

Colorado Water

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

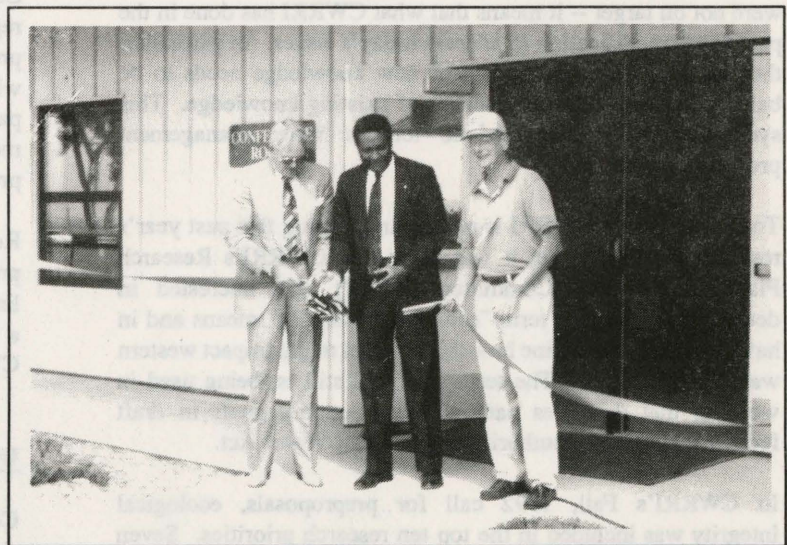
WATER ITEMS AND ISSUES . . .

October 1993

Message Received! But Where Do We Go From Here? -- Editorial by Robert C. Ward	2
Request for Preproposals for 1993-94	5
Water Research	6
Features	8
University Water News	11
Water Publications	15
Editor's In-Basket	16
Water News Digest	20
Seminar Series and Short Courses	25
Meetings	29
Calendar	32

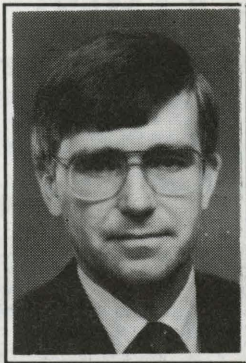
Colorado State's new Agricultural Research, Development and Education Center was dedicated on August 13, 1993

See page 12



From left: Kirvin L. Knox, Associate Vice President and Dean of Agricultural Sciences, President Albert C. Yates, and Frank P. Johnson, Assistant Director, Agricultural Experiment Station

**Colorado
State
University**



MESSAGE RECEIVED! BUT WHERE DO WE GO FROM HERE?

by Robert C. Ward

Over the past several years I have observed the increasing use of Colorado Water Conservation Board (CWCB) funds for water studies. I have also listened to discussions of the Legislature's Interim Committee on Water and State School Lands

Issues regarding pressing water issues facing Colorado. As I have observed and listened, I have also had several key Colorado water policy makers wonder out loud to me, "Why isn't CWRRI more relevant in assisting us as we try to solve these pressing water management problems?"

Questions like this cause a CWRRI director to stop and think!! After reflecting on the situation, I believe there are two fundamental reasons: (1) CWRRI has not focused its research efforts sufficiently, given its very limited resources; and (2) there is no formal, directly appropriated provision in Colorado's water management structure for research. Here is the rationale behind these statements.

Changes in CWRRI's Research Program

CWRRI has received the message that its research program needs to be modified to address pressing state water issues more directly. This does not mean that past water research efforts were not on target -- it means that what CWRRI has done in the past needs modification to address today's issues. In particular, the past focus on the creation of new knowledge needs to be balanced better with the synthesis of existing knowledge. This synthesis must be applied to today's water management problems.

To illustrate how CWRRI is responding, during this past year's research funding cycle, it was clear that CWRRI's Research Planning Advisory Committee (RPAC) was interested in determining what the term "ecological integrity" means and in having someone examine how this concept might impact western water management. The term was, and still is, being used in wording that describes national water quality goals in draft federal legislation reauthorizing the Clean Water Act.

In CWRRI's Fall, 1992 call for preproposals, ecological integrity was included in the top ten research priorities. Seven preproposals were received that addressed the concept of ecological integrity; however, in every case the proposed research appeared to be extremely limited. The straightforward issue of defining the term and assessing its impact on western water management was not a part of any preproposal. With guidance from RPAC, I chose to approach each of the seven faculty who submitted the preproposals (at both CSU and CU)

and determine if they would be interested in serving on a Task Force on Ecological Integrity and Western Water Management.

I asked Alan Covich, head of the Fishery and Wildlife Biology Department at CSU, if he would agree to chair the task force. Everyone agreed to serve (with very limited financial support), and this task force is currently underway with the goal of producing a "White Paper" on the subject, in a form that readily can be injected into the public debates taking place. In addition, while bringing existing literature to bear on the resulting definition of ecological integrity, the task force will also travel around the State of Colorado obtaining input from water users and managers. It is this blend of theory and practice that, hopefully, will produce a very relevant assessment of this water issue, and in the process produce a very relevant output from CWRRI's research program.

As you will note on page 5 of this issue of *Colorado Water*, CWRRI's next call for preproposals expands and formally incorporates this approach of synthesizing water knowledge for ready application to the Colorado water management process. This does not mean that basic research will no longer be funded, but it does recognize that for CWRRI to be more relevant to Colorado's water management system, more balance is needed.

A further modification of CWRRI's approach to managing its water research program was exhibited in the last issue of *Colorado Water*, when its RPAC members were listed. By regularly publicizing who is guiding CWRRI's water research program, I hope to get more input. Please contact these people with your concerns and research ideas. We need as much participation as possible. I am trying to get every RPAC member actively involved in the operation of CWRRI's research program.

Regardless of what CWRRI does to make its water research program more relevant, the fact remains that CWRRI has a limited budget with which to support water research. Perhaps a broader view of water research in Colorado would help put CWRRI's role in a proper perspective.

Water Research in Colorado

Colorado provides for many water management functions: water rights, discharge permits, enforcement actions, planning activities, construction loans, water diversion administration, water quality standards, monitoring flows and quality, and legal support. These functions are housed in, and funded through, a number of state agencies. However, water research, in support of all of the management activities at the state level, is not funded directly as a separate, formal function of water management.

This doesn't mean the state does not fund water research. There are aspects of the CWCB studies that are research in nature and some university faculty are involved with these studies (primarily as subcontractors to consulting firms that compete for the studies - universities are generally viewed as unfair competition on the CWCB studies and are quite reluctant to submit separate proposals for the work). Also, state agencies contract with university researchers, on an individual basis, to perform water research, some through CWRRI.

Via HB 1498, as amended (CRS 23:35:101-103), CWRRI was created by the Colorado Legislature "for the purposes of developing, implementing, and coordinating water and water-related research programs in the state and transferring the results of research and new technologies to potential users." Section 4(f)(II) further states that it is the duty of CWRRI to facilitate and stimulate research that "supports state water agencies' missions with research on problems encountered and expected." (CWRRI was assigned to CSU as a means of meshing with the Federal Water Resources Research Act, which placed water institutes on the nation's land-grant campuses.) Thus, there is a provision for state water research; however, it is an unfunded provision, except as noted below.

So, if the State of Colorado does not fund CWRRI via a direct appropriation, where does it get its funding? CWRRI receives some funding from the Federal government (via the U.S. Geological Survey through the Federal Water Resources Research Act, as amended). The Federal money is approximately \$100,000/year and requires a 2 to 1 match, thus the need for CSU to provide support from its Education and General Fund since no state monies are separately appropriated for CWRRI. Unfortunately, CSU's Education and General Funds are appropriated with no recognition of the need of water research to be performed by CWRRI. Research and education are functions of a land-grant university; however, with limited money, it is not easy to do both in the high profile and readily responsive manner being requested. In addition, CWRRI is a state-wide institute and should be working equally with all institutions of higher education.

CWRRI also has a technology transfer mission. This aspect of CWRRI's operation is currently focused on the publication of a newsletter (*Colorado Water*), research reports, and conference proceedings. Soon after taking over CWRRI, I realized we did not have the staff support needed to organize conferences so I removed CWRRI from the conference-organizing business. This is a major technology transfer tool that CWRRI is unable to employ. We do, however, cooperate with other water organizations in Colorado that organize meetings, and we publish the proceedings of some of these conferences.

It should also be pointed out that another major technology transfer tool that CWRRI currently does not employ is attending and providing input at the many water board and commission meetings held each month in the state (e.g., the Colorado Water Quality Control Commission, the Colorado Water Conservation Board, municipal water board meetings, conservancy and

conservation district board meetings, and pertinent legislative committee meetings).

Currently, CWRRI attempts to carry out its mandated Federal and State responsibilities in the area of water research and technology transfer with 1/3 of its budget from Federal monies and 2/3 from CSU monies. Is CWRRI making good use of these funds? I believe so! We just prepared a five-year activities report for the U.S. Geological Survey as part of our federal obligation and are currently involved in CSU's Strategic Planning effort to ensure that we are accountable to CSU's goals.

Another context within which to view CWRRI's budget is to compare its funding to that of other research-like activities being funded by the State of Colorado. The Fort Lyons Canal study, funded during the 1992 session and currently underway, was funded by the legislature at \$100,000. This year's CWCB Construction Fund bill (HB 93-1273) funded a South Platte water rights management system study at a \$350,000 level; a Regional study of Denver metro area water supply at a \$450,000 level; and the Colorado River compact decision support system model development at a \$1,420,400 level.

To examine CWRRI's budget in still another context, there are over 180 water oriented faculty within Colorado's higher education system who constantly seek and receive contract and grant monies to support their water research. These faculty bring into the university systems of Colorado literally millions of dollars each year, mainly from the Federal government that funds research to address federal water issues and concerns. Some of these external funding sources for water research are the National Science Foundation, the Bureau of Reclamation, the Corps of Engineers, the U.S. Environmental Protection Agency, U.S. Agency for International Development, U.S. Fish and Wildlife Service, U.S. Forest Service, Agricultural Research Service, and various Foundations and industries. In each issue of *Colorado Water* you can review (in the section on Water Research News) the list of water research projects being funded by external entities.

Thus, with its limited funding, CWRRI is able to only support "seed" money type of research (and now knowledge synthesis) projects. With this seed money, CWRRI has been able to direct faculty inquiry into areas of research and knowledge synthesis of importance to Colorado; however, CWRRI cannot fund full-scale water research or knowledge synthesis projects that can have significant impacts on Colorado's water management system. While CWRRI is changing to use its money in a more effective and focused manner, the simple fact remains, CWRRI will never be a big player in water research with its limited funding.

What does the Future Hold for Water Research in Colorado?

Should Colorado fund water research in a more formal manner? Or should it continue funding in the current manner? If water research were funded in a more formal manner, what mechanism

could be used? How could such research be made accountable to water users and managers? Is this next session of the legislature the time to examine funding for water research?

When I look at the existing structure for managing water in Colorado, I see the CWCB as a logical place to develop a state-funded, organized water research program. CWCB's role in water planning and construction would complement a water research function and provide the means for an annual assessment during legislative consideration of CWCB's funding bill.

How could such a research effort improve Colorado's water management system? Many questions are waiting to be answered:

Are there "unintended consequences" of basin-of-origin protection that need to be carefully studied?

What options does the state have to incorporate social, economic and environmental considerations into water transfer decision-making?

What is the myth/reality of agricultural water conservation? With some water rights based on return flows, what does agricultural water conservation really mean to Colorado's water management system?

Computers can help improve water management, and, yet, are the expectations of the many players involved beyond the realm of existing computer technology? What can realistically be expected from a multi-million dollar Colorado River Decision Support System? Or a South Platte computerized water management system? Or a computerized groundwater quality data base for the San Luis Valley?

How much does the public of Colorado know about how water is managed in Colorado? How is routine water management information provided to the public? For example, does the public know what the quality of Colorado's water is? Do they need to know? Do they care to know? Should Colorado water managers care if they know?

Answering such questions, in a carefully studied manner with the integrated knowledge, and yes opinion, of a number of

higher education faculty, could be a great service to Colorado's water management system. CWRRRI stands ready to enter into any arrangement that would enhance and promote water research into a fully funded partnership within Colorado's water management system.

I welcome comments and input. Water research is a critical emerging issue for Colorado's water management system and one that should be discussed thoroughly before the next legislative session.

COLORADO WATER

Vol. 10, No. 5

Date: Oct. 1993

Editor
Shirley Miller

Writers
Denise Fisher
Jennifer Roberts
April Rose
Greg Silkensen
David Williams

COLORADO WATER is a publication of the Colorado Water Resources Research Institute. The scope of the newsletter is devoted to enhancing communication between Colorado water users and managers and faculty at the research universities in the state.

This newsletter was financed in part by the U.S. Department of the Interior, Geological Survey, through the Colorado Water Resources Research Institute. The contents of this publication do not necessarily reflect the views and policies of the U.S. Department of the Interior, nor does mention of trade names or commercial products constitute their endorsement by the United States Government.

Published by the Colorado Water Resources Research Institute, Colorado State University, Fort Collins, CO 80523. Phone: (303) 491-6308

Robert C. Ward, Director

**COLORADO WATER RESOURCES RESEARCH INSTITUTE
REQUEST FOR PREPROPOSALS**

CLOSING DATE: January 10, 1994

Preproposals are invited for the Colorado Water Resources Research Institute FY1994-95 water research program. CWRRI is especially interested in projects that feature collaboration between university researchers and water management organizations. Demonstrating collaboration in the preproposal stage will enhance the possibility of an award. Highest priority will be given to projects that address Colorado's most critical water problems as identified by CWRRI's Research Planning Advisory Committee:

- Nonpoint source pollution control -- voluntary or regulatory approaches?
- Agricultural water conservation -- myth or reality?
- What are the economics of ecological integrity?
- Integration of water quantity and quality management in Colorado -- feasible? How?
- Interstate water marketing -- quantifying impacts on Colorado
- Water information for the public -- how can we make it meaningful, interesting, and informative?
- Integrated watershed management -- what does it mean to Colorado?
- Are we prepared for a drought?
- Basin of origin protection -- do the water courts need additional guidance regarding what to consider in evaluating out-of-basin water transfers?
- What is the quality of Colorado's groundwater?

The Colorado Water Resources Research Institute (CWRRI) has, for many years, funded individual faculty to study rather specific and narrow research questions. The lack of basic knowledge about water behavior, movement, quality, and impacts led to this research strategy. More recently, there are indications that knowledge synthesis (integrating existing knowledge to answer broader management questions) is an increasingly important focus for water "research." These indications come from evolving shifts in water management that now employ such concepts as "integrated watershed management" involving "ecological integrity" goals. Within such concepts, information needs are developing around agricultural water conservation, basin-of-origin protection, integrated water quality and quantity management, and informing the public about water management activities and results.

During this next cycle of CWRRI's water research program, in addition to basic research proposals, proposals that involve a number of faculty attempting to integrate knowledge that supports a better understanding of broader water management issues will also be sought. The goal is to have a blend of individual and group projects for 1994/95, all focused directly on high-priority needs of Colorado's water managers, users and citizens.

The proposals that attempt to synthesize knowledge must involve a group of faculty (and water managers/users) so that something like a "White Paper" on the topic can be developed. Such a product is designed to be readily useful to Colorado's water managers. Furthermore, it is desired that such groups of faculty, as part of their deliberations, also prepare a follow up proposal to seek additional funding from sources other than CWRRI. CWRRI monies are being used to direct faculty attention into those areas of investigation critically important to Colorado, realizing that CWRRI's funding levels cannot, of themselves, fund the level of research needed to adequately address the complexity of many of these issues.

Project Duration: Awards will be made for one year beginning July 1, 1994.

Funds Available: For 1993-94 CWRRI awarded 12 projects with direct costs in the range of \$10,000-20,000. Without additional funding, 1994-95 awards will be similar.

Indirect Costs/Cost Sharing: If additional funding for CWRRI's research program is obtained, cost sharing may be required of the principal investigator. Indirect costs must be provided as a contribution by the performing institution. Do not show indirect costs in this preliminary, direct-cost budget estimate. Financial arrangements for projects will be negotiated after successful preproposals have been identified.

Review Procedures: Preproposals will be evaluated by the Technical Advisory Committee (faculty of CU, CSM and CSU) and by the Research Program Advisory Committee (practitioners). Authors of preproposals judged to have a strong chance of final award will be invited to prepare full proposals. Criteria of selection include: (1) the ability of the proposed research "product" to be readily useful to Colorado's water users and managers; (2) relevance of research product to priority Colorado water problems; (3) scientific merit; and (4) performance record of principal investigator.

Eligibility: Open to regular, full-time faculty of Colorado State University, the University of Colorado and the Colorado School of Mines. For Instructions and Preproposal Format contact your Contracts and Grants office or call CWRRI (491-6308).

WATER RESEARCH

WYOMING SELECTS WATER RESEARCH PROJECTS FOR FY 1994

Eleven water research projects were recently approved for FY 1994 funding by the Wyoming Water Resources Research Center (WWRC) at the University of Wyoming. Five new projects and six continuing studies were approved.

New projects:

ASSESSMENT OF EXTREME STORM AND ITS UNCERTAINTY IN WYOMING, Yeou-Koung Tung, WWRC

DEVELOPMENT OF A LOW COST METHOD FOR MONITORING MUNICIPAL AND RURAL WATER SUPPLIES, B. Patrick Sullivan, UW Chemistry

DEVELOPMENT OF A WATER USE INVENTORY GEOGRAPHIC INFORMATION SYSTEM FOR RIVER BASIN PLANNING IN WYOMING, Scott Needham, WWRC

EVALUATION OF FLOW DURATION CURVES TO ESTABLISH WINTER INSTREAM FLOW STANDARDS FOR WYOMING TROUT STREAMS, Wayne Hubert, Wyoming Cooperative Fishery & Wildlife Research Unit

PERMEABILITY ARCHITECTURE ALONG THE ATTENUATED TRACES OF MAJOR RANGE-BOUNDING WYOMING FORELAND THRUST FAULTS, Peter Huntoon, UW Geology and Geophysics

Continuing Projects:

ASSESSMENT OF THE POTENTIAL ENVIRONMENTAL FATE AND EFFECTS OF OIL-FIELD DISCHARGE WATERS CONTAINING 226-RADIUM, Harold L. Bergman, UW Zoology and Physiology

CONVEYANCE LOSSES IN WYOMING STREAMS AND RIVERS, Victor Hasfurther, WWRC

DEVELOPMENT AND ENHANCEMENT OF A COMPREHENSIVE STATEWIDE WATER QUALITY DATABASE FOR WYOMING, Victor Hasfurther, WWRC

COMPARISON OF DEPTH-TO-GROUNDWATER SUSTAINABILITY CURVES FOR IMPORTANT RIPARIAN PLANT SPECIES IN THE SUBALPINE AND MONTANE ZONES, Quentin D. Skinner, UW Range Management

MONITORING DICAMBA AND PICLORAM MOVEMENT IN THE VADOSE ZONE FOR GROUNDWATER QUALITY PROTECTION IN WYOMING, George F. Vance, UW Plant, Soil and Insect Sciences

ECONOMETRIC STUDY OF WATER RIGHT MARKET PRICES: DETERMINANT IDENTIFICATION AND QUANTIFICATION OF RELATIONSHIPS AND PRICE TRENDS, Ari M. Michelsen, WWRC

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

FIELD MICROMETEOROLOGICAL MEASUREMENT, PROCESS-LEVEL STUDIES & MODELING OF METHANE AND CARBON

DIOXIDE FLUMES IN A BOREAL WETLAND ECOSYSTEM, David W. Valentine, Natural Resources Ecology Lab

RISK ASSESSMENT & NONPOINT SOURCE IMPACTS: RESEARCH THEMES FOR THE PROTECTION OF NATIONAL PARKS

FROM TOXIC THREATS, Stephen A. Flickinger, Fishery & Wildlife Biology

AQUATIC BIOTA & HABITAT OF THE PURGATOIRE RIVER IN PINON CANYON, Kurt D. Fausch, Fishery & Wildlife Biology

EVALUATING GAP ANALYSIS: A GIS-BASED STRATEGY FOR CONSERVING BIOLOGICAL DIVERSITY, Denis J. Dean, Forest Sciences

KODAK POLLUTION PREVENTION TRAINING PROGRAM, Harry W. Edwards, Mechanical Engineering

RANGELAND EVALUATION STUDY, CAPITOL REEF NATIONAL PARK, David M. Swift, Natural Resources Ecology Lab

CHINESE PIER SCOUR EQUATIONS, Carl F. Nordin, Civil Engineering

THE IMPACT OF WILDLIFE RELATED RECREATION ON THE ALASKAN ECONOMY, Edward W. Sparling, Agric. & Resource Economics

BIOTIC & ABIOTIC CONTROLS ON FORESTS IN THE ROCKY MOUNTAINS, Daniel E. Binkley, Forest Sciences

ROCKY FLATS PLANT ECOLOGICAL MONITORING PROGRAM, Edward T. Elliott, Natural Resource Ecology Lab

DEVELOPMENT & TESTING OF A SIMPLE MICRO-PHYSICAL-CONVECTIVE-RADIATIVE MODEL OF MARINE BOUNDARY-LAYER

CLOUDS, Sonia M. Kreidenweiss, Atmospheric Science

POUDRE RIVER CARRYING CAPACITY, Jerry J. Vaske, Resources & Landscape Architecture

FLUME MODELING, Frank G. Ethridge, Earth Resources

EFFECTS OF FOREST HARVEST ON PEAK FLOWS, Lee H. MacDonald, Earth Resources
 STRUCTURAL & FUNCTIONAL ROLES OF COARSE WOOD DEBRIS IN TROPICAL STREAM-RIPARIAN-UPSLOPE..., Alan P. Covich,
 Fishery & Wildlife Biology
 TOXICOLOGICAL EVALUATION OF FLOOD PLAIN "SLICKENS" ALONG THE CLARK FORK RIVER, William A. Alldredge, Fishery &
 Wildlife Biology
 RANGE OF NATURAL VARIATION FOR FRONT RANGE ECOSYSTEMS, Alan Covich, Fishery & Wildlife Biology
 REMOTELY SENSED CROP MAPS FOR THE LONETREE CREEK BASIN, Roger Hoffer, Forest Sciences
 1993 GLACIER CARRYING CAPACITY STUDY, Jerry Vaske, Natural Resources Recreation & Tourism
 BIOCHEMICAL TOXICOLOGY OF WILDLIFE - ROCKY MOUNTAIN ARSENAL, Howard Ramsdell, Environmental Health
 EVALUATE & ESTABLISH SELECTED NATIVE PLANT MATERIALS ON MANCOS SHALE SOILS, Edward F. Redente, Range Land
 Ecosystem Science
 CONJUNCTIVE MANAGEMENT OF IRRIGATION & N FERTILIZER, Grant Cardon, Agronomy
 WATER RESOURCES, SUSTAINABILITY & ENVIRONMENTAL ENGINEERING, Evan Vlachos, Civil Engineering
 ACID-MINE DRAINAGE IMPACTS ON IRRIGATED AGRICULTURE IN THE ALAMOSA RIVER BASIN, Grant Cardon, Agronomy
 THE INFLUENCE OF FLOW DIVERSIONS ON MACROINVERTEBRATES..., James Ward, Biology
 STATISTICAL METHODOLOGY FOR NATIONAL WETLANDS INVENTORY STATUS & TRENDS DATA, Kenneth Burnham, Cooperative
 Fish & Wildlife Research
 A GLOBAL DISTRIBUTION OF PRECIPITABLE WATER CONTENT FROM PRESENT DAY MICROWAVE SATELLITE..., Graeme Stephens,
 CIRA Administrative Unit
 APPLICATION OF CENTURY MODEL TO EVALUATE THE ECOLOGICAL EFFECTS OF CLIMATE CHANGE, William Parton, Natural
 Resource Ecology Lab

University of Colorado, Boulder, CO 80309

EVALUATING AND IMPROVING SEA SURFACE TEMPERATURE MEASUREMENTS FROM VOLUNTEER OBSERVING SHIPS AND
 THEIR USE AS VALIDATION MEASUREMENTS FOR INFRARED SATELLITE OBSERVATIONS, William Emery, Aero-Colorado
 Center for Astrodynamics Research Aerospace Engineering
 OPERATION OF THE SNOW AND ICE DISTRIBUTED ACTIVE ARCHIVE CENTER, Roger Barry, Cooperative Institute for Research in
 Environmental Sciences (CIRES)
 CONSERVATION VERIFICATION: AUTOMATION OF THE EAST HIGHLINE CANAL, Edith Zagona, CE&A-Advanced Decision Support for
 Water & Environ Systems
 MODELING FOR DECISION AND TESTING TREATMENT AND REMEDIATION TECHNOLOGIES FOR AQUIFERS LATE EASTERN
 ARCTIC CLIMATE OF THE PAST 2000 YEARS: THE VARVED LAKE SEDIMENT RECORD, Jonathan Overpeck, Institute of Arctic and
 Alpine Research
 HAN RIVER CONTROL SYSTEM, PHASE II. ADDITION OF DAM BREAK, HYDROLOGIC FORECASTING, AND ESTUARY ALTIMETRY
 AND REMOTE SENSING IN MARGINAL SEAS, Lakshmi Kantha, Aero-Colorado Center for Astrodynamics Research
 GLACIER CALVING, DYNAMICS AND SEA LEVEL, Bernard Amadei, Civil, Environmental and Architectural Engineering
 THE DIURNAL CYCLE OF ATMOSPHERIC WATER VAPOR AND CLOUDS AND ITS IMPACT ON REGIONAL AND GLOBAL ENERGY
 BUDGETS, Murry Salby, Astrophysical, Planetary and Atmospheric Sciences
 MEASUREMENTS OF STRATOSPHERIC WATER VAPOR IN THE TROPICS AND OVER ANTARCTICA, David Hofmann, Astrophysical,
 Planetary and Atmospheric Sciences
 ICE SHEET/OCEAN INTERACTIONS, EAST GREENLAND CONTINENTAL MARGIN DURING THE LAST 14,000 YEARS:
 SEDIMENTOLOGY, STRATIGRAPHY, AND MICROPALAEONTOLOGY OF HIGH-RESOLUTION MARINE RECORDS, John
 Andrews, Institute of Arctic and Alpine Research
 DEVELOPMENT AND EXPERIMENTAL VERIFICATION OF THEORIES FOR UP-SCALING OF WATER FLOW AND SOLUTE
 TRANSPORT IN SATURATED POROUS MEDIA, Tissa Illangasekare, Civil, Environmental & Architectural Engineering
 THERMOHALINE CIRCULATIONS AND GLOBAL CLIMATE CHANGE, Howard Hanson, CIRES
 MODELING THE SPATIAL DISTRIBUTION AND TEMPORAL PATTERNS OF ALPINE AND SUBALPINE SNOWMELT, Nelson Caine,
 Geography
 CHANGES IN RIVER MORPHOLOGY AND ENDANGERED FISH HABITATS OF THE COLORADO RIVER, John Pitlick, Geography
 LOWER TERTIARY ALLUVIAL PALEOSOLS AND PROCESSES OF ANCIENT FLOODPLAIN CONSTRUCTION, Mary Kraus, Geological
 Sciences
 THE FINAL STAGES OF A COLLAPSING MARINE ICE SHEET: LATE GLACIAL SEDIMENT FLUXES, PALEOCEANOGRAPHY AND
 CHRONOLOGY: HUDSON STRAIT AND ADJOINING SHELF, CANADA, Anne Jennings, Institute of Arctic and Alpine Research

Colorado School of Mines, Golden, CO 80401

COMPILATION OF SATURATED/UNSATURATED ZONE MODELS AND DEVELOPMENT AND APPLICATION OF TESTING METHODS
 AND BENCHMARK CASES, Paul van der Heijde, International Groundwater Modeling Center
 ASSESSMENT OF UNCERTAINTY IN THE MIGRATION OF GROUNDWATER CONTAMINATION, Eileen Poeter, Geology and Geological
 Engineering
 CODE PREPARATION AND DEVELOPMENT OF A STEADY-STATE FLOW AND HEAT TRANSPORT MODEL FOR A DRAINAGE
 TUNNEL PROJECT, HOT SPRINGS, ARKANSAS, Paul van der Heijde, International Groundwater Modeling Center

FEATURES

THE WISDOMS OF WATER: INTERPRETATIONS OF COLORADO'S WATER HISTORY

by Denise Fisher

Even though I am a native Coloradan, I had never set foot in the Colorado State Capitol until June of 1992 when I first went to view the murals painted by Allen Tupper True. Like any other tourist, I climbed the stairs up through the rotunda, which extends straight up, like a huge pipe, guiding the flow of visitors up to the gold plated cap that crowns the building. Plaques line the walkway that circles the gold dome, each plaque pointing optimistically to specific glacier-lined peaks of the Rocky Mountain range, but Denver's inversion patterns often cause the peaks to remain veiled behind the city's smog. Ideally, the tourist is given a smog-free view of Colorado's glacier lined peaks, and then is funneled back down through the "aqueduct" of the rotunda to the ideas represented in the murals, to a view of water structures seemingly necessitated by the semi-arid front range. Eight murals by Allen True, one poem by Thomas Hornsby Ferril, and one plaque commemorating the contributions of Charles Boettcher to the settling of the west line the panels of the circular room. Each mural represents a component of western water development.

Since that day, I've given a lot of thought to the reading of these murals--a year's worth. That day, I stood in the center looking at each of the 8x4 murals that surrounded and towered over me, feeling as if I had stepped back in time, seeing Colorado through the eyes of someone else--someone from another time, another culture, almost. And yet, as a native Coloradan who grew up on an irrigated farm on the Front Range, I recognized my own cultural heritage in the murals.

A few weeks later, I went back and sat on the rotunda steps, and contemplated the murals more fully, taking notes, listening to comments from visitors and the chatter of tour guides. I tried to see the murals through the eyes of the artist, through the eyes of the public, and through my own eyes, seeing the murals nearly 60 years after their inception, trying to translate into words the images before me--the aged feel, the WPA (Works Progress Administration) style, the strength of the images. This is how interpretation begins: with the viewer, or the reader--someone with a particular pair of eyes, a particular perspective and standpoint.

As a water story, the murals open themselves up to interpretation. What was the intended view presented in the murals and how are we to interpret them in light of the changing political and ecoregional context since the 30's when the murals were commissioned? The view in the murals is quite a monolithic, mono-cultural view that perhaps could not have been otherwise given the historical events outlined in my previous article (see August newsletter). But with the changing public views and diversification of water debates in

1993, we perhaps have the opportunity to express a greater variety of views than in 1938. By examining the one-pointed view in the murals, we can trace these other views by noting what is absent in the murals. What views have been obscured or left out? How might water be viewed differently? There is a predominate voice, one voice, that speaks in the series of murals which prohibits a mood of dialogue. The process of interpreting the murals will not wholly invalidate the view promoted in the murals, but will allow the inclusion of additional views and voices, and foster the dialogue so important to defining and guiding our relationship to water in the west.

As Thomas Ferril suggests in the poem that occupies the first panel in the series of murals, water has, in a sense, "written" the Colorado region:

*Here is a land where life is written in Water
the West is where the Water was and is
Father and Son of old Mother and Daughter
Following Rivers up immensities
of Range and Desert thirsting the Sundown ever
Crossing a hill to climb a hill still Drier
Naming tonight a City by some River,
a different Name from last night's camping Fire.*

*Look to the Green within the Mountain cup
look to the Prairie parched for Water lack
Look to the Sun that pulls the Oceans up
look to the Cloud that gives the Oceans back
Look to your heart and may your Wisdom grow
to power of Lightning and to peace of snow.*

If this is a land where life is written in water, then it would seem wise to enquire as to who the authors are and what is being said. How have we "written" our lives with water, and how might they be written in the future?

True has been recognized for his positive portrayals of Indians during a time when it was not popular to do so. It is interesting to note that True portrays the Native American as an artist, like himself. The Native American is telling a water story with his own art within the frame of his own culture.

Whether it is done consciously or not, True draws a parallel between himself and his role in Euro-American, western culture, and the Native American artist's role in his own culture. In the first mural, the Native American artist and his artistic representation of water is the focus of the image, signifying an aesthetic and spiritual relationship of Native Americans to water--a theme which is dropped immediately. Although this image is "positive," it is negated and usurped by the "progress" in the rest of the murals of Euro-American, western technology. In mural six, True also gives representation to African-Americans by depicting a black laborer, who happens to resemble a white performing as a black (a la Al Jolson). The Native American and the African-American laborer are the only representations of other races than Euro-American. Ostensibly, their role in this particular perspective in water development is marginal.

Of the eight murals, only two portray women, and both of these portrayals assign women to passive roles. In the third mural, a woman with two children asleep on her lap sits in a covered wagon in the background of a scene that captures the role of water in the psyches of settlers who came west. In the foreground, a man leans comfortably against the neck of one of his team of oxen and quenches his thirst from a river as the oxen do the same. The only other image of women appears in the last in the series of murals. Two generations of women lean forward in awe as they view the technological advances wrought by the development of water. During the techno-industrial phases depicted in the murals, women disappear from the scene. As with other cultures and races, women are seemingly absent from the formations of the structures of water.



*Deep in the Earth where roots of Willows drank
Shall Aqueducts be laid to nourish cities*



*Men shall behold the Water in the Sky
and count the Seasons by the living Grasses*

A notable feature of True's murals is the representations of nature. Nature, like water in the murals, never occupies much space on the canvas, leaving one with a virtually anthropocentric view of nature. Nature is a voice that becomes silent in the murals as the voice of man overlays the natural cycles of lightning, rain, glaciers, and rivers. Although nature appears as an active subject in the first mural that speaks to the Native American artist in its activity of a lightning storm, the activity of lightning later becomes a servile force in the drama of anglo-human culture in mural seven with the construction of hydroelectric dams.

In some of Ferril's poetry, which underscores the murals, there is an unabashed supplanting of nature: "here firewood is and here shall men build cities," "Deep in the earth where roots of Willows drank Shall Aqueducts be laid to nourish cities," "Water the lightning gave shall give back lightning and Men shall store the lightning for their use." The tone of these lines echoes a biblical voice in its attitude toward nature. And in the final mural, except for some barely visible bare mountain promontories in the background, technology has utterly displaced nature with jets, boats, bridges, skyscrapers, and a futuristic vehicle that puts one in mind of the "Jetsons."

Water has its own life cycle of movement and is constantly moving under its own volition: it flows, it condenses, it drips, it undulates, it seeps, and as it amasses, it exerts a powerful pressure, sometimes eroding barriers, and if it cannot surpass the barriers, it evaporates. But in the murals, water becomes mechanized--it is constrained, channelled, "corrected," and subjugated. The ascending techno-industrial emphasis in the murals shows a parallel ascending denial of human dependence on water. One can trace a movement through the murals from dependence on water, to domination of water.

In mural one, the unrestrained power of water is symbolized by the lightning that dominates the scene.

In mural two, the unrestrained, uncontrolled current of a river transports the explorers.

Between murals three and four, a definite shift from dependence to domination takes place: while mural three still exhibits water as unrestrained, and the settlers have come to water, *must* come to water, to drink, mural four characterizes water as an element to be moved and controlled via a sluice box for the utility of the miners.

In mural five, a headgate guides water into a furrowed field.

In mural six, the technology of constraint increases with an enormous aqueduct being lowered into the ground under the supervision of three well-muscled men. A pump also appears in this mural in the right foreground. In mural six, the technology advances to the construction of hydro-electric dams, again with two strong male laborers occupying the center of the construction activity.

Water has been transformed from subject that speaks to the artist in mural one, to object to be manipulated by technology in mural eight. As the murals progress, water becomes "obedient," and hence increases in utility. The final image of water in the murals is one devoid of the free wayward "lifelikeness" of water. There is a sense of ultimate control, of complete mechanization and utility. There is no backlash from nature, no disruption in the progression of constraint.

The interplay of dependence and domination depicted by the murals appears in the final mural as a seeming triumph over dependence as two generations of people sit drinking glasses of water in an apparent state of leisure (the young woman is resting her hand on a tennis racket). Within the context of the depression and drought of the thirties and the suffering they caused, this celebration of technology in the final mural is nothing short of a celebration of salvation. But like a master/slave relationship, what has actually been created is a hyper-dependence on that which they have enslaved. Their lives have most certainly been written in water. They have manufactured a technology of interdependence with water that they are now slaves to, that can only proliferate dams, aqueducts, and technologies of diversion and appropriation to maintain the hierarchy of the master/slave relationship.

As I was taking notes on the final mural, my attention was caught by the eyes of the grandfatherly looking gentleman in the mural who, unlike the other characters, was not looking in awe at the technological wonders of water development, but was looking out from the canvas at me. I was reminded of my father, my grandfathers, and my great-grandfathers, all irrigation farmers on the Front Range. I wondered what this old man was thinking. Why was he looking at me rather than the techno-scene in front of him? There was a sense in his eyes of knowing something that the others in the scene did not know, of having experienced something that they could not quite fully understand. As I looked back at the succession of murals, I thought, this is what he is thinking-- he is remembering where he's been, and where we've all, in a sense, come from in our relationship to the land in Colorado. Ferril's line under this mural reads, "Beyond the Sundown is tomorrow's Wisdom/today is going to be long long ago."

Then I looked back at the first mural of the Native American artist. Here too was a sense of something that could not be shared or fully articulated. The Native American is looking away from me, away from the other murals, perhaps looking into the past of his own heritage, a heritage that has slowly been forgotten. Could these two murals provide a key to future debates on water? Perhaps the key is to remember where we've been in *all* our heritages and in *all* our diversity -- in order to remember, or perhaps to discover, what wisdom we possess and to move forward with that wisdom.

No matter how you choose to read the murals, I think it is important to recognize their function in a whole field of power relations that regulates the discourses on water in Colorado, and, as the knowledge and technology that has developed out of this specific historical and regional context gets exported, around the world.



*Beyond the sundown is Tomorrow's Wisdom
today is going to be long long ago*

UNIVERSITY WATER NEWS

RTI/CSU TEAM SELECTED FOR COLORADO RIVER STUDY

by Greg Silkensen

The Colorado Department of Natural Resources has selected the project team of Colorado State University and its prime contractor, Riverside Technology, inc. (RTi), to develop an advanced computer-based decision support system for the Colorado River -- the *Colorado River Decision Support System (CRDSS)*. RTi and CSU submitted a proposal for the design and development of the system, and were rewarded with the first-year contract of approximately \$1.2 million.

Recent developments among the seven Colorado River Basin states (one example being the Roan Creek Proposal) illustrate the increasing need for an effective tool by which state water officials and other water users and interests can administer, manage, and account for water supply and use along the Colorado River. The complexity of water rights transfers, augmentation plans, exchanges, and number of water rights on the river is immense.

The Colorado Water Conservation Board's (CWCB) annual appropriations bill for 1992 authorized the expenditure of funds by the CWCB to undertake a feasibility study of developing and implementing a CRDSS. The study report determined that a data-centered decision support system was feasible to address the state's needs, and recommended that the CRDSS be developed over a four-year period. The initial focus in years 1 and 2 will be on database design and construction, analysis of the capability to utilize the current version of the USBR's Colorado River Simulation Model, and the development of consumptive use and water rights planning models. Years 3 and

4 include completion of the construction of the database and remaining models and other related activities. The proposed CRDSS will likely be an open system and data-centered to promote information sharing among government agencies and water users. Expectations are that the system will be efficient, easy to use by a wide range of interests, and employ a Graphic User Interface (GUI).

When complete, the system should have the capability of addressing a multitude of issues on the Colorado River such as: improved water use efficiency, exchanges between water users, construction of new reservoirs (or enlargement of existing facilities), augmentation and replacement plans, and the development of additional beneficial uses (such as the state's minimum streamflow program). Development of the CRDSS will make it possible to address these issues and evaluate alternative "what if" scenarios in the planning process before the change occurs.

Riverside Technology, inc. (RTi), a Fort Collins firm led and staffed by CSU graduates, is the prime contractor. Larry Brazil, RTi's Director of Water Resources Engineering, will be project manager. RTi's Steve Malers will also be a team member. The RTi team also consists of personnel from W.W. Wheeler and Associates, Jon Behrens & Associates, and Water Resources Management, Inc. (WRMI). The core project team is comprised of CSU engineering faculty members Neil Grigg, John Labadie, Luis Garcia, Darrell Fontane, Jose Salas, and Lynn Johnson of the University of Colorado-Denver.

EVAN VLACHOS RECEIVES AWRA AWARD

by Jennifer Roberts

Dr. Evan Vlachos, jointly appointed to the Sociology and Civil Engineering Departments of Colorado State University, has been selected to receive the 1993 Icko Iben award from the American Water Resources Association (AWRA). The AWRA created the Icko Iben Award in 1971 to recognize persons who have made outstanding contributions to the promotion of communications among the various disciplines of water resources. This award honors the late Icko Iben, one of the co-founders of the AWRA.

Dr. Vlachos has worked on a variety of projects nationally and abroad dealing with aspects of natural resources management, water resources planning, forecasting and futurism, technology assessment and demography. Specific recent contributions and projects include preparation of a 3-volume study of water resources planning in Southern Portugal; climate and water

resources (NATO); managing droughts (NSF); and transboundary water problems (Ford Foundation).

Currently, Dr. Vlachos is the Associate Director of the International School of Water Resources. Vlachos served as Director of the Environmental Resources Center at Colorado State University between 1979-1984. In addition, he served as a Member and Chairman of the Environmental Advisory Board, U.S. Army Corps of Engineers between 1982-1987 and the Committee on Irrigation-Induced Water Quality Problems of the National Research Council.

Dr. Vlachos was honored at the awards luncheon, 29th Annual AWRA Conference and Symposium, September 1st in Tucson, Arizona.

GASP VISITORS TOUR ERC AND ARDEC

by Greg Silkensen

On August 26, 1993, members of GASP (Groundwater Appropriators of the South Platte) visited two major CSU facilities: the Engineering Research Center (ERC); and the new Agricultural Research, Development and Education Center (ARDEC). GASP constitutes a group of approximately 100-150 water professionals from many aspects of Colorado water fields.

The tour spent the morning at the ERC where an open house served as a way for researchers and water users/professionals to interact, ask questions, and learn about current water research at Colorado State.



GASP visitors at CSU's Engineering Research Center Open House



Tour of dam safety overtopping facility was led by Jim Ruff, Professor of Civil Engineering

Research demonstrations in the hydraulics laboratory, solar simulator, wind tunnels, water treatment facility, water resources computer simulation lab, and dam safety overtopping facility were held for the visitors.

Presentations by Dr. Alan Covich and Dr. Dan Tyler on the ecological integrity concept and water history were also available to interested visitors.

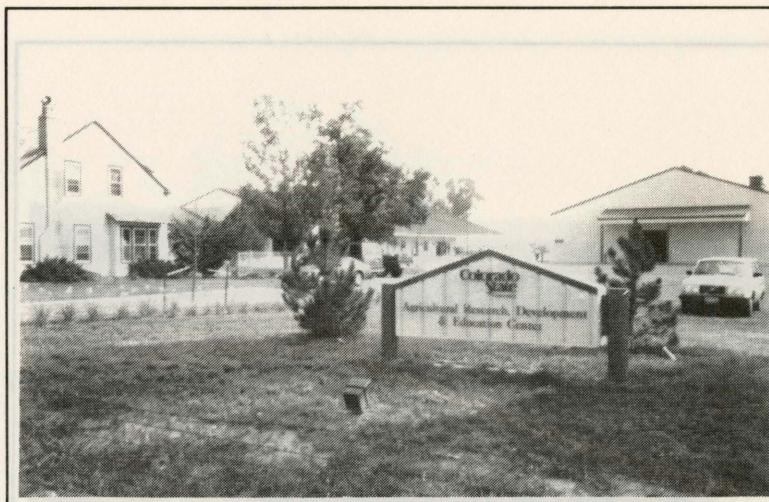
In the afternoon, GASP members visited CSU's new \$3 million Agricultural Research, Development and Education Center (ARDEC).

ARDEC is a biological field facility for conducting integrated agricultural research, instruction and outreach programs in soil, plant, water and food sciences. It is managed by the Director of the Colorado Agricultural Experiment Station, and serves as a site for faculty, staff and students to engage in research, instructional and outreach activities that include:

- Sustainable Agriculture
- Plant Breeding and Genetics
- Crop physiology and evaluation
- Integrated cropping systems
- Soil fertility and management
- Soil water management
- Producing and processing new and alternative crops for food and nonfood uses
- Water quality
- Agricultural enterprise economics
- Germplasm and host plant resistance to diseases, pathogens, insects and weeds
- Integrated pest management
- Irrigation management, conservation and technologies
- Waste management
- Chemical transport modeling
- Management approaches using computer technology, information systems and electronic sensory systems
- Pilot scale processing of extruded or fermented plant materials

Tour members learned about the agricultural water research capabilities of ARDEC. Agricultural water conservation, chemical transport modeling, irrigation management, water quality impacts, soil water management, best management practices, and non-point source pollution control are just a few of the many studies currently underway or planned for the new facility.

One project dealing with computer-controlled irrigation illustrates very clearly how modern technology will greatly facilitate agricultural water conservation while minimizing water quality impacts. Harold Duke, an agricultural engineer with the ARS, is heading a team of researchers developing a computer-controlled system that will allow farmers to irrigate literally from their front porches.



ARDEC -- CSU's new Agricultural Research, Development and Education Center



Researcher describes programmable linear-move irrigation system

Another water quality protection feature of ARDEC is the hazardous materials (such as pesticides) storage and handling facility. This facility consists of three safety-storage buildings placed within a secondary-spill containment area. The buildings also provide fire protection and security for the storage of hazardous materials.

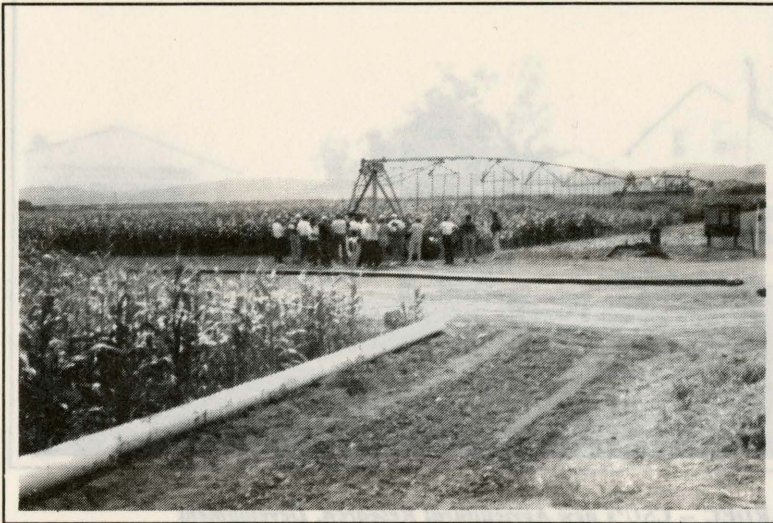
It is interesting to note where ARDEC gets its irrigation water and how this water is delivered to its fields. Water is drawn from both surface and groundwater sources. The system comprises four booster pumps in addition to three wells. More than 16,000 feet of pipe ranging in size from 6" to 24", 75 hand operated valves, and 50 air relief valves control water deliveries to more than 40 field turnouts. A reservoir allows mixing of well and ditch water. For a flow rate of 1000 gpm from the

The computer controls allow the 582-foot linear-move irrigation system to be programmed for many days at a time according to the specific needs of different plots. The system incorporates a satellite link-up that provides weather information that is used to decide when to irrigate. This system uses less water more efficiently, and is currently being further refined to apply pesticides or fertilizers in an equally tight pattern of application.

By having the ability to apply chemicals where and when needed, this system will ultimately mean a decrease in the amount of chemicals used. For example, because many pests migrate from the borders of a field inwards, this system will permit only the borders of fields affected to be sprayed.

farthest turnout on the south end of ARDEC, travel time of water in the pipeline is about 75 minutes. ARDEC, while working toward a more environmentally compatible agriculture, already is a vision of the future of sustainable agriculture in Colorado. The facility is modern and well-equipped to do a wide variety of agricultural research and education. Technology and systems at the research site include:

- Weather station
- Global positioning system
- Geographic Information System
- Satellite communications for televised downlink (future)
- Specialized research plot equipment
- Extrusion and food manufacturing equipment



ARDEC irrigation systems and field layout are explained to GASP team

The USDA Agricultural Research Service (ARS) cooperates with CSU faculty in conducting the Center's programs in soil, plant, water and food sciences.

To help Colorado citizens learn more about soil, plant and water relationships in Colorado, educational programs for the general public will also be a part of the ARDEC program.

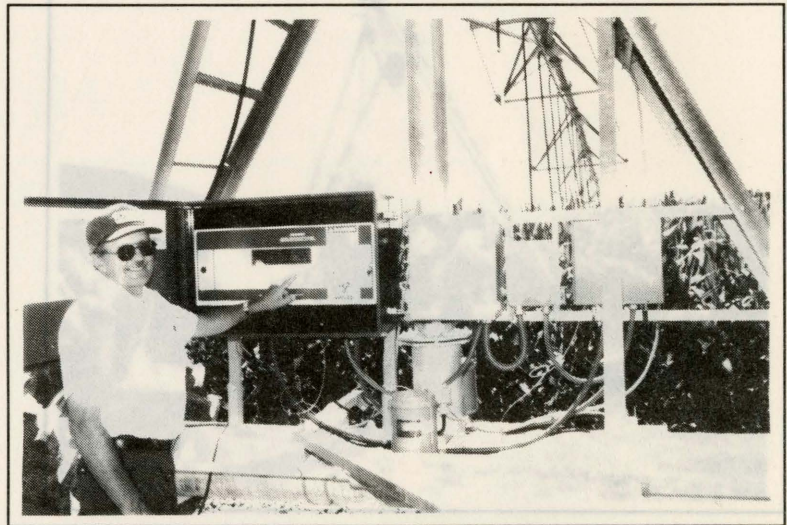
When the education and demonstration center at ARDEC opens, the public will be able to:

- Tour mini-plots of approximately 120 native and introduced plant species used in agriculture;
- See a disease nursery that displays approximately 50 diseases;
- View both beneficial and damaging insects;
- Walk-in a soil pit that provides direct viewing of the various soil layers; and
- Observe a long-term crop-management demonstration area that illustrates crop rotations, residue management, herbicide damage, and integrated pest management.

ARDEC is the result of the efforts of many faculty, staff and administrators at Colorado State University, the Commission on Higher Education and staff, and the Capital Development Committee of the Colorado General Assembly. The Center is

The Center's buildings, totaling approximately 80,000 square feet, include:

- General and special projects
- General purpose drying, materials processing, balance room and grinding room, conference, seminar, instructional and outreach capability with multimedia equipment
- 34 special project units and a wet chemical laboratory
- Shop and foundation seed building
- Pesticide laboratory and storage units
- Fertilizer storage



Computer technology will use less water more efficiently
(Photography by William A. Cotton, Public Relations Department, CSU)

located just northeast of the Anheuser Busch brewery on the east side of I-25 in Fort Collins. Self-guided tours or tours by appointment will be available. For more information about the tours, call Jack Fenwick at (303) 491-6907.

WATER PUBLICATIONS -- CWRRI Reports

A FRAMEWORK FOR DEVELOPMENT OF DATA ANALYSIS PROTOCOLS FOR GROUNDWATER QUALITY MONITORING

In response to rising environmental concern, the number of groundwater quality monitoring systems in the U.S. is steadily increasing. These monitoring systems are established to meet regulatory as well as internal management needs, but rarely are those needs articulated in terms of the nature of information to be obtained or how the information is to be used in decision making. Consequently, large quantities of data are being collected without a clear definition of program goals, data analysis procedures, reporting formats, or types of decisions to be made.

Protocols for field sampling and laboratory analysis are used on a routine basis to produce reliable ground water quality data. Efforts are now being focused on providing decision makers with the information they need from that data. One method of extracting information from data is statistical analysis. There are, however, no widely accepted protocols for statistically analyzing water quality data. Due to the wide variety of field conditions encountered in ground water monitoring, a general protocol would be of limited use. What is needed is a set of guidelines for writing data analysis protocols which are site specific.

Water quality researchers and professionals are beginning to switch their focus away from data collection and toward information generation. Some research on information generation activities has already been conducted, particularly in the area of statistical analysis. The research is difficult to apply to monitoring system design, however, because it is so widely scattered. A few attempts have been made to produce standardized sets of procedures for information generation known as "data analysis protocols" (DAPs). However, the DAPs tend to be incomplete and/or too general to be useful to monitoring system designers. Due to the wide variety of information needs and site conditions, it is impractical to expect

a single DAP to be suitable for all groundwater quality monitoring systems. What is really needed is a framework that can be used to develop DAPs which are program specific. No generally acceptable design framework for the development of groundwater quality data analysis protocols exists today.

A framework for developing data analysis protocols is presented in this report. The framework is essentially a "how-to" manual for protocol writers. The focus of the framework is analysis of groundwater quality data at hazardous waste facilities.

Detailed background information is provided for the framework. Four main issues which are addressed include: information goals, data record attributes, choice of statistical methods, and interpretation of statistical results. There is a great deal of confusion in the water quality community regarding these issues. This report does not attempt to resolve that confusion. Instead, the goal is to sort out areas of conflict and uncertainty, and present them in a clear manner. Recommendations are provided where possible.

The framework was used to write a data analysis protocol for an IBM semiconductor manufacturing plant in Hopewell Junction, New York. The combination of flexibility in the basic framework and the availability of detailed background information was quite effective. It allowed the data analysis protocol to be site specific and scientifically defensible.

This study was funded by IBM Corporation through the IBM Environmental Engineering Graduate Fellowship. CWRRI Technical Report No. 60, by Nadine C. Adkins. To order the report contact the CSU Bulletin Room, Aylesworth Hall, Colorado State University, Fort Collins, CO, 80523; Phone 303/491-6198. Price: \$10.00 plus \$3.00 postage and handling.

REPORT QUANTIFIES STREAM-AQUIFER INTERACTION

Recent research at the Colorado School of Mines has allowed the successful prediction of streamflow loss or gain based on field measurements of the groundwater system. The field area, located several miles southwest of the Colorado School of Mines in Golden, Colorado, was chosen due to the intermittent nature of the small stream, allowing an innovative yet inexpensive monitoring program. While a number of mechanisms have been known to control the interaction of groundwater with surface water, this study concentrated on monitoring the temporal and spatial changes in head gradient and hydraulic conductivity in the shallow subsurface. During the course of the study, observed gradients changed appreciably in magnitude over a long period of time, suggesting that the response time of the groundwater system is buffered. Measured conductivities of the

porous media vary over several orders of magnitude, but a distinct two-layer system was observed and used as a model to predict streamflows. Using this two-layered system as a model in conjunction with the shallow gradients, the predicted streamflow loss or gain compares favorably with the observed streamflows. The approach taken in this research serves as a guide for potential users who wish to obtain a quick and inexpensive overview of site-specific interactions between surface and groundwaters.

CWRRI Completion Report No. 169, by Eileen Poeter. To order contact the CSU Bulletin Room, Aylesworth Hall, Colorado State University, Fort Collins, CO, 80523; Phone 303/491-6198. Price: TBA

EDITOR'S IN-BASKET

Senate Passes DOI Funding Bill

On September 15, 1993 the US Senate passed HR2520 providing appropriations for the Department of the Interior and Related Agencies for FY1994. While the Senate insisted on its amendments to the bill and requested a conference between House and Senate conferees, it did adopt the following amounts:

Section on Water Resources

	FY94		
	Clinton Request	FY94 House	FY94 Senate
Allotment Grants*	5.529	5.529	5.529
Research Grants	0.000	0.000	0.000
Program Admin.	.241	.241	.241

*State Water Institute Program

Section on Fish and Wildlife Resources

Cooperative Res. Units	18.460	15.460	15.460
Nat'l Biological Survey	179.445	163.604	156.837

National Biological Survey

The National Biological Survey will be created in October 1993, by assembling substantial portions of the research and survey elements of the US Fish and Wildlife Service, the National Park Service, and the Bureau of Land Management. According to the DOI fact sheet on the NBS, over two-thirds of the Survey budget will be dedicated to research on species biology, population dynamics, ecosystems, and inventorying and monitoring functions. The Survey will consolidate approximately 1,600 scientists and support personnel involved in basic science studies and in conducting national inventories and inventories of national significance (ISDI News Release).

The Watershed Protection Approach: 1992 EPA Report

The EPA's Office of Wetlands, Oceans, and Watersheds recently released its 1992 report: *The Watershed Protection Approach*. The report summarizes EPA's strategy and progress in promoting watershed protection during 1992. The watershed protection approach is an integrated, holistic strategy for more effectively restoring and protecting aquatic ecosystems and protecting human health. It is a renewed effort by EPA to focus on hydrologically defined drainage basins -- watersheds -- rather than on areas arbitrarily defined by political boundaries. Thus, for a given watershed, the approach encompasses not only the water resource, but all the land from which water drains to that resource. To protect water resources, it is increasingly important

to address the condition of land areas within the watershed because as water drains off the land, it carries with it the effects of human activities throughout the watershed. The watershed protection approach has three major cornerstones:

- (1) **Problem Identification** -- identify the primary threats to human and ecosystem health within the watershed;
- (2) **Stakeholder Involvement** -- involve those most likely to be concerned or most able to take action, and
- (3) **Integrated Actions** -- take corrective actions in a comprehensive, integrated manner once solutions are determined, or evaluate success and refine actions as necessary. This approach places more importance on all types of water quality and encompasses all waters -- surface, ground, inland, and coastal. It is not new and it does not compete with or replace existing programs; instead it provides a framework and new focus for the successful integration of ongoing programs.

In adopting watershed management, EPA is undertaking a five-pronged strategy: 1) Try it out 2) Develop tools 3) Advertise it 4) Measure success 5) Align programs.

For more information on EPA's watershed activities in Region 8, contact: Bill Wuerthele, U.S. EPA, Region 8, 999 18th Street, Suite 500, Denver, CO 80202-1603, TEL: 303/293-1586.

WSTB Report Recommends National Strategy for Wetlands and Riparian Ecosystems

Restoration of Aquatic Ecosystems, a report released last year by the Water Science and Technology Board, recommends a national strategy for restoring degraded wetlands, rivers, streams and lakes. Several bills have been drafted based on recommendations from the report. One bill, drafted by the Association of State Wetland Managers for introduction to the U.S. Congress, is the Wetlands and Watershed Management Act of 1993. The bill would create a federal state and local government wetlands coordinating committee charged with reducing duplication and inconsistencies in federal, state and local wetlands management efforts and with assisting the development of a national cooperative wetland and riparian ecosystem restoration strategy.

Another bill, H.R. 5001, was introduced last September as a result of the report and was referred to the House Committee on Energy and Natural Resources. The bill would amend the Outdoor Recreation Act of 1963 to authorize the National Park Service and the Geological Survey to conduct a national river systems recreation assessment.

The report is available from: National Academy Press, 2101 Constitution Ave. NW, Box 285, Washington, DC 20055. Price: \$39.95 plus shipping and handling. Call 202/334-3313.

Watershed Principles Promoted in House Testimony

Last Spring, a U.S. House of Representatives subcommittee was told that restoration of the physical, chemical, and biological integrity of the nation's waters is possible only if the "business as usual" approaches of the past are dropped and innovative principles such as watershed management are implemented.

Paul Woodruff, Water Environment Federation member and chair of Water Quality 2000, emphasized that progress in achieving the Clean Water Act's goals will be possible only through a coherent national water policy that includes increased federal leadership in preventing pollution, promoting individual and collective responsibility, and implementing watershed-based planning and management approaches. Woodruff said other actions well-suited to the watershed approach include: water quality-based permitting for point sources; coordinating local and regional land-use and transportation planning within watershed protection goals; shifting water delivery systems away from political boundaries toward more efficient watershed boundaries; and managing runoff, including combined sewer overflow abatement, in developed urban areas.

Federation Highlights, May 1993

Congress Briefed on Groundwater Contamination

The Environmental and Energy Study Institute (EESI) recently conducted a briefing on contaminated groundwater as a surface water pollutant. Since groundwater is not accorded the same degree of protection under the Clean Water Act as is surface water, the briefing raised the question of whether groundwater is a significant enough threat to surface water quality that it should be further protected under the Clean Water Act.

In one presentation, Jack A. Stanford maintained that water management and law must consider the hydraulic continuum from a holistic, ecosystem perspective, and that mixing of surface and groundwater is a fundamentally important process that influences the quality of most, if not all, fresh waters.

It is estimated that groundwater supplies an average of 40 percent of streamflows nationwide, but in some areas the figure may be as high as 95 percent. It also has been estimated that 1 percent to 3 percent of all groundwater in the United States is contaminated. Localized contamination levels may be very high, and if they coincide with groundwater discharge points to surface water, may create serious pollution problems. According to EESI, numerous studies have shown that groundwater is causing extensive surface water pollution.

Presenters included: Dr. William Alley, Chief, Office of Groundwater, U.S. Geological Survey; Dr. Paul Jehn, Univ. of Idaho and Assoc. of State Water Pollution Control Agencies' Groundwater Task Force; Dr. Jack Stanford, University of Montana; and, Don Gray, EESI's Water Program Director.

National Association of State Universities and Land-Grant Colleges

Agencies to Seek Pesticide Use Reduction

The U.S. Department of Agriculture, Environmental Protection Agency, and the Food and Drug Administration will soon announce a new federal policy on pesticides. The new policy will seek to minimize pesticide use and establish a single regulatory standard. The Cooperative State Research Service has assembled a working group to gather background information throughout the land-grant system to be used by the media in covering the story. Len Carey (202/401-4268) is the contact for the working group.

Experiment Station Letter 2186, 9/3/93

USBR Announces Delay in Release of Glen Canyon Dam EIS

Release of the draft Environmental Impact Statement (EIS) on the operations of Glen Canyon Dam has been delayed for approximately three months, according to the Bureau of Reclamation. Upper Colorado Regional Director Roland Robison said the draft EIS, scheduled to be released for public comment in August 1993, was held in abeyance due to ongoing discussions between Reclamation and the US Fish and Wildlife Service (FWS) concerning endangered species. The agencies have now agreed on acceptable measures to protect the endangered fish species below the dam in Glen and Grand Canyons. The EIS is scheduled to be completed by October 1994. Public hearings will be held in San Francisco and Los Angeles, Phoenix and Flagstaff, Salt Lake City, Denver and Washington DC.

Current operations of the dam designed to reduce adverse impacts on the downstream resources will continue. On Nov. 1, 1991, Reclamation implemented Interim Operating Criteria at the Glen Canyon Dam until completion of the EIS and the Record of Decision is in effect.

USFWS Releases Draft RIPRAP

On Sept. 3 the US Fish and Wildlife Service released a draft Recovery Implementation Program and Recovery Action Plan (RIPRAP) and agreement for endangered fishes in the Upper Colorado River Basin. The document addresses how impacts related to water depletion from new projects and impacts associated with historic projects are to be handled. The draft agreement and RIPRAP are available from the US Fish and Wildlife Service, Assistant Regional Director, Ecological Services, P.O. Box 25486, Denver Federal Center, Denver CO 80225. Fax requests to 303/236-0027. For more information contact Robert Jacobsen 303/236-8189.

USBR News Release 8/13/93, *Western States Water* 9/17/93

USDA Secretary Announces Cost-Savings Reorganization

On September 7 Secretary of Agriculture Mike Espy unveiled his \$2.3 billion cost-savings USDA reorganization plan. The

plan will cut the number of agencies from 43 to 30, eliminate 7,500 employees over five years and streamline agency services. The reorganization plan includes creating a Farm Service Agency (FSA) that will cut red tape for the farmer. Merged into the new FSA will be the current agricultural Stabilization and Conservation Service (ASCS), the farmer programs currently located in Farmers Home Administration (FmHA), and the Federal Crop Insurance Corporation (FCIC).

The following additional changes are among those included in Espy's plan:

The Rural Utilities Service will combine telephone and electric programs of the current Rural Electrification Administration (REA) with the water and sewer programs of the Rural Development Administration (RDA).

The Rural Community Development Service will include FmHA rural housing programs as well as RDA and REA rural community loan programs.

The Rural Business and Cooperative Development Service will include the RDA and REA business development programs, the current Agricultural Cooperative Service (ACS) and the Alternative Agricultural Research and Commercialization Center (AARCC).

The new Natural Resources Conservation Service will be comprised of the current Soil Conservation Service combined with ASCS conservation cost-share programs.

The Office of Agricultural Environmental Quality will provide guidance on pesticides, water quality and other environmental issues.

The Cooperative State Research Service, the Agricultural Research Service, the Extension Service and the National Agricultural Library will be combined into the new Agricultural Research and Education Service.

The new Agricultural Economics Service will combine the current Economics Research Service and the Office of Energy.

For more information regarding the USDA reorganization plan, contact the USDA Office of Communications, Ag Box 1311, Washington, DC 20250-1311; Phone 1-800-292-7294.

Experiment Station Letter 2187, 9/10/93

CWCB Sets Hearings on Proposed Instream Flow Rules

The Colorado Water Conservation Board has prepared and distributed the proposed Instream Flow and Natural Lake Level Rules and Regulations (ISF Rules). The ISF Rules describe the process used by the CWCB to appropriate, acquire, administer and protect instream flow and natural lake level water rights. The Hearing Schedule is as follows:

Rulemaking Hearing

DATE: November 4, 1993
TIME: 8:30 a.m. - 5:30 p.m.
PLACE: Centennial Building
1313 Sherman St., Room 318
Denver, CO
303/866-3441

Prehearing Conference

DATE: October 29, 1993
TIME: 10:00 A.M.
PLACE: State Services Building
1525 Sherman St., Room 610
Denver, CO
303/866-3441

All public comments on the proposed ISF Rules should be made in writing. However, a short period of time at the end of the rulemaking hearing (30 minutes or less) will be reserved for oral comments by those persons unable to provide the CWCB with written comments. If you have any questions or require additional information please contact Dan Merriman or Chuck Lile at 303/866-3441; FAX 303/866-4474.

Biological Criteria Meeting Scheduled

EPA Region 8 will host a Biological Criteria Meeting on November 2-3, 1993, at the Regional Office in Denver. A primary focus of this initial meeting will be the exchange of biological monitoring information and a discussion of techniques used by the states. Regional staff and state participants will also discuss and prepare comments on EPA's proposed direction for the biological criteria program. For more information contact Phil Johnson at 303/293-1581.

Water Transfers Report Wins Award

Water Transfers in the West: Efficiency, Equity, and the Environment was awarded the "1993 High Quality Report Team Award" by the Commission on Engineering and Technical Systems (CETS). The report was commended for its organization and writing and for its success in communicating complex relations among concepts from economics, law and environmental science to a broad audience.

WSTB Newsletter, July 1993

"Thin Green Line" is Important to The Colorado Riparian Association

The Colorado Riparian Association describes itself as "a group of landowners, resource managers, organizations and interested people, dedicated to increasing the awareness of Colorado's riparian areas." The association's newsletter, *The Green Line*, which was first issued in the summer of 1990, offers a forum for information, opinions, and current events related to riparian management. The association believes that protection and

management of Colorado's "thin green line" is critically important to preventing soil erosion, maintaining water quality, and maintaining wildlife habitat. For membership or newsletter information, please write to Colorado Riparian Association, 134 Union Blvd., Suite 125, Lakewood, CO 80228.

Colorado Reader Features Educational Articles on Water

The Colorado Foundation for Agriculture recently published two issues of the *Colorado Reader* on the topic of water. One issue, "Colorado's Wonderful Water," is designed for fourth and fifth grades. The cover story in this issue discusses the importance of Colorado's water resource not only for Colorado but also the surrounding region. The second issue, "Wonderful Water!," is designed for sixth and seventh grades. This issue discusses in detail the unique weather patterns and water problems in Colorado so that the student can better understand our water resources. To order copies of the **Water Reader** series of the *Colorado Reader*, please write to the Colorado Foundation for Agriculture, P.O. Box 16596, Denver, CO 80216, or call Bette Blinde at 303/686-7806.

Colorado Foundation for Agriculture

Western States Water Publishes #1000

The first issue of *Western States Water* was published on May 14, 1974 under the direction of Jack Barnett, then the new Executive Director of the Western States Water Council. On July 20, 1993 the newsletter published its 1000th issue. *Western States Water* provides a brief weekly summary of national, regional and state news. It contains timely information on water issues and is an excellent source for research material.

Craig Bell is currently Executive Director of the Western States Water Council, and Tony Willardson is editor of *Western States Water*. The Western States Water Council is an organization of representatives appointed by the Governors of member states -- Alaska, Arizona, California Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, North Dakota, Oregon, South Dakota, Texas, Utah, Washington, and Wyoming and associate member state Oklahoma.

PEOPLE

Dr. Stanley Ponce has been named A/D for Resources Management and Research in the Region. His focus is on issues related to both natural and cultural resource management and research, and he believes strongly in "programmatic" management. Three of the region's new Global Climate Change research initiatives approved for FY 93 are for the Colorado Rockies, Glacier, and Central Grasslands. All three complement existing projects and provide the means to merge RMR programs with other regions and agencies.

Park Science Spring 1993

State Geologist Appointed

Vicky Cowart has been appointed as state geologist and director of the Colorado Geological Survey. She has 15 years of experience in the geoscience industry, including field management experience in oil and gas exploration. Ken Salazar, Executive Director of the Colorado Department of Natural Resources, announced the appointment. Cowart will manage a staff of 29 people and a budget of \$1.2 million.

The Geological Survey assists, consults with and advises agencies on geologic problems; promotes mineral development; inventories and analyzes mineral resources; identifies geologic hazards; collects geologic information; and prepares, publishes and distributes reports, maps and brochures.

Reclamation's Assistant Commissioner for Engineering and Research Retires

Darrell W. Webber, who has served as Assistant Commissioner for Engineering and Research for the US Department of Interior's Bureau of Reclamation, announced his retirement effective September 3. Weber has served in this position since 1982 and has 36 years of federal service, all with Reclamation. Weber served as head of Reclamation's Division of Data Processing before moving into upper management. His career is highlighted by many awards, including the DOI Meritorious Service Award and the Meritorious Presidential Rank Award.

Nebraska Geological Survey Celebrates Centennial

The Nebraska Geological Survey observed its 100th year of service with an open house on September 23, 1993. The centennial celebration featured videos about Nebraska's geology and geologic research, a display of Nebraska's gems and fossils, exhibits of drill rigs and soil probes, rock cores and samples from oil wells, and research displays and demonstrations -- including water, soils, and geographic information systems.

AWWA Offers Phone Service for Small Utilities

The American Water Works Association (AWWA) is offering a new, toll-free phone service to provide operations information for small water systems serving 1,000 connections or less. The program provides information about operational, management, regulatory or safety issues, as well as referral contacts for more information. The service is available to both AWWA members and nonmembers by calling 1-800-366-0107 between 8 am and 4 pm, Monday through Friday. After work hours, recorded messages may be left and calls will be returned as soon as possible. AWWA Small Systems Project Coordinator Joe McDonald, who has more than 15 years field experience, is the contact. There is no charge for calls but there may be a small charge for any printed materials requested.

WATER NEWS DIGEST

WATER ALLOCATION

Ruedi Water Sales Put on Hold Again

A second round of water sales from Ruedi Reservoir has been put on hold for at least six months while the U.S. Bureau of Reclamation (USBR) reviews its water-sale policies. According to a USBR spokesperson, the bureau wants to cut out its subsidies to western water users, and does not plan to issue any water contracts for anything more than 25 years. Historically contracts have been issued for an unlimited time. Those holding current contracts with the USBR may see a price increase after the contract expires, or the result could be an entirely renegotiated contract. A second round of sales of 38,650 acre-feet of water from Ruedi Reservoir this fall, aimed at paying off the dam's \$15 million construction debt, was supposed to have been wrapped up last winter. But the election of President Clinton and subsequent appointment of Dan Beard as Reclamation commissioner put the sales in limbo.

Grand Junction *Daily Sentinel* 8/18/93

Romer May Call Forum on Denver's Water Use

Governor Roy Romer is expected to decide within a month whether to create a Front Range Water Forum to make better use of existing water supplies in the Denver metropolitan area. The forum would likely focus on exhausting urban water supplies before the cities try to raid rural water. The forum might include Romer, Ken Salazar, director of the Colorado Department of Natural Resources, state engineer Hal Simpson, the Colorado Water Conservation Board, the mayors of Denver, Aurora, Thornton, Arvada, and Westminster, the Denver Water Board, several front range water districts, business, environmental and agricultural interests, an up to four legislators.

Pueblo Chieftain 8/25/93

Appeals Filed for National Water Rights

The federal government has appealed Division 1 Water Court Judge Robert Behrman's decision that puts federal water rights second to those of the state and other users of water in national forests. The U.S. Forest Service contends that because the court acknowledged the necessity of stream channel maintenance in national forests, it should have granted the federal government priority in water rights to maintain those channels. In Behrman's ruling, he noted "channel maintenance is necessary to effectuate a purpose of the national forests." The USFS filed its original claims in 1976 and modified them in 1977 and 1984. The state of Colorado and several water groups and districts appealed.

Grand Junction *Daily Sentinel* 4/19/93

Gunnison Flows Reduced for Studies

The U.S. Bureau of Reclamation is cutting the Gunnison River flow rate to 600 cubic feet per second (cfs) for three weeks to permit research to be conducted by the Colorado Division of Wildlife, U.S. Fish and Wildlife Service, and the National Park Service. Flows will be reduced through the Black Canyon of the Gunnison National Monument and the Gunnison Gorge from Sept. 27th through Oct. 18th. River flows will gradually increase after Oct. 18th to 1,200-1,300 cfs through December. For additional information contact: Jone Wright, USBR, P.O. Box 60340, Grand Junction, CO 81506, 303/248-0636.

Montrose Daily Press 9/24/93, *Pueblo Chieftain* 9/25/93

WATER PROJECTS

Utes Could Construct Animas-La Plata

A proposal by the head of the U.S. Bureau of Reclamation to turn over management of the Animas-La Plata water project to two Ute Indian tribes hasn't ended the bitter environmental fight over the project. Reclamation Commissioner Daniel Beard has proposed that the Southern Ute and Ute Mountain Ute tribes could construct the project under authority of the federal Indian Self-Determination and Education Assistance Act. The tribes are considering the idea. There is speculation the project might move more quickly toward completion with this type of Indian involvement.

The USBR planned to begin construction on the project in summer 1992, but in February of that year environmentalists filed a lawsuit, forcing the bureau to update the project's 1980 environmental impact statement (EIS) to comply with new laws. In November 1992 a draft EIS was released which drew a great deal of criticism from environmentalists and the EPA. A new EIS is due out in 12 to 18 months. A project completion deadline of 2000 is required under the 1988 Indian water rights settlement act. If the project is not completed by then, the tribes have until 2005 to accept compromise water rights in the Animas and La Plata rivers, or fight for full rights in court.

Grand Junction *Daily Sentinel* 8/6/93, *Montrose Daily Press* 8/9/93

Purgatoire River Flow May Change

The U.S. Army Corps of Engineers is proposing changes in the water control plan for Trinidad Dam. A recent study of the river channel below the dam shows the channel capacity has been reduced during the last 15 years, mostly due to encroachment of plants in the channel. Changing the dam's water control plan to reflect the new channel capacity will provide better flood control. The change will affect downriver water irrigators, which draw from the stored water in Trinidad

Lake. Releases of water from the lake will take a longer period of time. Some irrigators could wait an additional 2-3 days for their water. But the channel reduction will not change the amount of water received by downriver irrigators. Public input regarding the proposed change is being accepted, and a final decision is expected by the end of October. For comments write: U.S. Army Corps of Engineers, Albuquerque District, P.O. Box 1580, Albuquerque, NM 87103-1580, TEL: 505/766-1034.

Pueblo Chieftain 9/16/93

Agency Rejects Plan to Construct Hydropower Dam

The Federal Energy Regulatory Commission (FERC) has dismissed an application by a Denver accountant to build a hydropower dam on the Colorado River west of Rifle. The Houston Power Project would have flooded three miles of the Colorado River, inundating winter pasture, oil and gas wells, and river habitat of endangered fish. The dismissal came after Michael Raisch, who sought the federal permit, failed to supply extra information on the proposal. The FERC was in the midst of a two-year, \$500,000 environmental impact study on the project when it dismissed the proposal.

Grand Junction Daily Sentinel 9/23/93

WATER TRANSFER

Caution Directs State's Pursuit of Amity Water

The state of Colorado is interested in purchasing water shares in the Amity Mutual Irrigation Company which operates in southeastern Colorado. The water would be used to create a new state park in the southeastern part of the state. But Colorado is proceeding cautiously after difficult dealings with ditch companies in the past. In 1971 the state purchased more than 2,000 shares of Catlin Canal water with the plan of moving the water from the Rocky Ford area to John Martin Reservoir to create a permanent wildlife pool. But Catlin directors fell back on company bylaws to prevent moving the water after the sale.

After four trips to the state supreme court the case is still unresolved. Department of Natural Resources chief Ken Salazar fears that a similar situation could result after Amity Mutual Irrigation shareholders recently voted not to accept water purchased from Colorado Springs into their system. The water was needed to stabilize fish and wildlife at Nee Noshe, a lake in the Great Plains Reservoir system south of Eads. Shareholders worried that the Colorado Springs sale would set a precedent and hurt their chances to sell in the future.

Pueblo Chieftain 8/20/93

Water Transfer Legislation Discussed

Unless water in the basin of origin is protected against transfers, the issue may go on the ballot in a form neither lawmakers nor water users will like, a special legislative panel was told recently

by a spokesman for the Colorado Springs Utilities Department. The spokesman said the city of Colorado Springs is aware of ballot initiatives which could hamstring future water development in the state if an acceptable legislative solution is not forthcoming. Sen. Bob Pastore, D-Monte Vista, drafted a bill in the last session that would have amended the Colorado Constitution to allow voters in a basin area to accept or reject proposals for diversion of water before the diversion could take place. The measure did not pass. Much of the testimony before the committee urged caution in allowing diversion from basins of origin.

Grand Junction Daily Sentinel 8/25/93

Thornton Water Case Decided

In a major water case which began in 1986, a Greeley water judge has ruled that the city of Thornton can divert water from the Poudre River basin. But the ruling also denied some of Thornton's claims that would have damaged water rights and water quality for a variety of northern Colorado water users.

In 1985 Thornton secretly began buying farms in Larimer and Weld counties to obtain water rights. By April 1986 the city announced it had bought 21,000 acres of farmland and accompanying water rights Thornton estimated at 67,000 acre-feet. The city explained its plan to pipe the water 56 miles to the northern Denver suburb. Northern Colorado water officials objected to the plan, and Thornton's filing for claims and opponent's objections were heard in a 17-week trial during 1991 and 1992. The trial ended last October.

The exact amount of water to which Thornton is entitled is in dispute. Thornton's officials claim the judge's ruling will allow them to divert 50,000 acre-feet of water. Northern Colorado water officials say they think the ruling will allow Thornton to divert only about 20,000 acre-feet. During the next 4-5 months District 1 Water Court Judge Robert G. Behrman will evaluate the claims and issue a decree regarding the amount of water to be diverted.

Fort Collins Coloradoan 8/17/93, 8/23/93

WATER QUALITY

Spring Creek Sanitation District Eyed

At the request of a Spring Creek Estates Homeowners Association member, a workshop of concerned citizens was recently held to discuss wastewater issues and options for homeowners on Spring Creek Mesa, including wastewater management and the possible establishment of a Spring Creek Mesa Sanitation District.

A Montrose County inspector indicated that there are many septic systems on Spring Creek Mesa that are currently out of compliance with the Clean Water Act due to high levels of groundwater during parts of the year. An engineer with the Colorado Department of Health indicated the most viable

solution for the long term is to form a sanitation district on the mesa and bring a sewer line from either West Montrose or the city of Montrose for sewage treatment. An open public meeting for all interested and concerned residents has been scheduled for Wed. Oct. 6, 7pm at the Oak Grove School. For more information call the Montrose County Commissioners' office, 249-7755.

Montrose Daily Press 9/1/93

Results of Water Pollution Study Released

Current regulations are insufficient to curb water pollution in Colorado according to a study conducted by the Colorado Public Interest Research Group (COPIRG), and based on data compiled by the EPA between Oct 1991 and Sept. 1992. The study showed 17 of Colorado's worst water polluters were in serious violation of the federal Clean Water Act, and ranked Colorado 24th in the nation in the number of major facilities in significant noncompliance with the act. COPIRG will use the results to illustrate the need for tougher clean water legislation.

Montrose Daily Press 8/18/93

Landmark Violations Investigated

Landmark Petroleum Inc. is under investigation for 22 violations of the Clean Water act for effluent discharges between Jan. 1990 and Jan. 1992. Landmark, located west of Fruita, is one of 15 industrial sites and municipalities listed by the Colorado Public Interest Research Group (COPIRG), a nonprofit environmental watchdog group, as being in significant noncompliance with federal Clean Water Act standards. Landmark has until Oct 8 to submit a detailed explanation of how they will comply in the long-term to avoid future violations. Landmark contends it had dealt with each violation with the state as the violations occurred. In April the state Health Department's air-quality control division dismissed actions pending against Landmark regarding two alleged air-quality violations. In return, Landmark agreed to implement engineering modifications to reduce or eliminate emissions from the facility.

Grand Junction Daily Sentinel 9/5/93, 9/24/93

Glenwood Gives Desalination Plant Tentative OK

The Glenwood Springs City Council recently voted 6-1 to negotiate a two-year option with Aqua-Chem Inc. of Milwaukee for 40 acres of city land in South Canyon for a \$45 million desalination plant. The company proposes to pipe the salty outflow from the hot springs in Glenwood to South Canyon, where the plant would remove 200 tons of salt a day from 2 million gallons of water. Opponents of an earlier proposal said the new location and elimination of a power plant component to the project make the new version worth considering. The two-year option will give Aqua-Chem time to study the economic feasibility and environmental impacts of the desalination plant.

Grand Junction Daily Sentinel 8/20/93

ENVIRONMENT

Mine Cleanup Tab: \$71 Billion

According to the Mineral Policy Center, an environmental group, mining companies have abandoned more than 500,000 mine sites nationwide at a potential cleanup cost to taxpayers of between \$32 billion to \$71 billion. The report comes as Congress prepares to consider proposals to reform the 1872 mining law. Colorado has 23,000 abandoned mines, according to a spokesperson for the Colorado Division of Minerals and Geology. Colorado uses reclamation fees from coal mining to clean up the state's most dangerous mines, but would welcome more funding if a federal program was established. The mining industry criticized the report's numbers, calling them foolish and wildly exaggerated.

Denver Post 7/21/93

County Wants Meeting with State on Summitville Sale

Rio Grande County commissioners want a meeting with state officials to discuss the sale of some of Summitville Consolidated Mining Co.'s personal property to help put a dent in the nearly \$900,000 in back property taxes the company owes to the county. The state is resisting the county because it wants to use the property for an in-kind match for EPA funds for the cleanup of the mine. Summitville shut down last Dec. after declaring bankruptcy, and the EPA assumed cleanup of the gold mine from which cyanide and heavy metals had polluted creeks in the area.

Pueblo Chieftain 9/24/93

State Approves Open-Pit Gold Mine

The State Mined Land Reclamation Board has approved what could be Colorado's largest open-pit gold mine that will use a cyanide method similar to that used at the failed Summitville mine. The Cresson Mine, located just north of Victor, will begin operations next year on a 1,051-acre site. As at Summitville, the Cresson Mine will involve digging gold ore out of an open pit, crushing it and sprinkling a cyanide solution over it to dissolve out the gold. The board's approval was based on 25 conditions including guidelines for a triple-lined basin beneath the crushed rock to prevent cyanide and other dissolved heavy metals from leaking into the soil.

Montrose Daily Press 9/23/93

WETLANDS

CSU Expert: Stop De-Watering Wetlands

The de-watering of wetlands in the U.S. must halt immediately if the country wants to preserve this critical ecosystem, according to CSU wildlife biology researcher and wetlands expert Dr. David Cooper. Cooper testified before the Senate Committee on the Environment and Public Works, describing

the current state of wetlands in the western U.S. According to Cooper, the Central and Mississippi Flyways, extending from the Gulf of Mexico through the Great Plains into Canada, support one of the world's most important populations of migratory waterfowl, shorebirds, and cranes. Western wetlands also serve a valuable water quality function by trapping and retaining sediment and removing pollutants from water. Cooper urged the committee to encourage local and regional planning efforts to determine which wetlands areas are most important to the region.

Greeley Tribune 9/19/93

Clinton Wetlands Policy Prompts Suit

A White House plan to end years of agency infighting and gridlock over wetlands protection has run into a legal challenge. The National Association of Homebuilders and three other industry groups filed suit in U.S. District Court in Washington objecting to an administration regulation that would close a major loophole in wetlands policy. The industry groups argued that regulators must get congressional approval for certain policy changes announced by the Clinton administration. The loophole allows developers build restaurants, malls, and other structures on wetlands as long as they don't dump any soil into the land when they excavate it. Builders have been able to use sophisticated, expensive methods to bypass the law. The administration closed the loophole in response to legal action brought by an environmental group during the Bush administration.

Fort Collins Coloradoan 8/26/93

WILDLIFE

DOW Pleased with Lake John Reclamation Project

A recent Colorado Division of Wildlife (DOW) reclamation project of Lake John in North Park to deal with a sucker infestation entailed poisoning the lake with rotenone and installing a gravel filter to prohibit reinfestation of suckers. The rotenone was applied July 7-8, but some of the screens on the gravel filter leaked, allowing the introduction of sucker fry into the lake and shutting down the refilling process on July 14. DOW personnel redesigned the filter caulking and sprayed the ditch where the suckers were found with rotenone. After refilling a live box was placed in the lake, and if the fish lived for 48 hours, then the lake would be determined to be detoxified. Damsel flies and freshwater shrimp were unharmed by the rotenone. The restocking plan included 25,000 13- to 14-inch rainbow trout, as well as 135,000 4- to 5-inch rainbow and Snake River cutthroats.

Fort Collins Coloradoan 7/26/93

Loveland Sets Up Big Thompson Experiment

Loveland Water Department workers are hoping 15 juvenile trout in a 50-gallon tank at the city's water treatment plant will

give them early warning about potential contamination in the Big Thompson River. The tank is filled with untreated river water and contained for a period of three minutes at a time before it is replenished.

Trout, particularly juveniles, are sensitive to pollutants, and by monitoring them, city officials will watch for signs of contamination and hope to respond to possible river contaminations more quickly. Three substantial fish kills have occurred in the Big Thompson since 1992, but no definite causes were determined for any of them. If several fish in the tank die within a short period of time, the city will turn off the river water entering the plant and use reservoir water instead. The experiment is hoped to limit the magnitude of future fish kills by providing earlier indications of a problem, and monitor more closely the quality of raw river water taken into the treatment plant.

Fort Collins Coloradoan 7/26/93

Cities Vie With Wildlife Along Platte

Along the Platte River in Nebraska, where the annual spring migration staging of Sand Hill cranes has become an attraction for tourism, a potential water-use conflict is brewing between cities and wildlife interests. Domestic use of water holds precedence over wildlife use in Nebraska, but the existing pecking order has been called into question. A line for available Platte River water is expected to form this month when the Game and Parks Commission files for an instream flow right on the Platte. The commission wants to protect river flows for fish and to ensure enough subsurface flow to create adjoining wetlands for wildlife.

Meanwhile, the city of Grand Island is working on its own application for Platte River rights. Under new Nebraska law, cities are able for the first time to file for definitive water rights on the Platte River. Grand Island, like most other cities in the Platte valley, draws its water supply from wellfields along the river. As other downstream cities, including Lincoln and Omaha, file applications for rights the potential for conflict between cities and wildlife interests is likely to increase.

U.S. Water News 9/93

Endangered Fish Plan Released by FWS

Fish ladders, protection of instream flows, and limited stocking of native fish are parts of a recently-unveiled federal plan to protect endangered fish. The Recovery Action Plan, released by the U.S. Fish and Wildlife Service (FWS), is a draft document aimed at recovering endangered Colorado squawfish, humpback chubs, bonytail chubs, and razorback suckers while providing for future water development.

The highlights of the multi-agency recovery plan include: (1) Protection of instream flows, including plans to release water from Flaming Gorge Dam (Green River) and Blue Mesa Dam (Gunnison River) to mimic a natural hydrograph, with high

spring flows and lower, more stable flows the rest of the year; (2) Several wetlands will have levees or dikes removed or altered to allow the sites to be accessible by endangered fish; (3) A fish ladder is being designed for the Redlands diversion dam on the lower Gunnison River, as well as passages around agricultural diversion structures on the Yampa River; (4) Colorado, Utah, and the FWS are developing guidelines for stocking non-native fishes in lakes and reservoirs in the upper Colorado River, aimed at minimizing risks to endangered fish while providing sport-fishing opportunities. The Recovery Action Plan was released this month along with a draft agreement clarifying how the Endangered Species Act will be applied to new and existing water development projects in the upper Colorado River basin. For copies of the draft plan, contact the FWS at 303/236-2985.

Grand Junction *Daily Sentinel* 9/16/93

PEOPLE

River District Appoints New Council

The Colorado River Water Conservation District has appointed David C. Hallford as its new general counsel. He replaces retiring attorney Don Hamburg. Hallford recently worked as a partner in the Denver law firm of Saunders, Snyder, Ross & Dickson, where his practice focused on water law. He is a graduate of Denver University Law School.

Grand Junction *Daily Sentinel* 9/1/93

LEGISLATION

Senate Bill Calls for Wetland "Banks"

Ranking members of the Senate Environment and Public Works Committee have introduced a bill that would set permit deadlines and authorize mitigation replacement "banks" for those who disturb wetlands. The bill's sponsors, Max Baucus of Montana and John Chafee of Rhode Island, said the bill would improve the effectiveness, fairness, and flexibility of a preservation program without jeopardizing remaining wetlands, and make wetlands restoration a national priority. The bill would require U.S. Corp of Engineers permits to be issued for draining, excavating, trenching, and mechanized clearing of wetlands. The proposal exempts wetlands already in agricultural use and those established in uplands, such as stock ponds, and sets up an appeal process.

U.S. *Water News* 9/93

WATER RATES

C-BT Water Users Will See Rates Increase

The Northern Colorado Water Conservancy District (NCWCD) board of directors has approved a plan which will increase water rates 10 percent next year. NCWCD officials said an unexpected bill from the project's power provider, Western Area

Power Administration, forced it to increase rates on its "open-rate contracts," which encompass half the project's 310,000 units. WAPA discovered up to \$300,000 in back charges it had failed to submit to NCWCD over the past six years, and it sent them a bill for the full amount this summer. NCWCD annually pays approximately \$50,000 to WAPA.

Greeley Tribune 8/18/93

Water Districts Appeal Ruling

Seventeen suburban cities and water districts are appealing a judge's ruling that they aren't being overcharged by the Denver Water Department. Denver District Judge Connie Peterson ruled in July that the Denver Water Department isn't bound by contracts restricting suburban rates to no more than double those charged Denver residents. Some suburban rates are as much as 220 percent higher. The appeal challenges that conclusion and about 20 other findings. The appeal was filed by Lakewood, Littleton, and 15 other water districts in Arapahoe, Adams, and Jefferson counties.

Montrose Daily Press 8/30/93

LITIGATION

Adams County to Sue Sundstrand

Adams County Commissioners have authorized a suit against Sundstrand Corp. alleging that the aerospace manufacturer is polluting soil and groundwater while also suggesting the state has failed to act on its own findings at the site. According to Adams County attorneys, the county is suing because the state has not pursued the matter in court, even though the Colorado Department of Health has found Sundstrand to be violating state pollution regulations, including improper generation, storage, and disposal of hazardous wastes, most recently in June.

Denver Post 8/24/93

Court Rules Eagle Residents Can Sue Over Mine Cleanup

A federal appeals court has returned a mine-pollution case to a lower court to sort out which claims residents and businesses can make against Paramount Communications of Delaware. Several residents and recreation companies in Eagle County are trying to sue over contamination from mining and cleanup at Eagle Mine. The district court had ruled some of the claims invalid because of a previous cleanup agreement between Paramount, which has owned the mine since 1983, and the state. The plaintiffs sued Paramount, alleging that agreement harmed the Eagle River and the surrounding community, and requested money under the Comprehensive Environmental Response, Compensation, and Liability Act, in addition to punitive damages and an injunction stopping Paramount from releasing toxins.

Grand Junction *Daily Sentinel* 9/26/93

RECREATION

New Ski Area Proposed for Jackson County

A California developer seeking permission to build a ski area in Jackson County -- 65 miles west of Fort Collins -- has been negotiating with the State Board of Land Commissioners for a long-term lease agreement and construction of the resort on state land. Talks with the developer, Fred Sauer of Murietta, CA, began six months ago, and although no formal plans have been filed, the land board has set aside about 4,500 acres of land that could be developed for recreational use. The resort would be located just west of Cameron Pass in Jackson County near U.S. Highway 14.

Montrose Daily Press 8/19/93

GROUNDWATER

Creation of Texas Water Bank Sparks Debate

The creation and operation of the Texas Water Bank has sparked numerous questions and comments from Texas high plains residents, water interests, and others. Senate Bill 1030, passed by the Texas Legislature, establishes the Texas Water Bank and designates the Texas Water Development Board (TWDB) to administer its operation. The new law allows water rights, including surface water, groundwater, treated wastewater effluent, or irrigation tailwater to be listed with the water bank. A permit granting surface water rights will be protected from cancellation for a 10-year period while deposited in the bank and for an ensuing 10 years following Texas Natural Resources Conservation Commission approval of a water rights transfer. Up to 50 percent of a water right may be deposited in the water bank. The TWDB can charge a fee of up to \$500 per transfer to cover its administrative expenses. Use of the water bank will be optional, and transfers of water rights can take place outside the bank.

The Cross Section (Texas) High Plains Underground Water Conservation District, 9/93

State Considers Tougher Rules for Wells

Colorado health regulators are considering tougher standards for a nerve gas by-product polluting 104 wells outside the Rocky Mountain Arsenal, but the U.S. Army says the proposal is unwarranted. At issue is an industrial chemical called DIMP, which leaked outside the arsenal during the Army's manufacturing of chemical weapons two decades ago. The Colorado Department of Health is spending \$45,000 a year to provide free drinking water to south Adams County residents whose wells tested positive for the chemical. EPA considers the water safe to drink if its DIMP concentration is less than 600 parts per billion (ppb). The Colorado Health Department wants to revise that standard to 8 ppb. Army officials say the state has no credible health studies to support a tougher DIMP standard, but state toxicologist Raj Goyal urged the Colorado Water Quality Control Commission, a citizen panel appointed by Gov. Roy Romer, to adopt a tougher standard.

Montrose Daily Press 9/9/93

Arsenal Dump May Violate Numerous Laws

A preliminary plan by the U.S. Army to build a massive \$2.1 billion hazardous-waste dump in the heart of a future wildlife refuge at the Rocky Mountain Arsenal may violate numerous federal and state environmental laws. The 1.5-square-mile dump would be built atop Basin A, a primitive 1950's landfill that often fills with groundwater. The landfill has no liner to protect groundwater from contamination by toxins, including pesticides and chemical weapon agents. To combat this problem, the Army plans to treat the water forever, and incinerate other wastes. The plan is subject to public comment. State officials, who will oversee the cleanup with the EPA, hope negotiations over the next few months can produce a better plan.

Greeley Tribune 9/9/93

SEMINAR SERIES AND SHORT COURSES - COLORADO STATE UNIVERSITY

AGRICULTURAL & CHEMICAL ENGINEERING GRADUATE SEMINAR SERIES, Fall 1993

Seminars begin with refreshments at 3:15 pm and end by 4:30 pm. The usual meeting room is 203-205 in the Lory Student Center, but several seminars will be held in other locations. Please check the location each week. Interested folks from other departments are welcome. Please call Jim Loftis at 491-5252 for more details.

- | | |
|------------|---|
| October 11 | Dr. John Eisenbeis, Camp Dresser and McKee, Denver, Colorado, "Horizontal Wells for Soil Vapor Extraction in Low Permeability Soil"
Monday Noon to 1 pm, Virginia Dale Room, LSC |
| October 15 | Replaced by Monday Seminar |
| October 22 | TBA |

- October 29 Mr. Juergen Braun, Department of Agricultural and Chemical Engineering, Colorado State University, "Physical control of groundwater flow using polysaccharides"
- November 5 TBA
- November 8 Mr. Joby Adams, Colorado Groundwater Resource Services, Fort Collins, "Leaking Underground Storage Tanks (LUSTs) in Utah"
Monday Noon to 1 pm, Room 202 LSC
- November 12 Replaced by Monday seminar
- November 19 Mr. Clyde Fraisse, Department of Agricultural and Chemical Engineering, Colorado State University, "Variable water application by moving sprinkler system"
- December 3 Mr. Devin Moss, Department of Agricultural and Chemical Engineering, Colorado State University, "Topics in CVD Tungsten"
- December 10 Dr. Will Clements, Department of Fish and Wildlife Biology, Colorado State University, "Evaluating Water Quality Using Biological Monitoring"

INTERNATIONAL CONNECTIONS, Fall 1993

Joint Tuesday Noon Brown-Bag Lunch Program, Lory Student Center, Room ST 165, Tuesdays at 12:10, Colorado State University

- October 19 Dianna Laughlin, Life Choices of Some Pakistani Village Women, Women in International Development
- October 26 Raphael Nzirubusa, "Limits to Privatization, Case of the Agriculture in Burundi", Overseas Development Network
- November 2 TBA
- November 9 George Wallace, "The Ties Between Rural Development and Park Protected Management in Latin America", Overseas Development Network
- November 16 Marvin Jensen, World Conquers on Irrigation Management, Society for International Development

ENVIRONMENTAL ENGINEERING SEMINAR SERIES, Fall 1993 Department of Civil Engineering

Seminars are held Mondays from noon to 1:00 in the Senate Chambers in the Lory Student Center, except as noted. All are welcome and feel free to bring a lunch.

- October 18 Dr. Steve Dennis, Manager of Environmental Services, Raytheon, Denver, "Environmental Issues for a Siberian Refinery"
- October 25 Mr. Dave Oerke, Engineer, Black and Veatch, Denver, "Vail's Autothermal Thermophilic Aerobic Digester, First in the Rockies"
- November 1 Mr. Dale Gavel, P.E., Project Manager, EBASCO, Denver, "Wastewater Treatment Plant Concerns in Budapest Hungary"
- November 8 Mr. Joby Adams, Hydrogeologist, Colorado Groundwater Resource Service, Fort Collins, "The Nation's #1 LUSTing in Utah,"
Room 202, Lory Student Center, Co-Sponsored by Environmental Health
- November 15 Dr. George Moncure, Principle Hydrogeologist and Geochemist, SEACOR, Fort Collins, "Arsenic Geochemistry in Groundwater at a Superfund Site"

- November 29 Dr. Gabriel Sabadell, Design Engineer - Hydrologist, Morrison Knudsen Corp, Denver, "Designing a Transport-Storage-Disposal Site in Mexico"

DESIGN OF WATER QUALITY MONITORING SYSTEMS, Fall 1993
AE/CE 549

All lectures are held in Room C-106 Engineering Building at 2:10 p.m. Everyone is invited to attend.

- September 23 Kevin Dennehy, Chief South Platte NAWQA, U.S. Geological Survey National Water Quality Assessment Program - Monitoring System Design
- November 4 Dennis Anderson, Water Quality Control Division, Colorado Department of Health, Colorado's Water Quality Monitoring Efforts (History and Future) and Update on Intergovernmental Task Force
- November 11 Jim Loftis, Agric. & Chemical Engineering Department, Nonpoint Source Monitoring Network Design - Section 319 Efforts in Colorado
- November 18 Phil Johnson, Monitoring Coordinator, Region VIII USEPA, EPA Activities With Monitoring System Design and Operation

FLUID MECHANICS, HYDRAULICS AND WIND ENGINEERING PROGRAM, Fall 1993

Seminar Presentation are Wednesday at 4:00, refreshments are served at 3:45. All seminars are held in Room 230 of the Lory Student Center, unless otherwise noted.

- October 13 Dan Gessler, Research Associate, Civil Engineering, Colorado State University, "Sensitivity Analysis of Stable Channel Design Procedures"
LSC Room 224-26
- October 20 Scott A. Hogan, Research Associate, Civil Engineering, Colorado State University, "New Sampling Methods for Gravel and Cobble Bed Rivers"
- October 27 Ephraim Sparrow, ASME Distinguished Lecturer, Mechanical Engineering, University of Minnesota, "Coping With Incomplete Knowledge Bases in Engineering Practice and Education"
- November 3 Chester Watson, Research Scientist, Civil Engineering, Colorado State University, "Aeration Over a Hydraulic Weir"
- November 10 Yuji Ohya, Visiting Professor, Research Institute for Applied Mechanics, Kyushu University, Kasuga, Japan, "Experimental Facilities for Studying Stratified Flows"
- November 17 Chih Ted Yang, Program Manager, International and Technical Assistance, Bureau of Reclamation, Denver, CO, "Dynamic Adjustment of Rivers"
- December 1 Dave Alciatore, Assistant Professor, Mechanical Engineering, Colorado State University, "Unwrapping Images of the Unseeable: Building 3-D Computer Graphic Surface Models from Cross-sectional Data"

SEMINAR SERIES ON WATER RESOURCES SCIENCE AND ENGINEERING, Fall 1993

Seminar series are held at 12:10 p.m. on Thursdays. All Seminars are held in the Lory Student Center, Room 208, unless otherwise noted.

- October 14 Dr. David Zachmann, Professor, Department of Mathematics, Colorado State University, "A Groundwater Model of the Ogallala Aquifer in South Central Nebraska" **Location TBA**
- October 21 Dr. Mahmood Nachabe, Research Associate, Civil Engineering Department, University of Colorado, Boulder, "Scaling the Groundwater Flow Equation"

- October 28 Dr. Lee H. MacDonald, Associate Professor, Earth Resources Department, Colorado State University, "Cumulative Watershed Effects: Analysis, Prediction, and Management"
- November 4 Mr. John Kochendorfer, Ph.D. Student, Earth Resources Department, Colorado State University, "Opportunities in Hydrology in Russia"
- November 11 Dr. Gustavo Diaz, Research Associate, Civil Engineering, Colorado State University and Mr. Bill Hansen, Hydrologist, National Park Service, Fort Collins
- November 18 Mr. Gary Wolff, Senior Hydraulic Engineer, Resource Consultants & Engineers, Inc., Fort Collins, "Stream Channel Restoration, Mono Basin, California"
- December 2 Dr. Jill Baron, Research Ecologist, Natural Resources Ecology Laboratory (NREL), Colorado State University, "Snow Distribution Effects of a High Elevation Rocky Mountain Basin Simulated with the Regional HydroEcological Simulation System"

FISHERY & WILDLIFE BIOLOGY SEMINAR SERIES, Fall 1993

Seminars are held on Fridays at 3:00 pm in Room 133 of the Wagar Building. Refreshments are served at 2:45 pm in Room 130 of the Wagar Building.

- October 15 Rusty Rodriquez, USFWS, National Fisheries Research Center, Seattle, WA, "Assessment of Genetic Diversity and Race Discrimination of Salmonid Populations Using DNA Technology"
- October 22 Dr. Ann Richmond, Department of F&WL Biology, Colorado State University, "Role and Function of Large Woody Debris in Central Rocky Mountain Streams"
- October 29 Kevin Rogers, Department of F&WL Biology, Colorado State University, "Movement Patterns of Northern Pike and Largemouth Bass on the Rocky Mountain Arsenal"
- November 5 Jon Holst, Department of F&WL Biology, Colorado State University, "Deer & Elk Movements in East Brush Creek of White River National Forest"
- November 12 Gail Turchi, Department of F&WL Biology, Colorado State University, "Bird Species Richness in Aspen Habitats"
- November 19 Keith Koupal, Department of F&WL Biology, Colorado State University, "Extended Semen Ratio, Male Rejuvenation, and Spawn Taking Procedures for Walleye"
- December 3 Tamara L. Holmes, Department of F&WL Biology, Colorado State University, "Human Disturbance -- Behavioral Responses of Nesting Grassland Raptors"
- December 10 Dean E. Biggens, NERC, USFWS, "Update on the Black-Footed Ferret"

SHORT COURSES - COLORADO SCHOOL OF MINES

- October 19-22 Principles and Application of MODFLOW and Accompanying Modules, International Groundwater Modeling Center, Colorado School of Mines, Golden, CO 80401-1887; (303) 273-3103
- November 17-19 Using EPA's New WhAEM Model for Wellhead Protection, International Groundwater Modeling Center, Colorado School of Mines, Golden, CO 80401-1887; (303) 273-3103

MEETINGS

Conference on Tailings & Mine Waste '93, Nov. 29-Dec. 1, 1993, Colorado State University, Fort Collins, CO -- This conference will cover the latest information on mine and mill tailings and waste, as well as provide a forum for discussion of current and future mining and environmental issues. The program will include issues related to: tailings and mine waste management, reclamation and remediation, regulatory framework and public awareness. For information contact: Janet Lee Montera, Dept. of Civil Engr., Colorado State University, Fort Collins, CO 80523; Phone 303/491-7425; FAX 303/491-7727.

CONSERV93 -- The New Water Agenda, Dec. 12-16, 1993, Las Vegas, Nevada -- This important conference, which builds on the momentum generated at CONSERV90 in Phoenix, will continue to address and provide solutions to the most pressing water supply problems in North America. The program is multidimensional, offering a series of technical presentations, poster presentations, workshops, roundtables, panel discussions, and an impressive product exhibition of water conservation

related products and services. CONSERV93 is jointly sponsored by the American Society of Civil Engineers, the American Water Resources Association, and the American Water Works Association. For information contact the American Water Works Association, 6666 W. Quincy Ave., Denver, CO 80235.

Water Policy and Management: Solving the Problems, May 23-26, 1994, Denver, Colorado -- The Water Resources Planning and Management Division, American Society of Civil Engineers, will hold its 21st Annual Conference May 23-26, 1994, in Denver, Colorado. The theme will be "Water Policy and Management: Solving the Problems." The conference will refocus on national water issues and will also serve as a forum for western water issues. For information contact: Technical Program Chair Harry N. Tuel, Boswell Engr., 330 Phillips Ave., So. Hackensack, NJ 07606. Phone 201/641-0770; FAX 201/641-1831.

1994

American Water Foundation

INTERNATIONAL DAM SAFETY, OPERATION AND MAINTENANCE

SEMINAR AND STUDY TOUR

June 6-17

Cosponsors:

California Department of Water Resources
Denver Water Department
Federal Emergency Management Agency
Geomation, Inc.
U.S. Army Corps of Engineers

For information contact:

American Water Foundation
P.O. Box 480632
Denver, CO 80248-0632
303/628-5516

1993 SOUTH PLATTE RIVER FORUM

Seeking An Integrated Approach To Watershed Management In The South Platte River Basin and Update on Agricultural Water Quality Issues and Educational Program Responses in the Lower South Platte River Basin

October 26-28, 1993

University Park Holiday Inn, Fort Collins, Colorado

Recent administrative policies and pending reauthorization of the Clean Water Act by the U.S. Congress, has brought a new dimension to the management of water -- integrated watershed management. How will pending changes in resource management affect the way in which we manage the South Platte Basin? What is meant by "integrated watershed management?" The 1993 South Platte River Forum will provide a setting for discussing these important questions on October 27-28, 1993.

As in previous years, the South Platte Forum will facilitate multidisciplinary discussion and formulate direction through better understanding of the South Platte River system. In addition to our fourth annual conference, the Organizing Committee is pleased to assist in sponsoring Cooperative Extension's special session on Agricultural Water Quality Issues, to be held on Tuesday October 26, at the University Park Holiday Inn.

Keynote Presentations

Managing Our Water Resources: The State's Perspective
Legal Issues Associated with an Integrated Watershed Management Approach
The Integrated Watershed Management Concept/Clean Water Act Reauthorization
Overview of the National Biological Survey

Example of Integrated Approach to Basin Water Quality Assessment, South Platte NAWQA Study

Registration is \$45.00 if received by October 15, 1993 (late registration is \$60.00). The fee covers workshop materials, proceedings, lunch, and coffee breaks. Please make checks payable to: South Platte River Forum. Send payment with name, affiliation, and complete address to: Gene Schleiger, Northern Colorado Water Conservancy District, P.O. Box 679, Loveland, CO 80539.

The University Park Holiday Inn is providing special room rates for conference attendees: \$53.50 per night/single occupancy, and \$63.50 per night/double. Please contact the Holiday Inn directly to make reservations at 303/482-2626. For additional information, contact Kathleen Klein, CWRRRI 303/491-6308, or Chuck Grand Pre, CDOW 303/291-7202.

UPDATE ON AGRICULTURAL WATER QUALITY ISSUES AND EDUCATIONAL PROGRAM RESPONSES IN THE LOWER SOUTH PLATTE RIVER BASIN

October 26, 1993

University Park Holiday Inn
Fort Collins, Colorado

In Conjunction with the South Platte River Forum

Sponsored by
Colorado State University Cooperative Extension

Concerns over agricultural water quality issues in the South Platte Basin downstream of Denver are growing. Agricultural production in this part of the basin is a significant contributor to the Colorado economy. The scale of this enterprise raises the concern about water pollution from agricultural activities. Water quality data collected in this basin, while inconclusive and incomplete, does suggest that agriculture should do its part in modifying practices to reduce water pollution potential. Several organizations are responding to this need by conducting programs to further define

the issues and offer educational programs to agricultural producers. One goal of this no-cost pre-forum workshop is to present these issues and educational responses. Those attending the South Platte Forum with an interest in agriculture in the basin are invited and encouraged to attend. A second goal of this workshop is to begin developing a strategic educational plan for assisting agricultural producers in addressing water quality issues. This will be accomplished through round table discussions by all participants in the workshop choosing to be a part of this planning effort.

AWRA - COLORADO SECTION CALENDAR

<u>DATE</u>	<u>EVENT</u>	<u>LOCATION</u>
October 28, evening	McCullough Water Treatment Plant Improvements and Hydroelectric Retrofit	Colorado Springs
November	Program - TBA	CSU, Fort Collins

For information contact:
Steve Forvilly
Metro Wastewater Reclamation District, 286-3325

COLORADO WATER CONGRESS

- Oct. 19 **WORKSHOP ON LEGAL ETHICS IN WATER & ENVIRONMENTAL LAW**, Northglenn, CO. Contact: Colorado Water Congress, 1390 Logan Street, Suite 312, Denver, CO 80203.
- Oct. 20 **WORKSHOP FOR BOARD MEMBERS OF WATER CONSERVANCY & CONSERVATION DISTRICTS**, Northglenn, CO. Contact: Colorado Water Congress, 1390 Logan Street, Suite 312, Denver, CO 80203.
- Oct. 20 **WORKSHOP ON ENTERPRISE STATUS OF GOVERNMENT ACTIVITIES (S.B. 93-130)**, Northglenn, CO. Contact: Colorado Water Congress, 1390 Logan Street, Suite 312, Denver, CO 80203.
- Oct. 21 **13TH ANNUAL WORKSHOP ON FEDERAL AND STATE WATER QUALITY DEVELOPMENTS**, Northglenn, CO. Contact: Colorado Water Congress, 1390 Logan Street, Suite 312, Denver, CO 80203.
-

FROM THE STATE ENGINEER'S OFFICE, September 1993:

Statewide reservoir storage was 115% of normal at the end of August, with the Rio Grande basin having the highest storage rate at 227% of normal.

The National Weather Service reports statewide August precipitation as 133% of normal. The weather service's 30-day outlook is for below normal temperatures in the northwest and southeast corners of the state with near normal temperatures over the rest of the state, and for slightly above normal precipitation in all but the southwest corner of Colorado which should get normal precipitation.

Surface Water Supply Index

The Surface Water Supply Index (SWSI) developed by the State Engineer's 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 stream flow, 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 September 1, 1993 and reflect conditions during the month of August.

<u>Basin</u>	<u>Nov 1, 1992 SWSI Value</u>	<u>Change From Previous Mo.</u>	<u>Change From Previous Yr.</u>
South Platte	+2.8	+1.5	+0.1
Arkansas	+2.9	+0.7	+1.5
Rio Grande	+2.9	+1.4	+2.8
Gunnison	+3.2	+1.5	+4.6
Colorado	+3.8	+1.2	+4.2
Yampa/White	+1.4	-0.6	+4.0
San Juan/Dolores	+2.5	+0.9	+1.3

SCALE

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

CALENDAR

- Oct. 19 **WATERSHED APPROACHES AND NONPOINT SOURCE POLLUTION: PROPOSALS FOR CLEAN WATER ACT REAUTHORIZATION**, Boulder, CO. Contact: Kathy Taylor, University of Colorado, Natural Resources Law Center, Campus Box 401, Boulder, CO 80309-0401; (303) 492-1288.
- Oct. 21-22 **THIRD ANNUAL CALIFORNIA WATER POLICY CONFERENCE: BEYOND CONSENSUS**, Los Angeles, CA. Contact: Dodson & Associates, 1770 Ximeno Avenue, Suite 307, Long Beach, CA 90815; (310) 494-1525.
- Oct. 21-22 **GROUND WATER MONITORING AND SAMPLING TECHNOLOGY: DESIGN, INSTALLATION, DEVELOPMENT AND SAMPLING OF GROUND WATER MONITORING WELLS**, Denver, CO. Contact: Tina Falkenstein, ASTM, 1916 Race Street, Philadelphia, PA 19103; (215) 299-5480.
- Oct. 23 **A FIELD DEMONSTRATION OF ASTM STANDARDS ON GROUND-WATER MONITORING AND SAMPLING**, Golden, CO. Contact: Joel Siegel, Colorado Ground-Water Association; (303) 793-5088.
- Oct. 26 **UPDATE ON AGRICULTURAL WATER QUALITY ISSUES AND EDUCATIONAL PROGRAM RESPONSES IN THE LOWER SOUTH PLATTE RIVER BASIN**, Fort Collins, CO. In conjunction with the 1993 South Platte Forum. Contact: Kathleen Klein, CWRRI; (303) 491-6308.
- Oct. 26-28 **SEEKING AN INTEGRATED APPROACH TO WATERSHED MANAGEMENT IN THE SOUTH PLATTE RIVER BASIN**, Fort Collins, CO. Contact: Kathleen Klein, CWRRI; (303) 491-6308.
- Oct. 27-29 **ROCKY MOUNTAIN GROUND WATER CONFERENCE, and 6TH ANNUAL NEW MEXICO SECTION AWRA CONFERENCE** Albuquerque, NM. Contact: Gwen Easterday, PO Box 1852, Albuquerque, NM 87103; (505) 766-1745.
- Oct. 27-30 **INTERAMERICAN DIALOGUE ON WATER MANAGEMENT**, Miami, FL. Contact: Global Tomorrow Coalition, 1325 G. Street, N.W., Suite 1010, Washington, DC 20005-3104; (407) 687-6105.
- Nov. 9 **A REVIEW OF FEDERAL ENVIRONMENTAL LAWS IMPACTING WATER INTERESTS**, Denver, CO. Contact: Colorado Water Congress, 1390 Logan Street, Suite 312, Denver, CO 80203.
- Nov. 10 **WHAT YOU SHOULD KNOW ABOUT THE LEGISLATIVE PROCESS: THE LAW, THE RULES AND THE PRACTICES**, Denver, CO. Contact: Colorado Water Congress, 1390 Logan Street, Suite 312, Denver, CO 80203.
- June 6-17 **INTERNATIONAL DAM SAFETY, OPERATION AND MAINTENANCE SEMINAR AND STUDY TOUR**, Denver, CO., San Francisco, CA., Sacramento, CA. Contact: American Water Foundation, PO Box 480632, Denver, CO 80248-0632.
- Oct. 31-Nov. 5 **RISK BASED DECISION MAKING IN WATER RESOURCES VI**, Santa Barbara, CA. Contact: Donna McArdle, Engineering Foundation, 345 E. 47th St., New York, NY 10017. Phone (212)705-7836; FAX (212)705-7441.
- Oct. 31-Nov. 3 **1993 INTERNATIONAL IRRIGATION EXPOSITION AND TECHNICAL CONFERENCE**. Contact: The Irrigation Association, 1911 North Fort Myer Drive, Suite 1009, Arlington, VA 22209-1630.
- Dec. 6-10 **AGU 1993 FALL MEETING**, San Francisco, CA. Contact: American Geophysical Union, 2000 Florida Ave., NW, Washington, DC 20009. e-mail address for general information: SBELL2KOSMOS.AGU.ORG.

Colorado Water Resources Research Institute
410 University Services Center
Colorado State University
Fort Collins, CO 80523

Jim Klett
Horticulture
Shepardson Building

Bulk Rate
U.S. Postage
PAID
Ft. Collins,
Colo.
PERMIT NO 19