the margins of water management, approaching concepts we have traditionally considered in dryland crop management systems. Why is this true? Irrigated agriculture currently controls about 85% of the developed water resources in the state. The tremendous expansion of urban growth occurring along the Front Range combined with the fact that three of our four major water basins are overappropriated, the logical conclusion is that agriculture is going to be giving up water. We're going to see conversion of irrigated acres either to fallow land (most likely grassland or rangelands, much like those that existed before white settlers got here), to dryland acreage, or some combination of those, along with some minimally irrigated acres. These changes aren't all that new. As Justice Hobbs indicated in his luncheon address, the trend began many years ago, and we're several decades into this transition from irrigated agriculture to some other form of land use, especially in the two major basins in Eastern Colorado.

Given these realities, I briefly surveyed the best examples of ongoing research within our department of Soil and Crop Sciences that would accommodate the need for knowledge in this new arena? Alternatively, what research results do we have that will enable us to predict the impact of the conversion of irrigated lands to dryland farming in Colorado? Our department has a rich history of research into dryland farming management, dating from the inception of the Ag Experiment Station This traditional area of research received an added boost in the mid 1980s when a new phase of comprehensive research and outreach was initiated, which involved a more systematic study of dryland farming systems in Eastern Colorado. The research used a series of plots stretching from Sterling in the northeast to Walsh in the southeast. The researchers focused on two things: first, the use of minimum tillage. That was not new, certainly, but they combined that with the consideration of alternative crop rotation systems designed to take maximum advantage of the increased capture of natural precipitation. Results from these studies demonstrated that we can dramatically increase crop production per acre on an annual basis by converting from a conventional wheat fallow system to an alternative system where one obtains two crops out of every three years.

This dryland cropping system research incorporated another unique approach, and it shows the additional foresight of the leaders of this

program. As researchers, we typically like to sit back and just do the research, publish it somewhere and let it go.
They decided from the very beginning that the research was not going to be worth anything unless they connected it to an active outreach program. It's one of the best examples, I think, in our institution of where outreach flowed from the research as the results were being accumulated. As a result of this approach, we have seen some dramatic differences in the way dryland cropping systems in eastern Colorado have evolved. In something less than 20 years, we have gone from less than 10,000 acres of dryland corn in eastern Colorado to over 300,000 acres in the years before the drought of 2002. I think there's hope in these figures. All this increase in dryland corn production came from the existing dryland acres in eastern Colorado. It did not come from conversion of irrigated land to dryland. I think this provides substantial promise for lands currently devoted to irrigated agriculture, in that there are alternative dryland systems out there that will give us some productivity when water transfers occur.

More recently, this cropping systems effort has shifted its focus to limited irrigation cropping practices. The primary objective of these studies will involve maximizing the use of minimum water supply. Looking at factors such as deficit irrigation, alternative cropping patterns, and alternative crops, researchers hope to minimize water use while maintaining yields at acceptable levels.

If we look at significant increase in additional dryland acres that we'll likely see in eastern Colorado, we may need to broaden our reach beyond traditional Soil and Crop Sciences. We can anticipate croplands mixed with grazing lands or newly established rangelands, so we'll be looking at additional disciplines and alternative crops that don't necessarily look like traditional crops. For example wildlife surveys in eastern Colorado have documented substantial increases in pheasant populations. These increases have been partially attributed to improved habitat associated with the conversion of cultivated acreages to grasslands as a result of government conservation programs. Pheasant hunting on private lands offers new opportunities for alternative enterprises on these acreages. Perhaps this could make up for the anticipated decline in crop productivity on previously irrigated lands after water removal.

Mutual Understanding Sets the Stage, Discovery Changes the Conversation

by Kurt Fausch, Professor
Colorado State University, Dept. of Fisheries and Wildlife Biology

I've been conducting research with my colleagues and grad students since the 80s on not only stream fishes in high mountain waters, but also stream fishes all the way out to the edge of the state on the eastern Plains. Most of that work on plains streams was on private agricultural land. One of the things that helped me a little bit was that my father was a professor of Animal Science and raised on a farm so I spent my weekends working with large animals and normal dinner table conversation usually included pork and beef prices. I have a little bit of background that helps me when I think about working with private land owners there.

To summarize all that work from the 80s and 90s that we did in plains streams, I think I can make three basic points. First is that plains fishes are declining. Of the 38 native species of fishes that we have in the eastern plains, 19 of them are either extricated or on the state list. We have no federally threatened or endangered plains fishes but we do have a number of state endangered threatened and special concerns species. Second

point is that an individual fish in a stream is typically very tolerant; tolerant of high temperatures during the summer, tolerant of low oxygen. In fact, most of them don't die until all of the water is gone and the stream dries up. These two things don't match very well. If indeed they're declining and they're so tolerant, why is that? I think the reason is that as we all know, fish need water, so to have a population of these fishes requires that we have water somewhere on the landscape. What we've discovered is that these fish are highly dependent on refuge pools that are supplied by ground water and on surface flow connections at certain times of year when they need to move to specific places to spawn or to grow, or actually get back to those refuge pools to make it through dry summers and the ensuing winter when those pools can't reach to the bottom. So it became clear through more than a decade of research that groundwater was going to be the key if we're going to sustain these native fishes and prevent them from being listed as federally threatened or endangered species.

Our most recent research focus has been in the Arikaree Basin in Yuma County where towns of Yuma and Ouray are, for example. We're asking the question there for one of these species that the Colorado Division of Wildlife is particularly interested in: What sort of habitat is going to be needed for persistence of these species at the basin level? In a way we were fortunate to have a drought show up so for us as scientists it allowed us to see nature test the limits of the species we were interested in, which is the brassy minnow, although there are a number of other native plains fishes in the basin. So in looking across that landscape we found that there are indeed strong thresholds of stream drying that cause those populations to be extricated, to be lost in certain sections of the basin during that drought. In addition, water used in that basin for agriculture is very important. The center pivot system was invented in Yuma County. That pumping was important but we didn't know much about that when we ended that first study. Subsequently, I found that two of my colleagues affiliated with the Water Center, Deanna Durnford, groundwater hydrologist, and Ramchand Oad, an ag irrigation professor, were also interested in that basin. We formed a research consortium and are now studying the links between pumping percent of pivot irrigation groundwater levels that provides fish habitat in the Arikaree River and then how those fish respond in that habitat.

We know that in that basin groundwater has declined more than eight meters, about 25 feet, over about 22 percent of the basin, 950 square km, following the beginning of pumping in the early 60s. This pumping is strongly correlated with declines in river flow. We've been at it about a year, the three of us. We have a graduate student each in our lab working on coordinated projects. With respect to groundwater, clearly we want to predict the long term effects of this pumping as well as the additional combination of when you have a drought you need to do more pumping to supply those crops with water. We want to be able to predict those effects on fish habitat and fish. We've learned quite recently, actually just this last month, some preliminary results, although I would caution that these are indeed preliminary, but we really need to understand groundwater in two compartments: the high plains aquifer itself, as well as ribbon of river alluvium that supplies the river itself with water. So we are learning that things like riparian trees as well as pumps that are actually in the river alluvium itself --right along the river-- have strong short term effects on river flow, whereas those pumps on the uplands that are into the high plains aquifer itself potentially could lower the water table enough so that it no longer supplies the alluvium which supplies the river flow. As a group, we are now trying to understand that hydrology and how it feeds the river. If indeed the river dries up completely, and do this even with core habitat for the fish, I would add that we would probably not see those fish recolonize from downstream. Naturally they would have to be put back in with human intervention. So we're trying to understand the groundwater.

As far as irrigation, on a broad basis in the basin about 80 percent is used for pumping for crops, about 20 percent apparently is used by riparian trees for evapotranspiration. Those trees as well as pumps in the alluvium are really the short term effect that produces river flow or not, the way we understand it at the moment. As far as fish, clearly we need to know the relationship between groundwater levels and the amount of fish habitat to answer the question, what is the minimum habitat that's going to be needed to sustain these fishes into the future. Part of that that we need to understand is about baby fish. That's the most sensitive life stage and yet those fish can move very long distances. We've learned that even a three inch minnow may need 5 to 25 km of river in order to carry out its life cycle. That's a good and a bad thing. They need a lot of river, but they can also quickly recolonize. Overall, it seems clear that we need to seek a balance between water uses for agriculture production and native fishes and other stream and riparian biota because the future of both of these things hangs in this balance.

Dynamic Process is Key to Good Dialogue

by Luis Garcia, Professor and Acting Chair
Colorado State University, Dept. of Civil Engineering

It's a pleasure to be here. I'm here to talk about user-centered water research as a way to connect university research with the needs of Colorado water managers. As you know, over the many years that Robert Ward has been Director of the Colorado Water Resources Research Institute (CWRRI), he has always advocated for the university to be engaged in the relevant water issues of the state. This is not always easy to do, but, about ten years ago, Robert approached me with a golden opportunity. The opportunity was a project that was sponsored by CWRRI dealing with a model called SAMSON that had been developed with partial funding from CWRRI but had little support from the water community. As a result, SAMSON became what I call a *model looking for a user.*

However, the SAMSON project provided valuable lessons which Robert wanted to use to develop better methods for addressing user needs. Consequently, we began a new South Platte project with the idea of trying to meet a specific need: developing data and tools that could help water users deal with issues related to augmentation requirements. Funding from the Institute was combined with money from Cooperative Extension, and a panel of water users was convened. This was the first point in my career where I had the opportunity to ask people exactly what their needs were, develop a priority list of those needs, and come up with some strategies to address the needs. A steering committee of representatives from water user groups was created for ongoing discussions and adjustment of priorities. Over time, this user-centered process proved its worth. Now, for over ten years, every water user group has had some input, and we have developed, by consensus, a very open approach to model development.

As Justice Hobbs mentioned in his presentation today, the drought of the early 21st century forced the state to change the way that we were dealing with augmentation. Augmentation plans now have to go to water court. As you know, water court can be very expensive. I'm happy to report that the process that CWRRI helped to develop has yielded a set of tools that have been adopted for approximately 75% or 80% of the wells in the South Platte, vastly reducing the amount of potentially costly courtroom time.

The process was driven by the water users, and it focused on the problem rather than on

the tools. For instance, for the first year or so, we concentrated on specifying what the problem was and what the needs were. After clearly identifying the problem, we took advantage of university research, either funded by CWRRI or others, and merged our knowledge with the existing research in order to come up with a set of strategies to solve the problem. As a result, we developed a number of tools, and these tools have been adapted over the years to meet the changing needs.

The key to the process is that it is dynamic. I firmly believe that in order for us, the university, to develop a rapport with the water users and tools that are dynamic, the research process needs to be dynamic also. I don't believe that in this age of rapid change we can rely on tools that are static to solve all emerging problems. It is essential that the process of model development be dynamic over the long-term. Ten years on, the South Platte project continues to change.

Over the last couple of years, as some objectors to the water augmentation plans have voiced different issues, we were able to use our dynamic process to evaluate how tools might address those issues. As a result, some of the issues that were brought up were able to be resolved reasonably quickly. This wouldn't have been possible had we had a static system.

The dynamic process allows us to take advantage of a resource that the university has in human capital -- the students. I think Kurt mentioned that he has three students working on his project. As a result of our process, we have several students that are or have worked on our project. This provides an opportunity for the water community to take advantage of required research conducted by graduate students in pursuit of degrees.

What I've realized is that in the long run, any process that will succeed needs to take into account the fact that it takes time -- often several years -- to get to the point where everybody trusts the process and everybody communicates. Therefore, if we can put in place processes emphasizing adaptability and communication now, we can react in a timelier manner to any eventual crisis. A good example of this is how all the work that was done prior to the recent drought allowed us to meet the needs brought about by the drought fairly quickly. I think that the water community and the university can come together in working groups that have good communication and trust, and that this coordination can provide us with a dynamic process that will enable us to deal with new issues or challenges as they develop.

MEETING BRIEFS

Colorado Water Congress

The Colorado Water Congress held its 48th Annual Convention at the Holiday Inn DIA on January 26 and 27. Highlights included keynote addresses by University of Colorado President Hank Brown and Senator Ken Salazar. Colorado State University organized two workshops for the meeting. The first workshop covered how water research can inform the Roundtable process and the other workshop discussed preserving historical water documents and records. The session was entitled "Protecting, Preserving, and Promoting Colorado's Water History: Update on Water Archiving Efforts in Colorado" and was moderated by Brian Werner of the Northern District. Janet Bishop, Archivist, Colorado State University's Morgan Library spoke on CSU's water archive program and the critical need to begin correct preservation efforts to keep documents from going out of condition before they can be formally archived.

Speakers at the Colorado Water Congress included Colorado State University President Larry Penley (above) and Robert Ward, Director Emeritus of the Colorado Water Resources Research Institute (left). Janet Bishop (CSU Morgan Libraries Archivist) visits with Brian Werner (Northern Colorado Water Conservancy District) between sessions (below).

Contributions to the HB-1177 Process from Water Research was discussed by Dr. Tom Trout of the USDA-ARS, Dr. James Pritchitt and Dr. Lyn Kathlene of CSU. They described their current research efforts and suggested how the roundtables might use research-based knowledge to generate new perspectives in meeting future water demands in Colorado.

Retiring Water Congress Executive Director Dick MacRavey was honored at a banquet Thursday night where many of his friends and colleagues lauded his efforts on behalf of Colorado over the years. Robert Ward and Gail Norton were honored as lifetime members of the Colorado Water Congress.

Ogallala Aquifer Symposium
Monday, February 20, 2006
Wray High School Auditorium, Wray, Colorado

For more information or registration forms, go to : www.goldenplains.colostate.edu
or see the December 2005 *Colorado Water*, page 30.

Colorado School of Mines Ground Water Modeling Center Short Courses

Course Title	Instructors	Begin	End	Location
Applied Environmental Statistics	Dennis Helsel Ed Gilroy	March 27 8:00am	March 31 noon	The Mark Spencer Hotel Portland, OR
Nondetects and Data Analysis	Dennis Helsel	May 4 8:00am	May 5 5:00pm	The Hotel de Anza San Jose, CA
Polishing Your Ground-Water Modeling Skills	Peter F. Andersen Robert M. Greenwald	May 19 8:30am	May 21 5:30pm	CSM GC 297 Golden, CO
Introduction to ArcGIS	Kyle E. Murray	May 19 8am	May 21 5pm	CSM BH 222 Golden, CO
Finite Element Ground Water Modeling Using FEFLOW	Peter Schätzl Volker Clausnitzer	May 19 8am	May 21 5pm	CSM BH 201 Golden, CO
Modeling Water Flow and Contaminant Transport in soils and Groundwater Using the HYDRUS Computer Software Packages	M. Th. van Genuchten Jirka Simunek	May 24 evening	May 26 noon	CSM GC 297 Golden, CO
Subsurface Multiphase Fluid Flow and Remediation Modeling	John McCray	May 24 evening	May 26 noon	CSM GC 257 Golden, CO
Phreeqc Modeling: The Basics	Geoff Thyne	May 24 evening	May 26 noon	CSM SH 105 Golden, CO
GIS for Water Resources	Kyle E. Murray	May 24 evening	May 26 noon	CSM BH 222 Golden, CO
UCODE-2005 and Pest: Universal Inversion Code for Automated Calibration	Mary Hill Matthew Tonkin	May 24 evening	May 26 noon	CSM BH 201 Golden, CO

For more information, go to http://www.mines.edu/igwmc/short-course/

RESEARCH AWARDS

Colorado State University, Fort Collins, Colorado
Awards for December 2005 to January 2006

Principal Investigator -- Department -- Sponsor -- Project title -- Amount

Ramirez,Jorge A-- Civil Engineering--NSF-GEO-Geosciences--*CAREER: Stream Restoration, Ecological Engineering and Nutrient Retention of Streams in Urban and Agricultrual Settings*--**$97,042.00**

Salas,Jose D-- Civil Engineering--DOI-Bureau of Reclamation--*Phase II: Development of Stochastic Hydrology for the Colorado River System*--**$165,278.00**

Culver,Denise R--Fish and Wildlife Bio--Colorado Department of Natural Resources--*Survey of Critical Wetlands in Hinsdale County, Colorado*--**$63,507.00**

Rocchio,Joseph F--Fish and Wildlife Bio--Colorado Department of Natural Resources--*Vegetation IBI for Wetlands in Colorado - Phase III*--**$77,586.00**

Johnson,James Bradley--Biology--Colorado Department of Transportation--*Development and validation of the Functional Assessment Method for Colorado Wetlands*--**$44,783.00**

Johnson,James Bradley--Biology--Colorado Department of Transportation--*Development and validation of the Functional Assessment Method for Colorado Wetlands*--**$45,217.00**

Knapp,Alan Keith--Biology--Kansas State University--*Effects of altered rainfall timing and warming on soil processes and plant responses in a grassland ecosystem*--**$27,933.00**

Roesner,Larry A-- Civil Engineering--Water Environment Research Foundation--*Guidance for Stormwater-Borne Solids* --**$74,999.00**

Abt,Steven R-- Civil Engineering--USDA-USFS-Rocky Mtn. Rsrch Station - CO--*Bedload Transport in Gravel-bed Rivers & Channel Change*--**$69,624.00**

Kummerow,Christian D--Atmos Sci--NASA - Natl Aeronautics & Space Admin.--*A Physical Validation Approach for Precipitation* --**$50,000.00**

Sanford,William E--Geosci--DOI-NPS-National Park Service--*Modeling Groundwater at Doghouse Meadow, Yosemite National Park*--**$11,011.00**

Robeson,Michael D-- Civil Engineering--DBA Carpenter Erosion Control--*Hydraulic Testing Services on Riprap* --**$23,773.00**

Labadie,John W-- Civil Engineering--KOWACO-Korean Water Resources Corp.--*Advanced Application of K-MOD-SIM Model for Basin-Wide Optimal Water Allocation and System Evaluation*--**$103,780.00**

Pilon-Smits,Elizabeth AH--Biology--NSF - National Science Foundation--*Evolutionary and Ecological Aspects of Plant Selenium Hyperaccumulation*--**$150,746.00**

Stephens,Graeme L--Atmos Sci--University of California at Berkeley--*Studies of Biosphere-Atmosphere Interactions with a MODIS GCM*--**$126,417.00**

Stednick,John D—Forest Rangeland and Watershed--USDA-USFS-Forest Research--*Effectiveness of Erosion and Sediment Control Practices on Forest Roads*--**$25,000.00**

Julien,Pierre Y-- Civil Engineering--USDA-USFS-Rocky Mtn. Rsrch Station - CO--*Hydraulic Geometry and Sediment Transport of the Rio Grande*--**$76,544.00**

Research awards from institutions of higher education in Colorado other than Colorado State University are provided by self-report of the Principal Investigator. If you have water related research awards to report, send them to Gloria.Blumanhourst@colostate.edu.

Colorado State University Produced Waters Workshop
April 4-6
Fort Collins Marriott
Fort Collins, Colorado

Purpose of Workshop: ***What is the potential opportunity for beneficial use of produced waters and how can we make it happen?***
The overriding goal of this workshop is to enhance understanding of opportunities and challenges involved in converting produced waters to beneficial use. This will be accomplished through the assembly of disciplines and entities that can broadly characterize produced water sources, issues, and opportunities for responsible identification and development of realistic beneficial uses.

The Workshop Will:
- Identify the key opportunities and capabilities of state-of-the-art treatment technologies for produced waters;
- Initiate discussions regarding public policies to facilitate the development of this valuable resource; and,
- Define a course of action to further evaluate and pursue these opportunities.

Partial List of Speakers:
- Mark Limbaugh, Assistant Secretary for Water and Science, Department of the Interior
- Lynn Takaichi, Vice President, Kennedy/Jenks Consultants
- Glenn Porzak, Attorney, Porzak, Browning & Johnson, LLP
- Harold Bergman, Director, William D. Ruckelshaus Institute
- Pat O'Toole, President, Family Farm Alliance

Optional Tour on April 6: Optional tour on the morning of April 6. Travel to Wellington, Colorado to visit a local produced water treatment facility. Space is limited. Must register for tour. First come, first served.

Anticipated Audience: Legislators, energy producers, water users, water supply planners, government agency staff, researchers, and industry representatives.

Co-Sponsors:
- Bureau of Reclamation
- Family Farm Alliance
- National Institutes for Water Resources
- Ruckelshaus Institute of Environment and Natural Resources
- U.S. Geological Survey

Registration: Registration information available at www.cwrri.colostate.edu or fill out the registration form on the next page and fax it to : 970-491-1636.

Produced Waters Workshop

Energy and Water – How Can We Get Both for the Price of One?

April 4-6, 2006

Fort Collins, Colorado

Workshop Fee: $125 for early registration by March 3rd
Registration Form

Name	
Agency/Company	
Address 1	
Address 2	
City, State Zipcode	
Phone/Fax	
E-mail	
Will you attend optional field trip?	
Special Dietary Needs?	
ADA (physical or interpre-tive) needs?	
Workshop Fee Method of payment	____ Check payable to CSU (please note names of participants on the check) mailed to Conference Services, Colorado State University, Fort Collins, CO 80523-8037 OR Credit Card # _____ circle one : Visa MC Exp. Date_____ Please sign_____

Complete this form and return to CWRRI by fax: 970-491-1636.

Colorado Water Supply Issues –Today and Tomorrow

Friday, April 14th, 2006
Mount Vernon Country Club

Sponsored by:
Colorado Section of
American Water Resources Association
and
Colorado Foundation *for* Water Education

For more information visit http://www.awra.org/state/colorado/conferences.htm

CALENDAR

2006	2006
Feb. 16	**2005 Annual Meeting and Symposium of Big Thompson Watershed Forum.** Greeley, CO. For more information go to www.btwatershed.org.
Feb. 22-24	**Ditch and Reservoir Company Alliance 2006 Annual Convention.** Montrose, CO. For more information go to www.darca.org.
Mar. 3 & 10	**NCES 8381: Constructing and Rehabilitating Dams in Colorado.** University of Colorado, Denver. For more information, go to www.cudenver.edu/engineer/cont
Mar. 7-9	**17th High Altitude Revegetation Workshop.** Fort Collins, CO. For information on registration or to register, go to http://www.conferences.colostate.edu/register
Mar. 20-21	**NCES 8325: Advanced River Modeling with HEC-RAS.** CU, Denver. For more information go to www.cudenver.edu/engineer/cont.
Mar. 22-24	**NCES 8326: Unsteady-Flow Modeling with HEC-RAS.** CU at Denver. For more information go to www.cudenver.edu/engineer/cont
Mar. 27-31	**Applied Environmental Statistics, Colorado School of Mines, IGWMC Short Course.** (location to be announced). For information on registration deadlines, fees, or to register online, go to http://www.mines.edu/igwmc/short-course/
Apr. 4-5	**Produced Waters Workshop.** Fort Collins, CO. For more information go to www.cwrri.colostate.edu.
Apr. 14	**Colorado water Supply issues – Today and Tomorrow.** Mount Vernon Country Club, Denver, CO. For more information go to www.awra.org/state/colorado/conferences.htm.
Apr. 27-28	**NCES 8236: Introduction to Floodplain Management.** University of Colorado at Denver and Health Sciences Center. For more information, go to www.cudenver.edu/engineer/cont
May 4-5	**Third Annual Water Law, Science and Policy Conference.** Nebraska City, NE. For more information go to: http://snr.unl.edu/waterconference/.
May 5-9	**River Network's National River Rally 2006.** Bretton Woods, NH. For more information, go to www.rivernetwork.org/rally.
May 8-10	**American Water Resources Association 2005 Spring Specialty Conference: Geographic Information Systems (GIS) and Water Resources IV.** Houston, TX. For more information go to: http://www.awra.org/meetings/Houston2006/index.html .

May 17-19	**9th Inter-Regional Conference on Environment – Water: Concepts for Watermanagement and Multifunctional Land-Uses in Lowlands.** Unesco I.H.E., International Institute for Infrastructural, Hydraulic and Environmental Engienering, Delft, The Netherlands. For more information go to http://www.wau.nl/rpv/isomul/envirowater2006.
May 19-21	**Polishing Your Ground-Water Modeling Skills, Colorado School of Mines IGMWC Short Course.** Golden, CO. For information on registration deadlines, fees, or to register online, go to http://www.mines.edu/igwmc/short-course/
May 19-21	**Intro to ArcGIS, Colorado School of Mines IGMWC Short Course.** Golden, CO. For information on registration deadlines, fees, or to register online, go to http://www.mines.edu/igwmc/short-course/
May 19-21	**Finite Element Groundwater Modeling using FEFLOW, Colorado School of Mines IGMWC Short Course.** International Ground Water Modeling Center, Golden, CO. For information on registration deadlines, fees, or to register online, go to http://www.mines.edu/igwmc/short-course/
May 19-21	**Analysis of Surface Water-Groundwater Flow Systems Using Integrated Codes, Colorado School of Mines, IGWMC Short Course.** Golden, CO. For information on registration deadlines, fees, or to register online, go to http://www.mines.edu/igwmc/short-course/
May 21-24	**MODFLOW and More 2006: Managing Groundwater Systems.** Golden, CO. For abstract submittal and other information, go to http://typhoon.mines.edu/events/modflow2006/modflow2006.shtml
May 24-26	**Modeling Water Flow and Contaminant Transport in Soils and Groundwater Using HYDRUS Software, Colorado School of Mines, IGWMC Short Course.** For information on registration deadlines, fees, or to register online, go to http://www.mines.edu/igwmc/short-course/
May 24-26	**Subsurface Multiphase Fluid Flow and Remediation Modeling, Colorado School of Mines, IGWMC Short Course.** Golden, CO. For information on registration deadlines, fees, or to register online, go to http://www.mines.edu/igwmc/short-course/
May 24-26	**Phreeqc Modeling: The Basics, Colorado School of Mines, IGWMC Short Course.** Golden, CO. For information on registration deadlines, fees, or to register online, go to http://www.mines.edu/igwmc/short-course/
May 24-26	**GIS for Water Resources, Colorado School of Mines, IGWMC Short Course.** Golden, CO. For information on registration deadlines, fees, or to register online, go to http://www.mines.edu/igwmc/short-course/
May 24-26	**UCODE-2005: Universal Inversion Code for Automated Calibration, Colorado School of Mines, IGWMC Short Course**. International Ground Water Modeling Center, Golden, CO. For information on registration deadlines, fees, or to register online, go to http://www.mines.edu/igwmc/short-course/
June 26-28	**Adaptive Management of Water Resources, American Water Resources Association 2006 Summer Specialty Conference.** Missoula Montana. For more information go to http://www.awra.org/
Jul. 18-20	**2006 UCOWR Annual Conference: Increasing Freshwater Supplies.** For more information, go to http://www.ucowr.siu.edu/
Jul. 22-26	**Annual Meeting of International Soil and Water Conservation Society. Keystone, Colorado. For more information go to:** http://www.swcs.org/en/swcs_international_conferences/2006_international_conference/
Jul. 24-27	**5th Annual North American Surface Water Quality Conference and Exposition.** Denver, Colorado. For more information, go to http://www.stormcon.com/sc.html
Jul. 26-28	**31st Colorado Water Workshop.** Gunnison, CO. For more information go to www.western.edu/water.
Sept. 26-28	**3rd International Symposium on Integrated Water Resources Management.** Ruhr-University Bochum, Germany. For more information, go to http://conventus.de/water/

Oct. 25-28	**Ground Water and Surface Water Under Stress: Competition, Interaction, Solutions.** Boise, Idaho. For more information, go to http://www.uscid.org/06conf.html.
Nov. 6-9	**American Water Resources Association 2006 Annual Conference**. Baltimore, MD. For more information go to www.awra.org/meetings/Baltimore2006/ .
2007	2007
Jan. 25-26	**Colorado Water Congress 49th Annual Convention.** Denver, CO. For more information go to: www.cowatercongress.org, or phone 303/837-0812, or email macravey@cowatercongress.org .
Sep. 30 – Oct. 5	**Fourth International Conference on Irrigation and Drainage: Role of Irrigation and Draining in a Sustainable Future.** For more information go to http://www.uscid.org .