



COLORADO WATER

*Newsletter of the Water Center
at Colorado State University*

OCTOBER 2000

INSIDE:

Margaret Matter receives U.S. Committee on Large Dams (USCOLD) scholarship certificate and check from Dr. Debora Miller, CSU Graduate and member of USCOLD Board of Directors. Dr. Miller, as a Ph.D student in Civil Engineering at CSU, was the recipient of the first USCOLD scholarship.

From left: Debora Miller, Larry Stephens, USCOLD Executive Director, and Margaret Matter.

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Student Water Symposium <http://watersym.colostate.edu/>

EDITORIAL

WATER RESEARCH AND EDUCATION
AS MANAGEMENT TOOLS

At the Colorado Water Workshop in Gunnison this past August, David Holm, Director of the Colorado Water Quality Control Division, presented a thoughtful talk about the changes taking place in water quality management today. A transcription of the talk is presented on page 14 in this issue of Colorado Water. While David's views come from a water quality manager, I am struck by the implications to all Colorado water managers, not just those addressing water quality issues. Whether water managers work in water supply, flood control, water quality protection or environmental enhancement, they face increasingly integrated issues – issues that transcend traditional scientific and institutional boundaries.

Water managers have many tools with which to address the current water concerns of society. The prior appropriation doctrine, instream flow program, water quality standards, discharge permits, and construction grant/loan programs (in both quantity and quality) are a few such tools. The tools were often developed to address a particular problem as it presented itself to society. For example, when Europeans settling in Colorado in the mid 1800s needed to allocate the limited water among the miners and farmers, the prior appropriation doctrine, as defined in Colorado law, emerged. When water quality problems of the mid-1900s became excessive across the nation, the Federal Clean Water Act passed Congress. The different levels of government, managing various dimensions of our water resources,

led to some of the boundary issues David discusses in his talk.

As society, and water managers employed by society, work to solve the integrated water problems facing Colorado today, there are dimensions of each issue that demand a better understanding of basic water science, technology and policy. From the steady tightening of water quality criteria and standards, through the need to control non-point sources of pollution, to the growing desire to restore the aquatic habitats of Colorado's rivers, there is a need to more actively employ the research and education tools available to water managers.

Water research and education take place whenever the unknown is encountered. Water managers, in many ways, conduct short-term research and education as the need presents itself. Difficult TMDLS (i.e., waste load allocations in rivers) may require pushing the scientific capability of existing water quality models beyond the limits under which they were developed. Setting selenium standards may require extending the understanding of the relationships between life cycles of endangered fish and historic selenium levels. New forums for resolving water conflicts in the West are testing the theories of social organization.

At times, addressing modern water problems requires that we reach far beyond our current understanding of science, technology and policy. At such times, we need a more formal research and/or education process to

enhance the ability of science, technology and policy to support water management decisions. Within Colorado's higher education system is an outstanding array of 'water' faculty who can help water managers employ the 'research and education' management tools. Thus, when a water manager like David Holm describes the new initiatives and national trends in water quality management, I sense that the unknowns being encountered may require more extensive use of the research and education tools available to water manager. I hope that managers, when needing to employ research and education tools, will approach higher education faculty for assistance. If there is any way that CWRI can facilitate such connections, please contact us.

Faculty involved in employing research and education tools for improving water management may be asked to extend their work across disciplines while participating in close partnership with managers. The multi-disciplinary, multi-agency challenges facing water managers translate to new challenges facing 'water' faculty. To be relevant to the current research needs, faculty may have to work outside the bounds of their traditional disciplines and in ways not generally associated with traditional water research. CWRI welcomes the opportunity to work with water managers and faculty to find the optimum manner to effectively employ the water research and education management tools to address Colorado's increasingly sophisticated water management problems.



USGS ANNOUNCES RESULTS OF FY2000 NIWR/USGS NATIONAL COMPETITIVE GRANT PROGRAM

The eight proposals listed below have been selected for funding under the FY2000 National Institutes for Water Resources and U.S. Geological Survey National Competitive Grants Program. Abstracts of these proposals will be made available at <http://water.usgs.gov/wrri/2000.html>.

NJ-158	Wetlands in Urban Regions: Connections Among Wetland Structure, Wetland Function and Regional Water Quality , by Joan Ehrenfeld, Rutgers University, New Jersey Water Resources Research Institute, Rutgers University, \$115,000 (2 years)
UT-202	Development of a GIS-Based Approach for Better Statewide Water Use Estimation , by Mac McKee and David Tarboton, Utah State University; Lloyd Austin, Utah Department of Natural Resources, Center for Water Resources Research, Utah State University, \$138,431 (2 years)
WI-85	Watershed Transport and Transformations of Atmospherically Derived Mercury. . . , by James P. Hurley and Kristofer R. Rolfhus, University of Wisconsin, Water Resources Center, University of Wisconsin, \$210,000 (3 years)
NY-105	A Watershed-Scale Biogeochemical Loading Model for Nitrogen and Phosphorus , by Robert W. Howarth, Elizabeth W. Boyer, and Dennis Swaney, Cornell University, New York State Water Resources Institute, Cornell University, \$213,011 (3 years)
MN-174	In Situ Measurement of Denitrification in Agricultural Streams , by Patrick L. Brezonik and Lorin K. Hatch, University of Minnesota, Frank Triska, USGS-WRD, Water Resources Center, University of Minnesota \$89,930 (2 years)
WA-120	Integration of Surface Irrigation Techniques to Reduce Sediment/Nutrient Loading in the Yakima River Basin , by Brian Leib, Ariel Szogi, Robert Evans, and Robert Stevens, Washington State University; James Thomas, Yakima Nation, State of Washington Water Research Center, Washington State University, \$95,106 (3 years)
CA-147	Dynamic Chemical Loads as a Function of Land-Use Changes in a Watershed , by Arturo A. Keller, University of California, Center for Water Resources, University of California, \$41,937 (2 years)
OH-65	Methodology for Estimating Total Maximum Daily Load in Watersheds with Considerable Ground-Water Surface Water Interaction , by Maged Hussein and Frank W. Schwartz, Ohio State University, Water Resources Center, Ohio State University, \$94,764 (2 years)

DAVID JAQUETTE RECEIVES WATER CENTER GRADUATE FELLOWSHIP

The CSU Water Center's Program of Research and Scholarly Excellence in Water Management Science and Technology was allocated one 3-F Graduate Fellowship for 2000/2001. The fellowship is made available through the Graduate School, with the goal of strengthening water programs by recruiting top students into water-related studies at Colorado State University.

The recipient of the fellowship for 2000/2001 is David Jaquette, who is enrolled in the Watershed Science Program. David wants to get a solid academic foundation that will allow him to "assess the effects of human intervention on natural hydrologic process and predict potential problems." David is particularly interested in fluvial geomorphology, the conjunctive use of subsurface and surface water sources, and techniques in river system restoration. He describes his goal as applying the knowledge he gains in research to problems in domestic and international resource management.

David has traveled extensively, a bonus for his goal of applying his expertise in international resource management. He says his interest in hydrology began years ago on multi-day raft trips with his parents on the Green River in Utah, the Dolores River in Colorado, and the Colorado in Utah and Arizona. David lived in Katmandu, Nepal for a year with his father in 1986-87, and traveled in Hong Kong, Thailand, Bangladesh, India, Kenya, Egypt, Eastern Europe and Scandinavia. Closer to home, his travels include Mexico, Guatemala, Chile, Bolivia and Peru.

David is a graduate of Santa Monica High School in California. He attended Lafayette College, Easton Pennsylvania and Occidental College in Los Angeles, California, obtaining a B.A. in Geology Cum Laude, in May 1996. During college, he worked at a variety of jobs, including trip leader for Adventure River Expeditions, Utah and Moki Mac River Expeditions, Arizona; as a construction apprentice in Moab, Utah and Pagosa Springs, Colorado; and as a climbing instructor for Planet Granite in Santa Clara, California.

RESEARCH



LAWS INFLUENCING COMMUNITY-BASED CONSERVATION IN COLORADO AND THE AMERICAN WEST: A PRIMER

Natural Resources Law Center
University of Colorado School of Law

Project Manager: Douglas S. Kenney

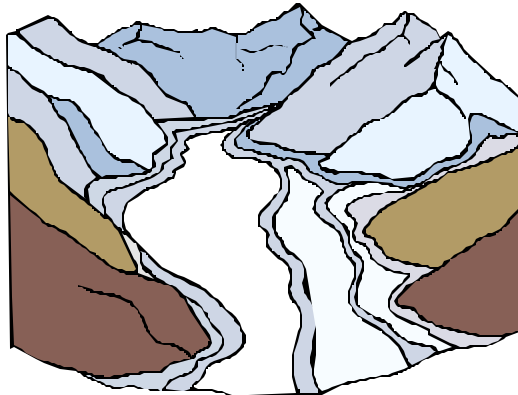
This report began in 1995 as a case study of Colorado's Yampa River Basin, but evolved into a more broadly relevant investigation of the laws influencing community-based conservation in Colorado and the American West. Among the laws reviewed are the federal National Environmental Policy Act, the National Forest Management Act, the Federal Land Policy and Management Act, the Endangered Species Act, the Clean Water Act, and the Federal Advisory Committee Act, as well as state prior appropriation law. A brief discussion of conservation activities in the White-Yampa Basin in north-western Colorado is also included. The Colorado Water Resources Research Institute cosponsored this work in conjunction with the Ford Foundation, U.S. Bureau of Reclamation, the General Service Foundation, the Environmental Protection Agency, and the Hewlett Foundation.

*A working knowledge of natural resources and environmental law
can be indispensable to efforts in community-based conservation.*

Much of the West is driven economically, politically, and socially by its natural resources. More than half of the West is federal public land, managed primarily by the U.S. Forest Service, Bureau of Land Management, and National Park Service. Many activities and resources on private lands are also subject to various degrees of federal control. Accordingly, federal natural resources laws and regulations play a central role in the management of the West's natural resources. The federal government is also involved in many facets of western water management, although water allocation is predominantly the domain of state law and is based on the private rights orientation of the prior appropriation doctrine.

One by-product of this legal framework is that many local "stakeholders" who have an obvious interest in the management of the West's natural resources often feel excluded from management decisions. Additionally, many management programs have not been as effective as desired in solving problems on the ground level. Largely in response to these and related concerns, many stakeholders have

banded together in recent years to form various types of partnerships, many of which pursue the goals of environmental protection and restoration. These efforts are frequently described as "community-based conservation." While not without historical precedent, most community-based conservation efforts in the West are relative newcomers to the institutional landscape, and are notable in part for frequently bringing together a wide diversity of interested parties, including local residents, industry representatives, farmers, ranchers, recreational users, environmentalists and representatives from local, state, and federal governments.



A working knowledge of natural resources and environmental law can be indispensable to such efforts in community-based conservation. At the state level in Colorado, as in most western states, the most important element of the state legal framework is the prior appropriation doctrine, which allocates water rights to private interests for recognized uses. Given that most waterways in the West are already fully appropriated and that non-rights-holders have

few opportunities to influence patterns of use or transfer, water management practices can pose difficult challenges to community-based conservation. However, programs that allow rights to be acquired for instream flows can be highly effective conservation tools. Colorado also has a special program (H.B. 1041) to limit water exports from localities wishing to keep resources in local control. Other western states undoubtedly also have unique programs and opportunities for influencing water management practices. Identifying such opportunities can be an essential component of a strategy for community-based conservation, especially in arid and semiarid regions.



Two of the most important federal laws pertain to rules of decision-making. The first of these is the Federal Advisory Committee Act (FACA). FACA is important in that it specifies the terms under which federal agencies can establish, utilize, and/or participate in multi-stakeholder groups. While considerable confusion surrounds the applicability of FACA to community-based conservation groups, violations can normally be avoided if the provisions of the act are carefully considered. Of even greater significance is the National Environmental Policy Act (NEPA), which specifies the decision-making process utilized to consider all major land use and environmental management decisions made by the federal government. The environmental impact statement (EIS) process, especially the “scoping phase,” can be an excellent entry point for concerned citizens into public decision-making processes involving natural resources.

The structure provided by NEPA is followed closely in several public land planning processes. For the National Forest system, forest-level planning under the National Forest Management Act provides a key opportunity for community groups to influence subsequent activities undertaken by the Forest Service. Similarly for lands managed by the Bureau of Land Management, the development of resource management plans under the Federal Land Policy and Management Act (FLPMA) requires and encourages public participation. Planning processes are extremely important in that they guide subsequent land-use and management activities for several years. As mentioned earlier regarding NEPA processes, often the best opportunity for advocates of community-based conservation come during the scoping phase of these efforts.

Many of the most important federal laws are regulatory programs. The Endangered Species Act (ESA) is among the most powerful and complex of all federal environ-

mental laws, and is frequently center stage in many conservation debates. The act does not, however, generally provide many opportunities for public input or involvement, as decisions are, in theory, largely technical. The role of citizens is usually limited to bringing lawsuits challenging listing decisions, but occasionally involves more cooperative exercises regarding species recovery planning and implementation. Greater citizen involvement is provided by the Clean Water Act. Also a highly powerful and complex statute, the Clean Water Act requires a number of permitting activities that can be opened to public scrutiny, and explicitly requires public input at three-year intervals in the revising of water quality standards. Perhaps the most important connection between these acts and community-based conservation, however, is as a stimulus for the formation of these efforts. This is particularly true for watershed-based initiatives.

Other potentially relevant federal laws include the Wild and Scenic Rivers Act; the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); and various laws pertaining to agricultural management. The Wild and Scenic Rivers Act provides a system for protecting riparian corridors, and can therefore be an important conservation tool. The best opportunities for public input are in the designation of new stream segments, and in the development of associated management plans through NEPA-like processes. CERCLA, on the other hand, guides the cleanup of sites polluted by hazardous wastes. CERCLA actions tend to be long, complex efforts, featuring many opportunities for public comment. More direct public involvement is often possible through many of the agricultural management programs, such as the soil conservation programs of the Natural Resources Conservation Service (formerly the Soil Conservation Service).

These laws and their associated administrative programs are designed to provide concerned citizens and stakeholders with access to decision-makers and decision-making processes. The first step is to identify and understand them.

Laws Influencing Community-Based Conservation in Colorado and the American West: A Primer, is available from the Natural Resources Law Center, University of Colorado School of Law, Campus Box 401, Boulder, CO 80309-0401. Phone 303/492-1272, e-mail nrlc@spot.colorado.edu, web www.colorado.edu/Law/NRLC/. The 51-page report is available for \$4 (for postage and handling), or can be viewed and downloaded free at www.colorado.edu/Law/NRLC/Yampa.PDF.

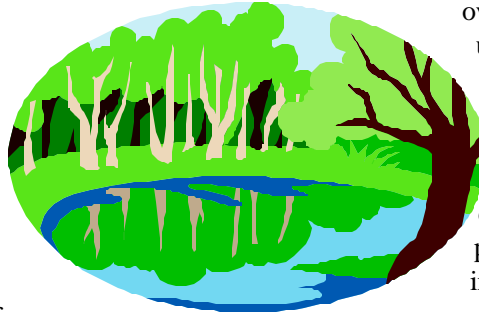


 **SELENIUM SYMPOSIUM 2000:
REMEDIAION TECHNOLOGIES AND RESEARCH**

by *Karla A. Brown*
Colorado State University Cooperative Extension
Montrose County

On June 28, 2000, the Gunnison Basin Selenium Task Force hosted a panel of selenium remediation and biotechnology specialists for a one-day technical symposium in Montrose. As part of a grant sponsored by the U.S. Environmental Protection Agency 319 program, the panel of seven speakers from around the nation presented information about selenium phytoremediation, plant selenium metabolism and biotechnology, flow-through wetlands and other selenium remediation techniques. The symposium was designed to assist the task force and educate the public about research findings in water treatment and selenium remediation, particularly the applicability of those findings and strategies to the environmental and economic situation in the Lower Gunnison Basin.

Selenium toxicity is a problem in many western states including Wyoming, Utah and California. Several of the speakers at the symposium researched selenium in the Central Valley of California, where numerous selenium remediation projects have been initiated in the last decade. Unlike the Lower Gunnison Basin of Colorado, selenium problems in the Central Valley are largely linked to insufficient options for the disposal of irrigation drainage and subsequent evapoconcentration of selenium to concentrations toxic to fish and waterfowl. Although irrigation drains in the San Joaquin Valley often carry higher flows (e.g., 100 million gallons a day) and higher concentrations of nitrates or boron than those in western Colorado, these drains also contain high levels of salts and often 100-600 ppb selenium or more.



Dr. Norman Terry, from the Department of Plant and Microbial Biology, University of California Berkeley, presented a multidisciplinary review of selenium phytoremediation, including the use of constructed wetlands to remove selenium from agricultural and industrial wastewater, the role of microbes, and developing superior plants for selenium phytoremediation through genetic engineering. Case studies from a variety of field locations found that wetlands can reduce selenium 90 percent compared to inflow concentrations. And where does the selenium go? The largest portion was found to be sequestered in sediment (especially the rhizosphere), with the remainder removed via plant uptake, about 5 percent, volatilization (between 2-19 percent), with a small loss to outflow.

Dr. Gary Bañuelos, from the USDA Water Management Research Lab in Fresno, California, presented the results of phytoremediation technology that their Water Management Research Lab has investigated since 1989. The technology manages soluble selenium from central California soils and uses plants to extract, accumulate and volatilize selenium with the aid of microbial activity, removing it from the soil. Bañuelos has conducted phytoremediation studies using canola, poplar and kenaf species with positive results.

“Kenaf,” says Bañuelos, “took up at least 25 percent of the soluble selenium to a depth of 3 feet. Canola, which has shallower roots, used about 50 percent of the selenium, to a depth of 2 feet.” More studies are evaluating the use of selenium-rich forage by domestic livestock.

Dr. Elizabeth Pilon-Smits, Colorado State University Department of Biology, provided an overview of plant selenium metabolism using a combination of plant physiology, biochemistry and biotechnology to create plants that are better phytoremediators of selenium. Using transgenic plants, designed to overproduce certain key enzymes, she has produced plants that show a 2 to 3 fold increase in selenium volatilization.

An innovative remediation strategy was presented by Tryg Lundquist from the Environmental Engineering and Health Sciences Lab at University of California, Berkeley. His research group developed an Algal-Bacterial Selenium Removal facility which, since 1997, has treated agricultural drainage water in the San Joaquin Valley. This facility consists of a series of ponds designed to promote indigenous microorganisms which remove nitrate and up to 80 percent of selenium.



Dr. Jack Adams from the Center for Bioremediation at Weber State University in Ogden, Utah, presented the results of a low-cost Se reduction and removal process which has been

validated under a recent EPA Mine Waste Technology Demonstration Program. This process has been demonstrated to remove Se from various conditions to an amount that is below detection.



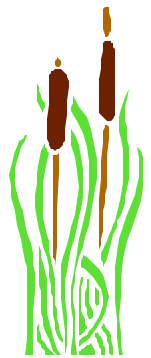
Carla R. Scheidlinger of the Agrarian Research and Management Company, located in Bishop, California, discussed the results of a low-tech flow-through wetland environment that has removed up to 80 percent of selenium from highly contaminated — up to 350 ppb — drain water. Designed to apply bioremediation

techniques on the farm, this experiment routed drain water through low-tech artificial wetland channels where selenium-accumulating plants were floated on evenly spaced straw bales throughout the length of the channel. Positive initial results found an 80 percent reduction of selenium in the effluent water.

Dr. John Letey, Director at the University of California Center for Water Resources in Riverside provided background on selenium problems in the western San Joaquin Valley, describing how various water management options have been pursued to deal with salt and selenium toxicity problems. In addition to the wetlands, phytoremediation and algal-bacterial control methods, basic water management cannot be overlooked in any selenium reduction strategy. Management strategies such as source control, better irrigation practices using sprinkler and drip irrigation, groundwater management, carefully managed evaporation ponds, compensation habitat



and even land retirement, were all presented as necessary tools that must be carefully combined to solve what should be a well-defined water quality problem. Selenium naturally occurs in high concentrations in Mancos Shale derived soils which are common to the Lower Gunnison and Grand Valley areas. In July 1997, the Colorado State Water Quality Control Commission adopted a 5 ppb (parts per billion) aquatic life standard for selenium in the Lower Gunnison Basin. Several stream segments within the basin did not meet this new standard, including segments of the Uncompahgre and Lower Gunnison rivers. Following this ruling, the Gunnison Basin Selenium Task Force was formed as a group of private, local, state and federal representatives committed to reducing selenium while maintaining the economic viability and lifestyle of the area. Currently, the task force is overseeing three separate Clean Water Act 319(h)-funded grant projects including water and soil monitoring to target selenium hotspots, investigating phytoremediation techniques to remove selenium from the soil and evaluating the effects of changing land use on selenium loading in the Whitewater area.



The symposium provided the Selenium Task Force with valuable information that will be directly applicable to their existing projects. The task force also is considering implementing a project similar to the flow-through wetland concept. For more information on the symposium contact Karla A. Brown at 970-249-3935.

Nolan Doesken, the state's assistant climatologist, says the first five months of this year have been the warmest in the past 111 years, averaging 45.9 degrees. May was the warmest May ever, averaging 61.5 degrees. May 29, with a 97 degree temperature, was the warmest day in that month ever recorded.



**2000 COLORADO STATE FAIR PROVIDED OPPORTUNITY
TO LEARN ABOUT COLORADO'S MOST CRITICAL NATURAL RESOURCE**

*by Katherine Timm
Colorado State Forest Service*

Imagine having the opportunity to tour Colorado's plains, mountains, wetlands and mesas on foot — all in one day. That's what awaited fair visitors in the Natural Resources Building at the 2000 Colorado State Fair. The 125-foot by 95-foot building featured a walk-through diorama of the four major ecosystems, which were built to help participants learn about the plant and wildlife that live in Colorado. Each diorama also included a water feature depicting the many uses of this critical resource.

The idea for the walk-through dioramas is the result of collaboration among several local, state and federal agencies, including the Colorado State Forest Service and Colorado State Cooperative Extension. The objective of the dioramas was to bring Colorado's natural beauty to life and inform the public about the importance of water.



Phil Hoefer, Colorado State Forest Service, rewards one of the many scavenger hunt participants for successfully identifying all the animals in the Natural Resources Building

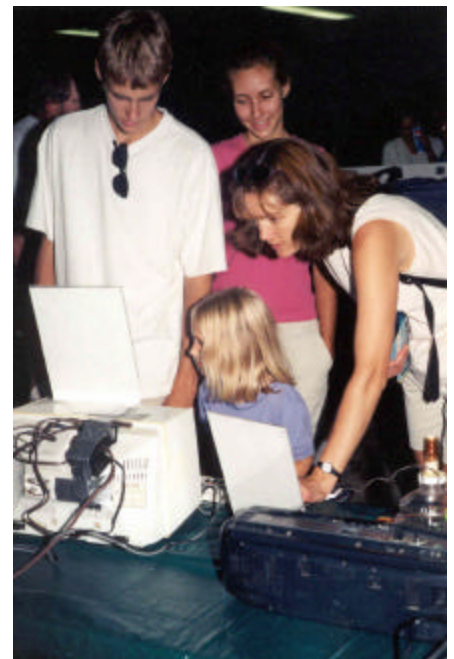
Throughout the 17-day fair, exhibits, presentations and hands-on activities focused on water and how it shapes Colorado's natural and cultural resources, industry, public policy, and communities. Organizers used this interactive approach to help fair visitors understand that humans are a part of each ecosystem and that human activities have a major impact on water quality and quantity.

In addition to the four dioramas, presentations explored historic and modern cultures and their interactions with Colorado waterways. Hands-on activities for youth included CSU's Little Shop of Physics, tree-seed planting, a scavenger hunt, and creating wildlife face masks and bookmarks.



Photos 2 and 3. Visitors of all ages enjoyed the hands-on activities offered by CSU's Little Shop of Physics.

A touch-screen computer kiosk created specifically for this event featured a water-knowledge quiz and other water-related activities found on the Colorado Water Resources Research Institute Web site.





On the last weekend of the fair, Extension's Master Gardeners from Pueblo County hosted an interactive display featuring water-friendly plants that thrive in urban ecosystems.



Anita Eakins, CSU Cooperative Extension Master Gardener in Pueblo County, helped young visitors plant Douglas fir tree seeds.

In 2001, agency staff will again combine their creative energy to develop displays and activities that will entertain and inform the public about Colorado's natural resources and the role they play in the well-being of Coloradans.

For more information about Colorado State's participation in the Colorado State Fair or to learn about opportunities to participate, contact Katherine Timm, Colorado State Forest Service, at 491-6303.

WATER SUPPLY



Conditions are still quite dry statewide even though the SWSI values rose slightly from last month due to precipitation in August and a resulting rise in stream flow in limited areas. The Rio Grande and San Juan/Dolores basins have very low stream flows. The SWSI values in the South Platte and Arkansas basins are supported by their reservoir storage in spite of low stream flows in those basins. Reservoir use has caused a drop in storage levels over the whole state this summer, as low stream flows have resulted in only the most senior direct flow water right holders being able to take river water. Many reservoirs, especially those used for irrigation supplies, are currently holding less water than they normally have at this time of year.

The surface Water Supply Index (SWSI) developed by this office and the USDA Natural Resources Conservation Service is used as an indicator of mountain-based water supply conditions in the major river basins of the state. It is based on stream flow, reservoir storage, and precipitation for the summer period (May through October). During the summer period, stream flow is the primary component in all basins except the South Platte basin, where reservoir storage is given the most weight. The following SWSI values were computed for each of the seven major basins for September 1, 2000, and reflect conditions during the month of August.

Basin	9/1/00 SWSI Value	Change from the Previous Month	Change from the Previous Year
South Platte	1.9	+0.3	-1.9
Arkansas	0.2	0.0	-3.0
Rio Grande	-2.3	+0.9	-5.6
Gunnison	-2.2	+0.6	-4.2
Colorado	-0.6	+1.6	-3.5
Yampa/White	-2.2	+0.6	-3.8
San Juan/Dolores	-2.7	+0.5	-6.2

SCALE								
-4	-3	-2	-1	0	+1	+2	+3	+4
Severe Drought		Moderate Drought		Near Normal Supply		Above Normal Supply		Abundant Supply

MEETING BRIEFS


**COLORADO WATER WORKSHOP
CELEBRATES 25th YEAR**

by Emile Hall



Above: Justice Greg Hobbs, Colorado Supreme Court, discussed water law at the workshop, and Richard Lamm, former Colorado Governor, presented his “Visions of Colorado’s Future” in the Keynote Address

Over 30 speakers addressed various components of the above questions. Many noted the impending changes in water management and systems that have made changes difficult. Ultimately, the overarching theme was a recognition of the more recently acknowledged beneficial uses of water and the challenge of addressing those while maintaining the tried-and-true tenets of the water law system under which water is managed.



Above: David Holm, left, chats with conference participant during a break

David Holm, Director of the Colorado Water Quality Control Division, addressed one area wrought with change in a speech entitled “A Volatile Period in Water Quality - New Initiatives and National Trends.” As the title suggests, water quality management in Colorado has entered a period of flux. Following you will find a summary of Holm’s presentation.

Left: New Zealand visitor Graham McBride and Consultant Tim Steele talk water issues



A VOLATILE PERIOD IN WATER QUALITY – NEW INITIATIVES AND NATIONAL TRENDS

by David Holm, Director
Colorado Water Quality Control Division

We are in a volatile period in water quality management. This is after nearly a decade of relative tranquility. The recent calm period has been due, in part, to the repeated failures on the part of Congress to reauthorize the Clean Water Act and the continued paralysis of Congress in dealing with any major environmental legislation. There also has been a time lag involving reorganizations at the state and federal level to better integrate environmental management. In Colorado, there has not been much hostile litigation recently, which can be attributed to the creation of the Water Quality Forum, an informal mechanism to talk about issues before they become major problems.

Now, it appears that we are entering into a new, more highly charged environment for water-quality problem solving. One of the indicators for this is the fact that we appear to be having boundary problems. Programmatic boundary disputes are emerging. We are having more difficulty coordinating between programs and are seeing turf battles and jurisdictional questions emerge. Between the state and the federal government, there are some renewed strains that have come to light most recently in the TMDL rule adoption process.

The nature of most of our remaining water quality problems calls for a very different approach than the NPDES model, with a delegated state and the EPA sitting in an oversight role. The non-point source issues, instream challenges and habitat issues that cause the loss of the uses that we care about call for revitalized relationships between many federal agencies as well as a variety of state agencies and local entities. In addition, to move in the direction the TMDL rule would have us moving, we need several changes in the Clean Water Act, especially in the funding mechanisms. The new TMDL rule shows an attempt to go from water quality protection into a water quality restoration program with the mere adoption of a rule. Like most of my counterparts, I find nothing more challenging than dealing with real water quality problems, but

we do not currently have the necessary mechanisms to turn into the state-wide water quality restoration program that is inferred by the TMDL regulations.

Other interesting boundary issues are emerging between and among the various water quality-related statutes. For example, the Clean Water Act (CWA) and the Endangered Species Act (ESA) have some serious boundary problems at the present time. There have been several attempts to

harmonize the ESA and CWA programs, but most have failed. Part of the problem is the autonomy of the district-level offices of the United States Fish and Wildlife Service and National Marine Fisheries Service. The problems are becoming more evident now in the wake of the Alaska Rule adoption. This adoption results in water quality standards adopted by states not becoming final and effective until EPA approves

them. That is a federal action and requires consultation under the ESA anywhere listed species may be present.

Now, each time we adopt standards on a water body where listed species are present there is a consultation process. The length of time for that process is different from that for water quality standards. Also, the consultation doesn't end with standards, but includes activities involved in the implementation of standards including the TMDL, NPDES permit adoption and non-point source projects that might affect a water body with listed species. Therefore, we are being pushed to accelerate our remediation efforts and improve our control programs in accordance with TMDLs, but we have constraints and delays on the other end related to the ESA.

There are also some important interfaces that might be the harbingers of future conflicts between the Clean Water Act and the Safe Drinking Water Act. One of the most controversial basic standards rulemaking hearings in over a

The non-point source issues, instream challenges and habitat issues that cause the loss of the uses that we care about call for revitalized relationships between many federal agencies as well as a variety of state agencies and local entities.



decade was recently completed. The hearing related to issues of protecting drinking water supplies and dealing with compliance issues at drinking water systems through the standards adoption process — issues that Thornton and FRICO have raised involving impacts to downstream water suppliers related to upstream dischargers.

One of the issues where there has always been a bright boundary is within the quality/quantity arena. Currently, in Colorado this raises issues related to wintertime snowmaking, upstream exchanges and the impacts they might have on downstream users, and providing sufficient quantities for instream recreation. The issue of bypass flows for protection of aquatic life below storage impoundments has also been raised. The boundary between quality and quantity has always been hotly contested in Colorado, involving much legislation and rule making, but as Justice O'Connor has stated, they really are two sides of the same coin. Quality and quantity really are inseparable.

Another area with true boundary disputes is the emerging interstate issue involving water quality concerns. Currently pending is a water quality issue in the lower-most segment of the Arkansas River. The watershed below Pueblo is derived from Peer shale. As a result of land use and natural runoff, we have very elevated concentrations of sulfate in the lower Arkansas segment. Colorado has adopted standards that reflect that natural level of sulfate in the system, while Kansas has adopted a secondary drinking water standard for sulfate. Nearly 2,000 mg/L leave Colorado, with a water quality standard of 250 mg/L just across the state line in Kansas. This means the Arkansas River just across the state line is impaired for sulfate and requires a TMDL. Interestingly, in the draft TMDL that Kansas has produced it is noted that the quality of the river is best when there are high flows; therefore, part of the solution is for Colorado to deliver more water to Kansas. Colorado has since written some lengthy comments to Kansas about their TMDL.

Another issue that may be sleeping and about to awaken is between Colorado and New Mexico. The lowermost segment of the Animas River has selenium concentrations

related to Mancos shale below Durango. There has been some concern that the Animas-La Plata project would exacerbate that condition, which right now hovers around the Colorado water quality standard of 5 micrograms/L. New Mexico has adopted the US Fish and Wildlife's recommended standard of 2 ppb for selenium. There we potentially have another interstate water quality problem. Here in Colorado we have found evidence that the North Fork of the Republican River, as it enters into Nebraska, is impaired in terms of its aquatic life use. Nebraska is concerned about the fact that the native fishes that should be in the stream don't appear to be there in sufficient numbers and diversity.

The Costillo River, when it flows back into Colorado, has sediment problems related to forestry practices in New Mexico. Therefore, Colorado might be on the complaining end for a change on that issue.

To deal with some of these interstate water quality issues, an organization called

the Western Water Quality Forum is proposed, which would be under the umbrella of the Western Governor's Association and the Western States Water Council. That might provide an opportunity apart from EPA being the broker of these interstate water quality problems.

There are also some volatile issues within Colorado's water quality management program. First, with respect to our Clean Water Program, in the monitoring and assessment arena one of the issues that we are now facing is reflected in an EPA initiative entitled a Consolidated Assessment and Listing Methodology (CALM). The challenge is to address a series of questions that have to do with how we are monitoring and assessing water bodies to make certain key water quality decisions. For example, how do you decide that a water body is not attaining its water quality standards? What is your level of confidence for making such a determination? There are a number of questions along those lines that need to be addressed, and the methodology that a state chooses ultimately will have a lot to do with whether lists of impaired waters are approved by EPA or whether they are subject to challenge.

We also have an aquatic life use support group — a work

The boundary between quality and quantity has always been hotly contested in Colorado, involving much legislation and rule making, but as Justice O'Connor has stated, they really are two sides of the same coin. Quality and quantity really are inseparable.

group effort to try to come to terms with a more refined aquatic life classification system, rather than the current crude system of simply Class 1 and Class 2. In the past, we have not done that, because we were not sure how the numeric standards would change. It is clear that in the Clean Water Act framework the use, and criteria to protect that use, are different. They both are the standard for the water body. The Colorado Water Quality Monitoring Council is in the process of assessing the level of sophistication in describing aquatic ecosystems. We have just gotten through a controversial basic standards rule-making hearing, but some more are coming up, including the South Platte River, the Cherry Creek Reservoir, and the Lower Colorado.

Also, there are new criteria for ammonia that may have implications for requiring increased treatment, particularly for facilities that discharge into warm water. Regarding nutrient standards, EPA is proposing to adopt presumptively applicable criteria at the end of this year, and there may be huge challenges in terms of improving treatment works around the state.

We are continuing to work through TMDLs. We have a schedule in which we are committed to develop TMDLs. We were committed to develop 30, or have good reasons not to develop one or more of those 30, by June 30, 2000. We have addressed 36 TMDLs, but most of them were addressed by de-listing the water bodies through increased monitoring work; 12 TMDLs were completed in this past year.

In the permits arena, the biggest issue relates to the phase 2 stormwater program and the massive expansion of stormwater permitting requirements it implies. A work-group is currently focusing on those implementation issues. We are also challenged with permitting all of the Confined Animal Feeding Operations in the state that meet the threshold of being concentrated operations (i.e. 1000 animal

units or more). An issue that EPA is raising as a major concern is sanitary sewer overflows.

We recently received a notice of violation in the Denver Metro Wastewater System, and we are working with them on a compliance agreement to address those issues. Metro is the most diligent in responding and reporting to SSOs, so

EPA has picked them as a target even though there are many other facilities that have far worse problems in the state.

One other thing I would flag in the permitting

arena is mixing zones. We are continuing to work on a mixing zone concept for Colorado which might have the result of tightening effluent limits, particularly those that discharge into quiescent waters on the eastern slope. Another work group effort that is under way is trying to get a state funding mechanism for our non-point source program.

Currently, the drinking water program is posing the greatest programmatic challenges. There are 20 new regulations that are to be implemented over the next few years in the drinking water realm, and some major new programs. There will be some discussion about capacity development, ensuring that systems

have the financial, managerial and technical capacity to meet the new regulatory requirements; and also, new requirements to have properly certified operators at drinking water facilities and a whole host of new training and technical assistance opportunities to assist in that certification of operators.

These are the challenges we are working on. Some of them are hot; some are volatile. Frankly, this is about the most challenging and most exciting period that I have seen in the last dozen years. I am pleased to be personally engaged in these issues.

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Colorado Water
Resources Research Institute

CU Water News



HOT TOPICS

THE NATURAL RESOURCES LAW CENTER, University of Colorado School of Law Presents

Fall 2000 in *NATURAL RESOURCES*

A Luncheon Program Series



Tuesday, October 31, 2000

Public Land Management - Colorado Style

Public land management in the West has always been controversial. Over the last several years President Clinton and Secretary of the Interior Babbitt have heated the controversy with several designations of national monuments and many more proposals under consideration. Interior's "national landscape conservation systems" could change the face of public land management. Will it change management and use of Colorado's public lands? Colorado has valuable public lands (including lands suitable for wilderness designation), its own brand of politics and a unique self. Ann Morgan, Colorado State Director of the bureau of Land Management and Suzanne Jones, Assistant for the Wilderness Society will reflect on public land management in Colorado - in current focus, its challenges, and its future. One general CLE credit applied for.

ADMISSION PRICE: \$13 by Friday, October 27th ; \$16 after October 22th ; \$5 additional for 1 General CLE Credit



Thursday, November 30, 2000

Fire in the Urban-Wilderness Interface

Wildland fires have been the hottest topic this summer in both Colorado and throughout the West. As the forests burned, protecting life, private property, and forest and cultural resources were immediate concerns. As forests and tempers have cooled, the long-term problem of dealing with hazardous fuels buildup looms. How can we address the problem on a meaningful scale? How can the agencies comply with the law, but minimize the delays and costs involved with meeting the requirements of NEPA, NHPA, and other federal and state laws? How should we prioritize and schedule fuels treatments and other fireproofing work, in the face of limited resources and personnel and nearly universal needs? U.S. Representatives Mark Udall (D-Colo) and Joel Hefley (R-Colo) have been invited to begin the discussion of these issues with a presentation on their proposed Forest Restoration and Fire Reduction Act (H.R. 5098).

The standard lunch time Hot Topics program will be followed from 1:30 to 3:30 by a panel discussion and public forum featuring federal, state and local representatives, including Jim Hubbard, Colorado State Forester; Steve Pedigo, Deputy for Fires, Region, U.S. Forest Service; Chris White Wildfire Coordinator for Boulder County; and Rocky Smith, Colorado Wild.

Register for luncheon only (1 general CLE credit applied for) or the entire program (3 general CLE credits applied for).

ADMISSION PRICE: \$13 by Monday, November 27th ; \$16 after November 27th ; \$5 additional for 1 or 3 General CLE Credit(s)



All programs begin at noon at the offices of Holland & Hart (555 17th St., 32nd Floor) in Denver. Box lunches are provided. Each event offers one hour of CLE credit (applied for).

Register by phone or FAX with credit card or send check (payable to the University of Colorado) to Natural Resources Law Center, Campus Box 401, Boulder, CO 80309-0401. **Phone Reservations** (303) 492-1272; Fax (303) 492-1297.





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**FALL 2000 WORKSHOP PROGRAM -- Sponsored by
The Environment and Behavior Program, University of Colorado**

The traditional E&B workshops will be held on Mondays at noon until 1:30 on the dates listed below. The range of topics is wide and interesting, and the discussions always lively. Please join us in the conference room of building IBS # 3 on Broadway. Feel free to bring your sack lunch and drinks.

- October 23rd** Professor James Wescoat, Geography and E&B professional staff, will discuss his current research on water and poverty.
- November 6th** Professor Terry McCabe and Dr. Judith McCabe, Anthropology and E&B, will discuss their current research on population and resource management in eastern Africa.
- November 20th** Chuck Howe and Chris Goemans, Economics and E&B, will discuss their findings on the characteristics and impacts of water transfers in the South Platte and Arkansas River Basins.
- December 4th** Dr. John Wiener, research scholar in E&B, will report on the results of the "Three States and Tribes Project" that traces existing and potential patterns of climate information use by water managers, including major Native American groups in Colorado, New Mexico and Utah.
- December 18th** Professor Kenneth Strzepek, Civil Engineering, will describe and assess the World Water Vision activities of the past 2 years.

The topics given above are tentative and approximate. A final schedule will be announced later.

CSM Water News



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 2001 September 9-11 — SUBSURFACE MULTIPHASE FLUID FLOW AND REMEDIATION MODELING
 2001 September 10-11 — MODEL CALIBRATION USING PEST
 2001 September 14-16 — UCODE: UNIVERSAL INVERSION CODE FOR AUTOMATED CALIBRATION
 2001 September 15 — MT3DMS WORKSHOP
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CSU Water News



USCOLD, AWRA COLORADO SECTION PRESENT SCHOLARSHIPS



From left: Dr. Debora Miller presenting scholarship certificate and check to Margaret Matter at USCOLD reception

in Fort Collins, Colorado, awarded a \$10,000 scholarship to Margaret Matter, a Ph.D. student in Civil Engineering at Colorado State University on August 25, 2000. USCOLD made the award at a reception held in the University Club lounge in Lory Student Center. Dr. Debora Miller, who presented the certificate and check to Margaret, received her Ph.D in Engineering from Colorado State University and was the first recipient of the USCOLD scholarship.

USCOLD offers research scholarships involving a broad range of topics, including design, construction, analysis, safety, maintenance, rehabilitation of, and environmental issues related to dams. Margaret summarized her research program at the reception, which will characterize and quantify pre-dam flow variability, at short time increments, for restoration and dam reoperations purposes.

In addition to the USCOLD scholarship, Margaret was awarded a \$1,000 Rich Herbert Memorial Scholarship by the Colorado Section of the American Water Resources Association (AWRA). The scholarship fund was named for Richard Herbert, a champion of water resources education, who passed away in 1994. It is intended for the enhancement of education in water resources, and is available to full-time undergraduate and graduate students enrolled in an academic program related to water resources.

Larry Stephens, Executive Director of the United States Committee on Large Dams (USCOLD), and Dr. Debora Miller, a member of the USCOLD Board of Directors and an Associate at ESA Consultants, Inc.

RESEARCH AWARDS
AT COLORADO UNIVERSITIES

A summary of research awards and projects is given below for those who would like to contact investigators. Direct inquiries to investigators c/o indicated department and university. The list includes new projects and supplements to existing awards. The new projects are highlighted in bold type.

COLORADO STATE UNIVERSITY
FORT COLLINS, CO 80523

Title	PI	Dept	Sponsor
Use of Tropical Rain Measuring Mission Data to Test an Improved Parameterization of Stratiform Precipitation	Randall, David	Atmos. Science	NASA-Goddard
Training & Education for Agricultural Chemicals & Groundwater	Waskom, Reagan	Soil & Crop Sci.	CDOA
Development of Implementation Protocols for the Integrated Disinfection Design Framework	Carlson, Kenneth	Civil Engr.	CH2M Hill
Greater Outdoors Colorado 2000 Aquatic Geographic Information Systems Manager	Baker, Barry	FWLB	CDOW
Wildlife & Wildlife Viewing Along the Yampa River	Knight, Richard	FWLB	CDOW
Effects of Brook Trout on Colorado River Cutthroat Trout	Fausch, Kurt	FWLB	CDOW
Distribution, Habitat & Life History of Brassy Minnow in Eastern Colorado	Fausch, Kurt	FWLB	CDOW
Sample Design & Analysis of Spatial Snowpack Properties	Elder, Kevin	Earth Resources	RMRS
Hydrocoverage for Colorado	Laituri, Melinda	Earth Resources	CDOW
Whirling Disease	Bergersen, Eric	CF&WRU	CDOW
TRMM Precipitation Radar & Microphysics: Interpretation & Precipitation Estimation	Venkatachalam, Chandrasekaran	Elec. & Computer Engr.	NASA-Goddard
Nonnative Fish Control	Bergersen, Eric	CF&WRU	CDOW
International Satellite Cloud Climatology Project Sector Processing Center for GOES-9...	Vonderhaar, Thomas	CIRA	NOAA
Activities & Participation in DMSP Satellite Data Processing & Analysis	Vonderhaar, Thomas	CIRA	NOAA
Enhancement of Satellite Data Processing and Analysis Capabilities in Central America	Vonderhaar, Thomas	CIRA	NOAA
U.S. Weather Research Program Joint Grants Program Satellite Support for NOAA	Vonderhaar, Thomas	CIRA	NOAA
A Study of Boater Recreation on the Upper Colorado River, Colorado	Titre, John	NRRT	BLM

FEDERAL SPONSORS: BLM-Bureau of Land Management, COE-Corps of Engineers, DOA-Department of the Army, DOE-Department of Energy, DON-Department of the Navy, DOT-Department of Transportation, EPA-Environmental Protection Agency, HHS-PHS-Public Health Service, NASA-National Aeronautics & Space Administration, NBS-National Biological Survey, NOAA-National Oceanic & Atmospheric Admin., NPS-National Park Service, NRCS-Natural Resources Conservation Service, NSF-National Science Foundation, USBR-US Bureau of Reclamation, USDA/ARS-Department of Agriculture, Agricultural Research Service, USDA/NRS-Department of Agriculture, Natural Resources Service, USFS-US Forest Service, USDA-USFS-RMRS-Rocky Mountain Research Station, USFWS-US Fish & Wildlife Service.

STATE/LOCAL SPONSORS: CDA-Colorado Department of Agriculture, CDNR-Colorado Department of Natural Resources, CDPHE-Colorado Department of Public Health and the Environment, CDWL-Colorado Division of Wildlife, NCWCD-Northern Colorado Water Conservancy District.

OTHER SPONSORS: AWWA-American Water Works Assn., CID-Consortium for International Development.

UNIVERSITY DEPARTMENTS, INSTITUTES AND CENTERS: Colorado State: BSPM-Bioagricultural Sciences & Pest Management, CBE-Chemical & Bioresource Engr., CIRA-Cooperative Inst. for Research in the Atmosphere, DARE-Dept. of Agric. & Resource Economics, FWB-Fishery & Wildlife Biology, HLA-Horticulture & Landscape Architecture, NREL-Natural Resource Ecology Lab, NRRT-Nat. Resources Recreation & Tourism, RES-Rangeland Ecosystem Science. University of Colorado: ACAR-Aero-Colorado Center for Astrodynamical Research, AOS-Atmospheric & Oceanic Sciences, CADSWES-Center for Advanced Decision Support for Water and Environmental Systems, CEAE-Civil, Environmental, and Architectural Engineering, CIRES-Cooperative Institute for Research in Environmental Sciences, EPOB-Environmental, Population & Organismic Biology, IAAR-Institute for Arctic & Alpine Research, IBS-Institute of Behavioral Science, ITP-Interdisciplinary Telecommunication Program, LASP-Lab. For Atmos. And Space Physics, PAOS-Program in Atmospheric and Oceanic Sciences.

Title	PI	Dept	Sponsor
Hydraulic Resistance of Large Woody Debris in Step Pool Channels	Wohl, Ellen	Earth Resources	NSF
Study of Boater Recreation at Lake Sonoma, Sonoma County, California	Haas, Glenn	NRRT	COE
Design, Field Protocols & Advice on Data Analysis for Environmental Contaminant Studies	Anderson, David	CF&WRU	USGS
Development of Theory & Application of the Trapping Web for Estimating Density of Biological Populations	Anderson, David	CF&WRU	USGS
Responses of Hydrologic & Aquatic Ecosystem Processes to Potential Climate Change	Parton, William	NREL	USGS
Forest Management, Water Yield, & Water Quality: A State-Of-The-Art Assessment	MacDonald, Lee	CWRI	Denver Water
Land-Use Change in Central Colorado: Ecosystem Consequences of Urbanization	Burke, Ingrid	Forest Sci.	USDA-CSRS
Habitat Management Support in the Colorado Division of Wildlife	Roath, L. Roy	RES	CDOW
Long-Term Ecological Measurements in Loch Vale Watershed, Rocky Mountain National Park	Parton, William	NREL	USGS
Monitoring the Effects of the Bobcat Fire	Stednick, John	Earth Resources	RMRS
White River National Forest Boundary Analysis: Blue River Basin Study Area	Wallace, George	NRRT	NW Colo. Council of Govts.
Model Urban Aquatic Ecology/Hydrologic/Geomorphologic Relationships on Urbanizing Streams...	Roesner, Larry	Civil Engr.	NSF
High Line Canal Water Usage of Cottonwoods Study	Jacobi, William	Bioag. Sci & Pest Mgmt.	Denver Water
Monitoring & Modeling Isotopic Exchange between the Atmosphere & the Terrestrial Biosphere	Denning, A. Scott	CIRA	NOAA
Examination of the Linkages between the Northwest Mexican Monsoon & Great Plains Precipitation	Cotton, William	CIRA	NOAA
Services of Regional Atmospheric Modeling System (RAMS)	Pielke, Roger	Atmos. Sci.	Univ. of Puerto Rico
Quantitative Modeling of Channelized Flow within a Karst Stream	Wohl, Ellen	Earth Resources	NSF
Convective Cloud Systems in Climate Models	Randall, David	Atmos. Sci.	NSF
Restore Snake River Gravel Pit...	Cooper, David	Earth Resources	NPS
Management Practice Study II - County Land Use Impacts on Irrigation Districts	Wilkins-Wells, John	Sociology	USBR
Hydraulic Resistance of Large Woody Debris in Step Pool Channels	Wohl, Ellen	Earth Resources	NSF
Ecological, Hydrological & Geochemical Effects of the Cerro Grande Fire on Watersheds in Santa Fe National Forest...	Clements, William	FWLB	USGS
West Bay Diversion Sedimentation Predictions	Gessler, Daniel	Civil Engr.	COE
Characterization Channel Disturbance Regimes in Hydroclimatically Extreme Regions	Wohl, Ellen	Earth Resources	DOD
The Effects of Wet Weather Discharges on the Physical Character of Aquatic Habitat	Roesner, Larry	Civil Engr.	Water Environment Research Fdn.
Hydrologic Forecasting System Evaluation & Development Support	Johnson, Lynn	CIRA	NOAA
Enhancement of Satellite Data Processing & Analysis Capabilities in Central America	Vonderhaar, Thomas	CIRA	NOAA
Numerical Modeling of Smithland Lock & Dam:	Gessler, Daniel	Civil Engr.	AJS Hydro, Inc.
Monitoring of the Little Snake River & Tributaries	Bledsoe, Brian	Civil Engr.	Three Forks Ranch Corp.
Snow Distribution & Runoff Forecasting, Kings River Basin, California	Elder, Kevin	Earth Resources	COE
A Study to Determine the Effects of Fish Size & Release Location on the Survival of Rainbow Trout Fingerlings Stocked	Bergersen, Eric	CF&WRU	Montana State Univ.
Larval Fish Laboratory Involvement in Implementing Recovery Actions for the Endangered Fish. . .	Bestgen, Kevin R.	FWLB	USBR

Title	PI	Dept	Sponsor
Evaluation of Interspecific Sensitivity to Dietary Selenium Exposure: Razorback Sucker versus Flannelmouth...	Beyers, Daniel W.	FWLB	USBR
Assessment of Drifting Larval Fishes in the Yampa & Green Rivers	Bestgen, Kevin R.	FWLB	USBR
Testing a High-Sensitivity ATR-FTIR Water Monitor for Ionic CWA Breakdown Products	Strauss, Steven H.	Chemistry	COE
Ecological Effects of Reservoir Operations on Blue Mesa Reservoir	Johnson, Brett M.	FWLB	USBR
Riparian Vegetation Studies on the Green & Yampa Rivers	Cooper, David J.	Earth Resources	USBR
Applying Pam to Control Soil Erosion in Furrows in Western Colorado	Pearson, Calvin H.	Fruita Research Center	USBR
Yampa River Non-native Fish Control: Northern Pike Spawning & Nursery Habitat Evaluation	Hawkins, John A.	FWLB	USBR
Dam Foundation Erosion Study	Ruff, James F.	Civil Engr.	USBR
Assessment & Prediction of Effects of Selenium on Razorback Sucker	Beyers, Daniel W.	FWLB	USBR

**UNIVERSITY OF COLORADO
BOULDER, COLORADO 80309**

Title	PI	Dept	Sponsor
Beaufort and Chukchi Sea Seasonal Variability for Two Arctic States	Maslanik, James	ACAR	Univ. of Alaska
ARC-MIP: An International Intercomparison of Arctic Regional Climate Models	Lynch, Amanda	CIRES	Univ. of Alaska
Collaborative Research: Did the Laurentide Ice Sheet Cause Abrupt Climate Changes?	Lynch, Amanda	CIRES	Ohio State Univ.
Study of Land-Atmosphere Interactions Using Satellite Data Assimilation	Qualls, Russell	CEAE	Gen'l. Sciences Corp.
Atmosphere-Land Surface Interaction Over a Midwest Watershed...	Grossman, Robert	PAOS	NSF
Collaborative Research: Isotopic Characteristics of Precipitation Across the U.S. - Patterns and Processes	White, James	IAAR	NSF
Ice-Ocean-Atmosphere Interactions Along the East Greenland Margin on Decade to Century Timescales...	Jennings, Anne	IAAR	NSF
Using the Sheba Flux Data to Improve Regional and Global Climate Models	Grachev, Andrey	CIRES	NSF
A Theoretical Study on the Governing Laws for Fluid Transport in Rough Fractures	Ge, Shemin	Geological Sciences	NSF
Anisotropic Flow, Depth-Age Relationships and Stratigraphic Disturbances in Polar Ice Sheets: Collaborative Research with Univ. of Washington	Fletcher, Raymond	Geological Sciences	NSF
Sea Ice Variability in the Beaufort and Chukchi Seas: Processes and Prediction	Maslanik, James	ACAR	NSF
Channel Monitoring to Evaluate Geomorphic Changes on the Mainstem Colorado River	Pitlick, John	Geography	USBR
Mechanisms for Displacement of Greenback Cutthroat Trout in Montane Streams in Colorado	Lewis, William	CIRES	Ocean Journey
Deep-Water Polynyas: Formation, Maintenance and Relationship to Antarctic Climate	Lynch, Amanda	CIRES	Jet Propulsion Lab.
Impact of Barotropic Variability on Satellite Ocean Observations	Wahr, John	CIRES	Jet Propulsion Lab.
Biological Wastewater Processor Research Work Plan: Bench-Top Bioprocessor Experiments	Silverstein, Joann	CEAE	Honeywell Internat'l.
Snow Surface Roughness - Data Collection, Geostatistical Analysis, Relationship to Meteorologic Observations, and Relevance to Snow Hydrologic Models	Herzfeld, Ute	IAAR	NSF

Title	PI	Dept	Sponsor
Labrador Sea Variability Over Decade to Millennial Time Scales	Miller, Gifford	IAAR	NSF
Tree-Ring Based Records of Temperature and Glacial Fluctuation Spanning the Past Two Millennia, Prince William Sound, Alaska	Calkin, Peter	IAAR	NSF
Width Adjustment in Mixed-Load Rivers	Pitlick, John	Geography	NSF
Collaborative Research: History and Evolution of the Siple Coast Ice Stream System as Recorded by Former Shear-Margin Scars	Scambos, Theodore	CIRES	NSF
The Dynamics of Water Vapor in the Tropics	Mapes, Brian	CIRES	NSF
El Nino and the Tropical Maximum SST	Sun, De-Zheng	CIRES	NSF
Greenland Ice Sheet Climatology and Surface Energy Balance Modeling: Greenland Climate Network	Steffen, Konrad	CIRES	NSF
Laboratory Studies of Cirrus Cloud Formation Mechanisms	Tolbert, Margaret	CIRES	NASA
Relationships Between the Bulk-Skin Sea Surface Temperature Difference, Wind and Net Air-Sea Heat Flux	Emery, William	ACAR	NASA
Atmospheric Circulation and Regional Sea Ice Sensitivity in the Arctic	Lynch, Amanda	Aerospace Engr.	NASA
Analysis of Nitrogen Losses in a Constructed Wastewater Treatment Wetland	Smith, Lesley	CIRES	USGS
Collaborative Experiment for Pulsed Radar Visualization of Water Flow Paths in Snow	Williams, Mark	IAAR	DOD
Spatial and Temporal Response to Anthropogenic Nitrogen Deposition in a Heterogeneous Rocky Mountain Watershed	Wessman, Carol	CIRES	NASA

**COLORADO SCHOOL OF MINES
GOLDEN, COLORADO 80401**

Title	PI	Dept	Sponsor
The Role of Organic Acids in the Transport of U(VI) and Pb(II) Through Saturated Porous Media	Honeyman, Bruce	Environ. Sci. Engr.	NSF
Reductive precipitation and stabilization of uranium complexed with organic ligands by anaerobic bacteria	Honeyman, Bruce	Environ. Sci. Engr.	DOE/NABIR
Hydrocarbons in soils; end-point evaluation and comparison of remediation technologies	Illangasekare, Tissa	Environ. Sci. Engr	Union Pacific
Three-dimensional test-bed facility	Illangasekare, Tissa	Environ. Sci. Engr	NSF
International collaboration: establishing a porous media observational facility at the University of Kassel, Germany	Illangasekare, Tissa	Environ. Sci. Engr	NSF
Doctoral Fellowships in Computational Contaminant Hydrogeology	McCray, John	Geol. & Geol. Engr.	U.S. Dept. of Education
Vulnerability of Colorado Aquifers to Pesticides	McCray, John	Geol. & Geol. Engr.	CDPHE
Quantifying Site-Scale Processes and Watershed-Scale Cumulative Effects of Decentralized Wastewater Systems	Siegrist, Robert	Environ. Sci. Engr.	U.S. EPA





PUBLICATIONS

NEW CWRI PUBLICATIONS

Proceedings, High Altitude Revegetation Workshop No 14, CWRI Information Series No. 91. This proceedings includes papers given on the following topics: The Endangered Species Act and Reclamation, Reclamation Case Studies, Reclamation of Roads and Trails, Technical Issues in Reclamation, Bioengineering and Biocontrol, and Weeds and Seeds. The conference also included poster papers, which are also summarized in the proceedings. The 14th biannual High Altitude Revegetation Conference was held at the University Park Holiday Inn, Fort Collins Colorado on March 8-10, 2000. The conference was organized by the High Altitude Revegetation Committee in conjunction with the Colorado State University Department of Soil and Crop Sciences. The conference was attended by 232 people from a broad spectrum of universities, government agencies and private companies. The program included a field tour of the Rocky Mountain Arsenal National Wildlife Refuge. Available from: CE Resource Center, Colorado State University. Phone: 970/491-6198, FAX: (970) 491-2961, E-mail: cerc@vines.colostate.edu.

U.S. GEOLOGICAL SURVEY PUBLICATIONS

Contact the U.S. Geological Survey, Earth Science Information Center, Open-File, Reports Section, Box 25286, Mail Stop 517, Denver Federal Center, Denver, CO 80225 or call 303/236-7476 unless another source is provided.

Trends in Precipitation and Stream-Water Chemistry in the Northeastern United States, Water Years 1984-96, by D.W. Clow and M.A. Mast. July 1999. USGS Fact Sheet 117-99.

The Quality of Our Nation's Waters, Nutrients and Pesticides. 1999. Circular 1225 and USGS Fact Sheet 116-99.

Streamflow and Dissolved-Solids Trends, Through 1996, in the Colorado River Basin Upstream from Lake Powell – Colorado, Utah, and Wyoming, by J.E. Vaill and David L. Butler. 1999. Water-Resources Investigations Report 99-4097.

Review of Phosphorus Control Measures in the United States and Their Effects on Water Quality, by David W. Litke. 1999. Water-Resources Investigations Report 99-4007.

Pesticides in Streams of the United States—Initial Results from the National Water-Quality Assessment Program, by Steven J. Larson, Robert J. Gilliom, and Paul D. Capel. Water-Resources Investigations Report 98-4222.



WATER NEWS DIGEST

by Marian Flanagan

City to build park in reservoir's place

After draining the lower Spring Creek Reservoir five feet below the spillway last year, Steamboat Springs has decided to empty the old reservoir and build a park with a pond in its place. Built in 1903 as an early source of municipal drinking water, the dam was rated unsatisfactory last year and the reservoir was drained to a safer level. Problems included excessive seepage at the foot of the dam and an inadequate spillway, causing engineers to worry that a spring runoff or a storm-caused flood could cause a dangerous overflow at the lower reservoir. The dam will be breached by the end of October. Water will flow through large boulders before heading into the stream channel. The reservoir has not been used as a source of the city's drinking water for almost 40 years, but with a wooden deck and trails, it was maintained as a water recreation area. The city's cost to repair the dam would have been almost \$250,000, without dredging the accumulated silt from the reservoir. The parks department pushed for the construction of a park and the city offered \$50,000 out of the 2000 budget to breach the dam and begin the project. The final cost will depend on how high the bids come in. The parks department will begin running advertisements for bids and will award the contract to the most successful bidder on Oct. 13. The park itself may not be completed for a number of years since there is no money for it in the 2001 budget.

The Steamboat Pilot, 9/26/00

 **DROUGHT**
State task force monitors drought conditions

Drought conditions became so severe in Colorado this summer that the State Drought Task Force recommended that a never-before-used emergency drought plan be activated. The governor's office felt that putting the plan into effect wasn't necessary, but recommended close monitoring of the situation. Members of the Drought Task Force were told in mid-September that another winter with below-average snowfall and another summer similar to the one that just ended could require the plan to be used. Even though the emergency plan was never put in place, the task force held meetings monthly rather than quarterly to keep close track of how the drought was affecting the state. Jeff Brislaw of the Colorado Office of Emergency Management is chairman of the task force, which is composed of federal, state and local experts in water availability and people who monitor snowpack, reservoir storage and streamflows.

Denver Post 9/23/00

 **FLOOD**
South Boulder Creek poses danger in 100-year flood

More than 4,000 people are in danger of flooding along South Boulder Creek. Neighborhoods were allowed to develop in the path of the flood because water flow amounts in the event of a 100-year flood were misjudged. Flood experts say South Boulder Creek would turn into a raging torrent like the one that hit Fort Collins two years ago. A total of 1,310 structures, many built since the first studies, would be inundated. Efforts to correct the problem are being stalled by disagreement between the city and county on one side and the University of Colorado board of regents on the other. Options on the table include dams to hold back water at Colorado 93 and a mile away at U.S. 36; culverts to carry the water under the roads; and the deepening or rechanneling of South Boulder Creek to keep the water from flooding the Sans Souci mobile home park. The officials are expected to mix-and-match options to create a plan, and then send it out for community comment.

Denver Rocky Mountain News, 9/19/00

 **LITIGATION**
Colorado awaits ruling on Republican River

The congressionally approved compact among Colorado, Nebraska and Kansas divides the flow of the Republican river among the three states. In 1998, Kansas sued Nebraska, alleging that Ogallala water within the Republican River basin is hydrologically connected to the Republican River. For that reason, argued Kansas, Ogallala depletions should be included in compact accounting. The Special Master appointed by the Supreme Court subsequently agreed with Kansas. This summer, Nebraska filed a cross-claim against Colorado on the theory that Colorado is overpumping the Ogallala to the detriment of the river, whose basin includes sections of Yuma, Kit Carson, Sedgwick, Logan, Washington and Licoln counties. The Colorado State Engineer's office has concluded that the aquifer has declined 20 percent in the past 25 years. State Attorney General Ken Salazar will defend Colorado's position Oct. 16 and 17 before the Special Master during a hearing in the 8th .S. Circuit Court of Appeals in Kansas City, but said he doesn't expect the dispute to be resolved for another four to six years.

Denver Post 9/27/00

 **RECREATION**
Where's the fish? Legislators hear about hot wildlife issues

Fish and elk were on the public's mind at a legislative committee meeting Sept. 11 at the Pueblo Convention Center. The interim legislative committee studying Division of Wildlife issues heard public testimony at the start of the meeting. Concerns were voiced that the DOW seems to have stopped or reduced the stocking of kokanee salmon in reservoirs like Eleven Mile, that no 4-year-old salmon at were caught there last year or the year before because when they are caught they are not released. Continue to stocking of these fish are very important. One man from Pueblo who has helped with DOW fishing programs for youth, told the committee he's worried about population growth and the lack of new fishing areas in Colorado as well as the amount of money the DOW is spending on whirling disease.

The Pueblo Chieftain, 9/12/00

 **THREATENED/ENDANGERED SPECIES**
Colorado River endangered fish an issue here?

Although it is headquartered in Pueblo, the Southeastern Colorado Water Conservancy District has been heavily involved in the debate on how to save four species of endangered fish in the Colorado River. The humpback and bonytail chub, the pike minnow and the razorback

sucker live in the Colorado River and are listed as endangered species by the U.S. Fish and Wildlife Service (USFWS). Because the Fryingpan-Arkansas project was started before the Endangered Species Act became law, conservancy district officials argued for years that the project was exempt from rules created by the Act. One of those rules requires Federal projects be studied by the Fish and Wildlife Service for their effects on endangered species. Water users such as the district feared any ruling that said the projects affected the species because it kept them from diverting all their water. The USFWS's plan to save the fish called for restocking and habitat creation. The plan also calls for getting more water flowing in the river stretches where the fish live during certain times of the year. Late last year, water users struck a deal with the USFWS. In exchange for projects being studied as a whole, rather than project-by-project, the water users agreed: (1) not to oppose the recovery plan, (2) not to operate their water projects in a way that undercut the recovery program, and (3) to provide 10,800 acre-feet of water each year for the recovery program. The group of water users included every entity that pulls water from the Western Slope to eastern regions, including the Northern Colorado Water Conservancy District and Denver, Colorado Springs and Aurora. For the present, Denver-owned water will be used to meet the 10,800 acre-foot requirement, but within 15 years, a permanent source for the required water must be found. Although no federally listed endangered fish species exist in the Arkansas Valley, several small fish species are listed by the state as endangered species. Those fish, which include the Arkansas River shiner and the plains minnow, don't pose an immediate water concern, but they may in the future.

The Pueblo Chieftain, 9/25/00, Leadville Herald Democrat, 9/6/00

WATER SUPPLY/DEVELOPMENT

Interior approves Animas-La Plata water project

The Animas-La Plata has won final Interior Department (DOI) approval, a step backers say could help push the measure forward in Congress. The DOI endorsed a finding that the planned project is the most environmentally responsible way to provide water to two Ute tribes in southwestern Colorado. Animas-La Plata could end up as a last-minute addition to a spending bill — Senate sponsor Ben Nighthorse Campbell (CO) is a member of the Appropriations Committee, which writes the spending measures. Animas La Plata has also received approval from EPA.

Fort Collins Coloradoan 9/27/00

California ruling backs farms' water rights

The California Supreme Court has invalidated part of a carefully negotiated water pact that required farmers in the Mojave River Basin to limit their use of the precious resource. The court ruled that agreements between cities and farmers cannot automatically supersede the state's 150-year old water policy, which favors landowners with the oldest water rights. Dozens of cities, water agencies and farming concerns filed briefs in the case.

Fort Collins Coloradoan 8/22/00

Douglas County residents support Rueter-Hess reservoir proposal; water managers also look at other options

Keeping pace with population growth, a concern of Douglas county residents, probably led to 77 percent support of the Parker Water and Sanitation District's Rueter-Hess reservoir proposal in a recent poll of 403 residents. Area homeowners are becoming increasingly aware that their water source — groundwater — is "finite," says the manager for Parker's water district. Approximately 85 percent of Douglas County residents use non-renewable water from the Dawson, Denver, Arapahoe and Laramie-Fox Hills aquifers — all in the Denver basin. Plans call for the Rueter-Hess reservoir to have a capacity of 16,200 acre-feet of water, about a third the capacity of Cherry Creek Reservoir. Water rate increases will cover the cost of the reservoir. The Rueter-Hess reservoir is named for former Parker-area rancher Rosie Rueter-Hess.

The East Cherry Creek Valley Water and Sanitation District and Douglas County Water Resource Authority also are looking at a 15-mile, \$20 million pipeline to help keep quickly growing areas in Arapahoe and Douglas counties afloat. The East Cherry Creek District would build the pipeline if it can obtain excess Western Slope water. Douglas County water providers are participating in a study with the Denver Water Board and the Colorado River Water Conservation District to determine whether it is feasible to buy excess water from the West Slope. The East Cherry Creek district has already bought a pump station for \$18.5 million, and hopes to split some of the cost with other water districts that could tap into the line.

Denver Post 6/7/00, Fort Collins Coloradoan 8/12/00



Camp Hale may provide water source for Vail, Aurora and Colorado Springs

For Vail, Aurora and Colorado Springs, Camp Hale, located 15 miles north of Leadville, may serve as a massive storage area for new water supplies. The camp, where the Army's 10th Mountain Division once trained, sits on a large aquifer that the cities believe could be used as an underground reservoir. The plan is one of five proposals to come out of the Eagle River Assembly, an informal group that includes almost everyone owning rights along the river. Combined, the three cities could gain 30,000 equally divided acre-feet of storage capacity if the project is built. Aurora and Colorado Springs own senior water rights along the Eagle River and several small tributaries. Through pipelines and an enlargement of Eagle Park Reservoir, enough water to meet the demands of an additional 100,000 people between the two cities. Eagle County and Vail would need about half of the water capacity in the next decade, smaller towns need the water for growth, and Vail wants it to increase its snowmaking capability and ensure consistent stream flows. Using the Camp Hale aquifer, water could be strategically pumped in and out depending on need, having little impact on the environment, says Aurora Utilities Director Tom Griswold. The plan is similar to the one in Park County, where Aurora has been fought by residents and county officials who say pumping water in and out will affect the quality of their wells and the water table in the area. At Camp Hale, the issue is moot, because no one lives in the area. If the Camp Hale project is built, Griswold says the cities would help restore wetlands in the area and stabilize water flows in the surrounding rivers and streams for fishing.

In July, the battle over South Park's water began in a high school cafeteria converted to a courtroom. The case that Aurora will present to Judge Jonathan Hays relies almost entirely on computer models to demonstrate that no other water supplies will be dried up inadvertently in tapping the aquifer beneath the Sportsmen's Ranch, Aurora's partner in the South Park Conjunctive Use Project, or CUP. Fearing that the project will drain their water from underneath them, objectors include local ranchers and homeowners, the federal government, the state engineer, the Denver Water Board and water conservancy districts. The debate centers on using the aquifer as underground storage and supply: unseen, difficult to measure, and a potential drain on water from nearby wells and streams that are also connected to the aquifer. All sides are prepared to dig in for the long haul.

Denver Post 7/11/00 and 9/10/00

Broomfield plans to buy water

City leaders anxious to lock in sufficient water for continued development are expected to approve an \$8 million bond today to buy 665 units of Colorado-Big Thompson (CB-T) water. The purchase is expected to cover Broomfield's anticipated growth for the next three to four years. Under the plan, Broomfield will buy a total of 1,000 units from the C-BT water supply, which also serves Boulder, Fort Collins, Greeley and several other municipalities. The 335 units not covered by the proposed \$8 million bond, are funded by previously approved bonds. The 1,000 units would be enough to serve about 1,400 homes annually. The current purchase price is \$12,000 to \$15,000 per unit, and in some cases has risen to \$17,000 per unit. (Each unit sold for about \$2,000 when Broomfield began purchasing the water in 1995. Water is expected to increase to up to \$50,000 per unit in 20 years.) City leaders predict all C-BT units will be sold within the next seven to eight years, and they want to guarantee the continued provision of water to Broomfield whose growing population is expected to increase from 39,000 to 67,000, by 2020. One of a series of water projects, initiated in 1991, and funded by a \$75 million grant from the Department of Energy, include purchasing replacement water from the Windy Gap project and the C-BT water supply, building a pipeline from Carter Lake to Broomfield and constructing a new replacement water treatment plant. Since 1995, Broomfield has purchased 7,776 units from the C-BT watershed.

The Broomfield News, 9/26/00

Water district takes steps to enlarge two reservoirs

The Southeastern Colorado Water Conservancy District has taken the first of many steps necessary to enlarge Pueblo and Turquoise reservoirs to meet expected population growth. The district's board intends to appropriate water rights for enlargement of the reservoirs and to seek an exchange of Fryingpan-Arkansas Project water. The Fryingpan-Arkansas project is made up of dams, reservoirs and water-diversion tunnels. Each year, it collects about 69,000 acre-feet of water from the Western Slope and delivers it via the Arkansas River to the Front Range and Eastern Plains. The district, which manages the water supply for nine counties and stretches from Buena Vista along the Arkansas River to Lamar, also includes El Paso County because Fountain Creek is a major tributary. Projections show that in 40 years, the district's population will double and an additional 122 acre-feet of water will be needed annually. Near Leadville, the Turquoise Reservoir, would be enlarged by an additional 19,000 acre-feet, and Pueblo Reservoir by 54,000 acre-feet. An acre-foot is enough water for a year for an average family of four. The conservancy district will ask Congress for authority to conduct a study that will determine whether the district's plan to store more water will work. That study should take about three years. Once the study is completed and approved, the district would have to go back to Congress to ask for authority to enlarge the reservoirs. It will cost an estimated \$90 million to expand the reservoirs, and that money would come from cities served by the district.

Denver Post Southern Colorado Bureau, 9/26/00



 WATER QUALITY**Cherry Creek algae must be reduced**

The State Water Quality Control Commission (WQCC) has adopted a tough new standard for Cherry Creek and has instructed state, regional and metro water quality agencies to figure out a way to achieve the standard. The WQCC plan measures algae more directly based on the amount of chlorophyll in the water. Under the current method of measuring phosphorus, chlorophyll levels were supposed to be limited to 15 m/L (micrograms per liter), which is the new standard proposed by the WQCC. Actual chlorophyll levels have jumped from 21 m/L to 27 m/L in 1999. Algae are the foundation of the reservoir's prized walleye fishery, but too much of it can deplete oxygen and fill the lake bottom with muck. The new standard replaces a 15-year old phosphorus standard that the lake never met. In August, the Cherry Creek Basin Water Quality Authority asked the Denver Regional Council of Governments to support a doubling of the old standard. The manager of the authority applauded the state's offer to take the lead, but said it would be tough to find cost-effective measures to meet the challenging standards adopted by the WQCC.

Denver Post 9/9/00 and 9/13/00

Colorado drinking water standards too tough?

The National Research Council, an arm of the National Academy of Sciences, has issued a report suggesting that Colorado's drinking water standards for the chemical disopropyl methylphosphonate, or DIMP, are too tough. This gives the Army new support over "safe" levels of the contaminant, found in groundwater flowing from the Rocky Mountain Arsenal. The EPA standard allows up to 600 parts per billion in water, while the Colorado standard is set at 8 ppb. An Army spokeswoman said it was too early to say what request the Army might make of the state in light of the study.

Meanwhile, while most of Colorado's drinking water is safe, 95 privately operated public drinking water systems around the state contain arsenic levels that exceed the EPA's new standards, a state audit report says. These are systems that get their water from underground wells where arsenic is found naturally in bedrock formations, says David Holm, Head of the Colorado Water Quality Control Division. According to the audit, more than 97 percent of the state's 2,200 public water systems were in compliance with federal drinking-water standards in 1997. In 1998, about 90 percent of the state's streams met standards.

Denver Post 7/31/00 and 8/29/00

Lyons officials see clearly on water

The water quality in Lyons clearly improved this summer. Now Lyons must decide if it can afford the million-dollar price tag to make the temporary improvements permanent. Improving water clarity was the first step of many to bring Lyons in compliance with strict EPA regulations that start in 2003. Lyons water suffers from turbidity every spring, which turns clear mountain water chalky brown during runoff. It is not dangerous but it sometimes contains bacteria. From June through August, the town experimented with a new Zenon water filtration system as part of a \$60,000 state environmental grant to study ways to upgrade the town's aging water system. The preliminary results are excellent: far below the EPA allowable standards. The summer's turbidity with the new filter was .03 or .04 microns, down from 5.0 to 1.0. The town is negotiating with Zenon Corp. for a permanent filtration system; however, water storage is the priority. Fixing that problem could cost between \$4.4 million and \$10 million, depending on the options.

The Boulder Daily Camera, 9/19/00

Slurry kills fish

Slurry used to fight the Eldorado Fire apparently spilled into South Boulder Creek, killing an undetermined number of fish, officials said. A Boulder woman said her 13-year-old son saw about 25 dead fish in the creek and then another 50 the next day. Studies have shown that a red retardant chemical — made with sodium ferrocyanide and ammonia — is toxic to some aquatic life when it is exposed to sunlight. When UV rays contact the substance, the toxicity increases 100-fold, according to a study conducted earlier this year by researchers at the U.S. Geological Survey. The federal government instructed the manufacturer to produce a fire retardant that does not contain sodium ferrocyanide by 2004, when the Forest Service takes bids. Primarily concerned with the aquatic habitat, Boulder officials will be keeping a close eye on South Boulder Creek in coming months as intense loading in the stream can occur from erosion following the fire. The creek is not a part of Boulder's water supply. Fire crews used 125,000 gallons of slurry mainly to reduce the fire risk to structures. On Saturday, the water board began diverting water away from the Moffat Treatment Plant, which feeds South Boulder Creek above Gross Reservoir, to avoid possible contamination from the slurry. Gross Reservoir is part of Denver's municipal water supply. The diversion will continue until water quality tests can be conducted.

The Boulder Daily Camera, 9/20/00



GS 592
WATER RESOURCES SEMINAR
Allocating Colorado's Liquid Gold: Meeting the Needs of the New West
Fall 2000 — 4:10pm, Tuesday — Room C362 Clark Building

The Fall 2000 offering of the Water Resources Seminar (GS 592) will examine a number of issues surrounding changing water demands in the New West and efforts to supply the water.

<u>Date</u>	<u>Topic/Speaker</u>
October 24	Student Synthesis of water needs to support a healthy western ecosystem (by student team)
October 31	"The Metro Water Supply Investigation – need for a similar statewide investigation?" - Hal Simpson, Colorado State Engineer
November 7	"Developing new water supplies for Colorado via an S.B. 215 approach" - Chris Paulson, Friedlob, Sanderson, Raskin, Paulson and Tourtillott, Denver
November 14	"West slope perspective on water transfers and future water needs" - Kathleen Klein, Manager, Upper Gunnison Water Conservancy District
November 21	Thanksgiving Holiday
November 28	Student Synthesis of approaches available to Colorado to meet future water needs of the New West (by all students in the seminar)

Students interested in taking the one-credit seminar should sign up for GS 592, Water Resources Seminar, Reference number: 249436. The seminar will be held 4:10pm Tuesday afternoons in Room C-362 Clark Bldg. Beyond being expected to attend all seminars, students taking the seminar for credit will work with a group of students from other water-related disciplines to prepare an in-depth, interdisciplinary, analysis of a New West water topic in which they are interested and the instructors approve. (Students who have enrolled in GS 592 in the past, can also enroll for this offering.)

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

FOR CSU DEPARTMENT SEMINARS SEE THE FOLLOWING WEB SITES:

Bioag Sciences and Pest Mgmt.	http://www.colostate.edu/Depts/bspm/SEMINAR/seminar%20schedule.html
Soil & Crop Sciences	http://www.colostate.edu/Depts/SoilCrop/deptinfo.html — (this page links to seminars)
Atmospheric Science	http://www.atmos.colostate.edu/seminar/semschedf00.html
Civil Engineering	http://www.engr.colostate.edu/depts/ce/
Earth Resources	http://www.cnr.colostate.edu/ER/seminars/index.html
Fishery & WL Biology	http://www.cnr.colostate.edu/FWB/seminar2.htm
NREL	http://www.nrel.colostate.edu/news/calendar.html#week
Environmental Health	http://www.cvmbs.colostate.edu/enhealth/departments/seminars2000.html
Microbiology	http://www.cvmbs.colostate.edu/microbiology/ — (takes you to home page)

CALLS FOR PAPERS

ANNOUNCEMENT AND CALL FOR PAPERS/POSTERS

***The Future of Water Quality Monitoring in Colorado:
Collaboration, Cooperation, and Communication***
A Joint Conference Presented by
Colorado Water Quality Monitoring Council
American Water Resources Association—Colorado Section
March 15 - 16, 2001 -- Mt. Vernon Country Club, near Golden, Colorado

Over the past year, a number of federal, state, and local agencies; academia; volunteer groups and environmental organizations; consultants; and professional organizations including the Colorado Section of AWRA have met to consider the formation of a group which would collaborate on water quality monitoring issues in Colorado. A National Monitoring Council was formed in 1997 to provide a coordinated national perspective on monitoring issues. Since then, several State-level monitoring groups have been created. The Colorado Water Quality Control Division, United States Geological Survey, and Colorado Water Resources Research Institute conducted a number of stakeholder meetings to consider the creation of a water quality monitoring group for Colorado. The stakeholders affirmed that such a monitoring group could be of great benefit.

In response, the Colorado Water Quality Monitoring Council was established to serve as a statewide collaborative body to help achieve effective collection, analysis and dissemination of water quality data, and monitoring information. The council addresses a full range of water quality information, including chemical, biological, and physical characteristics of surface and groundwater. The goals established for the Council include:

- To provide a forum for effective communication, cooperation, collaboration, and documentation among individuals and organization involved in monitoring.
- To promote the development of collaborative and cost effective watershed-based monitoring strategies.
- To promote the use of quality assurance procedures and protocols related to sample collection, analytical methods, assessment, data management, and distribution.
- To provide strategic direction for a statewide water quality monitoring network.

CONFERENCE TOPICS

The primary purpose of this one and one-half day conference is the furtherance of these goals. An optional tour of the new USGS National Water Quality Laboratory is scheduled for the afternoon of March 16th. The Council and the Colorado Section of AWRA invite you to participate in this groundbreaking conference and share your perspectives and experiences as we explore the following water quality monitoring topics:

- **Public Awareness & Stakeholder Outreach**— efforts to heighten public awareness and public involvement in water quality monitoring.
- **Institutional Collaboration**— efforts to build creative partnerships to foster collaboration among the water quality monitoring community.
- **Data Management**— ways of improving the management and accessibility of water quality monitoring data through technology and efforts to increase data sharing, public access, and utility.
- **Water Information Strategies**— how we can enhance the accountability of water quality monitoring to produce information that supports water quality management needs.
- **Methods and Data Comparability**— explore approaches to measurement that facilitate collaboration and yield comparable data and assessment results. This includes discussing: techniques to allow rapid communication and comparison of critical methods related parameters, and how this information is to be reported; and information on state-of-the-art measurement methodologies used to provide monitoring data on inorganic, organic, biological, and microbiological analyses in the environment.
- **Monitoring Interactions Among Watershed Components**— explore consistent and scientifically defensible basis and criteria for monitoring the quality of ground water, and for demonstrating how the interaction of this resource with other components of the watershed can impact the ecological integrity of the entire system.



Please submit a 1-page abstract on your proposed oral or poster presentation by December 15, 2000. Abstracts accepted for presentation will be compiled and made available at the Conference. Approximately 15 minutes will be allowed for each presentation, followed by a brief (5-minute) period for questions. Please send your abstract to:

American Water Resources Association, Colorado Section
P.O. Box 9881
Denver, CO 80209-0881



For further information, please contact Matt Cook, AWRA CO Section President at 970-667-8690 (E-mail mcook@waterconsult.com). E-mail submittals are encouraged in MS Word format. Please distribute copies of this announcement to your co-workers, colleagues, competitors, and adversaries. We look forward to lively and informative discussions!!!

MEETINGS

COLORADO WATER CONSERVATION BOARD BASIN MEETINGS

The Colorado Water Conservation Board (CWCBC) is holding a series of open house meetings through December 2000. The meetings, to be held in locations throughout the state covering each of Colorado's eight major river basins, will each be hosted by the Board Member representing that basin, along with CWCBC staff. Reports on the meetings will be prepared and provided to all of the Board Members, and summaries will be posted on the CWCBC web site (<http://cwcb.state.co.us>). These meetings and the subsequent meeting reports will be an important component in the revision of CWCBC's long-range plan. The CWCBC was created in 1937 and operates under the direction of a 15-member board. The board is comprised of nine citizen members who represent the eight major river basins and the City and County of Denver, along with the Department of Natural Resources Executive Director, the Commissioner of Agriculture, the Colorado Attorney General, the State Engineer, the Division of Wildlife Director, and the CWCBC Director. The CWCBC is required by law to:

- Promote the conservation of the water to secure its greatest utilization;
- Foster and encourage others to conserve, develop, and utilize Colorado's waters; and
- Promote and implement measures to enhance water use efficiency, assure the availability of adequate supplies for future uses and assure necessary water services are provided at a reasonable cost.

The objectives of the Basin Meetings will be:

- to present information on CWCBC's mission and programs currently administered by the Board staff – members of the CWCBC staff will make presentations on each of the major programs including: Water Supply Planning and Finance; Water Conservation Planning; Flood Protection; Stream and Lake Protection; and Water Supply Protection (including Decision Support Systems) to receive feedback from the public on services CWCBC currently provides in the Basin;
- to facilitate discussion between the public and the Board Member and CWCBC staff on priorities and future needs of the Basin, and to identify ways the CWCBC could help address these needs and priorities; and
- to review and identify additional information needs for the new CWCBC River Basin Fact Sheets, currently available in draft form on the CWCBC web site at <http://cwcb.state.co.us>

Times, dates, and locations of meetings are listed below. Further information will be posted on the CWCBC web site as they are confirmed. For more information, call the CWCBC at (303) 866-3441 or contact Basin Meeting Coordinator Cat Shrier at cshrier@lamar.colostate.edu.

BASIN	DAY, DATE, TIME	LOCATION
North Platte	Tuesday, October 17, at 7 pm	Wattenberg Center at the Fairgrounds, Walden
Yampa-White	Wednesday, October 18 at 2:30 pm	Hayden Town Hall, Hayden
Yampa-White	Wednesday, October 18, at 7:30 pm	Fairfield Community Center, Meeker
Colorado Mainstem	Thursday, October 19, at 7:30 pm (after WSWC reception)	Adams Mark Hotel, Grand Junction
South Platte	Tuesday, October 24, at 6:30 pm (after SP Forum reception)	Raintree Hotel, Longmont
Colorado Mainstem	Thursday, November 2, at 7 pm	Summit County North Branch library, Silverthorne (next to Town Hall)
South Platte	Wednesday, November 15, at 6 pm	Fairplay Fire Station, Fairplay
South Platte	Thursday, November 16, at 6 pm	Ramada Inn, Sterling



Money Flowing Through the South Platte Basin: The Business of Water
The 11th Annual South Platte Forum — October 24-25, 2000
Raintree Plaza Conference Center -Longmont, Colorado

2000 South Platte Forum -- Tuesdav. Oct. 24

- 8:00 a.m. **Registration and Continental Breakfast**
- 8:30 a.m. **Welcome**
Robert Ward, Colorado Water Resources Research Institute
- 8:45 a.m. **Session 1**
Changing Conditions in the South Platte – Can we supply the demand?
 Moderator:
Dr. Evan Vlachos, Colorado State University, Department of Sociology
 Title TBA
Dr. Marie Livingston, University of Northern Colorado, Department of Economics
An Economist's View of Competition For Water In The South Platte
- 9:45 a.m. Break
- 10:15 a.m. Session 1 continues
Eric Wilkinson, Northern Colorado Water Conservancy District
An Overview of South Platte Basin Supply Issues
Steve Boand, HydroLogic Technology
Replacement of the Sustainable Water Supply Deficit in the South Denver Metropolitan Area
- 11:45 a.m. **Keynote Luncheon**
David Robbins, Hill and Robbins
 Title TBA
- 1:00 p.m. **Session 2**
The Skyrocketing Price of Water – Are we getting soaked?
 Moderator: Mike Smith, City of Fort Collins
Everrett Schneider, WW Auctions and Real Estate
Water Issues from a Broker's Point of View
Frank Jaeger, Parker Water and Sanitation District
Obtaining Water for a Growing City in a Semi-arid Region
Mike Applegate, Larimer/Weld Water Issues Group
 Title TBA
- 2:15 p.m. Break
- 2:45 p.m. **Session 3**
How Much Green to Keep It Clean?
 Moderator TBA
Dr. John Loomis, Colorado State University, Department of Agriculture and Resource Economics
Measuring the Total Economic Value of Restoring Ecosystem Services in the Platte River Basin
Laurie Rink, Mile High Wetlands Group
Wetland Mitigation Banking – A Green Solution for the South Platte Basin
Jack Odor, Groundwater Appropriators of the South Platte (GASP)
Hey Mister! How much would you take for that water you own?
Bob Sanders, Ducks Unlimited
 Title TBA
- 4:30 p.m. **Poster Session and Social Hour**
- 6:00 p.m. **Day 1 ends**

2000 South Platte Forum -- Wednesday, Oct. 25

- 8:00 a.m. **Continental Breakfast**
- 8:30 a.m. **Opening Keynote**
Bill Jackson, Greeley Tribune
A Changing Agriculture
- 9:15 a.m. **Session 4**
Growing Crops or Growing Houses – Rural v. Urban Water Competition
Moderator: Doug Kemper, City of Aurora Water Resources Division
Barbara Kirkmeyer, Weld County Commissioners
Title TBA
Dr. Marshall Frasier, Colorado State University, Department of Agriculture and Resource Economics
Title TBA
- 10:00 a.m. **Break**
- 10:30 a.m. Session 4 continues
Tom Pointon, Arkansas Valley Producer
Can Agriculture and Municipalities Both Survive in the Future?
Speaker TBA
- 11:40 a.m. **Break**
- 12:00 p.m. **Keynote Luncheon**
Governor Richard Lamm
An Alternative Future for Colorado
- 1:00 p.m. **Conference ends**

Poster Session

These and other posters will be displayed throughout the conference and will be available for viewing during breaks. The official staffed poster session will be 4:30 – 6:00 p.m., Tuesday, Oct. 24, during the social hour.

South Platte Decision Support System – Goals and Objectives

Ray R. Bennett – Colorado Division of Water Resources

Dynamic Systems Modeling: A Method for Integrating the Diversity of Water Management Systems

Jim B. Finley and Barry Carlson – HIS GeoTrans, Westminster

Valuing Irrigation Water in the Platte River Basin

Eric Houk, Marshall Frasier and Garth Taylor – Dept. of Agriculture and Resource Economics, Colorado State University

Recent Findings on Habitat Use by State-threatened Brassy Minnow across a Gradient of Intermittency in an Eastern Colorado Plains Stream

Julie A. Scheurer and Kurt D. Fausch - Department of Fishery and Wildlife Biology, Colorado State University

Mitigating the Effects of a Reservoir Sediment Release on the Downstream Channel: A Case Study from the North Fork Cache La Poudre River

Sara L. Rathburn – Department of Earth Resources, Colorado State University

To request information about the conference, contact:

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Colorado Water Resources
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410N University Services Center
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or 970/491-6308
FAX: 970/491-1636

CALENDAR



Oct. 24-25	11TH ANNUAL SOUTH PLATTE FORUM, Longmont, CO. Contact: Jennifer Brown at Phone 970/491-1141, FAX 970/491-2293.
Nov. 8-10	STUDENT WATER SYMPOSIUM, Colorado State University, Fort Collins, CO. Contact: mmatter@engr.colostate.edu.
Nov. 13-15	ASKING THE RIGHT QUESTIONS: EVALUATING THE IMPACT OF GROUNDWATER EDUCATION, Nebraska City, NE. Phone 1-800-858-4844, 402-434-2740, Fax 402/434-2742, or E-mail cindy@groundwater.org.
Nov. 15	A REVIEW OF FEDERAL ENVIRONMENTAL LAWS, Denver, CO. Contact: Colorado Water Congress, Phone 303/837-0812, FAX 303/837-1607, Website http://www.cowatercongress.org .
Nov. 16	FOREST MANAGEMENT & WATER RESOURCES, Denver, CO. Contact: Colorado Water Congress, Phone 303/837-0812, FAX 303/837-1607, Website http://www.cowatercongress.org .
Nov. 17	WORKSHOP ON LEGAL ETHICS IN WATER & ENVIRONMENTAL LAW, Denver, CO. Contact: Colorado Water Congress, Phone 303/837-0812, FAX 303/837-1607, Website http://www.cowatercongress.org .
Dec. 4-6	45TH ANNUAL NEW MEXICO WATER CONFERENCE, Water Growth and Sustainability: Planning for the 21st Century, Albuquerque, NM. Contact: New Mexico Water Resources Research Institute, Phone 505/646-4337, FAX: 505/646-6418, website at http://wrri.nmsu.edu/ .
Dec. 4-7	INNOVATIVE TECHNOLOGIES FOR PLANNING ANIMAL FEEDING OPERATIONS -- COMPREHENSIVE NUTRIENT MANAGEMENT PLANNING, Denver, CO. See websites http://www.co.nrcs.usda.gov , http://www.swcs.org , and http://www.highplainspilot.com .
Dec. 13-14	GROUND WATER: A TRANSBOUNDARY, STRATEGIC AND GEOPOLITICAL RESOURCE, Assoc. of Ground Water Scientists and Engineers Annual Meeting, Las Vegas, NV. See the webpage http://www.ngwa.org/education/agwse2.html .
Jan. 15-18	CONFERENCE ON TAILINGS AND MINE WASTE '01, Fort Collins, CO. Contact: Linda Hinshaw, Dept. of Civil Engr., CSU at Phone 970/491-6081, FAX 970/491-3584, email lhinshaw@engr.colostate.edu.
Jan. 25-26	COLORADO WATER CONGRESS 43RD ANNUAL CONVENTION, Holiday Inn - Northglenn, CO. Contact: Colorado Water Congress, Phone 303/837-0812, FAX 303/837-1607, Website http://www.cowatercongress.org .
Jan. 25-26	SYMPOSIUM ON SPATIAL METHODS FOR SOLUTION OF ENVIRONMENTAL AND HYDROLOGIC PROBLEMS, Reno, NV. Contact A. Ivan Johnson, 7474 Upham Court, Arvada, CO 80003-2758, Phone 303/425-5610, Fax 303/425-5655.
Mar. 22-23	ARKANSAS RIVER BASIN WATER FORUM, Lamar, CO. Contact: Tom Pointon at 719/456-0413.
Aug. 19-24	LINKING STORMWATER BMP DESIGNS AND PERFORMANCE TO RECEIVING WATER IMPACTS MITIGATION, Snowmass, CO. Contact: Ben Urbonas at 303/455-6277; 303/455-7880, Email burbonas@udfcd.org.

COLORADO WATER CONGRESS MEETINGS

CWC Workshop – A Review of Federal Environmental Laws
 CWC Conference Room, 1580 Logan St., Suite 400, Denver, CO
 November 15, 2000

CWC 43rd Annual Convention
 Holiday Inn – Northglenn, I-25 & 120th Ave., Northglenn, CO
 January 25-26, 2001

For details and registration forms see the CWC web page at
<http://www.cowatercongress.org> or contact the Colorado Water Congress at 303/837-0812.

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