

COLORADO WATER

Newsletter of the Colorado Water Resources Research Institute, Fort Collins, Colorado 80523

WATER ITEMS AND ISSUES . . .

August 1992

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STATE ENGINEER AND WATER CONSERVATION BOARD DIRECTOR APPOINTMENTS ANNOUNCED

On Friday, August 7, Department of Natural Resources Executive Director Ken Salazar and the Colorado Water Conservation Board (CWCB) announced the appointments of Harold "Hal" Simpson as state engineer and Daries "Chuck" Lile as director of the CWCB. CWCB Chairman Tyler Martineau said members were unanimous in their support for both appointments. (See page 19)

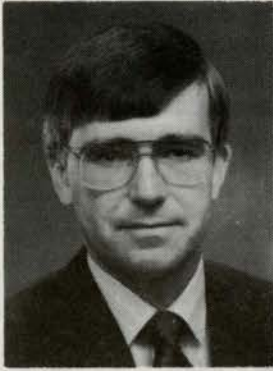
Lucy High, Director of the Colorado Water Workshop, outlines the schedule for participants at the workshop's July meeting (See page 20)

Research Opportunity

The Southwest Center for Environmental Research and Policy has issued a Request for Proposals that address the environmental problems existing in the border areas between the United States and Mexico.

Contact your Contracts and Grants Office for details. **Deadline: September 18, 1992.**





WATER CONFERENCES!

Editorial by Robert C. Ward

Over my first 10 months as CWRRI Director, I've attended a number of water meetings, conferences and workshops. They have been, in general, very informative, well-attended, and excellent forums for discussing our diverse views on water.

The talks and discussions of these meetings usually center around the water concerns of the sponsoring organization's mission. These concerns deal with specific watersheds; land/water/ecology relationships; specific water uses; legal, institutional and political developments; and emerging water quality and environmental concerns.

Colorado Water attempts to announce water meetings being held in Colorado in sufficient detail to guide water professionals and managers and interested citizens to the meetings most relevant to their needs. Anyone planning a water meeting in Colorado is encouraged to forward a meeting announcement to *Colorado Water* editor Shirley Miller.

As we list the water meetings in each newsletter and as I attend many of them, I try to view the Colorado water meeting scene from the perspective of an attendee. With limited time and tightening finances, it is increasingly difficult to attend all relevant water meetings. Further complicating the Colorado water meeting scene is the increasing complexity of Colorado water management. Are all the new dimensions of water management being covered adequately? On the other hand, are there water topics being addressed too often?

Would it be advisable for those of us who organize water meetings in Colorado to coordinate our meeting plans in order to better serve the water professionals, managers, and citizens in the state?

TWO COLORADOANS ELECTED TO UCOWR BOARD OF DIRECTORS

Robert Ward, CWRRI Director, and James Heaney, Head of the Civil Engineering Department at the University of Colorado, were elected to the Board of Directors of the Universities Council on Water Resources (UCOWR) at UCOWR's annual meeting in Charlottesville, Virginia in late July. The theme of the meeting was, appropriately, new directions in clean water policy. Congress and the President have designated 1992 as the "Year of Clean Water...in celebration of the Nation's accomplishments under the Clean Water Act, and the firm commitment of the nation to the goals of that Act."

UCOWR is a national organization of universities actively engaged in teaching, research and public service in the broad disciplines of water science, engineering, and management. Of

his views on the goals and objectives of UCOWR, Ward says: "UCOWR provides a rather unique forum for the interaction of water resources oriented educators and researchers. Over the years this forum has addressed many topics related to 'water resources development and utilization'...As the theme of this year's UCOWR meeting suggests, however, many of today's water issues relate to a picture much larger than 'development and utilization' of water. Many academic, government, industry, and professional organizations are examining their past approaches to water resources and are suggesting new environmental/ecological-oriented directions..."

The complexity of the issues grows as budgets decrease, says Ward. Defining his role on the Board, he says his time will be spent "in a determined search for ways UCOWR can more effectively and efficiently fulfill its traditional integrating and networking roles in these rapidly changing times."

Another Rocky Mountain native on the Board will be Howard Peavy, Director of the Montana Water Resources Center at Montana State University, who was reelected to another term.

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Editor
Shirley Miller

Writers
Maureen Maxwell
Jennifer Roberts
Laurel Saito
Craig Woodring

Writer-Librarian - Mary DeMartini

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Robert C. Ward, Director

WATER RESEARCH

PROJECT EVALUATES IRRIGATION WATER USE IN THE CENTRAL COLORADO WATER CONSERVANCY DISTRICT

by Jennifer Roberts

Through the generous support of the Colorado State University College of Engineering and the Colorado Commission for Higher Education, I am able, along with ten other undergraduate engineering students, to participate in the Summer Research Scholars Program. During my two years of study at Colorado State University, I have developed an interest in the complex and ever changing field of water resources. Therefore, I chose to pursue this interest by participating in a project that will evaluate irrigation water use by farmers in the Central Colorado Water Conservancy District (CCWCD). This study is part of the Sustainable Agriculture Project funded by the Environmental Protection Agency, Region VIII, and the Bureau of Reclamation, with CCWCD as the lead agency and project manager.

Irrigated agriculture has been suggested as a source of ground water pollution in many states. Irrigated return flows, either as surface water runoff or deep percolation, are believed to transport agrichemicals and nutrients to surface and ground water sources. Since return flows are believed to transport pollutants into the ground water (water quality), it is essential to determine the amount of return flows (water quantity) from irrigation taking place both as deep percolation and runoff in actual fields.

This project echoes this concern for both quantity and quality of irrigation water. To examine this relationship, we are monitoring three fields near La Salle and Gilcrest, Colorado, two potato fields and one corn field. The fields are all surface-irrigated using a combination of pumped ground water and ditch water that is applied to furrows through siphon tubes.



Siphon tubes irrigate and fertilize farmer's field



Luc Claessens measures water inflow with current meter

Because both agricultural practices and the landscape are varied, project work largely has been to determine which flow-measuring devices are most appropriate for each site. A current meter is being used to measure the water inflow to the fields. Rainfall gauges have been installed at each site to measure the amount of rain water each field receives. Cuthroat flumes are used to measure the tailwater runoff from each field. We are also monitoring 2 to 3 furrows within each field. We found that the most appropriate method to determine individual furrow inflow has been to measure direct volumetric flow from the siphon tubes.

With the above data and infiltration tests we will create an infiltration profile for each field. The volume of water infiltrated is the sum of the volume of water used by the crop and the volume of water that deep percolates. To distinguish between these amounts we will determine the crops' consumptive use with evapotranspiration data. Thus, with this information we can compute a water balance: $\text{Water Applied (precipitation + irrigation water)} - \text{Surface Water Runoff} - \text{Crop Consumptive Use} = \text{Volume of Deep Percolation}$. In addition to collecting data to complete this water balance we are also testing water samples for nitrate content using a Hach field kit.

All aspects of the project have been a valuable experience for me, from the field work to data analysis and developing human relation and organizational skills. Perhaps most valuable has been the new perspective I have gained concerning agriculture and the time and effort that is involved in research.

Recently there has been a great emphasis on establishing quantifiable relationships between agricultural activities and water quality. The Great Plains Agricultural Council's Water Quality Task Force published a draft in January of 1992 that "documented that water quality is being significantly affected by agriculture related activities and that agriculture is the largest contributor of nonpoint source pollution in the region as well as throughout the nation." The 1985 and 1990 Farm Bills have also brought environmental issues, including water quality, to the forefront.

Environmental and public interest groups are playing a more active role in the writing of agricultural legislation. "The public wants an agriculture that will not only be productive and profitable, but that will also conserve resources, protect the environment, and enhance the health and safety of the public" (1991 Agricultural Yearbook, p.176). This sounds like a pretty tall order. The editor of High Country News contributes this conflict to "cultural differences -pickups versus Subarus, cowboy poets versus Edward Abbey, snowmobiles versus cross country skis - and different economic interests (that) separate and keep us at war, with natural resources as the wounded hostage (HCN, 5/18/92, p.14).



Terry Podmore gives lesson on siphon tubes



Jennifer Roberts struggles with siphon tube

At first, it appears that there are insurmountable differences between the two sides, but I am learning through interaction with the rural farming communities that despite our apparent differences we have a lot in common, including a concern for environmental problems. The magnitude and nature of environmental problems require the whole spectrum of interests to work together and compromise.

Recently an article appeared in the Fort Collins Coloradoan that described a study about the Great Plains conducted by the Denver-based Center for the New West. The study disputes the finding of a 1987 Rutgers University study conducted by Urban Studies Professor Frank Popper that pronounced 40 Great Plains counties dead. Popper claimed the area is in decline and should be turned into a grasslands preserve. The President of the Center for the New West, Phillip Burgess said "we took the beyond redemption counties and we did a novel thing - we went out and actually talked to the people. Popper and the economists of the Federal Reserve tend to look at numbers only, and never go out and actually kick the tires," (Coloradoan, 5/20/92).

This project provided a wonderful opportunity to learn about irrigation and water management from the farmers, and I believe these types of interaction will be the key to finding practical and feasible solutions in the future.

Principal Investigator: Jim Loftis, Department of Agricultural and Chemical Engineering, Colorado State University
 Co-Principal Investigator: Terry Podmore, Department of Agricultural and Chemical Engineering, Colorado State University
 Research Assistant: Henriette Emond
 Field Assistants: Luc Claessens and Jennifer Roberts

CSU RESEARCHERS STUDY PLANT GROWTH IN OUTER SPACE

NASA Grant funds plant/gravity study--Colorado State University researchers in the Colleges of Agricultural Sciences and Engineering are trying to unscramble no- or low-gravity

problems so plants can be grown on future space stations, the moon and other worlds. The \$64,000 project is part of research being performed for NASA by Colorado State's Center for

Engineering Infrastructure and Sciences in Space. Center Director Willy Sadeh presently serves as program manager for four research projects funded by NASA. This particular grant funds Colorado State researchers to develop models for plant growth under controlled environmental conditions. Martin Marietta Space Systems then will use this research to design hardware systems to manipulate environmental conditions. John Hendrix, plant physiology professor, is co-researcher.

In another of the NASA-funded studies, Willard Lindsay, Colorado State Professor of Agronomy, will try to determine if earth plants can grow in lunar soil. The success of future space exploration depends on the establishment of a lunar base where humans can live and food plants can be grown for extended periods of time.

Source: Public Relations Department

RESEARCH ON WATER QUALITY DATA MANAGEMENT COMPLETED

Masters student Laurel Saito recently completed a research project that focuses on water quality data management in the United States and Colorado. The research included a nationwide water quality data management survey undertaken in 1991, as well as an assessment of water quality data management activities in Colorado. Two-hundred water quality agencies in 48 states and one territory responded to the survey, which solicited information on the types of data management systems used, the water quality activities involving water quality data performed by each agency, the data types used, the sources of the data, and interagency activities for sharing water quality data. The results of the survey were summarized briefly in October 1991. In evaluating Colorado's existing water quality data management, three problem areas were identified: the lack

of a centralized database, the lack of management of a significant amount of the data collected, and the lack of adequate integration of water quality and quantity data. Based on the results of the survey and an inventory of water quality data management activities in Colorado, the development of a centralized statewide water quality and quantity database for Colorado is recommended.

Research findings will be published in the Institute's technical report series. In addition to presenting the methodology and results of the water quality data management survey, the report will include background information on water quality legislation and data management technologies, a summary of existing water quality data management in Colorado, and a discussion of recommendations for initiating the development of a centralized database.

BOULDER FIRM TO STUDY FLOOD MITIGATION PLANS

The Mitigation Assistance Corporation (TMAC) of Boulder has been selected to assist the Amite River Basin Drainage and Water Conservation District (Louisiana) develop a public participation planning process. The initial goals of this effort are to reduce future flood losses while promoting other multiobjective river corridor management principles and practices. Objectives include formation and training of a local mitigation planning team and the development of a basin-wide flood mitigation plan that identifies priorities, responsibilities, schedules, and potential funding as appropriate. The ARBD encompasses scores of communities scattered over hundreds of square miles within five southeastern Louisiana parishes.

Source: *Natural Hazards Observer*, July 1992

WATER RESEARCH AWARDS

A summary of water research awards and projects is given below for those who would like to contact investigators. Direct inquiries to investigator c/o indicated department and university.

Colorado State University, Fort Collins, CO 80523

- Testing of an Improved Cumulus Parameterization in the NMC Global Model, David A. Randall, Atmospheric Science
- Degradation, Leaching & Adsorption of Methylsulfonyl Methyl in Six Colorado Soils, Robert Zimdahl, Plant Pathology & Weed Sciences
- Coupling Ecosystem Processes & Vegetation Pattern Across Environmental Gradients, William K. Lauenroth, Natural Resource Ecology Lab (NREL)
- Improved Measures of Economic Impacts of Drought in Arid Regions, Robert A. Young, Agricultural and Resource Economics
- Quality Assurance Support for the National Atmospheric Deposition Program, David S. Bigelow, NREL
- Wildlife User's Public Access Preference, Michael J. Manfreda, Recreation Resources
- Irrigated Agriculture Management Improvement Process, Wayne Clyma, Agricultural and Chemical Engineering
- Water and Climate, David A. Randall, Atmospheric Science
- Biosphere-Atmosphere Interactions - A Study of the Energy, Water & Carbon Cycles, David A. Randall, Atmospheric Science
- Time Series, Extreme Values & Stochastic Models, Peter J. Brockwell, Statistics
- Investigation of Global Environmental Change on Paired Ecosystems in USA & USSR, William E. Marlatt, Earth Resources

- Effects of Range Grasshopper IPM Project on Fish and Wildlife, Lowell McEwen, Fishery & Wildlife Biology
 Instream Flow Rights & Needs in the Western United States, Lee H. MacDonald, Earth Resources
 Responses of Hydrologic & Aquatic Ecosystem Processes to Potential Climate Change..., Jill S. Baron, NREL
 GIS Habitat Model of a Colorado Headwaters Watershed, Roger M. Hoffer, Forest Sciences
 Research in Support of a Microwave Precipitation Retrieval Algorithm for TRMM, Graeme L. Stephens, Atmospheric Science
 Plant Community Disturbance Evaluation, Grand Teton National Park, Edward F. Redente, Range Science
 Vegetation Restoration Research, Rocky Mountain National Park, Edward F. Redente, Range Science
 Mesoscale Analysis & Forecast Product Development for Severe Storm Nowcasting, Thomas H. Vonderhaar, CIRA Admin. Unit
 Evaluation of NEXRAD Doppler Weather Radar Algorithms & Mesoscale Analysis & Prediction..., Thomas H. Vonderhaar, CIRA
 Regional Modeling of Trace Gas Production in Grassland & Boreal Ecosystems, David S. Schimel, NREL
 Carbon Balance in Global Grasslands, David S. Schimel, NREL
 Research & Product Development to Support NOAA's Mesoscale Weather Prediction Program, Thomas H. Vonderhaar, CIRA
 Hydrologic Forecasting System Evaluation, Lynn Johnson, CIRA
 Modeling Ecological & Distribution Responses of an Aquatic Macrophyte, Michael B. Coughenour, NREL
 Observational Requirements for Investigating & Monitoring Cloud/Climate Interactions, Graeme L. Stephens, CIRA Admin. Unit
 1991-1992 Aquatic Studies, Eric P. Bergersen, Cooperative Fish & Wildlife
 Optimal Feeding Strategies, David R. Anderson, Cooperative Fish & Wildlife
 Independent Review & Evaluation Services for EG&G - Rocky Flats, Ralph E. Smith, Vice President for Research
 Long-term Ecological Research Program - Shortgrass Steppe, William K. Lauenroth, NREL
 Modeling Forest Response to Environmental Change, Dean L. Urban, Range Science
 Grazing Impacts on Filtering of Sediment & Nutrients in the Riparian Zone, Milton J. Trlica, Jr., Range Science
 Regional Flood Hazard Analysis, Jose D. Salas, Civil Engineering
 Fish Species Identification on the Methow River, Robert J. Behnke, Fishery & Wildlife Biology
 *Experimental Tests of Ecosystem Dynamics Along Developmental, Climatic and Biotic Gradient..., William J. Parton, NREL
 TERRA - The Land and Its Role in Global Environmental Processes, Robert G. Woodmansee, Range Science
 Global Change Impact on the Biological & Ecological Resources in the Central Grasslands, Dennis Ojima, NREL
 Modeling Global Methane Emission from Livestock..., Donald E. Johnson, Animal Sciences
 The Creation of Wetlands at the Rocky Mountain Arsenal: Monitoring the Patterns..., David J. Copper, Cooperative Fish & Wildlife
 Research
 Successional Changes in Benthic Communities in Wetlands at the Rocky Mountain Arsenal, William H. Clements,
 *Joint CSU-USSR Cloud-Radiation Climate Studies, Stephen K. Cox, Atmospheric Science
 *The Influence of Methodology on the Validation of Field Scale Solute Transport Models, Greg Butters, Agronomy
 Large-Scale Water Budgets for the United States, Jorge A. Ramirez, Civil Engineering

University of Colorado, Boulder, Colorado

- *Polar Exchange at the Sea Surface, Roger Barry, Cooperative Institute for Research in Environmental Sciences (CIRES)
 Conceptual Planning for Integrated Analyses (Integral) of Water Resource Systems and Power Operations, Steven Chapra, Civil
 Engineering
 Repair and Retrofit of Unreinforced Masonry Structures, P.L. Benson Shing, Civil Engineering
 Evaluation of Condition of Structures from Transient Response, George Hearn, Civil Engineering
 Artificial Intelligence Applications for Sea Ice Classification and Processes, James Maslanik, CIRES
 *Comparative Lithological Mapping Using Multipolarization, Multifrequency Imaging Radar and Multispectral Official Remote Sensing,
 Fred Kruse, CIRES
 *Determination of Precipitation Via Remote Sensing, Susan Avery, Aerospace Engineering
 *Development and Experimental Verification of Models for Estimation of Uplift Water Pressures in Cracks in Dams, Tissa
 Illangasekare, Civil Engineering
 Late Quaternary Glaciations of Franz Josef Land, USSR: Ice Extent, Timing and Paleoenvironmental Reconstructions, Gifford Miller,
 Institute of Arctic and Alpine Research
 Establishment of a Steering Committee for Paleoclimates of Arctic Lakes and Estuaries, John Andrews, Institute of Arctic and Alpine
 Research
 Analysis of Global Cloud Imagery from Multiple Satellites, Murry Salby, Astrophysical, Planetary and Atmospheric Sciences
 *Application of Special Sensor Microwave Imagery (SSM/I) Data for Snow Cover/Climate Research, Roger Barry, CIRES
 *Studies of Global Sea Level and Ice Sheet Volume Changes, John Wahr, CIRES
 *Mapping Atmospheric Water Vapor and its Motions with SSM/I Data and the Consequences for Moisture Flux From the Ocean to the
 Atmosphere, William Emery, Aerospace Engineering
 *Potential Impacts of Global Climate Change on Western River Basins, Pedro Restrepo, Civil Engineering
 Development and Trend Analysis of an Arctic Tows Temperature Sounding Record, Siri-Jodha Khalsa, CIRES
 DOW-Basin Mapping Prototype Study, Thomas Huber, Geography & Environmental Studies
 Comparative Lithological Mapping Using Multipolarization, Multifrequency Imaging Rada and Multispectral Official Remote Sensing,
 Fred Kruse, CIRES

- Floodplain Deposition, Pedogenesis, and Shallow Burial Diagenesis in the Lower Mississippi River, Mary Kraus, Geological Sciences**
Late Quaternary Dynamics of the Labrador/Foxe Sectors of the Laurentide Ice Sheet and Ice Sheet/Ocean Interaction in the North Atlantic, Gifford Miller, Institute of Arctic and Alpine Research
Effects of Climate Change in the Colorado Alpine, Nelson T. Caine, Institute of Arctic and Alpine Research
Late Quaternary Cryosphere/Ocean Interactions: Margin of the Hudson Strait Ice Stream...John Andrews, Institute of Arctic and Alpine Research
Kids as Global Scientists: The Utilization of the Internet for Middle School Atmospheric Sciences, Nancy Songer, Education
Non-Methane Hydrocarbon Emissions from Plants, R. Ray Fall, CIRES
Cryospheric Indices of Global Change, Roger Barry, CIRES
***Atmospheric Frontal Dynamics, William Blumen, Program in Atmospheric & Oceanic Sciences**
Air-Sea Exchange Processes in TOGA-COARE, Robert Grossman, Program in Atmospheric & Oceanic Sciences
***The Nature of Eolian Activity During the Holocene on the Northern High Plains, USA: A Geomorphic Analog for Landscape Response to Future Atmospheric Warming, Alexander Goetz, CIRES**
***Sea Ice-Atmosphere Interaction: Application of Multispectral Satellite Data in Polar Surface Energy Flux Estimates, Konrad Steffen, CIRES**
***Observational and Modeling Studies of Radiative, Chemical, and Dynamical Interactions in the Earth's Atmosphere, Murry Salby, Astrophysical, Planetary and Atmospheric Sciences**
***Water Resources Global Climate Change ADSS - Solute Transport Modeling, Steven Chapra, CADSWES (Civil Engineering)**
Modeling Pollutant Exchanges and Fate Within and Above Vegetation Canopies, Jeffrey Weil, CIRES
Estimating Ecosystem Biogeochemistry Through Hyperspectral Analysis, Carol Wessman, CIRES

JOINT NAWQA MEETING HELD

by Craig Woodring

North Platte, Nebraska was the site of the first joint meeting of the National Water Quality Assessment (NAWQA) Platte River Liason Committees. U.S. Geological Survey is completing a five-year baseline study of the water quality of the South Platte Basin as well as the main stem Platte River Basin. These two basins are part of an ongoing program of water quality assessment for river basins nationwide. NAWQA studies have liason committees which have been formed to give guidance and water community direction.

The joint meeting provided a rare forum for water professionals from the three states with Platte River streammiles to get together and discuss water quality issues in a positive scientific forum. Over 80 water professionals from a variety of state, federal, regional, and local government agencies attended and listened to presentations on the current status of the study as well as future plans.

Presentations relative to the South Platte included initial findings on South Platte bibliography, environmental setting, and data base/Geographic Information System studies of the USGS study team. The Nebraska team presented comparable findings as well as their work on developing an intensive fixed station monitoring system for the NAWQA studies. Planned studies that were presented to be completed or commenced in the near future included reports on retrospective analysis of the basins, low-flow synoptic studies, habitat reconnaissance, tissue and bed sediment surveys, biology training and method excercises, and articles on pesticides, nutrients, and sediments.

Anyone wishing to know more about these studies should contact the USGS NAWQA program at (303) 236-4882.

WATER INSTITUTES WORK WITH DOE TO HELP CLEAN UP SITES

In a cooperative, pilot project with the U.S. Department of Energy, the network of state water institutes will help DOE find ways to clean up chemical and hazardous wastes at its sites throughout the nation. Water institutes of seven states designated as Integrated Demonstration Sites (IDS) by the DOE - Colorado, Idaho, Nevada, New Mexico, South Carolina and Washington - will participate in the program's initial 3-year phase. All of the nation's water resources institutes will eventually participate in the program.

Environmental restoration and waste management are top-priority issues for the DOE. Its activities in the past focused on the national defense mission, but the agency now has shifted its efforts toward environmental restoration. The success of these efforts will depend on a well-trained work force in both the technical and regulatory arenas and an informed and supportive public.

Discussions between representatives of DOE and the National Association of Water Institute Directors (now National Institutes for Water Resources) began in late 1990, and have culminated in an ambitious research program to complete environmental restoration work by 2019. There are three areas in which the Institutes believe they can most effectively collaborate: education; assessment of technology effectiveness; and transfer of university-based technologies.

The project will include components on Education, Assessment of technology effectiveness, and technology transfer.

The next issue of *Colorado Water* will present more details about the study.

UNIVERSITY WATER NEWS

PRESIDENT'S LETTER LISTS ACHIEVEMENTS

Making Vital Connections, President Albert C. Yates' letter to faculty and staff of Colorado State University, contains a review of some overall achievements during the 1991-92 academic year. President Yates noted that the University saw an 8.2 increase in research proposal volume from \$194 million in April 1991 to \$210 million in March 1992 and a six percent increase over last year in total research funding, including the following water-related studies:

Professor John Reif of Environmental Health is leading a \$690,000, three-year study into the effects of the Rocky Mountain Arsenal on surrounding communities.

Professor Raymond Yang, head of the Department of Environmental Health, received a National Institute of Environmental Health Sciences Superfund Health Research Grant for more than \$3.3 million to study the human health effects of chemicals found in Superfund waste sites.

Atmospheric Scientist Stephen Cox received \$501,000 from the Office of Naval Research for observation and modeling studies of weather over the Atlantic Ocean.

Professor Robert B. Shaw, Range Science, was funded at \$1.1 million to determine land conditions and changes on Army lands from the Department of Defense.

Professor James Gibson, Natural Resources Ecology Lab, received \$795,000 from the USDA/CSRS to coordinate and monitor deposition from acid rain.

The Center for Science, Mathematics and Technology Education, under the direction of Professor Fred Stein, was awarded \$625,000 by the National Science Foundation to develop a way to improve high-school science education.

President Yates also noted that examples of excellence at Colorado State are many, and cited examples including:

Atmospheric Science Professor Stephen Cox received the NASA Medal for Exceptional Scientific Achievement for his contributions to understanding the atmospheric radiation processes associated with clouds and their role in Earth's climate.

The 4-H club in Pueblo County received a Take Pride in America Award from President Bush for making a trail along the Arkansas River accessible to people with disabilities.

The Department of Chemistry was ranked 12th most influential in the world in terms of research impact by Science Watch.

CSU GRAD WINS TOP AWARD IN UCOWR DISSERTATION COMPETITION

The Universities Council on Water Resources (UCOWR) has selected James F. Booker's Ph.D dissertation on the Colorado River for its Outstanding Water Resources Dissertation award. The dissertation, "Economic Allocation of Colorado River Water: Integrating Quantity, Quality, and Instream Use Values," won in the category of Social and Behavioral Science. The UCOWR award is given annually, after national competition, to the best dissertation in each of three areas: Engineering and Physical Sciences; Environmental and Biological Sciences; and Social and Behavioral Science.

Booker worked under CSU Professor Robert A. Young on a USGS-funded project that examined impacts of using water markets to allocate Colorado River water resources. While use of basin water has traditionally been based on the prior appropriation doctrine and interstate compacts, evolving new needs have focused attention on water transfers from traditional agricultural uses. Booker's work directly estimates economic and hydrologic implications of ideas such as California's recent proposal for an interstate water bank on the Colorado River. Results of this work have been presented at several conferences and meetings, most recently at the Western Agricultural Economics Annual Meeting, July 12-15 in Colorado Springs and at the Colorado Water Workshop, July 22-24 in Gunnison.

Booker's dissertation work has led him to continue research on Colorado River issues as a member of a multi-state team studying impacts of severe and sustained drought in the basin. Now at the University of Wyoming, his work also includes detailed examination of direct and indirect impacts of drought in Wyoming's Upper Green River Basin. This Fall he will teach a graduate-level class in Natural Resource Economics at CSU.

Booker received a B.A. in Physics at Dartmouth College (summa cum laude, highest distinction) in 1980, his M.S. from Cornell University in Applied Physics in 1982, and a Ph.D from Colorado State University, Department of Agricultural and Resource Economics in 1990 (4.00 GPA). He is an avid cross country skier, hiker and runner and was a member of the Nordic Ski Club and Volunteers for Outdoor Colorado while at Colorado State.

Booker's dissertation work is presented in CWRRI Completion Report No. 161, "Economic Impacts of Alternative Water Allocation Institutions in the Colorado River Basin," by James F. Booker and Robert A. Young. It is available from the CSU Bulletin Room, Phone 303/491-6198. Price: \$7.00.

COLORADO STATE ANNOUNCES APPOINTMENTS

AGRICULTURAL EXPERIMENT STATION - Colorado State University has selected **Charles W. Laughlin** as Director of the Colorado Agricultural Experiment Station (CAES). His appointment is effective August 15. Laughlin is Associate Director of the Georgia Agricultural Experiment Stations and Professor in the Department of Plant Pathology at the University of Georgia. As director of the CSU station, Laughlin will administer a nearly \$10 million budget, oversee CAES's campus and 11 outstate research centers and provide leadership and assistance to obtain industry funding and support.

Laughlin has served as Head of the Department of Plant Pathology and Weed Science at Mississippi State University, Professor in the Department of Entomology and Assistant Dean and Director of Academic and Student Affairs at Michigan State University, and consultant to the Michigan State University/Brazilian Ministry of Education and Culture Project. He received a bachelor's degree in horticulture from Iowa State University, a master's degree in agronomy from the University of Maryland, and a doctorate in plant pathology and physiology from Virginia Polytechnic Institute and State University.

COOPERATIVE EXTENSION - **Milan Rewerts**, who has served as interim director of Cooperative Extension since July 1990, will remain in the director's position. The announcement was made by Kirvin Knox, Associate Academic Vice President for Agriculture and Outreach and Dean of the College of Agricultural Sciences. Knox said recent reorganization of agricultural operations and the need to address several institutional issues prompted campus officials to abandon their external search for a director. Prior to his appointment as interim extension director, Rewerts was Cooperative Extension personnel director and field representative. He also served as South Central District Cooperative Extension Director and as a 4-H/youth extension agent.

COLLEGE OF NATURAL RESOURCES - On May 13 Al Dyer was named Dean of the College of Natural Resources. He had served as Interim Dean since the retirement of Jay Hughes in July 1991. Dyer joined Colorado State in 1971 and became chairman of the Department of Forest Sciences in 1984. He has served on the University Budgets and Financial Planning Committee, University Scholarship Committee and the Colorado State Environmental Resources Center Council. Dyer received his doctorate from Utah State University.

CSU FACULTY NEWS

Vujica Yevjevich, Professor Emeritus of Civil Engineering, attended the United Nations Conference on Environment, Rio de Janeiro, June 1-5, 1992. On the invitation of UNESCO and the Brazilian government, Yevjevich gave the talk, "Problems and Solutions in Hydropower and Water Resources Development while Protecting the Environment (Hydropower-related session on June 2, 1992). He also was invited to talk at the Eco-Tech Conference of Brazilian organizations on June 4, 1992 on the trends in planning river basin water resources schemes.

Charles Shackelford, Assistant Professor of Civil Engineering at Colorado State, has been selected as a National Young Investigator by the National Science Foundation. NYI awardees may receive up to \$62,500 per year for five years from NSF provided they raise \$37,500 in matching funds or equipment from industry and other eligible sources. Over 1600 nominations for the 1992 NYI competition were received. The awardees were selected through a merit review process that focused on the accomplishments of the candidates and their potential to become academic leaders both in teaching and research. Shackelford's research and professional interests include: contaminant transport through porous media; diffusion of contaminants in soils; permeability and compatibility of fine-grained soils, physico-chemical properties of soils; soil and waste stabilization; environmental geotechnics and geotechnical engineering for waste management. He received his Ph.D from the University of Texas at Austin in 1988, and is a Registered Professional Civil Engineer in Colorado and California.

Marshall Flug, National Park Service water scientist and faculty affiliate in CSU's Department of Civil Engineering, has been selected by the 1992 Nominations Committee as a candidate for Director-at-Large of the American Water Resources Association.

At Water Forum '92, **E. V. Richardson** will lead a review and discussion of the impact of CSU's Water Resources Education Program on hydraulic engineering world-wide. The national conference, sponsored by the American Society of Civil Engineers, will be held in Baltimore, Maryland on August 2-6, 1992. The review will include special recognition of Drs. Maurice Albertson, Daryl Simons and Vujica Yevjevich, professors emeritus of civil engineering at CSU.

Congratulations to **Marsha Hilmes** on her selection as this year's recipient of the American Water Resources Association - Colorado Section scholarship award. Marsha is a MS candidate in Earth Resources at Colorado State University and is conducting research that examines the impacts of mining on stream channel morphology.

Last year's scholarship winner, **Cynthia Paulson**, described her research on metals speciation in urban stormwater at the AWRA May meeting. Cynthia, a graduate of Colorado State, is pursuing a Master's degree at the University of Colorado. Her research objective is to develop a conceptual model to help predict the partitioning and speciation of metals in stormwater runoff and receiving waters so that concentrations can be related to toxicity and appropriate criteria for metals in stormwater runoff.

Neil Grigg, former CWRRI Director and current Head of CSU's Civil Engineering Department, has been elected to the Board of Directors of the American Public Works Association and will participate in a two-week Japan tour in September to study public works management.

GO! GO! GO!

by Mary DeMartini

On June 20, civil engineering students from across the nation paddled their concrete canoe creations in fierce but fun competition. After nearly a year of preparation in which each team met the challenge of designing and building a concrete canoe and won their respective regional competition, 20 teams arrived in Fort Collins, Colorado, on June 18 for the American Society of Civil Engineers (ASCE) Fifth Annual National Concrete Canoe Competition.

ASCE chapters and clubs from the following schools participated in the event: the University of Maine, the University of North Carolina -- Charlotte, the University of Alabama -- Huntsville (UAH), the South Dakota School of Mines and Technology, Northern Arizona University, the University of Maryland, Iowa State University, New Mexico State University, the University of Houston, the University of Pennsylvania, the University of Illinois -- Urbana, State University of New York -- Buffalo, Oklahoma State University, Ohio State University, City College of New York, University of New Orleans (UNO), University of California -- Berkeley (UCal--Berkeley), Washington State University, Michigan State University, and Virginia Tech.

Teams were judged on the design, construction, speed, and maneuverability of their canoes. Sixty percent of the total team score was determined from their written report and oral presentation while the remaining 40 percent was based on the race results.



Canoe race

UCal--Berkeley and its sleek "ClassiCal" canoe won the competition and took home first place award of \$5,000 in scholarship money for their school's CE department. Placing in second and third were UAH and UNO, earning \$2,500 and \$1,500 for their respective CE departments.

The event, sponsored by Master Builders, Inc., and hosted by Colorado State University, showcased the versatility of concrete and demonstrated the creative genius of America's future civil engineers - these students may one day become the leaders to steer this nation's infrastructure clear of the rocks.

THE COLORADO SCHOOL OF MINES

Located in Golden, Colorado, about 15 miles west of Denver, the Colorado School of Mines ranks as the second oldest and the largest institution in the United States dedicated entirely to mineral engineering education. For more than 100 years the School has maintained its dedication to quality education, research and public service. The School's 2500 graduate and undergraduate students represent all the states and 67 foreign countries.

Research is conducted primarily in the specialties of geotechnics, waste management and ground-water hydrology, or a combination of these fields. Research facilities include the joint USGS/CSM Geotechnical Research Laboratory, Rock Mechanics laboratories in the Mining Engineering Department, integrated geochemistry laboratories, complete field and laboratory geophysical equipment in the Department of Geophysics, Remote Sensing laboratory, an integrated Departmental and campus-wide computer network, and a research water-well field.

The Institute for Ground-Water Research and Education (IGWRE) was founded at CSM in 1986, and coordinates a wide

range of groundwater-related projects. In 1991 the International Ground Water Modeling Center (IGWMC) moved from the Holcomb Research Institute at Butler University to CSM, becoming part of the IGWRE. An internationally oriented center for groundwater modeling, IGWMC operates a clearinghouse for groundwater modeling software, organizes annual series of short courses, conducts research to support its information and educational activities, and provides technical assistance in various areas related to groundwater modeling. For information contact: The Institute for Ground Water Research and Education and the International Ground Water Modeling Center at: Phone - 303/273-3103; FAX - 303/273-3278

Through its Office of Special Programs and Continuing Education (SPACE), CSM provides opportunities for practicing engineers and other professionals to augment and upgrade their technical skills. For information about special programs and continuing education at the Colorado School of Mines call Toll Free: 1-800-245-1060, Ext. 3321 within Colorado; 1-800-446-9488, Ext. 3321 outside Colorado; or Telephone 303/273-3321, FAX 303/273-3314.

COLORADO SCHOOL OF MINES - FACULTY EXPERTISE IN WATER RESOURCES - 1992-93

Except as noted, all addresses must be completed by adding "Colorado School of Mines, Golden, CO 80401." Also, all phone extensions can be completed by adding (303)273-xxxx.

<u>Name</u>	<u>Phone Extension</u>	<u>Address</u>
<u>Economics</u>		
Roderick Eggert	3981	Mineral Economics
Wade Martin	3507	Mineral Economics
<u>Groundwater</u>		
Annette Bunge	3722	Chemical Engr. & Petroleum Refining
Robert Baldwin	3727	Chemical Engr. & Petroleum Refining
Steve Marinella	3042	Chemical Engr. & Petroleum Refining
Sami Selim	3724	Chemical Engr. & Petroleum Refining
Helen Dawson	3401	Environmental Science & Engineering
Timothy Cross	3883	Geology & Geological Engineering
John Curtis	3887	Geology & Geological Engineering
Wendy Harrison	3821	Geology & Geological Engineering
Eileen Poeter	3829	Geology & Geological Engineering
Kenneth Kolm	3932	Geology & Geological Engineering
Jerry Higgins	3817	Geology & Geological Engineering
Abdelwahid Ibrahim	3521/3468	Geophysics
Alexander Kaufman	3457	Geophysics
Phillip Romig	3454	Geophysics
Guy Towle	3473	Geophysics
H.T. Anderson	3933	Geophysics
<u>Hydrology</u>		
Greg Hulden	3855	Geology & Geological Engineering
Richard Hutchinson	3039	Geology & Geological Engineering
David Munoz	3658	Engineering
Karl Nelson	3683	Engineering
<u>Law, Institutions, Policy, History</u>		
Karen Wiley	3750	Humanities & Social Sciences
<u>Models/Computer Data Management and Presentation</u>		
Joan Gosink	3524	Engineering
Paul Van der Heijde	3103	Geology & Geological Engineering
Steven Pruess	3860	Mathematical & Computer Sciences
Ronald Knoshang	3501	Geophysics
Keenan Lee	3808	Geology & Geological Engineering
Norm Bleistein	3461	Director, Center for Wave Phenomena
<u>Stream and Riparian Zone Biology/Wetlands</u>		
John Emerick	3520	Environmental Science & Engineering
<u>Water Quality Measurement/Monitoring</u>		
Stephen Daniel	3636	Chemistry & Geochemistry
Ronald Klusman	3617	Chemistry & Geochemistry
Donald Langmuir	3631	Chemistry & Geochemistry
Donald Macalady	3996	Chemistry & Geochemistry
Kent Voorhees	3616	Chemistry & Geochemistry
Samuel Romberger	3828	Geology & Geological Engineering
Tom Wildeman	3642	Chemistry & Geochemistry
<u>Water and Wastewater Treatment/Environmental Engineering</u>		
Keith Turner	3802	Geology & Geological Engineering
Ronald Cohen	3421	Environmental Science & Engineering

EDITOR'S IN-BASKET

AWWA DESIGNATES BIG DAM AS A WATER LANDMARK

Neil Hamilton of the Home Supply Ditch and Reservoir Company accepted a plaque from the American Water Works Association on May 7 designating the Big Dam on the Big Thompson River as a Water Landmark. The ceremony took place in front of the Rimrock House overlooking the dam, which is located near the Loveland treatment plant.

In 1880 a log dam was constructed by the Home Supply Ditch and Reservoir Company for irrigation purposes. That dam was washed away in the flood of 1894, and the next year Loveland Engineer John Nelson designed a stone and concrete dam to take its place. At a cost of \$11,000 to design and build, the Big Dam is one of Colorado's oldest masonry arch design dams. It is 60 feet high from bedrock to the top, although it doesn't appear so high now that it has filled with silt. Rocks weighing from 1,500 to 2,000 pounds were hauled in by team and wagon and laid in cement for the bottom layer. To add to its stability, the dam walls were cemented into the rock wall of the canyon.

Charles Lester and George Kelly were the contractors. Lester said the dam would never go out and history has proven him correct - it survived the Big Thompson flood with very little damage. Today, the Home Supply Ditch and Reservoir Company takes irrigation water out on the south side and the City of Loveland diverts its water supply out on the north.

WETLANDS RULE AVAILABLE

The Agricultural Stabilization and Conservation Service (ASCS) has published the rule for implementing the Wetlands Reserve Program (WRP) provided for in the Food, Agriculture, Conservation, and Trade Act of 1990 (Public Law 101-624, Nov. 28, 1990). The final rule appeared in the FEDERAL REGISTER (57 FR 23908, June 4, 1992).

HOUSE COMMITTEE RESTORES USGS/WATER INSTITUTE FUNDING

On June 29 the House Committee on Appropriations announced its funding recommendation for Fiscal Year 1993 for the Department of the Interior and Related Agencies. The marks for the Water Resources Research Institute Program are (in thousands of dollars):

FY92	<u>ACTUAL</u>	8,017
FY93 Bush	<u>REQUEST</u>	3,229
FY93 HAPP	<u>MARKS</u>	6,258

The Committee Report reads:

An increase of \$3,029 million is recommended in the water resources research institutes program, consisting of \$2,804 million for Institute grants and \$255,000 for program administration, both to restore base funding. No funds are recommended for the National water resources research grants program (Section 105) because of budget constraints.

The House Bill (HR5503) also proposes \$587 million funding for the USGS compared to the President's request of \$540 million. Appropriations for fiscal 1992 were \$582 million. Water Resources Investigations would receive \$188 million, an increase of \$18 million from the President's request. Appropriations for fiscal 1992 were \$182 million for this division. Included in the WRI Division are the Acid Rain program, the National Water-Quality Assessment Program, and the Global Change Hydrology program.

Partial source: *EOS*, July 21, 1992

USGS ANNOUNCES FY1992 SECTION 105 AWARDS

The U.S. Geological Survey has selected 16 projects for its FY1992 Section 105 competitive grant program, which received funding of \$1.8 million from Congress. Included was a University of Colorado project, "Using Water Banks to Promote More Flexible Water Use." The principal investigator is Larry MacDonnell, Director of the Natural Resources Law Center at Boulder. Other states which had projects funded are: Arizona, California, Kentucky, Illinois, Nebraska, New York, North Carolina, Utah, West Virginia and Wisconsin. Arizona, California and Illinois received two awards each, and Utah received three awards.

DNR FINALIZES "OUTLINE FOR PROGRESS" PLAN

The July issue of *DNR News*, newsletter of the Department of Natural Resources, presents the Department's 1991-95 plan - a guide for activities that includes five resource areas: water; outdoor recreation; wildlife; land management; and minerals, energy and geology. The plan is the result of a long-range planning process by the Department, begun last year, that involved employees, members of boards and commissions, and constituency groups. For more information, contact Ken Salazar, DNR Executive Director. "We will be monitoring our progress and updating the plan continually," said Salazar, "and we welcome your ideas."

STATE GEOLOGIST ROLD RETIRES

John Rold, State Geologist and Director of the Colorado Geological Survey for more than 30 years, retired July 31, 1992. Rold was raised on a ranch near Salida and has a BA and an MS in geology from the University of Colorado. He was named State Geologist by Governor John Love in February 1969. Ken

Salazar, Executive Director of the Department of Natural Resources, said it would be difficult to replace Rold, who has served the state of Colorado with distinction. The search process for Rold's replacement is now underway. Pat Rogers will serve as acting director of the CGS effective July 31.

Source: *DNR News*, July 1992

ROTUNDA MURALS ARE FOCUS OF HISTORICAL INTEREST

by Denise Fisher, Student Intern

The November 1989 issue of *Colorado Water* included the first in what was to be a series of articles on the Allen True murals that are located on the main floor of the rotunda in the Colorado State Capitol Building. Unfortunately, information on the murals has been hard to come by and it will require time and effort to research the circumstances that originated the artwork. As the newest intern at CWRRI, I will take on this project.

On the first day at the Water Institute, I sorted through between 15 to 20 water research reports for mailing. Reading through the titles of the reports, it seemed a rather intimidating pile of knowledge about water. The question occurred to me, "What does this scientific information about water tell us about ourselves as human beings and our relationship to this precious element that allows this planet to be our home?" The eye of science originates and culminates in a set of value systems. What, then, about the artistic eye? How do scientific vision and artistic vision formulate the value systems that then give us direction for water practices?

As I research the murals I will focus on the historical context in 1938 when the murals were first conceived. I will also look at the artists themselves and their subjective contexts--who they were and how they and their art were a reflection of water consciousness in Colorado in the '30s. As politicians walk past these murals each time they assemble to legislate water law and determine water practices, it seems crucial to understand this quintessential reflection of where we have come from in our relationship to water in Colorado.

MRBWC DEVELOPS 5-YEAR PLAN

The water resources institutes and centers of the Missouri River Basin states have established a 5-year plan (1992-1997) that includes a narrative description of the basin, a discussion of water resource concerns for the region, and a set of research priorities. The priorities are organized around regional water resources concerns expressed by citizens, scientists, and water institutes/centers. There are parts of ten states in the Missouri River Basin -- Montana, Wyoming, Colorado, North Dakota, South Dakota, Nebraska, Kansas, Iowa and Missouri. For more information contact: Kansas Water Resources Research Institute, 144 Waters Hall, Kansas State University, Manhattan, KS 66506-4007.

POSITIONS AVAILABLE

Post-Doc Position, Earth Resources Department, Colorado State University--This position will be on a project that will quantitatively investigate the effects of spatial scale on our ability to detect changes in sediment yield. The project will attempt to determine the relative effects of dilution, storage, temporal variability, and measurement error on the minimum detectable effect. This will be done through an analysis of nested basin data and computer simulations. Analogous but less intensive work will be done on scale considerations in temperature and nutrient monitoring.

Desired qualifications: Completed Ph.D.; theoretical and practical knowledge of sediment transport and storage processes; modeling and computer skills; field experience in measuring suspended sediment and bedload; excellent writing skills; strong statistical background; and interest in land management effects on sediment, especially forestry.

Salary: Approximately \$30,000 depending on qualifications. Preferred starting date is early Fall.

Send cover letter, c.v., dissertation abstract, brief statement of research interests, writing sample(s), and three references (including names, addresses, and telephone numbers) to Prof. Lee MacDonald, Dept. of Earth Resources, Colorado State University, Fort Collins, CO, 80523. **Deadline:** Aug. 25, 1992.

Assistant/Associate Professor (Resource Economist), Central State University, Ohio--Responsible to: Director, International Center for Water Resources Management (ICWRM). ICWRM is a multi-disciplinary cooperative education and research center founded by an act of the Ohio General Assembly in 1985 to improve the management of water resources in Ohio, the U.S. and throughout the world. It will move into a new \$7.3 million Center in December 1993.

Responsibilities will include providing instruction to students in courses related to the economics of natural resources with particular emphasis on water resources systems and to conduct related research and program development. Successful applicant will be assigned a teaching load of 12 hours with release time for sponsored research.

Qualifications: An earned doctorate in Economics, Natural Resources Economics, Agricultural Economics or related field is required. Closing Date: Open until filled. Contact:

Dr. Victor I. Okereke, Director
International Center for Water Resources Management
Central State University
Wilberforce, Ohio 45384
513/376-6153

WATER PUBLICATIONS

LAST WATER HOLE IN THE WEST

A History of the Northern Colorado Water Conservancy District and the Colorado-Big Thompson Project

In 1933, spurred by drought and depression and encouraged by the programs and policies of the New Deal, farmers in northern Colorado envisioned tapping into the Colorado River (the last water hole available) and diverting the water through a thirteen-mile tunnel under the Continental Divide to Colorado's eastern plains. The result of that vision stands today as the state's largest trans-mountain water diversion project -- the Colorado-Big Thompson. To oversee this monumental project from its design to construction, water delivery, and payment, the Northern Colorado Water Conservancy District (NCWCD) was created.

The Last Water Hole in the West offers a detailed exploration of a single water-management agency (the NCWCD) and its response to changing regional and national conditions. Using a wealth of information, including minutes, reports, speeches, memoranda, newspaper accounts, and interviews with NCWCD officials, historian Daniel Tyler focuses on the construction of the Colorado-Big Thompson project and how its operation was affected by regional water development issues.



June 23, 1947 Dedication

First water flows to East Slope through the Alva B. Adams Tunnel



*CBT Staff Inspect the Alva B. Adams Tunnel -
13.1 miles in length, 9 ft. 9 and 3/4 inches in diameter*

Following the NCWCD's search for compromise and solutions among competing demands of inter-basin struggles on the Colorado River- agriculture, growing municipalities, hydroelectric power, recreation, fish and wildlife, and environmental concerns - this volume charts the evolution of the NCWCD into its current leadership position in state water matters.

Daniel Tyler is professor of history at Colorado State University. He has been an expert witness in several Hispanic water development cases and has lectured extensively on the historical development of water in the American West.

The Last Water Hole in the West will be available in September 1992 through the University Press of Colorado, P.O. Box 849, Niwot, Colorado 80544, (303) 530-5337.

AGRICULTURE AND WATER QUALITY IN THE GREAT PLAINS: STATUS AND RECOMMENDATIONS

In May 1990 the Great Plains Agricultural Council (GPAC) established a Water Quality Task Force to examine the status of water quality (as a function of agricultural activities) in the Great Plains region of the United States. Water quality problems in the Great Plains tend to be site-specific and related to irrigated agriculture or confined livestock operations. The

task force concluded that "...water quality is being significantly affected by agriculture-related activities, that agriculture is the largest contributor of nonpoint source pollution in the region and throughout the nation; and that from a quantitative perspective, our knowledge of 'cause and effect' relationships between agricultural production practices and their impact on water

quality is limited and inadequate." The Task Force report "Agriculture and Water Quality in the Great Plains: Status and Recommendations," GPAC Publication No. 140, is available for \$1.00 per copy. To obtain copies, contact Ron Lacewell, Department of Agricultural Economics, Texas A and M University, College Station, Texas 77843.

CWRRI PUBLICATIONS

Copies of CWRRI publications are available from: Bulletin Room, 171 Aylesworth Hall, Colorado State University, Fort Collins, CO 80523; Phone 303/491-6198.

South Platte River Basin: Uses, Values, Research and Management-- Current and Future

Information Series No. 70. Edited by Craig Woodring. Recaps the 1991 South Platte River Basin Conference, the second in a hoped-for annual occurrence. The conference was organized to be multi-disciplinary and multi-dimensional to allow for discussions that include the wide range of uses of the basin's water resources. Topics included: An Overview of the South Platte River Basin, Water Quality Aspects of the South Platte Basin, South Platte Water Transfers, Water Administration of the south Platte Basin, Water Education for the Water Users of the South Platte Basin, The South Platte as an Agricultural Resource, and The South Platte as an Ecological and Recreation Resource. Price: \$6.00.

Forecasting Streamflow For Colorado River Systems

Completion Report No. 164. Written by D.C. Wang and J.D. Salas. This publication reports on research aimed at improving current forecasting procedures for Colorado water supply. The study developed single input-single output and multiple input-single output periodic transfer function models for forecasting monthly streamflow. The models have been applied to forecast monthly flows of the Rio Grande watershed system in Southern Colorado. Tests and comparisons showed that the single input-single output periodic transfer function model gives better monthly streamflow forecasts than the multiple regression approach. Also, the addition of more inputs in the transfer function model improves the forecasts. Price: \$10.00.

GAO RELEASES REPORT ON EPA'S EFFORTS TO PROTECT GROUNDWATER

This report resulted from a request by the Chairman, Environment, Energy and Natural Resources Subcommittee, House Committee on Government Operations, that the GAO assess a number of issues related to EPA's efforts to prevent groundwater contamination. Contact the General Accounting Office, Resources, Community and Economic Development Division, Washington, D.C. 20548 for information about the report - WATER POLLUTION: More Emphasis on Prevention in EPA's Efforts to Protect Groundwater (GAO/RCED-92-47).

WATER PUBLICATIONS DIGEST AVAILABLE

Water Publications Digest is a new, 11-issue-a-year review that abstracts and summarizes information appearing in about 12 leading water periodicals. It is available for \$59/year from Water Publications Digest, Lakeview Publications, P.O. Box 6866, Charlottesville, VA 22906-6866; Telephone 804/973-5111. A sample issue is available for \$2 from the same address.

U.S. GEOLOGICAL SURVEY PUBLICATIONS

The following publications are available from the Books and Open File Report Section, U.S. Geological Survey, Federal Center, Box 25425, Mail Stop 517, Denver, CO 80225; Phone 303/236-7476.

WRI-90-4005. COLORADO. "Analysis of water-quality data and sampling programs at selected sites in north-central Colorado," by D.K. Mueller. Prepared in cooperation with the Northern Colorado Water Conservancy District and the U.S. Bureau of Reclamation. 1990. 79 p. (NC.Da.M.Wb.Db.U;) Microfiche \$4; paper copy \$12.75.

"Methods of data collection and water-quality data for Standley Lake, Jefferson, County, Colorado, 1989-90," by Barbara C. Ruddy, David A. Johncox and David K. Mueller. Study conducted in cooperation with the cities of Arvada, Golden, Northglenn, Thornton and Westminster. Open File Report 92-44.

USGS Yearbook Fiscal Year 1991. This publication includes reports on Geographic Information Systems and Spatial Data Coordination and Management, People and Programs, the National Mapping Program, Geologic Investigations, Water Resources Investigations, International Activities, and Information Systems Activities.

"Evaluation of proposed water-management alternatives to lower the high water table in the Arkansas River valley near La Junta, Colorado," by K. R. Watts and J.B. Lindner-Lunsford. Water Resources Investigations Report 91-4046.

NATIONAL PARK SERVICE WRD ISSUES 1991 ANNUAL REPORT

The report summarizes technical and project support provided by the Water Resources Division of the National Park Service during 1991. Among the accomplishments reported on are the field studies conducted for use in setting "interim" flows at Glen Canyon Dam to minimize the negative effects of dam releases on downstream natural and cultural resources in Grand Canyon National Park.

The Water Resources Division is headquartered in Fort Collins, Colorado with additional program offices in Denver and Washington, D.C. For more information about the report, contact the WRD Fort Collins office at 303/221-8311.

MEETINGS

DENVER MUSEUM OF NATURAL HISTORY HOSTS CULTURAL AND ECOLOGICAL INSTITUTE ON WATER

Interested participants from across Colorado gathered at the Denver Museum of Natural History July 9-11 for a 1992 Water Conference sponsored by the museum's Water Institute. Formed in 1991, the institute was created to address the pressing need to develop a comprehensive and representative water education program within the context of the natural history museum. The water conference included slide lectures, panel discussions, workshops, and films on the natural and cultural history of aquatic systems worldwide, with an emphasis on western U.S. rivers.

The keynote presentation was given by Mr. Marc Reisner, author of *Cadillac Desert*, a book about the American West and its disappearing water. Reisner spoke on the historical development of water in the West and how it became such an emotionally charged issue. He compared water development in the West to the practice of religion -- practical and habit-forming, but not necessarily a good impetus for change. Reisner cited the example of the Los Angeles basin in southern California, with an in-basin, native water supply able to support a population of approximately 450,000. Due to water importation from northern California, the eastern Sierra Nevadas, and the Colorado River, the population of the Los Angeles basin

is today somewhere between 15 and 16 million. Reisner questions placing cities in locations where water is scarce, and predicts profound changes for western water, including no additional large main-stem dams on western rivers, mitigation of environmental disasters such as the loss of salmon runs on many west-coast river systems, and the loss of wetland ecosystems. Reisner advocates the idea of water marketing, where cities would help pay farmers to conserve water in return for rights to the salvaged water, leasing of water by municipalities from farmers during drought years, retiring of some farm land, and new definitions of beneficial uses for water including instream rights and non-consumptive uses.

Other scholars and experts participating in the conference included Hubert Farbes of the Rothgerber, Apple, Powers and Johnson law firm; David Getches and Sarah Bates of the Natural Resources Law Center at the University of Colorado; historians Patricia Nelson Limerick and William Buckles; and world explorer Richard Bangs.

Participating organizations included the Natural Park Service, Denver Water Board, Colorado Department of Natural Resources, and the Nature Conservancy among others.

Colorado Ground-Water Association Annual Field Trip to CLEAR CREEK/CENTRAL CITY--August 22, 1992 - This field trip will combine a little geology, a little hydrogeology, a little mining history, and a lot of gambling and fun! A day of field trip activities is planned ending in Central City. Cost is \$25.00/person, including a morning snack and lunch. RSVP to: Kelly Hranac, Morrison Knudsen Corporation, 7100 E. Belleview, Suite 300, Englewood, CO 80111; Phone mail 793-5077; FAX 290-0238. **PLEASE REGISTER BY 8/14/92**, so appropriate-sized bus can be rented.

RMSAWWA/RMWPCA Annual Conference--The Tamarron Resort in Durango, Colorado is the location for the Annual Conference of the Rocky Mountain Section of the American Water Works Association/Rocky Mountain Water Pollution Control Association. The conference is scheduled for September 8-11, 1992. The technical program will feature 30-minute presentations on drinking water treatment, water plant operations, wastewater treatment and various other topics. Other conference activities will include table-top displays, preconference workshops (Final EPA 40 CFR 503 Sludge Regulations and an AWWA session on Corrosion Control), a spouse's program and special events night, trivia bowl and action now seminar. For information contact Martin Garcia at the Denver Water Department, Phone 303/628-6631; FAX 303/628-6199.

AWWA/IWSA Joint Distribution System Symposium--For the first time, the International Water Supply Association (IWSA) joins the American Water Works Association (AWWA) to cosponsor the

1992 Distribution System Symposium. The three-day conference will be held at the Adams Mark Hotel, Philadelphia, PA September 13-15, 1992. Water supply professionals from the US, The Netherlands, England, France, Italy, Spain and Canada will exchange ideas and solutions to challenging issues in water distribution. Registration for the full symposium is \$375 for members until August 31, 1992, and \$440 on-site for non-members. Registration for single days varies. Member students may register for \$35 (\$55 for non-members) for the entire symposium. Spouses can be registered for \$20. For information contact George Craft at AWWA, 6666 West Quincy Ave., Denver, CO 80235 or call 303/347-6192.

CCWCD Annual South Platte River Tour--The Central Colorado Water Conservancy District invites you to join their Annual South Platte River Tour on Thursday, September 17, 1992. The tour will include a visit to Siebring Reservoir and the Rocky Flats Plant in Golden. Due to security clearance preparation, NO late registrations will be permitted -- **REGISTER BY AUGUST 14, 1992**. Space is limited to 125 participants. Contact: CCWCD, 3209 W. 28th St., Greeley CO 80631; 303/330-4540 or Metro 825-0474.

USCID Conference on Irrigation and Water Resources--Irrigation and Water Resources in the 1990s is the topic of the 1992 National Conference of the U.S. Committee on Irrigation and Drainage (USCID) to be held October 5-7, 1992 in Scottsdale, Arizona. Thirty-two professional papers will be presented on the following topics: New Technologies in Irrigation and Drainage;

Rehabilitation, Operation and Maintenance Automation; Conservation vs. Development; and Environmental Issues. The conference also will include a one-day study tour of Central Arizona Project facilities. To receive a program and registration information, contact the U.S. Committee on Irrigation and Drainage, 1616 Seventeenth St., Denver, CO 80202; Phone 303/628-5430; FAX 303/236-5431.

Second Symposium on the Settlement of Indian Reserved Water Rights Claims--The Western States Water Council and the Native American Rights Fund will sponsor this symposium. The initial symposium was held Sept. 19-21, 1991 in Albuquerque, and some 220 people attended. The format consisted primarily of panel discussions with presenters who had participated in successful negotiations representing Tribal, State and Federal governments, interest groups, and congressional staff. The second symposium will be held Sept. 1-3, 1992 in Albuquerque at the Hyatt Regency Hotel. The format will be the same as the initial symposium, with different presenters and some different topics. For information contact the Western States Water Council at 801/561-5300.

Riparian Management: Shared Interests and Common Threads--Albuquerque, NM, February 4-6, 1993. A western regional conference to bring federal, state and local agencies together with private-sector interests involved in management of riparian areas (especially those areas which are jointly managed/owned by federal agencies and others). Cost of registration, three meals and Proceedings for the 2-1/2 day conference will be \$100 for advance registration and \$135 for late registration. Field trips are extra. Registration will begin in Sept. 1992. Funding will be available for a limited number of individuals. Conference is financially cosponsored by the University of Arizona, The U.S. Forest Service, the Bureau of Reclamation, the Soil Conservation Service, and the Bureau of Land Management. The Powell Consortium (the seven Colorado River Basin States) is also a cosponsor. For information contact Barbara Tellman or Mary Wallace at 602/792-9591.

19th Annual AWWA Water Quality Technical Conference and Exhibition, Toronto, Canada, Nov. 15-19, 1992. More than 30 topics will be presented, and attendees will have an opportunity to tour the Metropolitan Toronto Works Department laboratory and filtration plant, Ontario Ministry of the Environment laboratories, and Ontario Science Centre. Immediately following the conference, AWWA will offer three in-depth training courses - Methods for Detecting, Identifying and Enumerating Giardia and Cryptosporidium in Water Samples; Flavor Profile Training Workshop; and Drinking Water Laboratory Certification Workshop. Registration is: \$325 for members until Oct. 24; \$390 on-site and for non-members; \$50 for member students and \$72 for non-members. For more information contact the AWWA at 303/794-7711.

Colorado Ag Day 92, Colorado State University, Fort Collins, Saturday, Sept. 12. For the past 11 years, the State of Colorado has proclaimed Colorado State Ag Day as a special day to recognize those involved in one of our state's most essential and diversified industries. Colorado agricultural organizations and associations together with Colorado State University's College of Agricultural Sciences and Department of Intercollegiate Athletics are proud to host the 11th annual Ag Day event. Order your tickets today for the barbecue and football game - combination ticket \$17; barbecue only \$7. All tickets are advance sale only. Barbecue service 10:00

a.m.-11:30 a.m.; Game Kickoff is 12:05 p.m. in Hughes Stadium - the Rams will meet the University of Idaho Vandals. For information contact CSU Alumni Center at 491-6533.

"Total Quality Environmental Management," 6th Annual Colorado Hazardous Waste Management Society Conference and Exhibition, Oct. 22-23, 1992, Denver, CO. Keynote Speakers: Dr. Patricia Nolan, Executive Director of the Colorado Department of Health; and J. Winston Porter, former EPA National Program Manager for Superfund and RCRA. Sponsored by Colorado Department of Health, USEPA, University of Colorado, Colorado School of Mines, University of Denver, Kansas State University, and Front Range Community College. For information call Vicki Anderson, Martin Marietta, 303/977-9073.

Colorado Ground-Water Association September Meeting, "Aquifer Storage and Recovery," Wed., Sept. 16, 1992, 11:30 a.m. to 1:30 p.m. South Suburban Board of Realtors Meeting Room, 7899 S. Lincoln Court, Littleton. Speakers: Mr. Paul Grundemann of Centennial Water and Sanitation District, Mr. Kahn Le of Willows Water District, and Ms. Chris Schuyler-Rossie of the Denver Water Department. RSVP by phone - Barbara Osmer at CH2M Hill (771-0952, ext. 2255) or FAX (290-6465).

SOUTH PLATTE RIVER BASIN CONFERENCE

October 27-28, 1992

The third annual South Platte River Basin Conference will be held October 27-28, 1992 at the Fort Collins University Park Holiday Inn. This year's theme is "Defining Ecological and Sociological Integrity for the South Platte River Basin." The conference will begin on Tuesday, October 27 at 8:30 a.m. and end Wednesday, October 28 at 2:00 p.m.

Presentations on Water History, Fisheries, Birdlife, Stream Habitat, Water Quality, Agriculture, Water Management, Urban Impacts and Climate are planned. Guest speakers include federal, state, university and media representatives.

Sponsors of the 1992 conference include the Northern Colorado Water Conservancy District, the Colorado Division of Wildlife, the U.S. Fish and Wildlife Service, the Denver Water Department, the U.S. Environmental Protection Agency, the U.S. Geological Survey and the Colorado Water Resources Research Institute.

Call (303)491-6308 for more information

SHORT COURSES

Introduction in Ground-water Modeling, Sept. 14-18, 1992. International Groundwater Modeling Center, Colorado School of Mines, Golden, CO 80401. Phone 303/273-3103; FAX 303/273-3278.

ANNOUNCEMENT TO COLORADO STATE UNIVERSITY CIVIL ENGINEERING ALUMNI
AND INTERESTED OTHERS

INFRASTRUCTURE, ENVIRONMENT AND EDUCATION
FOUNDATIONS OF COLORADO'S FUTURE

November 19, 1992 - Denver, Colorado

AN AFTERNOON EVENT: LUNCHEON, KEYNOTE ADDRESS, GENERAL SESSIONS, AND RECEPTION

General Sessions: "Colorado's Transportation Infrastructure"
"Colorado's Environment and Water Resources"
"Future of Engineering and Engineering Education"

Contact: Ms. Lisa Jacobs, Office of Alumni Relations, Colorado State University, Fort Collins, CO 80523
Phone: 303/491-6533

A fee will be charged to cover lunch and refreshments

CALLS FOR PAPERS

CONSERVE 93: The New Water Agenda - You are invited to submit abstracts for the CONSERV93 program for oral presentations, poster presentations, workshops, roundtables, panel discussions, or software demonstrations. Papers should be on a specific subject of interest to water supply professionals, with emphasis on water conservation. Submit 10 copies of the abstract information form to Rick Harmon, Secretary, CONSERV93 Program Planning Committee, AWWA, 6666 W. Quincy Ave., Denver, CO 80235. Phone 303/794-7711; FAX 303/794-7310. Deadline: Dec. 1, 1992.

International Symposium on Water in the Middle East - University of Illinois at Urbana-Champaign, Oct. 7-9, 1993. The aim is to provide a forum to exchange ideas of creative intrastate, interstate, and regional comprehensive solutions for water sustainability in the Middle East. A group of invited speakers will be invited for each panel of the symposium; however, the organizing committee seeks a limited number of qualified presentations related to the symposium's theme and objectives. Submit a one-page presentation proposal including author's name, address, phone and FAX numbers before Feb. 11, 1993. Full papers are expected to be submitted by May 12, 1993. Contact: Water Resources Center, University of Illinois at Urbana-Champaign, 205 N. Mathews Ave., Urbana, IL 61801-2352, Phone 217/333-6275, FAX 217/244-6633.

Educational Research and Methods Division 1993 ASEE Annual Conference - June 21-24, Urbana, IL. The ERM Division solicits papers, workshops, and other session proposals for the program at the 1993 ASEE Engineering Educators Annual Conference. Submit a 200-400 word abstract of proposal to the Program chair: Bruce Carlson, ECSE Dept., Rensselaer Polytechnic Institute, Troy, NY 12180-3590. Voice 518/276-6089; FAX 518/276-6261; EMAIL CARLSON@ECSE.RPI.EDU. Deadline: Sept. 6, 1992.

International Seminar on Bangladesh Floods - Papers are invited for the seminar to be held in the Spring of 1993 at the Univ. of Illinois, Urbana-Champaign. International representatives from agencies who have studied the problem and persons in the United States from Bangladesh are being invited to participate. The theme is *Alternate Solution Strategies for the Flood Problem*. Abstracts of papers not exceeding 200 words should be sent to the following address by September 30, 1992. Seminar Organizing Committee, Bangladesh Environment and Flood Committee in America, 1804 Lyndhurst Drive, Savoy, IL 61874, FAX 217/244-6633.

"Water Resources Education: A Lifetime of Learning" & "Changing Roles in Water Resources Management & Policy," AWRA Summer Joint Symposia, June 27-30, 1993, Seattle, WA. For Water Resources Education Symposium, send 3 copies of 200-word abstract to: N. Earl Spangenberg, College of Natural Resources, Univ. of Wisconsin-Stevens Point, Stevens Point, WI 54481; Phone 715/346-2372; FAX 715/346-3624. For Changing Roles Symposium, send 3 copies of 200-word abstract to: Donald F. Potts, School of Forestry, Univ. of Montana, Missoula, MT 59812; Phone 406/243-6622; FAX 406/243-4510. Deadline: Aug. 31, 1992. Submit three copies of 250-page abstract to: Contact: AWRA, 5410 Grosvenor Lane, Suite 220, Bethesda, MD 20814-2192, Phone 301/493-8600.

"Innovations in Groundwater Management," 29th AWRA Annual Conference, & Symposium "Effluent Use Management," Aug. 29-Sept. 2, 1992, Tucson, AZ. For conference, submit three copies of 250-word abstract to: Hanna J. Cortner, Director, Water Resources Research Center, 350 N. Campbell, Univ. of Arizona, Tucson, AZ 85721; Phone 602/621-7607. For symposium, submit three copies of 250-word abstract to: Ken Schmidt, 1540 E. Maryland, Suite 100, Phoenix, AZ 85014; Phone 209/224-4412. Deadline for conference and symposium is Oct. 23, 1992.

ASCE Infrastructure Management & Planning - Two Parallel Conferences - Denver, CO, June 21-23, 1993.
Infrastructure Management: New Challenges, New Methods

The conference will focus on state-of-the-art transportation facility management. Topics will include:

<u>Management Systems:</u>	State-of-the-Art for Highways/Pavements/Bridges, Railroads, Airports, Waterways, Pipelines
<u>Data Collection:</u>	Inventories, Methods, Management, Budgets
<u>Facilities Modeling:</u>	Deterioration Models, Risk Assessment, Fatigue/Failure Analysis, Repair/Rehabilitation Impacts
<u>Life-Cycle Cost Benefit Analysis:</u>	Deferred Maintenance Costs, Optimization, Budgeting/Resource Allocation
<u>New Technology:</u>	Condition Assessment, Materials, Repair/Rehabilitation Methods, GIS, Expert Systems
<u>Implementation & Training:</u>	Organization Issues, Promoting the Concepts, Policies, Standards, Funding

Guessing the Future: Coping with Uncertainty in Infrastructure Planning

This conference addresses the challenge faced by professionals in planning facilities under uncertain conditions. Topics will include:

<u>What are the Principal Uncertainties?</u>	Travel Demand & Forecasting, System, Political, Current Conditions, Energy/Material/Other Inputs, Technological.
<u>Techniques for Coping with Uncertainty:</u>	Risk Pooling, Flexible & Adaptable System Design, Sensitivity Analysis, Computer-based Decision Support, Data Collection Costs/Benefits, Presenting Uncertainty to Decision Makers, Determining Appropriate Project Planning Horizons, Capital Markets.
<u>Economic, Social & Political Implications:</u>	Project Liabilities & Losses, Projects with Lower-Than-Expected Demand, Ethics of Forecasting, Consultant/Client Relationships/Responsibilities.
<u>Case Studies:</u>	Transportation-Airports/Transit Systems/Maglev/High-Speed Rail/Toll Roads, Water Supply, Environmental Planning - Flood Control/Flood Plain Preservation

DEADLINE FOR BOTH CONFERENCES: September 1, 1992 - 500 word abstract due.

Send to:	Professor Sue McNeil	or	Professor Jonathan L. Gifford
	Department of Civil Engineering		Center for Transportation and Land Policy
	Carnegie-Mellon University		George Mason University
	Pittsburgh, PA 15213		Fairfax, VA 22030
	Telephone: 412/268-5675		Telephone: 703/993-1395
	FAX: 412/268-7813		FAX: 703/993-1399
	EMAIL: mneil("CE.CMU.EDU)		EMAIL: JGIFFORD("GMUVAX.GMU.EDU)

Cooperating Organization: Civil Engineering Department, Colorado State University

HAL SIMPSON NAMED STATE ENGINEER

As State Engineer, Simpson will manage the Division of Water Resources, which has a staff of 220 employees and an annual budget of \$11 million. Simpson began his career with the Division of Water Resources in 1972 as chief of the Land Use Branch. He subsequently directed the Water Management Branch, was promoted to assistant state engineer in 1980 and was appointed deputy state engineer in 1985. In February 1992, Simpson was appointed acting state engineer. Simpson has a bachelor's degree in civil engineering and a Masters degree in water resources, both from Colorado State University.

Ken Salazar, Executive Director of the Colorado Department of Natural Resources, said of the appointments: "Both Hal and Chuck have earned respect throughout the state as knowledgeable and fair-minded professionals. The selection process was extremely rigorous. In addition to the standard requirements for filling positions at this level, which included conducting a statewide search, written examination and oral board interviews, we sought input from the Water Conservation Board and the Governor before finalizing the appointments. We are pleased that the Governor, the board and I reached unanimity in our support for these two individuals."

"CHUCK" LILE TO HEAD CWCB

"Chuck" Lile will manage 30 employees and a \$1.96 million budget at the Colorado Water Conservation Board. Lile began his state career in 1967 as a water resource engineer with the Division of Water Resources. In 1973, he was promoted to assistant division engineer in Steamboat Springs and assumed his current duties as division engineer of water district 7 in Durango in 1978. Lile has an associate degree in civil engineering and a bachelor's degree in geology from the University of Southern Colorado.

WORKSHOP PARTICIPANTS URGE COOPERATION OVER CONFLICT

"Showdown on the Colorado River" was the title of the Seventeenth Annual Colorado Water Workshop held at Western State College July 22-24. While no gunshot was heard, a few verbal barrages were exchanged and several bargaining positions staked.

Judith Jacobsen, Assistant Professor of Geography at the University of Wyoming, encapsulated the modern debate over allocation of Western water by telling a story of two visitors who appeared at her camp one night when she was on a solo raft trip. One was a weathered but ageless man, dressed in khaki and wearing a Caterpillar cap. The other was a weathered but ageless woman in shorts, a T-shirt with "Extinct is forever" printed on it, and tennis shoes. They each sat at her campfire and told their view of Western water history and predictions for the future.

The man described a history of hard work, mining, agriculture. The water helped extract the mineral wealth of the West and supplied the towns built to enjoy that wealth. "The future flows from the past," he said. "What of environmental damage?" queried Dr. Jacobsen. "It's a dog-eat-dog world," she was told. The environment will have to be balanced with jobs: when economic development is wanted, some species will have to be balanced out. The consequences of global warming are uncertain, he said, but we need more water projects to deal with that uncertainty. Water, he declared, is freedom.

The woman described a different perspective of Western water history, saying that our parents came a hundred years and more ago, but had to turn to the federal government to bail them out of the mistake of trying to turn the dry Western climate into an agricultural region. Now beautiful canyons lie under tons of water. She agreed that there was great wealth in the mountains where the miners went, but it was wealth for the few: most had to suffice on paltry wages. Ghost towns, mine tailings, and decreased biodiversity are the legacy. Then came those who valued the natural over the manmade, who felt that animals and plants had as much rights as humans and that there are cultures other than the white European culture that offer viewpoints of water and nature worth considering. "The future flows from the past," she said, as the man had done. The future is one of a sustainable society, one that does not compromise future generations, including the future generations of non-humans. The doctrine of prior appropriation will no longer have primacy over the public interest. Dr. Jacobsen asked how the environment could be so sustained in the face of the growing population; what about property rights? "It's a dog-eat-dog world," she was told again; as much of the basin must be restored as possible. Ultimately, there will be an outmigration of people. The scales must go far toward wilderness to compensate for the damage caused by humans, the woman stated.

When they finished speaking, the two strangers rose and left the campsite without further comment, retreating in opposite direc-

tions. The visit left Dr. Jacobsen no more sure of a solution to the conflicts over Western water than she had been before.

The rest of the conference shed light on the complexities of the two sides described in Jacobsen's story, as well as the many other interests involved in sharing the Colorado River. Rural-to-urban water transfers, interstate apportionment, and water marketing were primary themes.

THE LAW OF THE RIVER: The first two panels analyzed the Colorado River Compact, legal interpretations of it and the question of whether the law of the river is obsolete. Attorney John Carlson, of Carlson, Hammond & Paddock, briefly told the history of the Colorado River Compact. He described the efforts to promote formulation of the compact by Delph Carpenter, a Greeley lawyer, whose reading of the U.S. Constitution convinced him that the only solution for a fair share of the Colorado River would be an interstate compact. Such compacts are permitted only with the approval of Congress.



Workshop participants gather for barbecue and conversation on the campus of Western State College.

Although the compact was meant to settle controversy, it also generated controversy. Carlson pointed out that some feel that Article III, Paragraph (d) guarantees to the lower basin states first call for up to 7.5 million acre-feet each ten years, a call that in times of drought would deny the Upper Basin its full 7.5 million acre-feet apportioned "in perpetuity" in Paragraph (a). Delivery of the 7.5 million has not thus far been a hindrance to development. In addition, Carlson commented that while in 1922 there was great cohesion among the basin states about wanting to develop, that is not so now, as the demand for instream flows and the concern over salinity have grown.

Carlson concluded that we cannot cast aside the compact, that we must work to preserve the apportionment. Whether that is attainable for Colorado is not certain, he said. As John Wesley Powell was once rescued from a crevasse into which he had climbed by his rescuers dangling a pair of pants down to him to catch hold, so Carlson hopes that Governor Romer and others can extend a pair of pants and save Colorado's water.

James Lochhead, with the Upper Colorado River Commission and the Colorado Water Conservation Board, detailed the rest of

the law of the river. He emphasized that the compact apportions not ownership of the water but the right to use the water.

The next panel considered the relevance of the law of the river to the future use of the Colorado River. Lori Potter, an attorney for the Sierra Club Legal Defense Fund, talked about the environmental legislation that began to be passed by Congress in the late 1960s and early 1970s. The law of the river now includes modern social and environmental laws and regulations, and the economic, social and political forces that underlie these laws. The law of the river is not obsolete, she said, but is evolving.

Anthony W. Williams, Attorney, Williams, Turner & Holmes, PC, discussed the importance of compacts to preserving Colorado's water. The greatest threat Williams saw to developing Colorado's portion of the compact water comes from such things as the requirements of the Endangered Species Act and the problems associated with high salinity. Although some fear that lower-basin use of upper-basin water may mean the upper basin will not see the water again, Williams did not feel this was a problem. He described Colorado as being like the farmer at the headgate: if we cut off the water, they have to come and get it.

Carroll E. Multz, Chairman, Upper Colorado River Commission, described the federal role on the Colorado River. He listed three responsibilities of the federal government: 1. reservoir operations and administration of water delivery in accordance with the law of the river, 2. the Secretary of Interior's trust responsibilities for Native Americans, and 3. administration and compliance with environmental regulatory laws. He concluded that whether it is good or bad, the federal government has an inescapable role under the law.

The following morning began with a description of the Colorado Water Education Foundation. Carmine Iadarola, President of the Foundation, described the need for factual information and water education that does not promote the goals of one side or another. To address this need, the Foundation plans to become a clearinghouse of information, is working to establish contacts with libraries across the United States, and is developing a newsletter. Iadarola extended an invitation to the conferees to share their ideas and suggestions with the Foundation by attending the annual meeting September 24 in Denver at the Hilton Southeast.

RESERVE WATER RIGHTS: The first panelists of the day discussed Native American water rights, interstate compacts, and water marketing. Scott McElroy, attorney for the Navajo Nation, emphasized that choices made about Indians' water rights need to be made by the Indians themselves. The sovereignty of the tribes is well founded in U.S. jurisprudence, he said, and detailed the 1908 Winters decision establishing the reserve rights doctrine. The 1963 *Arizona v. California* case awarded perpetual quantification of water rights to the five Colorado River mainstem tribes and reservations, using the "practicably irrigable acreage" standard. When the 1922 Colorado River compact was being negotiated, the

commissioners did not know what to do with tribal rights, so Herbert Hoover suggested an article saying the compact did not address tribal rights. The tribes were not consulted. Therefore the law of the river does not apply to the tribes, according to McElroy.

George Arthur, Vice Chairman of the Resources Committee of the Navajo Nation Council, stated that the law of the river was obsolete the day it was written because the Native Americans were left out. The so-called surplus water in the Upper Colorado Basin is undeveloped reserved water, so cannot be developed without the Tribes. Native Americans are willing to come to the table and talk about water allocation and water marketing, he emphasized, pointing out that controversy exists because people do not sit down and talk to each other. Although water marketing is a new concept to how Native Americans have thought about water, Arthur urged his listeners to keep in mind that the Native Americans are willing to contribute to the economy of the United States. He added that they know what "environmental" is--"that is our lifestyle."

Jerald Peabody, from the Ute Mountain Ute, said that there are two types of assets on the reservation: natural resource assets and people assets. Of the natural resource assets, water may be the most important and most sacred to Native Americans and to the Utes. He pointed out that only those tribes with quantified water rights are in a position to market water.



Ute Mountain Ute Tribal Representative Jerald Peabody discusses water marketing.

ENDANGERED SPECIES ACT: The next panel discussed the impact of the Endangered Species Act (ESA) on water development and allocation decisions. Patrick Parenteau, Of Counsel with Perkins Coie and Head of the Environmental Resources Practice Group, Portland Office, said that there is a dilemma about preserving our natural inheritance and/or making a living, and there are no clear cut answers. He said that the dilemma is a people problem and the people come first. We, however, can build economic systems that do not destroy species. He called the recovery process the linchpin of the ESA. Extinction is part of the natural order of things, he said, but it is the human-caused acceleration of extinction that is the problem. His advise to those who want to get the ESA out of

their lives: get species off the list and give the cooperative approach a chance.

Janice Sheftel, Attorney with Maynes, Bradford, Shipp & Sheftel, said the ESA is broken and needs to be fixed. She described it as neither equitable nor fair, citing reports of species that have disappeared while awaiting listing. The ESA fails to protect but is very successful at halting and increasing the costs of development, she said.

Mark Schaffer, Vice President of The Wilderness Society, focused on the question of biodiversity. The controversy is often cast in simplistic terms, he said, displaying some truth but not the whole truth. For example, the issue might be described as owls versus jobs or as owl jobs versus salmon jobs. With the ESA, the United States is the first society in history to say that the variety of species is of fundamental importance. We need to talk about biodiversity, he said, not just endangered species.

Bill Trampe, Chair of the Upper Gunnison River Water Conservancy District, spoke not of the goal or politics of the ESA but of its effect on him as a rancher. His property below the Roaring Judy fishery has bald eagles on it. The fishery does not because it is open to the public, and the area below the property is also too populated for the eagles. He described a visit by a wildlife officer asking him where was the poison cow he had left out to kill the eagles, although he had done no such thing and would not. Maybe, Trampe said, he should open up his property to the public so there wouldn't be any eagles and he wouldn't have to worry about the ESA anymore. The eagles don't bother him, but the side effects of the ESA do.

Another story Trampe told of the effects of the ESA was the finding of a particular species of toad on some Forest Service land to which he is the permittee. He was told to prevent his cattle from congregating at the stream, but pointed out three inconsistencies: 1. the stream is the first access to water for the cattle entering that property--how is he to stop them from drinking, 2. the toads have already hibernated in the fall when he runs his cattle there, 3. there are so many campers and hikers there that cattle don't want to go there anyway.

Trampe's point was that ranchers and farmers are not the danger to the environment they have sometimes been accused of being and, as in the case of the bald eagle, protection of their property rights has also offered protection to endangered species. He reminded the audience that when times are tough, farmers and ranchers have to mortgage or sell their property rights; that is why they are so careful about their land and water rights. We all have to work together, he said, and be open and forthright.

WATER TRANSFER: The afternoon was devoted to rural-to-urban transfer of water, both interstate and intrastate. Duane Georgeson of the Metropolitan Water District of Southern California (MWD) described the conservation measures taken by MWD. Last year the agency spent \$15 million to help member agencies implement conservation programs and will spend \$21 million this year. He described a wastewater reclamation program that reclaims three times the amount of water used by

San Francisco. He described desalination efforts to clean brackish groundwater along the coast. He spoke of the agreement MWD has with the Imperial Irrigation District: MWD pays for modernization of the IID system and in turn gets some of the conserved water. In addition, MWD is working with agricultural agencies on a two year demonstration program in the Palo Verde irrigation district to fallow 25 percent of agricultural land. The State Water Project (SWP) continues to have great uncertainty, due to the lack of facilities and the potential effects of the ESA.



Duane Georgeson discusses Metropolitan Water District conservation efforts. Behind him, James Booker listens.

Representing the rural area so often cited in water debates, Greg James, Director of the Inyo County Water Department, showed slides displaying the effect on Owens Valley of the transfer of most of its water to Los Angeles. The river through the valley ceased to exist for 53 miles except in very wet years, creating a major dust pollution problem. Before the transfer, 75,000 acres in the valley were irrigated; today 12,000 acres are irrigated. In the 1960s, artesian wells that had been dug around the turn of the century began to dry up. Subsequently Inyo County sued Los Angeles and the court ruled that the city had to write an Environmental Impact Statement for water to be added to the aqueduct.

Colorado State Senator Harold McCormick addressed the politics of rural-to-urban transfers, pointing out that on the national level, California has more U.S. Congressmen than state senators. He spoke of the "rule of 18 and 33" in Colorado: 18 state senators and 33 members of the Colorado House are needed to pass water-related legislation. Eight state senators are from entirely rural districts, where virtually all the water in Colorado originates, four are from urban and rural districts, and 23 are from metropolitan districts (including Pueblo and Grand Junction). He discussed his bill, SB 92, recently signed by the governor, which requires water judges to include mitigation provisions when permitting rural to urban transfers of water.

Jim Dyer, Director of Water and Agriculture Programs at the Rocky Mountain Institute, emphasized the conservation side of the water transfer question, pointing out that residential water

use is not entirely consumptive. Technology exists to reduce both inside and outside water use by 30 percent. In addition, high efficiency measures such as low-flow showerheads reduce pollution resulting from energy use and emission from water pumps and heaters. He listed five suggestions for water planning: 1. employ end-use/least-cost analysis, 2. look at long-term whole-system costs, 3. use the incentive approach, with an enlightened price structure and a variety of choices, 4. put planning in the context of long-range community planning based on the desired future, and 5. consider efficiency as a supply of equal standing. Farms and cities, he warned, need to recognize that they need each other.

Speaking at the conference banquet, Roland Robison, Regional Director of the Bureau of Reclamation, stressed the importance of seeking a balance in Western water. Water marketing is not necessarily promoted by the Bureau, said Robison, but the Bureau will assist the process if the states decide they wish to engage in it. The ESA is the law, he said, and the Bureau will comply, trying to be mindful of the concerns of its traditional constituency but dealing with the new reality.

On the final day of the conference, Commissioner Dennis Underwood of the U.S. Bureau of Reclamation discussed the Bureau's future. There is no change in the Bureau's mission, he said, but a change in emphasis. The three important words in the Bureau's mission are "development, management, and protection." In the past the emphasis has been on development; it will now be more on management. Because of increasing demands and a narrowing margin of reserve infrastructure, there are increasing conflicts. However, taking from one need to fulfill another is bad for the economy, Underwood explained, and the Bureau will try to avoid such conflicts and trade-offs between the environment and the economy.

INTERSTATE WATER BANK: Underwood was followed by a panel discussion about an inter-state water bank. Gerald R. Zimmerman, Executive Director of the Colorado River Board, California, said it is important for the basin states to discuss the transfer of water and the need for a water bank within the basin states. He emphasized that the water has been apportioned by compact and the "use it or lose it" concept does not apply to the interstate apportionment. He stressed that interstate transfers should be on a state-by-state basis rather than between individual water users, consistent with the law of the river, on a willing seller-willing buyer basis, and should recognize third party and environment impacts and provide appropriate compensation or mitigation.

James Booker, with the Department of Agricultural Economics and the Wyoming Water Resources Center at the University of Wyoming, looked at the economic impacts of an interstate bank. He cautioned that while markets produce what is called "economically efficient" resource use, the many positive and negative external impacts of water transfer are the basis of the policy disputes in allocation of basin water. Booker based his presentation on "Economic Impacts of Alternative Water Allocation in the Colorado River Basin," by Booker and R. A. Young, CWRRI Completion Report No. 161. The report

concluded that water transfers from agriculture to MWD water users would result in substantial economic benefits. Because differences in marginal economic values of consumptive use are modest between upper and lower basin agricultural users, any gains from trade would be modest. The predicted economic benefits of upper to lower basin transfers become significant when nonconsumptive-use values are included: reductions in salinity concentration and increased hydropower production make a big difference.

James Lochhead speaking on behalf of Colorado, said that the law of the river is not obsolete but the states have never tested the limits of the system. Now states will be testing the limits and viability of that law. He said that Colorado Governor Roy Romer's opinion is that California's use should be reduced to California's basic compact apportionment and that answers exist within California to meet the Los Angeles metropolitan area needs. In addition, the states should decide on changes rather than let the Bureau of Reclamation and Congress impose a solution that the states would not like.

Thomas Cahill, Director of the Colorado River Commission, Nevada, said that even with conservation measures, Nevada's Colorado River allocation will meet demand only until 2006. Nevada does not have instate options comparable to other states, and the transfer of Colorado River water from other basin states is one of the options being examined. Betsy Rieke, Director of the Arizona Department of Water Resources, stated that the development of the law of the river has led to deep-seated antagonism and a healthy suspicion toward California by Arizonans. Although Arizona is wary and resistant to additional uses of water from the Colorado River, Rieke said, that does not mean that Arizona takes a position that the status quo must be preserved at all costs.

CONCLUDING REMARKS: The final panel presented concluding remarks by conference observers. Mark Obmascik, Columnist for the Denver Post, said that much of what he had heard in the conference gave him hope and much of it was discouraging. Sarah Bates, Assistant Director of the Natural Resource Law Center at the University of Colorado, heard hope in the presentations that solutions to many of the conflicts could be worked out, but she also heard sobering reminders of just how deep the conflicts about the river go. Jack Ross, Attorney with Saunders, Snyder, Ross & Dickson and former director of the Colorado River Basin Commission, gave highlights he had selected from each speech. He quoted the words of poet Tom Ferrill that appear under the murals of Alan True in the Colorado State Capitol: "Beyond the sundown is tomorrow's wisdom. Today is going to be long, long ago." Ross wondered if, when today has become long, long ago, will tomorrow's wisdom be as harshly critical of today's wisdom as today's wisdom has been of the last 80 years?

Transcripts of the 1992 Colorado Water Workshop will be available through the Colorado Water Resources Research Institute. Transcripts from the 1990 and the 1991 Colorado Water Workshops are currently available through CWRRI.

WATER NEWS DIGEST

WATER PROJECTS

Bureau Plans Water Release From Ruedi

The Bureau of Reclamation (USBR) plans to release 20,000 acre-feet of water from Ruedi Reservoir to benefit endangered fish species downstream in the Grand Valley. The release will be from August 1 to October 31, 1992. In 1989 and 1990 the USBR released 10,000 acre-feet of unsold Ruedi water each year to help the recovery of endangered fish species, and doubled that amount in 1991 without harming either recreation at the reservoir or fishing downstream on the Fryingpan River.

Grand Junction Daily Sentinel 6/2/92

Trinidad Dam Controversy Continues

The dispute over payment of operation and maintenance costs for Trinidad Dam is unlikely to be settled until at least September. Attorneys for both the Purgatoire River Water Conservancy District and the four ditch companies contesting the payment of the O&M costs on the dam have requested the Las Animas District Court to set a hearing date for this fall. The dispute began when the four ditch companies refused to pay their annual fees, calling the cost outrageous. The Bureau of Reclamation and Army Corps of Engineers, who operate the dam, refused to release water to the conservancy district without full payment. The conservancy district paid the fees so that other ditch companies that had paid could receive water.

Pueblo Chieftain 5/27/92

Water Projects Obtain Funding

Governor Roy Romer has approved funding for four projects in the San Luis Valley: the Trincheras Irrigation Company will receive a \$1 million loan to repair Mountain Home Reservoir southeast of Fort Garland; the Sanchez Ditch and Reservoir Company will get a \$400,000 loan to rehabilitate its reservoir 10 miles southwest of San Luis; the Colorado Water Conservation Board's contribution to the federal Closed Basin Project will be increased by \$271,000 to help develop the San Luis Lakes Recreation Area; and \$45,000 was authorized for a demonstration project on groundwater recharge in the Closed Basin area in cooperation with the San Luis Valley Conservation District. The Senate bill also authorized the Water Conservation Board to spend up to \$100,000 on a study of alternatives to transferring agricultural water from the Fort Lyon Canal to the Denver metro area. Under the same bill, the North Poudre Irrigation Co. will receive a 40-year \$1.8 million loan to add 10,000 acre feet of storage capacity to Reservoir No. 6 located northeast of Fort Collins. Reservoir water currently is unusable because the structure does not meet state safety standards.

Pueblo Chieftain 5/28/92, Fort Collins Coloradoan 5/28/92

Court Reverses Decision on Homestake II

The Eagle County District Court has reversed a decision made by county commissioners to deny the cities of Colorado Springs and Aurora permits for the construction of the Homestake II water project. The commissioners had unanimously denied the permits in February 1988 despite prior approval from federal agencies that have jurisdiction over the areas affected. The Court remanded the permit requests to the commissioners with directions to approve the permits in question.

Grand Junction Daily Sentinel 7/16/92

Federal Water Projects Short of Water

Federal water projects located in western Nebraska, Kansas, and eastern Colorado in the Republican River Basin are beginning to run out of water. The U.S. Bureau of Reclamation predicts that major reaches of rivers in the basin will run dry by 2018. Two lakes, Harlan County Lake in Nebraska, and Lovewell Reservoir in Kansas are beginning to run dry due to heavy irrigation, modern farming practices, and drought.

Montrose Daily Press 6/16/92

Animas-La Plata Project Progresses

The U.S. House of Representatives approved a bill appropriating \$11 million for the Animas-La Plata project in southwestern Colorado. This will allow the project to go forward while project proponents continue work to recover endangered fish populations in the San Juan Basin. The U.S. Bureau of Reclamation has awarded Northern Arizona University a five-year \$7.74 million contract to evaluate archaeological sites in preparation for the project. The contract keeps the project on its 12-year construction schedule, but may set off a new court challenge from environmental groups who feel the contract award is illegal. USBR faced the threat of legal action from water users and Indian tribes if it did not award the contract.

Grand Junction Daily Sentinel 6/19/92, Montrose Daily Press 6/10/92

Denver Water Board Explores Alternatives to Two Forks

The Denver Water Board is exploring alternatives to Two Forks including: strengthening Antero Reservoir in southern Park County so that it can hold additional water; raising the dam height at Eleven Mile Reservoir--also in Park County--to increase its yield; expanding Gross Reservoir on the north end of the water system in Boulder County; expanding the collection system at Williams Fork in Grand County, which feeds the Moffat Tunnel; and storing water in Adams or Weld County.

Montrose Daily Press 7/1/92

New Reservoir Proposed Near Kremmling

The Colorado River Water Conservation District and the Denver Water Board have reached an agreement to allow construction of the \$49 million Wolford Mountain reservoir on Muddy Creek north of Kremmling. It would have a capacity of 60,000 acre-feet, which is about five times the size of Chatfield Reservoir in the southwest Denver metro area. The agreement approved by CRWCD calls for Denver to pay the river district \$43 million over the next 25 years in exchange for 12,000 acre-feet of reservoir water a year—enough to accommodate the annual needs of 48,000 additional metro-area residents. Denver plans to release water from Wolford Mountain Reservoir to compensate the Western Slope for flows diverted farther upstream in the Colorado River system at the city's existing Dillon Reservoir. Another related agreement will let Denver send more water downstream on the Western Slope's Fraser River for use by Winter Park and Granby, city officials said. Wolford Mountain Reservoir is scheduled to be completed in 1995.

Montrose Daily Press 7-23-92

Delta Considers Hydro Projects

The Delta City Council is considering an agreement with Cool Water, Inc., of Durango, which would result in the construction of two hydroelectric projects along a city-owned water pipeline on the Grand Mesa. Under the agreement, Delta would lease water it owns on the Grand Mesa to Cool Water, which would build two hydroplants along the pipeline route, with the end of the pipeline also being rerouted from the Delta airport area to the lower White Ranch. The water run through the hydroplants would provide irrigation for city-owned land on the White Ranch, which it leases out for agricultural uses.

Montrose Daily Press 7-27-92

Casino Development Faces Possible Restriction

Casino development in Central City and Black Hawk could be restricted or shut down for two or more years if the federal government requires an environmental impact study before the two towns can build any new water storage reservoirs. A detailed environmental study can take between 18 months and two years. Black Hawk plans to build a water treatment plant this summer, and also needs to construct a new pumping station in a wetlands area, which would not be possible until the environmental study is finished.

Denver Post 6/17/92

WATER TRANSFER

Judge Rules on Litigation Costs

Judge Robert Ogburn has granted an award of \$2.7 million to a group opposing American Water Development Inc.'s (AWDI) plan to transfer San Luis Valley water to the Denver metropolitan area. The award is intended to cover litigation

costs incurred by the Rio Grande Water Conservation District and its allies in fighting AWDI. In November of 1991 Ogburn had ruled that AWDI could not transfer the water since it is tributary to streams and rivers in the valley. AWDI has since appealed the award.

Pueblo Chieftain 6/2/92, 6/30/92

Water Swap Options Considered

Mesa County Commissioners are considering asking Denver to pay for highway improvements and airport landing fees in exchange for Denver's request for additional water from the west slope's planned reservoir at Wolford Mountain on Muddy Creek near Kremmling. In 1986 Denver agreed to help pay for Wolford Mountain and use 40 percent of its water for 25 years. When Denver's Two Forks Reservoir was killed by the EPA, Denver offered to pay an additional \$12 million for additional water. Denver would use the water by exchange, releasing water from Wolford Mountain to make up for increased transmountain diversions from Dillon Reservoir on the Blue River.

Grand Junction Daily Sentinel 7/16/92

WATER QUALITY

Colorado Springs City Council Rejects Water Plant

Settling a 2-year controversy, the Colorado Springs City Council unanimously voted down a proposed water treatment plant at the mouth of Cheyenne Canyon. The council decided to supply water to the city's southwest side from the existing Mesa Water Plant by installing new water lines at a cost of about \$25.2 million. The motion approved Tuesday carried two conditions: that Cheyenne Creek not be dried up by any future projects; and that there be "appropriate" handling of the Water Department land near the canyon. Many residents want the land turned over to the Park and Recreation Department.

Colorado Springs Gazette Telegraph 7/29/92

Biological Life of Water May Add to Regulations

Colorado currently restricts chemical contamination of streams and lakes but may add biological criteria to future water quality standards, which could mean a significant expansion of state regulation of waterways. Hearings scheduled for August will prompt promulgation of rules that could affect those who directly or indirectly discharge materials into lakes and streams.

Pueblo Chieftain 7/16/92

Fort Collins Water Receives High Marks

Fort Collins recently received high marks in a round of Environmental Protection Agency (EPA) drinking water tests. The EPA's standards require that no more than 10 percent of samples taken from a water system exceed 15 micrograms of

lead per liter, or 1,300 micrograms of copper per liter. Tap water from 110 Fort Collins sample homes showed 2.46 micrograms of lead per liter and 166 micrograms of copper per liter.

Fort Collins *Coloradoan* 7/9/92

Lake Hasty Closed by High Coliform Count

Lake Hasty below John Martin Dam has been closed to swimming and boating because counts of coliform bacteria in the water exceed safe levels. Tests for bacteria are performed weekly by the U.S. Army Corps of Engineers, which operates both John Martin Reservoir and Lake Hasty. The lake has been posted with warning signs, but remains open to fishing because fish do not absorb coliform bacteria. Pueblo County Health Department officials are testing the water to determine the source of the bacteria. Possible sources include a sanitation unit near Lake Hasty that treats sewage from campground and recreation vehicles, or contamination from a high population of migratory waterfowl last fall and winter. The lake has been tested for coliform and other contaminants from May through September since 1972, and this is the first time coliform levels have been too high for human contact. It is uncertain how long the lake will be closed.

Pueblo *Chieftain* 7/3/92

Cleanup of Naphtha Spill Expected to be Lengthy

A U.S. Bureau of Land Management (BLM) spokesperson indicated it will take months to clean up hazardous materials dumped on the side of Colorado 141 in late June. More than 5,000 gallons of petroleum naphtha -- a gasoline additive -- spilled from a tanker truck when it overturned on the highway. Some of the hazardous and flammable liquid trickled into nearby East Creek, which drains into the Gunnison River, prompting officials to dam the creek in three locations. Only trace amounts of the liquid were detected at the end of the creek, and should have no effect on the Gunnison River.

Grand Junction *Daily Sentinel* 6/30/92

Farmers, Ranchers Not Satisfied with Cyanide Cleanup

Leroy Salazar, the engineer for the Alamosa-La Jara Water Conservancy District, and district president John Shawcroft, maintain that an agreement between the Summitville Consolidated Mining Co. and the Colorado Department of Health, the Department of Natural Resources, and the Attorney General's office does not address damage to farmers' fields and reservoirs caused by last year's cyanide spill into the Alamosa River. Jim Pendleton, technical and scientific coordinator for the Colorado Mined Land Reclamation Division, said the three state organizations and Summitville agreed to a cleanup of Summitville's cyanide heap leach facility. Summitville has paid fines for the violations and has posted an additional \$5 million bond, bringing its bond to \$7.3 million for cleanup.

Pueblo *Chieftain* 7-24-92

Water Treatment Plants Dedicated

Two new water treatment plants near Leadville opened earlier this year making possible removal of heavy metals from water flowing into the Arkansas River. The Yak Tunnel Water Treatment Plant opened in February and handles water flowing through mines in the California Gulch area south of Leadville. It was constructed and continues to be operated by Resurrection and ASARCO mining companies under the direction of the EPA. The Leadville Tunnel Treatment Plant opened in March and handles water from three mines in the Leadville drainage area at the north end of town. It was built and continues to be maintained by the U.S. Bureau of Reclamation. The combined price tag of the plants reaches more than \$19 million. Both water treatment plants will monitor water quality continually. Officials hope the cleaner water delivered to the Arkansas River not only will help the environment but also re-establish the once strong brown trout fishery in the area.

Pueblo *Chieftain* 7-23-92

WILDLIFE

AB Lateral Will Not Harm Fish, According to Feds

The U.S. Bureau of Reclamation (USBR) and the U.S. Fish and Wildlife Service (USFWS) have determined that the AB Lateral project near Montrose will not affect a newly-listed endangered fish, the razorback sucker. The Army Corps of Engineers, which must approve a federal permit before work can begin on AB Lateral, was waiting for the USBR's determination before making a decision on the permit. The AB Lateral will use water diverted from the Gunnison River to power a 40-megawatt generator north of Montrose. The cities of Montrose and Delta are both concerned that high water flows from the project could damage Montrose's wastewater treatment plant and Delta's Confluence Park.

Grand Junction *Daily Sentinel* 7/1/92

Study Shows Endangered Species Act Falling

A recent report by the General Accounting Office (GAO) is highly critical of the Bush administration's efforts to protect rare and endangered species from extinction. The two-year study shows that while 650 species have been listed as endangered or threatened under federal law since 1973, another 600 have been accepted by federal agencies as candidates, but their official designation will be held up in paperwork until at least 2006.

Grand Junction *Daily Sentinel* 6/4/92

PEOPLE

Water Position Goes to Colorado Lawyer

Carroll Multz, a Colorado lawyer, has been appointed by President Bush as chairman of the Upper Colorado River Basin Commission. He replaces Denver water attorney Jack Ross,

who was appointed chairman of the Commission by Ronald Reagan. Multz is the first chairman to actually live in the Upper Basin, which encompasses portions of Colorado, Wyoming, Utah, and New Mexico. Multz grew up in Helena, Montana, and graduated from the University of Montana law school in 1961. After a stint as assistant attorney general of Montana, he came to Colorado in 1963 and practiced in private law firms in Steamboat Springs and Denver until 1968. He served as chief trial deputy for the El Paso County district attorney and in 1974 was appointed district attorney for Grand, Moffat, and Routt counties. He has been in private practice in Grand Junction since 1981.

Denver Post 7/4/92

Engineer Carlos G. Bates Dies After Brief Illness

Carlos G. Bates, internationally recognized engineer who designed the hydro-electric pumping system for Colorado's Big Thompson Project, died July 3. An engineer with the U.S. Bureau of Reclamation, Bates served as a consultant on project in Panama, Brazil, Yugoslavia and the former Soviet Union. He was in charge of the design of the third power plant at Grand Coulee Dam in Washington, which included the world's four largest hydroelectric generating units. Bates was born in Denver in 1914 and was a descendant of William Brewster, one of the original Mayflower pilgrims.

WEATHER

Meteorologist Predicts Drought

John Henz, president of Henz Meteorological Services, predicts that Colorado is due for a severe three-to-four year drought that will strain the state's water supplies. Henz provides weather predictions to insurers, mining companies, municipal governments, and other clients in the Rocky Mountain region.

Colorado Springs Gazette Telegraph 5/31/92

RECREATION

Amphitheater Planned for Pueblo Reservoir

Plans are well underway to build an outdoor amphitheater at Pueblo dam and reservoir. According to Charles L. (Tommy) Thomson, manager of the Southeastern Colorado Water Conservancy District, cost of construction is estimated at \$3 million, and the operating and maintenance (O&M) costs are estimated at about \$50,000 annually. Local backers of the project are looking for help from the feds, foundations and other sources to build the amphitheater, but they expect to handle O&M costs locally through revenues that the amphitheater would generate. Thomson reports that Third District Congressman Ben Nighthorse Campbell is prepared to sponsor legislation to finance a major portion of the construction and development costs. Fifth District Congressman Joel Hefley has asked to be included as a co-sponsor. Both of Colorado's U.S. Senators have expressed interest in getting the bill through their

chamber. Support from the Department of the Interior is also expected. The Campbell legislation was included as a provision in the omnibus reclamation bill (HR 429) as it passed the Senate, and Campbell is working with key House conferees to approve the provision when the omnibus bill gets to conference. The area already attracts 1.5 million visitors annually, and is expected to increase, according to Thomson.

Source: *Western Resources Wrap-Up*, by Helene C. Monberg, July 23, 1992

Use of Great Plains Reservoir System Undecided

Two members of the Arkansas River Commission want issues on the use of irrigation water resolved before giving approval to plans for a state park on the Great Plains Reservoir system. They want the commission to make sure putting water in the five Great Plains Reservoirs for recreation development and wildlife habitat would be the most efficient use of water now used to irrigate crops. Studies being conducted by the Colorado Division of Wildlife on water purchased for the state park and the Colorado Water Conservation Board on the Fort Lyon Canal cannot be completed before November or December. Otero County Commissioner Robert Bauserman said more time is needed to conduct these studies, and that the commission could not develop a work plan with any merits without the studies. The Colorado Legislature appropriated \$2 million in its last session for water studies and purchasing water for the park.

Pueblo Chieftain 6/29/92

Arkansas River Most Heavily Rafted in the U.S.

The Arkansas River is the most rafted river in the nation. The 150-mile section from Leadville to Pueblo, known as the Arkansas Headwaters Recreation Area, is used by more than 150,000 boaters each year. The Colorado Tourism Board estimates that 77 percent of the rafting in the state occurs here, resulting in an estimated \$21 million in tourism dollars (1990). Twenty-two local rafting companies and an additional 46 from across the state and the West use the Arkansas River. Due to the popularity of the sport, the Bureau of Land Management is considering a rationing plan that will limit the number of rafts allowed on the river each day.

Pueblo Chieftain 6/15/92

Rio Grande Rafter Experience Low Flows

Rio Grande rafters in northern New Mexico have had less than ideal conditions so far this season. According to Tom Mottl of the U.S. Bureau of Land Management, the Rio Grande River was expected to have a flow of 3,000 cubic feet per second (cfs) in late May and early June due to above-average snowpack. But in late May the river's flow was only 770 cfs, largely because upstream Colorado irrigators diverted much of the water for irrigation. A warm, dry April in southern Colorado triggered a high runoff into the Rio Grande headwaters, allowing Colorado to meet its water obligations to downstream users early in the

season. Now Colorado irrigators, who have the ability to divert up to 3,000 cfs of water, can take most of the water north of the state line for crop use. Rafting companies still can operate, but with smaller rafts and fewer passengers.

Pueblo Chieftain 5/31/92

LITIGATION

Supreme Court Limits Environmental Suits

A recent Supreme Court ruling makes it more difficult for environmental groups to force the federal government to protect endangered species and other natural resources. Groups and individuals can no longer sue the government solely on behalf of the general public interest, or the flora and fauna they seek to protect. What they must do is demonstrate that without help from the courts, they would suffer specific harm to themselves.

Pueblo Chieftain 6/13/92

Judge Approves Idarado Cleanup Plan

A federal judge has approved a cleanup plan for inactive Idarado mine sites in Telluride and Ouray, ending two years of negotiations between the company and state officials over reclamation of the sites. The cleanup plan calls for a phased approach requiring that performance objectives be met for revegetation of mine waste and for water quality improvement, and focuses on reclamation of numerous tailings piles, mine waste rock, and portal discharges in the San Miguel River and Red Mountain Creek drainages. The plan gives Idarado 5 years to restore the sites, after which state officials will have 10 years to evaluate the success of the cleanup effort.

Montrose Daily Press 7/8/92

Environmental Groups File Suit

A number of environmental groups have filed suit against Interior Secretary Manuel Lujan for delaying protection of hundreds of endangered animal and plant species. The lawsuit, filed in U.S. District Court, alleges that 34 plant and animal species have become extinct because of the U.S. Fish and Wildlife Service's (USFWS) "past delay" in enforcement of the Endangered Species Act. It seeks a court order to force the FWS to implement a monitoring system to speed up the process of classifying endangered species, and contends that the FWS frequently designates species as "warranted" for protection, but does not list them as such, sometimes for as long as 15 years.

Montrose Daily Press 5/29/92

Decision Pending in Ute/Grand Junction Suit

Ute Water Conservancy District (UWCD) attorneys want the city of Grand Junction to be required to honor a contract with the water district. Under the contract, which runs through the year 2011, UWCD would supply domestic water to customers

who live both within its boundaries and within the Grand Junction city limits. If the contract is terminated, UWCD would lose a huge portion of its customers because the city's annexation policy has put more and more UWCD territory within the city. UWCD has reportedly spent \$29 million on its system based on the assumption that it would have the full life of the contract to reap a return on its investment. Grand Junction water attorneys argue that an economic collapse in 1982 left UWCD with excess capacity, which was not the fault of the city. A decision is expected soon.

Grand Junction Daily Sentinel 6/12/92

Water Law Ballot Initiative Resumes

The Colorado Supreme Court has rejected a challenge to a water-related ballot initiative, allowing its backers to continue to collect signatures to try and get it before voters in November. The proposal is known as WATER, or "Willingness and Appropriateness in Transfers and Exports of Rivers." It would prohibit water transfers from one river basin to another unless voters in the district most directly affected by the transfer approved of it. The challenge to the initiative was filed by representatives of the cities of Pueblo, Colorado Springs, Aurora, and the Colorado Farm Bureau.

Denver Post 6/24/92

Court Rejects Public Service Water Diversion Request

The Colorado Supreme Court has rejected Public Service Co.'s request to transfer its Las Animas Ditch water diversion point to Pueblo's Comanche Power Plant. The decision upheld a lower court decision which found that the utility company failed to satisfy key conditions on its original 1984 decree of majority water rights in two ditch companies -- the Las Animas Consolidated Canal and Extension Canal. At that time, Public Service planned to use the water for a proposed power plant and reservoir near Las Animas. The project was never built, thus violating two conditions in the 1984 and 1987 decrees. If the project is eventually built, farmers who sold their shares of water to Public Service would agree to "dry up" their lands now irrigated by ditch water. The Supreme Court agreed with a lower court that Public Service had not established that it "can and will" put the water to beneficial use.

Pueblo Chieftain 6/9/92

Kansas Water Claim Dismissed

A federal referee has ruled that the state of Kansas has failed to show how Trinidad Reservoir violates the Arkansas River Compact, ending a portion of a Colorado-Kansas lawsuit that has spanned seven years. Special Master Arthur Littleworth said in a ruling that Kansas did not adequately show how the dam has depleted the state's water supply. This decision leaves two points of the case to be decided: the operation of wells in eastern Colorado, and the winter storage program associated with the Fryingpan-Arkansas water project. Another six months

are expected to pass before Littleworth hands down a decision, expected to be appealed to the Supreme Court.

Pueblo Chieftain 6/11/92, 6/12/92; *Montrose Daily Press* 6/11/92

Two Canal Firms Sue Over Water Rights

Two canal companies on the Purgatoire River have sued the Arkansas River Compact Administration and the state engineer's office. The suit claims the 1980 plan for John Martin Reservoir damaged the water rights of the Highland and Nine Mile canals.

Colorado Springs Gazette Telegraph 6/25/92

Tribes Lose Water Rights Battle

The Wyoming Supreme Court has ruled against the Shoshone and Northern Arapaho tribes in a long-standing water rights battle, deciding that the state of Wyoming has the upper hand in regulating water within the borders of the reservation. The court also ruled that the Indians don't have the right to use their agricultural water rights to hold back water on the Wind River for the establishment and maintenance of fisheries.

Denver Post 6/8/92

WETLANDS

The House and the Senate Appropriations committees have refused to fund the Wetlands Reserve Program in fiscal 1993 as part of a spending bill for food and farming programs. The Bush administration had requested \$161 million for the Wetlands Reserve Program, which would have allowed farmers to enroll up to 200,000 acres of wetlands in 1993. House members cited budget constraints for their decision, as well as wanting to assess producer interest in the pilot program. Under the program, the Agriculture Department will pay landowners easement costs for acreage accepted into the program, plus 75 percent of the costs for work to restore the land to a healthy wetland condition. The enrolled acreage must be kept permanently as a wetland. The plan is a pilot program in nine states: California, Iowa, Louisiana, Minnesota, Missouri, Mississippi, New York, North Carolina and Wisconsin. Environmentalists have turned to the Senate in a bid to restore spending for the program.

Montrose Daily Press 7-27-92

WILDERNESS

BLM Acquires Public Access to Devil's Canyon

A 640-acre parcel of land that has blocked public access to the lower end of Devil's Canyon west of Grand Junction has been purchased by the U.S. Bureau of Land Management (BLM). The acquired land adjoins the Black Ridge Canyon's Wilderness Study Area, and is near the site where the Colorado Division of

Wildlife transplanted a herd of desert bighorn sheep in 1979, part of the division's recovery program for threatened species. The BLM plans to limit access to the area until a management plan can be finalized.

Grand Junction Daily Sentinel 6/18/92

Water Board to Study Piedra Plan

The Colorado Water Conservation Board (CWCB) has agreed to study a new water right that would allow development above the proposed Piedra River wilderness area while providing adequate river flows downstream. The proposed wilderness is controversial because it is the only one in Colorado located downstream of existing development. The plan would save for unspecified, future development a portion of any state-held water rights for the Piedra Wilderness. The compromise would break a stalemate between the CWCB, private landowners above the proposed wilderness, and the Forest Service, which manages the 56,000 acre area.

Rocky Mountain News 7/11/92

Committee Approves Colorado Wilderness Bill

The House Interior Committee has unanimously approved a Colorado wilderness bill that designates 21 new wilderness areas covering 671,000 acres in the state, but remains silent on the issue of federal water rights. The bill would protect another 83,000 acres as recreation areas. The bill must next go through the House Agriculture Committee before it faces a vote by the full House.

Montrose Daily Press 7/9/92

MISCELLANEOUS

Denver Water Department Joins Urban Coalition

The Denver Water Department has joined forces with 20 other urban water districts in a new coalition designed to help cities counter the political power that farmers have in western water rights. Rep. George Miller, D-Calif., chairman of the House Interior Committee overseeing water legislation, called the coalition's formation the "single most important event" in current water policy debate. Miller feels cities in the West must organize to loosen the "death grip" that politically powerful agribusiness has on federal water management. Steve Hall, executive director of the California Farm Water Coalition in Fresno, which represents more than 70 agricultural water districts, said farming interests would like to negotiate with the new urban group.

Denver Post 7/1/92

Bureau Shifting to Co-op Projects

U.S. Bureau of Reclamation (USBR) Commissioner Dennis Underwood unveiled a 10-year strategic plan to step up "creative

partnerships" with USBR water users to wring the most out of water already in the USBR system in the arid West. Rather than dam-building, the new plan includes convincing electric utilities to share costs of upgrading current hydropower plants and farmers to help finance new irrigation methods that conserve federally subsidized water. Critics of the plan have called it vague and full of generalities. Underwood admits the plan is sketchy, but says it will be followed up by 25 implementation documents by the end of the year.

Fort Collins *Coloradoan* 6/17/92

Western Urban Water Lobby Formed

The Western Urban Water Coalition officially announced its formation in Washington D.C. on June 30. The new water lobby, made up of 22 urban water entities, was organized to assure additional Western water developments where needed but stresses water conservation and also the setting aside of water to protect the environment and for recreational use. The Coalition claims to represent more than 35 million people in the states of California, Nevada, Utah, Colorado, Oregon and Washington. The Coalition said it would stress increasing water supply through water conservation, encouraging water sharing and water transfers, and try to provide alternative solutions to water supply problems such as watershed planning and better water management, and attempt to establish achievable Clean Water

Act and Safe Drinking Water Act standards for the West. Patricia Mulroy, general manager of the Las Vegas Valley Water District in Las Vegas, is chair. Guy R. Martin, former Assistant Secretary of Interior for Land and Water Resources, is the Coalition's general counsel and will be located in Washington. Don Christiansen, general manager of the Central Utah Water Conservancy District, is WCWC treasurer.

Source: *Western Resources Wrap-Up*, by Helene C. Monberg, July 23, 1992

Peat Basins May Play Role in Global Carbon Cycle

The large peat basins of North America represent an important reservoir in the global carbon cycle and a significant source of methane, according to National Science Foundation scientist Donald Siegel of Syracuse University. Siegel has selected two peat basins for further study: the glacial Lake Agassiz peatlands of Minnesota, and the Albany River peatlands of northern Ontario. The geologist will test four models of peatland development to determine if these basins are sources, sinks, or steady-state reservoirs for carbon. He will determine rates of carbon storage or loss, rates and mechanisms of methane flux, and hydrogeologic processes that control the flux of dissolved gases through peat deposits. The project is focused on an important reservoir of carbon that may be intimately linked with climate change, says Siegel.

WATER SUPPLY

From the Office of the State Engineer, July 1992--Below-average snowpack over the winter and above normal temperatures during early spring caused an early runoff this year. The early runoff contributed to the lower June SWSI values this year. Streamflows are in decline statewide and most areas are expecting low flows this summer. Statewide reservoir storage was 108 percent of average on July 1. The Dolores and Animas River basins have the highest storage rate at 127 percent of average while the Arkansas basin has the lowest storage rate at 91 percent of average. The near average to above average reservoir storage situation may contain the only bright spot in this season's water supply. Water users with storage will likely be drawing on their supplies this summer.

The National Weather Service 30-day forecast (July 1) is for above normal precipitation and below normal temperatures over all but the extreme southwest portion of the state where near normal precipitation and temperatures are expected. The 90-day forecast (July 1) is for above normal precipitation and below normal temperatures over the north half of the state with the south half receiving normal precipitation and temperatures.

The Surface Water Supply Index (SWSI) developed by this office and the USDA Soil Conservation Service is used as an indicator of water supply conditions in the major river basins of the state. It is based on streamflow, reservoir storage, and precipitation for the summer period (May through October).

During the summer period streamflow 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 basins on July 1, 1992 and reflect conditions during the month of June.

Basin	July 1, 1992 SWSI Value	Change From Previous Mo.	Change From Previous Yr.
South Platte	+1.8	+0.4	+0.1
Arkansas	+0.1	-1.1	-0.4
Rio Grande	-1.6	-1.1	-1.7
Gunnison	-1.4	-2.4	-2.6
Colorado	-2.2	-1.8	-2.0
Yampa/White	-3.5	-1.9	-3.6
San Juan/ Dolores	-0.6	-2.4	-0.2

SCALE

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

(Note: The Fort Collins *Coloradoan* reported on July 26 that year-to-date precipitation was running 6.06 inches above normal.)

Water Supply Conditions for the Western States, July 1992, Bureau of Reclamation--The Palmer Drought Severity Index for

June 27, 1992 indicates severe drought conditions in the Columbia River Basin of the Pacific Northwest, central and eastern Oregon, most of Idaho, western Montana, northern Nevada, northwest, central, and southeast California, and a large portion of Wyoming. Moderate to severe conditions exist in the rest of California, central Nevada, Wyoming, western and north central Colorado, and other isolated areas. Moist to extremely moist conditions prevail across Arizona, New Mexico, and western Texas. Local exceptions are found to this generalized perspective. The Palmer Index reflects local soil moisture conditions and does not reflect water supply availability.

Drought conditions continue in several areas of the Pacific Northwest Region...Oregon and southwestern Idaho are particularly dry. Carryover storage will not provide adequate irrigation supplies in some areas. (The Associated Press reported on July 19 that Portland, Oregon imposed the first mandatory water restrictions since 1951. Violators risk fines of \$100 to \$500.)

In the Upper Colorado River Basin, because of this year's warm, dry spring, reservoirs received their highest inflow in May. Water year 1992 will be the sixth consecutive year of below normal runoff in the Colorado River Basin; the years 1987-1992 are the lowest 6 consecutive years of riverflow on record.

SNOTEL--The Soil Conservation Service is upgrading the cooperative federal-state-local snow data collection network in 11 western states. The improvement includes:

- modernization of electronic components for the automated SNOTEL system;
- addition of some new SNOTEL sites;
- discontinuation of manual measurements at those snow courses that are no longer essential.

Network optimization is taking place under a three-phase program. The first phase evaluates the utility of each data collection site. The second phase identifies sites that provide redundant information. The third phase identifies sites that can be replaced with measurements provided by the SNOTEL network.

For more information, or a copy of the "Snow Data Collection System Evaluation" and the "Snow Course Reduction Plan," contact the Soil Conservation state office, 655 Parfet st., Room E200C, Lakewood, CO 80215-5517.

MEETING CALENDAR

- Aug. 22 **COLORADO GROUND-WATER ASSOCIATION ANNUAL FIELD TRIP TO CLEAR CREEK/CENTRAL CITY.** Contact: Kelly Hranac, Morrison Knudsen Corporation, 7100 E. Belleview, Suite 300, Englewood, CO 80111; Phone mail 793-5077.
- Aug. 27-28 **COLORADO WATER CONGRESS 17TH ANNUAL MEMBERSHIP FORUM AND WATER WORKSHOP,** Colorado Springs. For more information contact the CWC office in Denver (303)837-0812.
- Sept. 1-3 **SECOND SYMPOSIUM ON THE SETTLEMENT OF INDIAN RESERVED WATER RIGHTS CLAIMS,** Albuquerque, NM. Contact the Western States Water Council at 801/561-5300.
- Sept. 8-11 **ROCKY MOUNTAIN SECTION OF THE AWWA & ROCKY MOUNTAIN WATER POLLUTION CONTROL ASSOCIATION ANNUAL CONFERENCE,** Durango, CO. Contact: Martin Garcia, Denver Water Dept., Phone 303/628-6631; FAX 303/628-6199.
- Sept. 12 **COLORADO AG DAY 92,** Colorado State University. Contact Alumni Center at 303/491-6533.
- Sept. 13-15 **AWWA/IWSA JOINT DISTRIBUTION SYSTEM SYMPOSIUM,** Philadelphia, PA. Contact George Craft at AWWA, 6666 West Quincy Ave., Denver, CO 80235; Phone 303/347-6192.
- Sept. 13-16 **THE ASSOCIATION OF STATE DAM SAFETY OFFICIALS (ASDSO) 1992 ANNUAL CONFERENCE,** Baltimore, MD. Contact: ASDSO, P.O. Box 55270, Lexington, KY 40555, (606)257-5146; FAX 258-1958.
- Sept. 13-17 **THE NATIONAL RCWP SYMPOSIUM, 10 YEARS OF CONTROLLING AGRICULTURAL NONPOINT SOURCE POLLUTION; THE RCWP EXPERIENCE,** Orlando, FL. Contact: The National RCWP Symposium, c/o The Terrene Institute, 1000 Connecticut Ave., NW, Suite 802, Washington DC 20036. FAX 202/466-8554.
- Sept. 16 **COLORADO GROUND-WATER ASSOCIATION SEPTEMBER MEETING, "AQUIFER STORAGE AND RECOVERY."** Contact: Barbara Osmer at CH2m Hill, 771-0952 ext. 2255.
- Sept. 17 **CCWCD ANNUAL SOUTH PLATTE RIVER TOUR. Register by Aug. 14.** Contact: CCWCD, 3209 W. 28th St., Greeley, CO 80631; 303/330-4540 or Metro 825-0474.
- Sept. 19-21 **2ND SYMPOSIUM ON THE SETTLEMENT OF INDIAN RESERVED WATER RIGHTS CLAIMS,** Albuquerque, NM. Contact: Western States Water Council at 801/561-5300.

- Oct. 2-3 **WESTERN REGIONAL INSTREAM FLOW CONFERENCE II - TOOLS & STRATEGIES FOR THE ENHANCEMENT & MAINTENANCE OF INSTREAM FLOW**, Jackson Hole, WY. Phone: 307/733-9678.
- Oct. 5-7 **USCID CONFERENCE ON IRRIGATION AND WATER RESOURCES**, Scottsdale, AZ. Contact: USCID, Phone 303/628-5430; FAX 303/236-5431.
- Oct. 6 **COLORADO WATER CONGRESS WORKSHOP ON WETLANDS**, Northglenn. For more information contact the CWC office in Denver. (303)837-0812.
- Oct. 14-16 **WATERSHED RESOURCES - BALANCING ENVIRONMENTAL, SOCIAL, POLITICAL & ECONOMIC FACTORS IN LARGE BASINS**, Portland, OR. Contact: College of Forestry, Beavy Hall 202, Oregon State University, Corvallis, OR 97331; Phone 503/737-2329.
- Oct. 22-23 **TOTAL QUALITY ENVIRONMENTAL MANAGEMENT - 6th annual Colorado Hazardous Waste Management Society Conference and Exhibition**, Denver, CO.
- Oct. 27-28 **SOUTH PLATTE RIVER BASIN CONFERENCE, "DEFINING ECOLOGICAL AND SOCIOLOGICAL INTEGRITY FOR THE SOUTH PLATTE RIVER BASIN,"** Fort Collins, CO. Contact: Craig Woodring at 303/491-6308.
- Nov. 1-5 **28TH ANNUAL AWRA INTERNATIONAL CONFERENCE & SYMPOSIUM ON MANAGING WATER RESOURCES DURING GLOBAL CHANGE**, Reno, NV. Contact: AWRA, 5410 Grosvenor Lane, Suite 220, Bethesda, MD 20814-2192; Phone 301/493-8600.
- Nov. 15-19 **19TH ANNUAL AWWA WATER QUALITY TECHNICAL CONFERENCE AND EXHIBITION**, Toronto, Canada. Contact the AWWA at 303/794-7711.
- Nov. 19 **INFRASTRUCTURE, ENVIRONMENT AND EDUCATION - FOUNDATIONS OF COLORADO'S FUTURE - (an afternoon event)**, Denver, Colorado. Contact: Ms. Lisa Jacobs, Office of Alumni Relations, Colorado State University, 303/491-6533.

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40th Annual Convention
COLORADO WATER CONGRESS
 Northglenn, Colorado — January 29-30, 1998
 For information contact the CWC office at 303/837-0812

CALENDAR

- Jan. 26-29 CONFERENCE ON TAILINGS AND MINE WASTE '98, Fort Collins, CO. Contact: Linda Hinshaw, Dept. of Civil Engineering, Colorado State University, Fort Collins, CO 80523-1372, Phone 970/491-6081, FAX 970/491-3584/7727.
- Feb. 4-5 A RIVER OF DREAMS AND REALITIES -- PAST, PRESENT, FUTURE, 4th Annual Arkansas River Basin Water Forum. Contact: Joe Kelley, City of La Junta, P.O. Box 489, LaJunta, CO 81050; Phone 719/384-7358, FAX 719/384-8412.
- Feb. 12 OGALLALA AQUIFER SYMPOSIUM -- SOLUTIONS FOR SUSTAINABILITY, Sterling, CO. Contact: Mahdi Al-Kaisi, U.S. Central Great Plains Research Center, P.O. Box 400, Akron, Colorado 80720; Phone 970/345-0508 or 970/345-2259 Main Office, FAX 970/345-2088.
- Mar. 4-5 13TH HIGH ALTITUDE REVEGETATION WORKSHOP, Fort Collins, CO. Contact: Gary Thor, phone: (970)491-7296; FAX: (970)491-0564; e-mail: garythor@lamar.colostate.edu.
- Mar. 20-29 WETLANDS ENGINEERING & RIVER RESTORATION CONFERENCE, Denver, CO. Contact: American Society of Civil Engineers, Phone 703/295-6029; FAX 703/295-6144, or visit ASCE Web Site at <http://www.asce.org>.
- Apr. 19-23 FIRST FEDERAL INTERAGENCY HYDROLOGIC MODELING CONFERENCE, Las Vegas, NV. Contact: Don Frevert or Jim Thomas, Phone 303/236-0123 x235; FAX 303/236-0199; or E-mail dfrevert@do.usbr.gov or jthomas@do.usbr.gov.
- Apr. 26-28 WATER DISTRIBUTION SYSTEM DISINFECTION RESIDUALS WORKSHOP, Philadelphia, PA. Complete information is available on the Internet at <http://www.awwa.org/tande/dsdrw.htm>.
- Apr. 28-30 SOURCE WATER PROTECTION INTERNATIONAL 98, Dallas, TX. Contact: National Water Research Institute, 10500 Ellis Ave., PO Box 20865, Fountain Valley, CA 92728-0865, FAX 714/378-3375, E-mail NWRI-1@worldnet.att.net.
- May 3-6 WATERSHED '98 — WATERSHED MANAGEMENT: MOVING FROM THEORY TO IMPLEMENTATION, Denver, CO. Contact: Water Environment Federation at 800/666-0206 or E-mail confinfo@wef.org.
- Sept. 27- Oct. 2 GAMBLING WITH GROUNDWATER, Physical, Chemical, and Biological Aspects of Aquifer-Stream Relations, Las Vegas, NV. Contact: IAH/AIH Conference Las Vegas — Conference Headquarters, Attn: Helen Klose, 2499 Rice St., Suite 135, St. Paul, MN 55113-3724, Phone 612/484-8169, FAX 612/484-8357, e-mail AIHydro@aol.com.

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