ATTEMET PRIME VENES

# Colorado Water

April 1993

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

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"View of the chasm through which the Platte issues from the Rocky Mountains" - Samuel Seymour, Illustrator Steven H. Long Expedition 1819 - 1820 Courtesy Denver Public Library, Western History Department

see page 4: South Platte River Observations...

 "WILD AND ZANY WATER PROJECTS: How Bizarre is the Colorado-Big Thompson Project?" Dr. Dan Tyler April 30, 1993
7:30 p.m., Room 228 Lory Student Center Colorado State University Presented by AWRA-Colorado Section



"View of the chasm through which the Platte issues from the Rocky Mountains." Samuel Seymour, Illustrator. Steven H. Long Expedition 1819-1820. Courtesy Denver Public Library, Western History Department.



# WALKING A FINE LINE!



# Editorial by Robert C. Ward

As many of you are aware, there has been some concern expressed in the water community about the National Water Policy report issued by the Long's Peak Working Group (the report was summarized in the February 1993 issue of *Colorado Water*). Greg

Hobbs has summarized this concern in the article that appears on page 14 of this issue of *Colorado Water*. Legislative hearings on the report were held in Denver on February 17 to discuss the report's ramifications to Colorado's current water management framework. There is no doubt that change is in the air, and Colorado's water management system is not isolated from these winds of change.

About the time I was hearing of the concern about the report prepared by the Long's Peak Working Group, I received the Fall-Winter 1993 issue of Arroyo (Vol. 6, No 3), the newsletter of the Arizona Water Resources Research Institute. The newsletter is devoted to an analysis of the Central Arizona Project's (CAP) underutilization controversy (described in the June 1992 issue of Colorado Water). The controversy stems, in part, from the high cost of CAP water and the resulting financial problems being created for agricultural and municipal water users. The Arroyo analysis also reviewed some of the history of the CAP and noted that university researchers in Arizona (CSU's Bob Young was one of the professors) had, in the 1960's, raised some concern about the future economics of the project. These concerns, in the minds of many, have been realized in the current problems. When the university water researchers in Arizona expressed their concerns in the 1960's, however, they were derided and, personally, "declared personas non gratis."

Shortly after the above newsletter was received, the March 8, 1993, issue of *High Country News* arrived with Ed Marston's article entitled, "Don't look for free inquiry at the West's land-grant colleges." He is concerned that natural resource faculty at land-grant colleges and state universities have become "cheerleaders" for natural resource industries and are not able to provide the good science and policy needed to break, what he sees as, the existing natural resource management gridlock.

What is the role of higher education's water researchers? We recently completed our annual review of water research proposals, and I noted that many of the topics deal with interpreting the effects of evolving regional and national water management trends on Colorado's water resources management system. I am concerned that CWRRI may find itself funding research that might be viewed as controversial by some Colorado water users or the public. Some may desire not to

have state or national issues and trends opened up for analysis because of the potential change such trends might bring to our current water management system. Others may view the funded research as just a continuation of past industry support.

I am sometimes confronted with the comment by a water user that CWRRI is there and we know it exists, but it does not really contribute to the ongoing evolution of Colorado's water management efforts. Is this because researchers don't tend to inject themselves into "hot" water issues for fear of offending either one side or the other in the many ongoing water debates in Colorado?

What is the role of higher education's water researchers? As I see this role, it is our responsibility to Colorado citizens and water users: (1) to create the basic knowledge necessary to support the water management system chosen by Colorado citizens; (2) to identify, examine and assess regional, state, national and international water management trends and alert

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Colorado water users and managers to upcoming water management issues; and (3) to formulate responses to these evolving water management trends, with pros and cons, for consideration by Colorado water users, managers and citizens. University researchers cannot define the future; however, we can assist in pointing out changes taking place and develop the knowledge necessary for Colorado citizens to approach the evolution of their water management system in an informed manner.

There is no doubt that situations will continue to develop that result in higher education's water information being viewed as biased, especially when the findings do not support one side's agenda or ideology. Both higher education researchers and Colorado water users must appreciate that full disclosure and debate on all the issues surrounding a water management issue, in an open and informative manner, is the best way to ensure

#### **RESEARCH OPPORTUNITIES**

## (Contact your Contracts and Grants Office for details)

The EPA, Office of Research and Development and EMAP have announced the availability of research grants to develop Indicators of Ecosystem Stress. The objective is to support the development and evaluation of indicators for estimating the ecological condition of estuarine, forested, and wetland resources as related to the values of biological integrity/biodiversity and ecological sustainability. Applications are due in Washington D.C. by April 30.

The AWWA Research Foundation has approved \$3.8 million to sponsor research on the topics of water treatment, distribution systems, monitoring and analysis, management and administration, and health effects. Researchers may submit proposals in response to RFPs to the Research Foundation through May 3 for projects with budgets up to \$250,000 in AWWA Research Foundation funds. Proposals for RFP projects with AWWA Research Foundation funds of \$250,000 and greater will be accepted through July 15. Several of the projects are EPA Cooperative Projects.

# SCHOLARSHIP OPPORTUNITIES

The Colorado Section of the American Water Resources Association (AWRA) will offer a \$1,000 cash scholarship award for the 1993-94 academic year. To be considered for the scholarship, the applicant must meet the following criteria: enrollment as a student in a degree program at any accredited Colorado public or private college or university; and involvement in research or independent study pertaining to hydrology, geology, engineering, hydrogeology, law, economics, planning, computer science, environmental science or other topics concerning water resources in Colorado.

Send abstract of research, letter of reference from faculty adviser, and resume to: Chairman, AWRA-Colorado Section Scholarship Committee, P.O. Box 9881, Denver, CO 80209-0881. Abstracts should be submitted no later than June 1 prior to the beginning of the academic year. The award includes a one-year membership in AWRA-Colorado Section.

For additional information call Ed Rovey at (303)433-9125.

that Colorado does not create its own CAP controversy! In an era when the public will be much more involved in many natural resource decisions, it is in the best interests of everyone to foster as much discussion of water issues as possible. Higher education researchers have a responsibility to participate in such discussion and contribute their knowledge and views, so the public/water users can benefit from the water expertise being supported within Colorado's system of higher education. Researchers also have the responsibility to put their knowledge and views in words that relate to the practical situation and not

and views in words that relate to the practical situation and not some academic journal. I will continue to search for forums and opportunities where higher education can contribute to Colorado's water management system in a constructive and positive manner. I welcome any input on how Colorado citizens and water users can best make use of higher education's water expertise in an unbiased manner.

# 1993 STUDENT PAPER COMPETITION American Water Resources Association (AWRA) Universities Council on Water Resources (UCOWR) Hydrolab Corporation

- AWARD #1 Given by Hydrolab Corporation for the Best Student Paper Presentation at the Annual AWRA meeting August 29 to September 2, 1993, in Tucson, Arizona. - Cash prize of \$300 and one year's membership in AWRA. This award will be presented at the Annual Meeting.
- AWARD #2 Two awards given by UCOWR and AWRA to the students who submit the best technical paper. One award is given for undergraduate paper and one award is given for the best graduate paper. Cash prize of \$250 and one year's membership in AWRA for each award. Publication in the Water Resources Bulletin for each award.

# INSTRUCTIONS FOR SUBMISSION OF PAPER AWARD

SUBJECT: Any water resources topic.

<u>REQUIREMENTS</u>: Author must be a student or have received a degree during the 1992-93 academic year.

SUBMISSION: Mail two (2) copies by SEPTEMBER 17, 1993 to: Student Paper Competition, American Water Resources Association, 5410 Grosvenor Lane, Suite 220, Bethesda, MD 20814-2192.

Cover page (removed during review to ensure anonymity) should contain: author's name, address, and telephone number (should appear only on this page); title of paper (repeat first page of text); division - undergraduate or graduate; institution and (anticipated) date of graduation; faculty contact - name, address, and telephone number.

Paper should comply with "Instructions to Authors," Water Resource Bulletin 27(1):167-176, Jan.-Feb. 1991. Should contain no more than 5,000 words and four (4) figures.

FOR QUESTIONS CALL: PETER E. BLACK at (315)470-6571.

# WATER RESEARCH

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# SOUTH PLATTE RIVER OBSERVATIONS: Historical Clues to the Evolution of a River's Ecology

by Greg M. Silkensen Graduate Student, History Department Colorado State University Presented at the 1992 South Platte Conference October 27-28, 1992, Fort Collins, Colorado Defining Ecological and Sociological Integrity for the South Platte River Basin

Let me begin with a brief explanation of what I have tried to accomplish with this research. First, I make no claim that this work is comprehensive. I have looked at as much material as time would allow, however there are aspects to the history of the South Platte I am not familiar with. Second, I cannot properly call this an 'ecological history' of the South Platte River. I am neither an ecologist, botanist, nor a biologist, and have no expertise in those areas. However, history can be used as a tool to interpret the past. Through the observations of an 1820's explorer or an 1859 gold-seeker it is possible to interpret what the South Platte was like during the 19th century. But this historical method faces certain limitations. Those who travelled up the South Platte in the 19th century were most likely unaware of and unconcerned with the "ecological integrity" of the river, or the maintenance of its aquatic habitat. Rather, they were interested in the river and its valley as a water source and route or mode of transportation. Also, observations from the past can be interpreted, but the writer's intent cannot always be known. However, the observations of 19th century inhabitants reveal that water in the arid west, or the lack of it, was a major concern then, just as it is now.

Originally enacted in 1972, the Clean Water Act is currently awaiting amendment and reauthorization by the United States Congress. Section two of this legislation, now in the hands of the Senate (S1081), lists as one purpose of its reauthorization: "To assure that water pollution control programs more comprehensively protect the ecological integrity of waterbodies, including the maintenance and restoration of aquatic habitat, through enhanced protection of the physical and biological components of waterbodies." This statement raises important questions. What exactly is "ecological integrity," and to what extent will aquatic habitats be protected and "restored?" These questions are particularly relevant when applied to the South Platte River in northeastern Colorado. For here is a river which has been substantially altered by human activity over the past 100 years. How will reauthorization of the Clean Water Act affect the South Platte basin? Before answering this, it is first necessary to examine the history and evolution of the South Platte River over time. What was the river like a century ago, and how did it reach its current state?

In the mid-nineteenth century large stretches of the South Platte River valley in northeastern Colorado were treeless, and described by phrases such as a "miserable country," one of "alkali soils" and "unvaried sterility." The earliest observations of the South Platte reveal a river which could be a raging torrent one year, and a dry sand bed the next. Historically intermittent, the South Platte is today a perennial river, with a much more predictable flow than 130 years ago. While this predictability



Fording of the South Platte River at "California Crossing," near Julesburg, Colorado. W.H. Jackson, n.d.

and meticulous regulation are controversial, the South Platte's riparian habitat (across Colorado's high plains) is in part a direct result of human influence. Over the past century the development of irrigated agriculture within the South Platte valley has created a greater and more constant flow of water in the river, due in large part to irrigation, water storage, and diversion of water from adjacent watersheds.

for additional information call for Rovey in (203)/03-9125

**Exploration** -- The earliest anglo-American scientific exploration to ascend the South Platte and record observations along its route was that of Steven H. Long in 1819-1820. Edwin James of the Long expedition, the official botanist and geologist for the trip, wrote what is probably the best account of the journey. Upon reaching the South Platte, James first noted that the river "is about nine hundred yards wide, and very rapid, but so shoal that we found it unnecessary to dismount from our horses, or to unpack the mules [in order to cross]." As a trained geologist and botanist, James described the land formations and scenery as the expedition progressed:

We passed several extensive tracts nearly destitute of vegetation. The surface of these consisted entirely of coarse sand and gravel, with here [and] there an insulated mass of clay, highly impregnated with salt....Some extensive portions of the immediate bottom land, along the river, were white with an effloresced salt.

And as the group continued west towards the Rockies, James made a significant observation:

As we approached the mountains, wood became much more abundant along the [South] Platte. We had often heard our guide, in speaking of the country, two or three days journey from the mountains, mention the *Grand Forest*, and were a little surprised on arriving at it, to find no more than a narrow but uninterrupted strip of timber, extending along the immediate bans of the river, never occupying the space of half a mile in width.

Why were more trees observed along the South Platte as the expedition continued upstream? One of the most obvious answers is that during some years, the flow of the South Platte was sufficient to sustain the river across all of Colorado's high plains. But during times of drought, the river's flow must have sunk into its sandy bed far upstream from its confluence with the North Platte, leaving a large portion of the river-bed dry.

This was in fact the situation when Charles C. Fremont ascended the South Platte in 1842. Following the experiences of the Long expedition, nearly 22 years had elapsed before another anglo-American expedition surveyed and explored along the South Platte River. John C. Fremont, a lieutenant in the Corps of Topographical Engineers, was chosen to explore the area in 1842. Although Fremont's principal objective was to survey the north fork of the Platte, he decided to ascend the south fork to obtain astronomical positions, and to locate the mouths of the South Platte's tributaries as far west and south as St. Vrain's Fort.

Our general course was southwest, up the valley of the river, which was sandy, bordered on the northern side of the valley by a low ridge; and on the south, after seven or eight miles, the river hills became higher. Six miles from our resting place we crossed the bed of a considerable stream, now entirely dry -- a bed of sand. There were but few trees, a kind of long-leaved willow, standing; and numerous trunks of large trees were scattered about on the ground.... A few willows on the banks strike pleasantly on the eye, by their greenness, in the midst of the hot and barren sands.

Fremont's descriptions, like James', emphasize the sandy, hot, and barren nature of the lower South Platte, and the scarcity of trees. Unlike the Long expedition, however, which found the river flowing throughout its course across the high plains, Fremont was not so lucky. On July 7, 1842, Fremont wrote:

The sun was getting low, and some narrow lines of timber four or five miles distant promised us a pleasant camp, where, with plenty of wood for fire, and comfortable shelter, and rich grass for our animals, we should find clear cool springs, instead of the warm water of the [South] Platte. On our arrival, we found the bed of a stream fifty to one hundred feet wide, sunk some thirty feet below the level of the prairie, with perpendicular banks, bordered by



"View of the Rocky Mountains on the Platte 50 miles from their base." Samuel Seymour, Illustrator. Steven H. Long Expedition 1819-1820. Courtesy Denver Public Library, Western History Department.

a fringe of green cottonwood, but not a drop of water. There were several small forks to the stream, all in the same condition. With the exception of the Platte bottom, the country seemed to be of a clay formation, dry; and perfectly devoid of any moisture, and baked hard by the sun.

In 1842 the South Platte was an intermittent river. Perhaps the mountain snowpack of the previous winter had been sparse, providing little spring runoff. Whatever the reason, Fremont found the South Platte dry along its lower portion in July of 1842.

Like Edwin James of the Long expedition, Fremont noted the increasing expanse and lushness of the vegetation as he ascended the South Platte:

Since leaving the forks, our route had passed over a country alternately clay and sand, each presenting the same

naked waste. On leaving camp this morning [July 8, 1842], we struck again a sandy region, in which the vegetation appeared somewhat more vigorous than that which we had observed for the last few days; and on the opposite side of the river were some tolerably large groves of timber.

As previously mentioned, observations of both James and Fremont support the possibility that the more lush riparian vegetation along the upper portions of the South Platte nearer the mountains was due to geography. Here, near the mountains, the river's flow was much more likely to be perennial, even during dry years, than further downstream.

In June of 1843 Fremont headed west from Missouri up the Kansas and Republican watersheds on a second expedition, reaching the South Platte valley from the east on June 30, 1843:

Crossing the summit of an elevated and continuous range of rolling hills, on the afternoon of the 30th of June we found ourselves overlooking a broad and misty valley, where, about ten miles distant, and 1,000 feet below us, the South fork of the Platte was rolling magnificently along, swollen with the waters of the melting snows.

And from a journal entry on July 21, 1843:

There is a difference in weather compared to last year. The water in the rivers is so high that the crossing causes great delay. The same streams were hardly knee deep last year.

Both of these observations of the South Platte in 1843 indicate a high water year, in stark contrast to the previous year's conditions. Historically the South Platte has had a tremendous variation in Flow from year to year.

<u>Gold Rush</u> -- In July of 1858 three brothers from Georgia discovered gold on Dry Creek near present-day Denver. News of the small discovery spread quickly, and spawned

one of the largest migrations in Colorado history. The following summer brought gold-seeking "fifty-niners" by the thousands to Colorado with their slogan "Pikes Peak or Bust." Many of them and the pioneers and settlers who soon followed entered Colorado along the "Denver Road" through the South Platte valley, some of them describing the South Platte in journals, diaries, and letters.

Guidebooks to the Pikes Peak region were quickly published for travellers bound for the Rockies. One such book published in 1858 was entitled *The New Gold Mines of Western Kansas*, written by William B. Parsons. Widely used, it became known simply as "Parsons' Guidebook," and said of the South Platte route into Colorado:

Grass is not very abundant beyond Kearney on account of the vast number of animals which passed over the road.... There is no wood of any account between O'Fallen's Bluff [near the confluence of the North and South Platte] and Fort St. Vrain. Water will be found without much difficulty the whole way.

This description of the South Platte is significantly different than anything previously mentioned. Parsons reported little grass and no trees (wood) along much of the South Platte. He also insinuated the availability of water along the route. But from Long and Fremont's experiences, this would not have consistently been the case. In fact, the accuracy of many contemporary guidebooks to the goldfields of Colorado of that era is questionable. The vast number of people traversing the "Denver Road" along the South Platte certainly had a tremendous and sometimes negative impact on the riparian habitat and natural resources of the river valley. Large numbers of trees were cut for fuel, and grass was heavily grazed along the route.



South Platte River near Denver c.1910. Courtesy Colorado Historical Society F11,879.

One of the many gold-seekers to travel up the South Platte in 1859 was a man by the name of M. O. Morris, an Englishmanheaded for the Rockies. His observation of the South Platte reflects that of many other fifty-niners:

I took the opportunity of walking across the Platte, which here [in the vicinity of Julesburg] is from a quarter to half a mile in width, and rapid in parts; it gives the idea, with its shifting currents and sand spots, of a tide receding from a broad strand...there was a pretty view of the Platte, which extended into a basin and was studded with green islets, quite as pretty...as the 'thousand islands' on the St. Lawrence.

In the nineteenth century prior to irrigation and water storage, the bed of the South Platte was relatively wide, shallow, and braided. With human interference over time the flow of the river became more perennial, and the river bed and channel narrowed. Between June and August of 1862, Emily Malone Raymond and her three young children traveled with a small wagon train across the plains to meet her husband in Denver. Although the trip was difficult, particularly for a woman with children, Raymond found time to keep a diary of the trip:

Sunday August 3, 1862: We have seen today the first trees since we crossed the river and they were so rare a sight...We had to travel till after dark to find a good camping ground.

A newlywed couple, Mr. and Mrs. Thomas Tootle, also ascended the South Platte valley in 1862 on their honeymoon trip to Denver. Mrs. Tootle kept a diary of her travels, and recorded these passages:

There is no timber in the Platte valley, all the wood is obtained from the islands in the river...the Platte [is] studded with islands of all sizes from 1 yd. to 1 or 2 miles long, come [sic] covered with high grass and all have trees, some evergreen....The Platte though from 1 to 1 1/2 miles wide is nowhere more than 1 to 4 ft deep....Came to Bijou

Creek this morning and found the first timber for 8 days.

Tootle's comments mirror earlier observations concerning the river's width, braided nature, and lack of available wood.

**Irrigation** -- With the discovery of gold in the Rockies and the resulting settlement at Denver came some of the earliest attempts at irrigation in the South Platte valley. An 1861 U.S. Patent Office Report on Agriculture in the Territory of Colorado stated:

The results of numerous irrigating enterprises during the past season, if for gardening purposes soley, were not only most gratifying but immensely profitable. It was ascertained that in the wide bottom lands of the [South] Platte River and other streams near the base of the mountains, there was a rich alluvial deposit, which only required water at long intervals to promote an astonishing vegetable growth.

Early pioneers recognized their dependence upon irrigation for successful agriculture, and thus began the development of irrigation in the South Platte valley, the digging of the first canals, the development of the agricultural colonies at Greeley and Longmont, and the further development of Colorado water law and the concept of prior appropriation.

Henry M. DeVotie first came to the South Platte valley in 1864. He bought a farm north of the La Grange schoolhouse near Greeley in Weld County around 1870. Some of his recollections in March of 1918 provide additional insight into the early history of the river:

In 1864 when I first came here it was the fall of the year. My recollection is that the Platte river at that time, after we got above Julesburg it was practically dry for a good many miles; there was plenty of water standing in holes along the banks for culinary purposes and for stock....When we came up in 1864 we used to meet parties going down and camped with them. They told a good many times that the Platte was dry up above, and by the time we got up there we might have trouble finding water....They said the river was practically dry up in Colorado. The general talk was, among the men we met, that all the lower Platte in Colorado would go dry....

When we came up the river later in 1866 I think there was plenty of water for all our necessities. There was water running everywhere as far as I remember at the time. After we got up in to Colorado the river was pretty low above Julesburg, but water was running all that season, for the necessities of the caravan.

DeVotie's comments tend to substantiate the concept of the South Platte as intermittent.

According to records, David Wall, a disillusioned fifty-niner, first diverted water from Clear Creek to irrigate approximately two acres near Golden in 1859. Later that same year irrigation developed on Boulder Creek, and in 1860 on the Cache la Poudre River, St. Vrain, and Lefthand Creeks -- all of which are tributary to the South Platte. As farmers irrigated, they and others began to notice over a period of years an increase in the volume of water in the stream and river channels at and below the irrigated sections. This was first observed on a local scale between 1885 and 1897. It was at this time that the hydrologic character of the South Platte began to change. This was also confirmed by the biennial State Engineer's Report of 1883-1884:

It is claimed that the flow of water in the Platte River through this district is much more uniform than formerly, which is undoubtedly true, and is due to the effect of the irrigating canals on the stream above, by reducing its flow in the flood season. After high water, its natural flow is increased by the return into the stream of a portion of the water, which is commonly called 'seepage.'

In 1922 Ralph Parshall, a former faculty member of Colorado Agricultural College and a U.S. irrigation engineer, wrote a paper on the return of seepage water to the lower South Platte. He concluded:

The practice of irrigation, including the use of extended distribution systems, has created conditions which not only tend to maintain a constant return flow, but have apparently increased the river's discharge beyond all expectation.... Perhaps no other Colorado stream has such an abundant return flow as the South Platte River.

**Reservoir Construction** -- From approximately 1880-1920 an era of reservoir construction flourished in the South Platte basin. Many reservoirs were constructed in natural depressions and basins throughout the plains region of the South Platte valley. Today the basin is a patchwork of these irrigation storage reservoirs, ranging in capacity from just a few af (acre feet) to well over 50,000 af. These reservoirs not only store a portion of the spring runoff, but according to Parshall (1922), contribute approximately 20 percent to the return flow to the river through seepage.

Early descriptions of the South Platte help reconstruct what the river and its valley were like during the early and midnineteenth century. First, the South Platte was certainly an intermittent stream with fluctuating flows from year to year. Observations from both the Long and Fremont expeditions support this conclusion. Perhaps the best evidence is Fremont's records of 1842 and 1843. During the first year he found the lower South Platte "entirely dry -- a bed of sand." The following year the water was "so high that crossing causes great delay." Second, the South Platte valley had segments that were both timbered and barren. James and Fremont both noted the greater amount of vegetation along the upper South Platte near the front range. This is probably due to many factors, an important one being the intermittent nature of the river (the presence of water in the upper river, and lack of water in the lower South Platte during dry years). Third, prior to the practices of irrigation and water storage along the South Platte, the river's bed was relatively wide, shallow, and braided, with thousands of islands along its course.

Water Diversion -- In addition to irrigation and water storage, water diversion into the South Platte basin has played a major role in the evolution of the river's ecology. The first transbasin diversion of water into the South Platte basin occurred in 1860 near Fairplay, where it was diverted for mining by gold prospectors. By 1922, ten additional transbasin water diversions into the South Platte basin were in operation. Today an average total of nearly 400,000 acre feet of water each year is imported into the South Platte basin. This is approximately 30 percent of the South Platte's annual native runoff. Nearly all of this water originates in the Colorado River basin.

The South Platte River in northeastern Colorado is no longer the same river it was 130 years ago. Human activity in the region has dramatically altered many aspects of the river's ecology. The actions of farmers, irrigators, and reservoir companies since 1860 have dramatically changed the South Platte. Some of the resultshave been positive. The riparian habitat now in existence is more extensive than before the development of irrigated agriculture, and provides important habitat for wildlife. A study of vegetation along the South Platte concluded that 1973 tree conditions indicated wetter soil conditions than existed historically. This suggests that over the past 130 years an increase in the soil moisture has not only increased the number of trees, but the number of species as well.

But human activity in the South Platte basin has also adversely affected the environment. As the flow characteristics and vegetation along the South Platte have changed, so have the river's channel formation and sedimentation. Prior to the action of irrigation, the South Platte channel could widen itself during floods, spreading its load of sediment over a broad flood plain.

As the river became more perennial and constant through water storage and augmentation, riparian vegetation acted to stabilize the channel, forcing it to become narrower and more sinuous. During drought years this new vegetation encroached into areas below the mean high water level of the river channel, restricting lateral movement and dispersion during flooding.

While increased water supplies through reservoir storage and transbasin diversion have added riparian and wildlife habitat to the South Platte basin, this action has de-watered and sometimes adversely affected other watersheds. And although increased irrigation in the South Platte valley has helped much of northeastern Colorado economically, it has added to the problem of water pollution from irrigation runoff.



"Crossing the Ford" (South Platte River). Worthington Whittredge, c.1870's. Courtesy Colorado Historical Society F11,879.

As the future of the South Platte River is contemplated, recognition of the South Platte's ecological history over the past 130 years is both necessary and vital to understanding how reauthorization of the Clean Water Act may affect the river. If the "ecological integrity" of the South Platte is to be protected, what kind of integrity (unimpaired, unmarred condition) should be sought? And if the South Platte's aquatic habitat is to be "restored," then to what kind of condition? Perhaps its condition prior to 1859? If so, it is necessary to first know what the river was like at that time. History can help in answering these questions, but it cannot do the work alone.

This research only scratches the surface of the river's history and ecological development. A combined effort is needed on the part of ecologists, botanists, biologists, geographers, historians, and others to better understand the history and evolution of the South Platte.

NOTE: CWRRI partially funded this historical research in support of the 1992 South Platte Conference.

#### **RPAC AND TAC EVALUATE RESEARCH PROPOSALS FOR 1993-94**

Research proposals submitted for 1993-94 funding in CWRRI's Water Research Program have been evaluated by the Research Planning Advisory Committee (RPAC) and the Technical Advisory Committee (TAC). Proposals were submitted by water researchers from Colorado's higher education institutions including CSU, CU and CSM. The annual RPAC proposal review helps CWRRI focus on research topics that are targeted as priority problem areas by Colorado water users and managers. RPAC members include representatives of state, federal and local agencies and organizations and private-sector individuals. The technical merit of the research proposals was evaluated by the TAC, comprised of representatives from CSU, CU and CSM. Of the 36 proposals submitted, ten were selected for funding, and in addition several proposals were combined into one task force effort on ecological integrity -- its meaning and potential impact on western water management. This is an attempt by CWRRI to better define research needs in a rapidly evolving water subject. Any input to this new effort will be appreciated. CWRRI's research program for 1993-94:

Demonstration and Publication of Best management Practices for Irrigated Agriculture in Colorado, Grant Cardom, Agronomy, CSU

Initiating a Water Management Decision Support System for the Platte River Basin, Darrell Fontane, Civil Engineering, CSU

Use of GIS Modeling Techniques as a Planning Tool for Establishment of Wetlands as Nitrate and Pesticide Removal Facilities, Luis Garcia, Agricultural and Chemical Engineering, CSU

Changes in Morphology and Endangered Fish Habitat of the Colorado River, John Pitlick, Geography, CU

Design and Operation of Small Lysimeters for Estimating Return Flows for Urban Lawn Water Use, Terry Podmore, Agricultural and Chemical Engineering, CSU

Field Assessment of Stream-Aquifer Interaction and Development of Computer Teaching Tool, Eileen Poeter, Geology and Geological Engineering, CSM

Economic, Political and Legal Aspects of Colorado Water Law: Changes from 1973 to 1993 and Needs for the Future, George Radosevich, Agricultural and Resource Economics, CSU

South Platte Management Support System, Phase IV, David Sieh, CADSWES, CU

Water Transfer Effects on Vegetation and Riparian Systems in a High-Altitude Mountain Meadow, Dan Smith, Agronomy, CSU

Developing a Biotic Index for Colorado Stream Water Quality, James Ward, CSU

White Paper -- Ecological Integrity and Western Water Management: A 1994 Synthesis and Perspective, Alan Covich, CSU

Complete research proposals are due at CWRRI on May 1. More detailed information on the CWRRI 1993-94 water research program will be included in the June issue of *Colorado Water*.

## DOE ENVIRONMENTAL RESTORATION PROJECT UPDATE by David Barnes

The October, 1992 issue of *Colorado Water* describes the components of the environmental restoration project being conducted by the network of State Water Institutes for the Department of Energy. The progress to date on this extensive project includes a thorough detailing of the specific tasks that will be involved in the components of education, assessment of technology effectiveness and technology transfer and an on-going comprehensive literature search. The CSI portion of the project was recently funded \$90,000 for continuing work.

The research for the DOE revolves around the idea that many people believe that a majority of environmental remediation technologies can be found in package systems currently available that can treat groundwater and soil. This perception is founded in a belief that most of the technologies rely on chemical or mining engineering unit operations that are at least 50 years old. While this may be true, applications of these technologies to the solution of soil and ground-water contamination problems are in their infancy. As these technologies are applied at hazardous waste sites, new problems emerge. Frequently, the problems reduce the efficacy of the remediation method below that which would be predicted by a more traditional engineering analysis (i.e., waste characterization followed by design of the process). With this idea in mind, the Water Institutes are tailoring the goal of the research to understanding the basic physical and chemical concepts underlying each applicable treatment process. Once this is achieved, it will be possible to determine process efficiencies and isolate environmental factors that could limit remediation effectiveness. These assessments will be performed by experts in the respective fields in the universities and perhaps, private industry and government laboratories.

# 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

DEVELOPMENT OF THE NATURAL RESOURCES WORKSTATION, Luis Garcia, Agricultural & Chemical Engineering ANALYSIS OF EFFECTIVE WIDTH & EQUIVALENT ROUGHNESS OF CHANNEL HYDRAULICS, Chester C. Watson, Civil Engineering

2-D HYDROLOGY MODEL, Pierre Y. Julien, Civil Engineering

BIOLOGICAL HYSTERESIS IN CLIMATE CHANGE MODELS FOR THE GREAT PLAINS..., Dennis Ojima, Natural Resources Ecology Lab (NREL)

APPLICATION OF SEWAGE SLUDGE TO DRYLAND WHEAT, Kenneth A. Barbarick, Agronomy

SATELLITE ANALYSIS OF COVER TYPES ON A POUDRE RIVER WATERSHED, Roger M. Hoffer, Forest Sciences

STATISTICAL FRAMEWORK FOR THE UTILIZATION OF RADAR DATA IN TROPICAL RAINFALL MEASURING MISSION, V. Chandrasekar, Electrical Engineering

IDENTIFICATION & ENUMERATION OF BENTHIC MACROINVERTEBRATES FOR THE COLORADO DEPARTMENT OF HEALTH, Boris C. Kondratieff

IMPACT ASSESSMENT SCHEMES FOR STUDIES OF REGIONAL CLIMATE CHANGE, Jorge A. Ramirez, Civil Engineering

THE EFFECTS OF CLOUDS IN TROPOSPHERIC CHEMISTRY, Sonia M. Kreidenweis, Atmospheric Science

LITERATURE SEARCH - EROSION AT DAM FOUNDATION, James F. Ruff, Civil Engineering

TOOLS FOR THE COLLABORATIVE ANALYSIS OF CHANGE IN FCOSYSTEMS, Robert G. Woodmansee, NREL

#### University of Colorado, Boulder, CO 80309

OPPORTUNITIES FOR INCREASED ENVIRONMENTAL BENEFITS, Lawrence MacDonnell, Natural Resources Law Center THE SOLID FORMS OF LEAD IN MINING, MILLING AND SMELTING WASTES, LEADVILLE, COLORADO WITH APPLICATIONS TO AQUEOUS LEACHIBILITY...Donald Runnells, Geological Sciences

EFFECTS OF CLIMATE CHANGE IN THE COLORADO ALPINE: ECOSYSTEM RESPONSE TO ALTERED SNOWPACK AND RAINFALL REGIMES, Carol Wessman, Institute of Artic and Alpine Research (IAAR)

BIOLOGICAL HYSTERESIS IN CLIMATE CHANGE MODELS FOR GRASSLANDS: IMPLICATIONS OF PLANT COMMUNITY DYNAMICS ON BIOGEOCHEMICAL FEEDBACKS, Timothy Seastedt, IAAR

COMPARATIVE LITHOLOGICAL MAPPING USING MULTIPOLARIZATION, MULTIFREQUENCY IMAGING RADAR AND

MULTISPECTRAL OFFICIAL REMOTE SENSING, Alexander Goetz, Coop. Inst. for Research in Environ. Sciences (CIRES)

INVESTIGATIONS OF NATURAL GROUNDWATER HAZARDS AT THE PROPOSED YUCCA MOUNTAIN HIGH LEVEL NUCLEAR WASTE REPOSITORY, Charles Archambeau, Physics

APPLICATION OF THE INFLUENCE DIAGRAMMING TECHNIQUE TO DOE ENVIRONMENTAL RESTORATION PROJECTS, James Diekmann, Civil, Environmental and Architectural Engineering

PALEOECOLOGICAL TESTS OF CLIMATE MODEL SIMULATIONS FOR THE PAST 18,000 YEARS IN EASTERN NORTH AMERICA, Jonathon Overpeck, IAAR

GROUNDWATER TRANSPORT OF VIRUSES, Gary Amy, Civil, Environmental and Architectural Engineering

NATIONAL WATER POLICY PRIORITIES, Lawrence MacDonnell, Natural Resources Law Center

MODELING FOR DESIGN AND TESTING OF TREATMENT AND REMEDIATION TECHNOLOGIES FOR AQUIFERS

CONTAMINATED WITH ORGANIC WASTES, Tissa Illangasekare, Civil, Environmental and Architectural Engineering

OPTIMIZED COAGULATION FOR NATURAL ORGANIC MATTER (NOM) REMOVAL FROM MWD SOURCE WATERS:

DEMONSTRATION AND BENCH-SCALE STUDIES, Gary Amy, Civil, Environmental and Architectural Engineering

INTERACTION OF TERRESTRIAL AND ATMOSPHERIC HYDROLOGICAL CYCLES IN THE CONTEXT OF THE NORTH AMERICAN SOUTHWEST SUMMER MONSOON, William Emery, Aerospace Engineering

# Colorado School of Mines, Golden CO 80401

REMOVAL OF HEAVY METALS FROM GROUNDWATER USING MAGNETIC CHITOSAN BEADS, J. Douglas Way, Chem. Engr. & Petroleum Refining

COMPUTER AND EXPERIMENTAL MODELING OF EVAPORATION AND DISTILLATION OF BUILDING 374 AQUEOUS WASTE STREAM (ROCKY FLATS), Robert Knecht/Victor Yesavage, Chem. Engr. & Petroleum Refining

# FEATURES

REMARKS OF JOHN STENCEL, PRESIDENT, ROCKY MOUNTAIN FARMERS UNION Institute for Advanced Legal Studies, University of Denver College of Law presented October 11, 1991 (reviewed for publication in *Colorado Water* March 1993)

## "RURAL IMPACTS" -- WATER MARKETING IN COLORADO'S FUTURE: DEBATE AND ANALYSIS

Ladies and Gentlemen -- It is a pleasure to be a part of your program this afternoon. I'm not sure how I got to be a part of this program, but it is good that agriculture producer interests are represented. One thing has been bothering me though - How does a person as myself, not a water expert or a water lawyer, debate such a big issue as water marketing in Colorado's future? We'll give it a try -- but no promises.

Before I begin, let me take a few minutes and talk to you about Farmers Union -- something I know about. Rocky Mountain Farmers Union is a division of National Farmers Union, which has its headquarters in Denver as well. Nationally, we have about 240,000 members; and in Rocky Mountain, Colorado, New Mexico, and Wyoming we have close to 12,500 farm and ranch families as members. We are the second oldest of the farm organizations, after the National Grange, founded in 1902 in Point, Texas.

We build our program around an equilateral triangle, a symbol of the organization. One side of the triangle is legislation, and we lobby at the state houses in Cheyenne, Denver and Santa Fe. We also have a fine legislative staff in Washington, D.C. The second side of the triangle is cooperation. We work with other organizations to accomplish our goals and policies, but just as important, our members have organized more cooperatives in this country than any other organization. We therefore, support co-ops and cooperative principles. The base of out triangle is education. We spend a great deal of our time with informational and educational programs for the youth, young farmers, women and in general, the members of our organization.

Our policy is developed in a grass-roots fashion. Starting at the county level and working its way to the national level, we put together a policy program that speaks to farm income and many other issues, including water. Our policy program is somewhat different from the topics that I am supposed to address; therefore, I would like to talk instead of general ideas about water policy in Colorado as they affect agriculture.

Our RMFU policy speaks to the need for a state water policy. There is a common myth that Colorado has a water policy -- it really doesn't. Oh yes, we have the appropriation doctrine which is entrenched in Colorado. However, it is not enough to fit today's concerns. A statewide water court system cannot be construed as an adequate water policy or as a state water plan. Planning involves a determination about the values and demands of society when making decisions about the use of water. Planning necessarily requires that choices be made among competing interests for water.

The current situation, in which water rights are freely transferrable and are sold to the highest bidder is certainly not planning; it does not make value choices among societal goals. It does not protect the less vigorous economic segments of society, and it does not address non-economic interests and considerations.

A state water plan crafted by a state agency or group of state agencies or branches of the government would permit the recognition of economic, social, and political needs within the state.

A state water plan would assist the state in dealing with issues involving interstate compacts and the use of the State's water resources among the various drainage basins.

It would provide guidance to water courts when faced with huge complicated water rights transfer cases.

It would guide other state agencies such as the state engineer's office, the Colorado Water Conservation Board, and the Division of Wildlife, when they are making policy decisions involving the state's water rights, and it is absurd to have a continuation of the current circumstance where the desires of businessmen, speculators, entrepreneurs and lawyers determine how scarce water resources in Colorado are used without a road map based in good planning, that highlights the needs and impacts of various social choices being made today without comprehensive public input. One example of these impacts is the effects of water transfers out of agriculture.

The time has come for the state to develop a state water plan that has the following characteristics:

Developed by an agency established for that purpose with representatives from the various regions of the state, having the support and backing of the State Legislature (such as the Colorado Water Conservation Board, or some other body, such as a special one-time commission established solely for the purpose of developing the plan.)

The plan must focus on the water resource issues in all of the river basins in the state.

The plan must consider those river basins where water resources are in short supply, as well as those where water is relatively abundant, in terms of both physical requirements and legal supply regulated by Compacts.

The plan must consider the environmental concerns of the general populace and the limitations which exist as the result of federal water quality regulation and other environmental regulations.

The plan must consider, among others, the following issues:

The appropriate role of water for environmental needs, including:

1. wilderness areas,

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  - 2. water quality purposes,
- 3. instream flow protection, and
- 4. wetlands and the water resource necessary to maintain them.

We need to consider water for agriculture. Because water is a property right, legislation which requires that the agricultural or any other water user community either hold, or dispose of, a property right seems to be fundamentally unfair.

However, a water resource plan which provides guidelines by which water rights may be acquired from agriculture or by which members of the agricultural community may dispose of water rights or a plan that sets goals and standards for the preservation of the agricultural economy in this state, that provides guidance to water courts and public officials concerning the matters that must be considered before transfers out of agriculture occur, would be entirely appropriate.

The responsibilities of development interests and municipal interests to plan for metropolitan municipal water supplies that are not duplicative and that make the best use of available resources.

A requirement for water conservation in agriculture, in the municipal sector, and, as important, in the recreation sector. This last point is very important because some of the groups which are currently advocating increased streamflows, based upon environmental concerns, are also advocating the increase in those streamflows for their own personal, economic benefit. I am referring to the recreation industries which rely on the rivers and streams of this state for rafting, kayaking, float fishing, and the like. A state water plan must recognize that they are simply another competitive economic force in the marketplace and the plan should not be used to give one group the opportunity to deprive other economic groups of the right to use the state's water resources, nor can a plan operate effectively to transfer ownership of portions of the state's water resource from those currently holding the water rights to those seeking the use of the water without the benefit of a water right.

Most importantly, the plan, once completed, has to have some force of law. It needs to be recognized in water resource decisions and water transfer proceedings in the water courts of the state. It needs to be recognized by and bind the actions of the state engineer and other state agencies. Only if we can successfully accomplish these goals will we have a tool that looks after the interests of the agricultural economy in relation to the various other segments of the state's economy and provide some standards by which individuals who desire to continue the state's long-standing farming and ranching traditions can do so without undue burden, while protecting the rights of others to sell their water resource in order to change their lives, lifestyle, or their means of support.

What happens without a state water plan?

The burden on the water-using community continues to rise as extensive and complex litigation continue. The economic cost increases and the dislocations within the state grow.

The impacts of undirected water resource development affect us all. If you live in the South Platte Basin and have any interest in water resource issues, you are well aware of the current conflict among the water user interests in northern Colorado along the Cache La Poudre and South Platte Rivers with the City of Thornton. If you are a resident of the San Luis Valley, you are certainly painfully aware of the efforts of American Water Development to secure a right to export 200,000 acre-feet of water per year from that valley. If you live in the Gunnison River drainage, you are familiar with the efforts of the City of Aurora and Arapahoe County to secure thousands of acre-feet of water per year for their use in the Denver metropolitan area.

All of these conflicts represent different facets of the same problem -- the desires of various communities within the metropolitan area to secure a long-term water supply for growth and development seeking that supply at the expense or the perceived expense of agricultural interests in other parts of the state.

What are the consequences of continuing the current process of water resource allocation? -- the free market/no plan process. One is economic consequences. The rural areas of Colorado are enormous. When water resources are purchased, the value of the farm property drops dramatically which has a direct impact on public services, schools and all other forms of tax-supported government activities.

The people of this state need to understand that while a substantial number of people, in fact the majority of people, living in the rural areas are involved in agriculture and derive their livelihoods from direct or indirect participation in the growth of food supplies, only a small percentage of them own water rights and obtain a benefit when they are sold.

When agriculture no longer has a water supply, the quantity of crops grown diminishes, the economic viability of the farm industry diminishes, the size of farms must increase, the amount of money coming into the economy from agriculture decreases substantially.

It is not the farmer who sells his water right, takes the profits, and moves to the city, who is most severely impacted. It is the individuals in the cities and towns and on the farms who do not own the water right but rely on the commerce generated by the use of the water who are impacted. It is the farm implement dealer, the supermarket owner, the pastor in the local church, the school teacher, the policeman, the fireman, the clothing store owner, the fertilizer distributor, the auto mechanic, the gas station owner, and almost anyone else you can think of. When the farmer no longer has the income to expend in these communities to buy goods and services, the source of commerce upon which all of these people rely for their livelihoods disappears and they are then forced to move to the cities for other work or to rely on the government to support them.

This is not a particularly pretty picture for our society. In fact, it is something of a spiral since the people forced to leave the rural areas typically move to the metropolitan area, thereby fueling increased water needs and the next round of battles. So, I hope you will join with me in favoring the development of a plan which does not prohibit the transfer of agricultural water rights to other purposes, but a plan that looks long and hard at the consequences of such transfers; that places policy limitations and restrictions on the transfer; that forces the metropolitan areas into a mode of cooperation to prevent excessive competition for the resource which creates inefficiency and results in more cropland going out of production than is warranted. Finally, there are two other issues I would like too discuss briefly.

As I understand it, the State of Colorado has obligations to its neighboring states on all of the rivers and streams which leave Colorado. These agreements or compacts require Colorado to share the water resources in those streams with our neighbors. Several major rivers within the state are, have been, or will be the subject of litigation over those compacts.

From 1968 to 1985, the State of Colorado was subject to a Supreme Court stipulation after it was sued by Texas and New Mexico over alleged violations of the Rio Grande Compact. Those states alleged that Colorado had become over 900,000 acre-feet in debt to them for failure to deliver waters required for delivery by the compact. Each and every year from 1968 to the present, the Colorado State Engineer has carefully regulated diversions within the Rio Grande drainage to insure that Colorado meets its compact obligations.

Water rights far senior to the compact, fully vested and authorized under Colorado law, are curtailed or shut off in order for that water to be delivered to the downstream states (Texas and New Mexico). That has been true in the past and will continue to be true in the future.

On the Arkansas River, the State of Colorado has been engaged in complicated, costly and extremely time-consuming litigation. Kansas has alleged that Colorado has failed to comply with the terms of the Arkansas River Compact and seeks to obtain tens of thousands of acre-feet of water and over \$100,000,000 in monetary compensation for Colorado's alleged wrongs.

On the South Platte River, there has certainly been discussion concerning the obligations and responsibilities of Colorado to Nebraska. At the present time, Nebraska is suing the state of Wyoming in the U.S. Supreme Court concerning the waters of the North Platte River and could well sue Colorado in the future.

Only in the Colorado River, does the state of Colorado each and every year deliver water to its downstream neighbors far in excess of Colorado's needs but within Colorado's Compact entitlements. Hundreds of thousands of acre-feet of water, to which Colorado is entitled to make consumptive, beneficial use, leave the state every year.

I would hope that a state water plan would take into consideration these issues. It makes no sense to me to have the cities and towns in our state constantly litigating with their neighbors in river basins where the water resources are fully and completely used, like the Arkansas and Rio Grande, while ignoring the fact that there is water to which Colorado is legally entitled flowing out of the state each year on the Colorado system.

I hope we will take a close look at this issue because it seems to me to make ultimate sense that the state should be looking for ways to make better use of its rights and entitlements under the Colorado River Compact before we begin to talk about selling, leasing, bartering or trading that water resource to California, Arizona, and Nevada.

As a state, we have not fully explored the possibilities for the joint use of water resources by users. Most cities plan for water resource needs based on dry year scenarios. They spend millions of dollars to firm up those supplies against the call of senior downstream agricultural rights.

One way to firm up supplies in the face of senior demands is to build dams and store their dry year supplies.

Another way to arrive at the same point, a firm dry year supply, is to buy the right to use a senior decree during the dry years. To pay the farmer a profit for the year or years when the city needs the water and to assure the farmer his full supply in normal and wet years. Sure there are problems, but we don't solve all the problems when a water right is purchased outright and permanently withdrawn from agriculture. Why can't the same engineers and lawyers accomplish the same goal when the water is used in the city only once or twice in ten years?

We need to do the following: 1) insure adequate compensation, 2) maintain river conditions to protect other water users not participating, and 3) provide for soil protection on the lands withdrawn. But, this approach has great benefits: such as - 1) it leaves water in agriculture most of the time, 2) keeps local agricultural economies active and healthy, and 3) gives cities dry year protection.

Some detriments are: 1) It can't be used for wild, unfettered growth, 2) it deprives the speculator of the profit because money only passes to the farmer when water is needed. To many, this is not a detriment.

In conclusion, as a state, we need a plan. Water resources planning should not be the province of the speculator; it should be the province of the state and local governments.

# MEETING CALIFORNIA'S WATER NEEDS Duane L. Georgeson, Assistant General Manager Metropolitan Water District

(Summary of a presentation at the Colorado Water Convention, January 1993)

Southern California's urban water needs have historically been met by local groundwater and surface water supplies, reuse of wastewater, and supplemented by bringing imported water into the region first from the Owens Valley and then later from the Mono Basin, Colorado River, and Northern California through the State Water Project. The Metropolitan Water District of Southern California was formed by 13 cities in 1928 to supplement the water supplies available to those cities. Metropolitan constructed the Colorado River Aqueduct and later contracted with the State of California for a water supply from the State Water Project.

Presently, Metropolitan supplies water to most of the 15 million people who live in Southern California, roughly half the State's population. Many issues have arisen which have made

Metropolitan's existing supplies less reliable and developing new supplies much more difficult. Metropolitan lost the dependability associated with over half of its Colorado River supply with the <u>Arizona</u> v. <u>California</u> litigation with the commencement of operation of the Central Arizona Project. The State Water Project can only deliver one-half of the water that the State contracted to deliver as additional reservoirs and facilities to transfer water from the Sacramento River to the California Aqueduct have not been constructed in northern California. Considerable uncertainty has arisen concerning the reliability of the supply to the City of Los Angeles from the Owens Valley and Mono Basin as a result of litigation. Finally, groundwater contamination has been found locally.

More efficient use of the water resources available to Southern California has been the focus over the last ten years for meeting urban water needs. Metropolitan is a signatory to a memorandum of understanding that commits urban water agencies in California to a series of best management water conservation practices. In 1992-93, Metropolitan has budgeted \$21 million to implement water conservation programs. For a number of years, Metropolitan has provided financial incentives for wastewater reclamation. Southern California is now reclaiming nearly 300,000 acre-feet of wastewater per year. Metropolitan also furnishes financial incentives for the recovery of brackish and contaminated groundwater. Through seasonal pricing of water, Metropolitan encourages storage of water in local groundwater basins in off-peak demand periods. An offstream storage reservoir to regulate the delivery of water for later storage in groundwater basins is now in the design stage.

With respect to Colorado River supplies, Metropolitan is funding the costs of a water conservation program being undertaken by the Imperial Irrigation District to improve the efficiency of its distribution of water and the on-farm management of water. In return, Metropolitan is receiving the use of the water conserved. In 1992, Metropolitan and the Palo Verde Irrigation District undertook a test land fallowing program in the Palo Verde Valley along the Colorado River. In return for financial compensation, the water saved by foregoing Irrigation is being made available to Metropolitan.

There continues to be great uncertainty regarding the water supply available from the State Water Project. Endangered species issues are beginning to impact operation of the project. The winter run salmon has been listed as a threatened species. Fortunately, the Governor's Drought Emergency Water Bank assisted in reducing the impacts of the drought in 1991 by acquiring water through land fallowing, groundwater pumping, and from surface water storage facilities for sale to those agencies with critical water needs.

All of these strategies emphasizing more efficient use will continue to be important in managing California's water resources in the immediate future as construction of some new facilities will take ten to 15 years. With 80 percent of California's developed water utilized by agriculture, opportunities abound for urban and rural areas to work together on water transfers.

# AN ANALYSIS OF COLORADO AND FEDERAL LAW IN CONTRAST TO THE "REPORT OF THE LONG'S PEAK WORKING GROUP"

# Greg Hobbs

# Hobbs, Trout & Raley, P.C.

(NOTE: The following analysis of the Long's Peak Report, as contrasted with Colorado and federal law on key water matters, was prepared by Greg Hobbs for submission to Members of the Senate and House Agriculture and Natural Resources Committees prior to their February 17, 1993, meeting to discuss the Long's Peak Report.)

I. Colorado Law. Water Subject to Appropriation By the People of Colorado. "All water in or tributary to natural surface streams...originating in or flowing into this state have always been and are hereby declared to be the property of the public, dedicated to the use of the people of the state, subject to appropriation and use in accordance with sections 5 and 6 of Article XVI of the State Constitution ..." C.R.S. 37-92-102.

Federal Law. Since 1866, water allocation and use has been subject to state law. "Whenever, by priority of possession, rights to the use of water for mining, agriculture, manufacturing, or other purposes, have vested and accrued, and the same are recognized by local customs, laws, and the decisions of courts, the possessors and owners of such vested rights shall be maintained and protected in the same." 43 U.S.C. 661 (Mining Act of 1866).

Long's Peak Report. Federal regulatory authority should be utilized to protect and restore the aquatic ecosystem. "The President should issue an Executive Order establishing a policy of watershed-level aquatic ecosystem protection and restoration. The order should direct the EPA and the Departments of the Interior, Agriculture, Defense, and Commerce (with oversight from the Council on Environmental Quality) to: review, revise, and coordinate their activities and operations to use all authorities under existing law to manage federal lands; to operate federally owned or licensed projects and facilities to protect and restore fish, wildlife, and their habitats on an equal basis with other primary project purposes (where such protection is not provided under the Endangered Species Act)". Recommendation 11, Long's Peak Report.

II. <u>Colorado Law. Water Rights Are Property Rights.</u> "A water right is a property right." (Weibert v. Rothe Brothers, 618 P. 2d 1367, 1371 (Colo. 1980).

Federal Law. Property rights are protected under the Fifth Amendment of the United States Constitution Against Regulatory <u>Takings.</u> "...nor shall private property be taken for public use, without just compensation." Fifth Amendment, U.S. Constitution.

Long's Peak Report. "The Administration should support legislation to expand agency authority and revise project purposes where necessary." (Recommendation 11, Long's Peak Report.) "Where a transition from old to new values demands reallocation of water from existing uses, the equities of people with existing uses established under lawful prior policies should be respected." Long's Peak Report, P. 6.

III. Colorado Law. Instream flows are to be appropriated by the Colorado Water Conservation Board in priority for protection of the environment to a reasonable degree. "Further recognizing the need to correlate the activities of mankind with some reasonable preservation of the natural environment, the Colorado Water Conservation Board is hereby vested with the exclusive authority, on behalf of the people of the State of Colorado, to appropriate in a manner consistent with Sections 5 and 6 of Article XVI of the State Constitution, such waters of natural streams and lakes as the Board determines may be required for minimum stream flows or for natural surface water levels or volumes for natural lakes to preserve the natural environment to a reasonable degree." C.R.S. 37-92-102 (3).

Federal Law. Federal forest land reservations do not establish a water right in the federal government for instream flows for fish, wildlife, recreational or esthetic purposes outside of state law. "All waters within the boundaries of national forests may be used for domestic, mining, milling, or irrigation purposes, under the laws of the State wherein such national forests are situated, or under the laws of the United States and the rules and regulations established thereunder." 16 U.S.C. 481 (1897 National Forest Organic Act).

"Not only is the Government's claim that Congress intended to reserve water for recreation and wildlife preservation inconsistent with Congress' failure to recognize these goals as purposes of the national forests, it would defeat the very purpose for which Congress did create the national forest system. The water that would be 'insured' by preservation of the forest was to 'be used for domestic, mining, milling, or irrigation purposes, under the laws of the State wherein such national forests are situated, or under the laws of the United States and the rules and regulations established thereunder.' Organic Administration Act of 1897, 30 Stat. 36, 16 U.S.C. 481 (1976 ed.). As this provision and its legislative history evidence, Congress authorized the national forest system principally as a means of enhancing the quantity of water that would be available to the settlers of the arid West. The government, however, would have us now believe that Congress intended to partially defeat this goal by reserving significant amounts of water for purposes quite inconsistent with this goal." United States v. New Mexico. 438 U.S. 696, 713 (1978).

Long's Peak Report. The Departments of Interior and Agriculture should assert instream flows on federal lands and use their regulatory permit authority to impose them. "The Departments of Interior and Agriculture should assert rights to instream flows for federal lands and encourage states to adopt and strengthen instream flow programs by using authority to grant or withhold federal funds and federal permit approvals." Recommendation 38, Long's Peak Report.

IV. Colorado Law. Water quality regulation should support making beneficial use of Colorado's water and the development of Colorado's interstate compact entitlements. "In order to foster the health, welfare, and safety of the inhabitants of the State of Colorado, and to facilitate the enjoyment and use of the scenic and natural resources of the State, it is declared to be the policy of this State to prevent injury to beneficial uses made of State waters, to maximize the beneficial uses of water, and to develop waters to which Colorado and its citizens are entitled and, within this context, to achieve the maximum practical degree of water quality in the waters of the State consistent with the welfare of the State." C.R.S. 25-8-102(1).

Water rights shall not be abrogated, superseded or impaired by water quality regulation. "No provision of this article shall be interpreted so as to supersede, abrogate, or impair rights to divert water and apply water to beneficial uses in accordance with the provisions of Sections 5 and 6 of Article XVI of the Constitution of the State of Colorado, compacts entered into by the State of Colorado, or the provisions of Article 80 to 93 of Title 37, C.R.S., or Colorado court determinations with respect to the determination and administration of water rights." C.R.S. 25-8-104.

Federal Law. Federal water quality programs under the Clean Water Act shall not supersede or abrogate State water law or impair water rights. "It is the policy of Congress that the authority of each state to allocate quantities of water within its jurisdiction shall not be superseded, abrogated or otherwise impaired by this chapter. It is further policy of Congress that nothing in this chapter shall be construed to supersede or abrogate rights to quantities of water which have been established by any State. Federal agencies shall cooperated with State and local agencies to develop comprehensive solutions to prevent, reduce and eliminate pollution in concert with programs for managing water resources." 33 U.S.C. 1251(g).

Long's Peak Report. The Federal Clean Water Act should be utilized to impose instream flow requirements. "The Administration

should support and work with Congress to reauthorize and strengthen the Clean Water Act to: Keep clean water clean by protecting and restoring instream flows and other aquatic ecosystems, encouraging integrated watershed planning and management, promoting water conservation, and protecting pristine waters." Recommendation 44(e), Long's Peak Report.

V. Colorado Law. Colorado is a party to nine interstate water allocation compacts. Animas-La Plata Project Compact, 82 Stat. 885 (1968); Amended Costilla Creek Compact, 77 Stat 350 (1963); Arkansas River Compact, 63 Stat. 145 (1949); Upper Colorado River Compact, 63 Stat. 31 (1949); Republican River Compact, 57 Stat. 861 (1943); Rio Grande River Compact, 53 Stat. 785 (1939); South Platte River Compact, 44 Stat. 195 (1926); La Plata River Compact, 43 Stat. 796 (1925); Colorado River Compact, 42 Stat. 171 (1921).

Federal Law. Under the compact clause of the United States Constitution, Congress ratified the nine interstate compacts to which <u>Colorado is a party</u>. California and Arizona have developed their compact entitlements with the assistance of federal funds under the Boulder Canyon Project Act and the Colorado River Basin Project Act. The Animas-La Plata Project and other projects were promised to Colorado, along with other projects in the 1968 Act, in return for the Central Arizona Project.

Construction to be concurrent with Central Arizona Project construction. "The Secretary is directed to proceed as nearly as practicable with the construction of the Animas-La Plata, Dolores, Dallas Creek, West Divide, and San Miguel participating federal reclamation projects concurrently with the construction of the Central Arizona Project, to the end that such projects shall be completed not later than the date of the first delivery of water from said Central Arizona Project." Section 501(b), Colorado River Basin Project Act, 43 U.S.C. 1501.

Long's Peak Report. Development of additional water supplies should be severely limited by economic and environmental considerations, and reallocation of existing water supplies should be preferred. "Economics will dramatically limit the development of new water supplies. New projects should be planned and authorized by Congress only to meet the highest priority needs. The Administration should treat environmental quality as equivalent to regional economic development in applying the Principles and Guidelines. Modifications to existing projects should be considered by the appropriate agency and Congress only after the existing project has been reevaluated in light of new needs and water conservation objectives. Reallocation of existing supplies should be preferred as an alternative to new storage." Recommendation 30, Long's Peak Report.

VI. <u>Colorado Law. Return flows from irrigated agriculture do not require federal point source discharge permits.</u> "Point source' does not include irrigation return flow." C.R.S. 25-8-103(14).

Federal Law. Return flows from irrigated agriculture do not require federal point source discharge permits. "The term 'point source' means any discernible, confined and discrete conveyance, including, but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged. This term does not include agricultural storm water discharges and return flows from irrigated agriculture." 33 U.S.C. 1362(14).

Long's Peak Report. Federal point source discharge permits should be required for irrigation return flows. "End the agricultural exemption from the National Pollutant Discharge Elimination System (NPDES) permit program in non-compliance areas." Recommendation 44(o), Long's Peak Report.

VII. <u>Colorado Law. Dams do not require federal point source discharge permits.</u> "Activities such as diversion, carriage, and exchange of water from or into streams, lakes, reservoirs, or conveyance structures, or storage of water in or the release of water from lakes, reservoirs, or conveyance structures, in the exercise of water rights shall not be considered to be point source discharges of pollution under this article." C.R.S. 25-8-503(5).

Federal Law. Dams do not require federal point source discharge permits. "In addition to our general doubts, expressed above, about how heavily to rely on the broad goals of the Act, we find specific indication in the Act that Congress did not want to interfere any more than necessary with State water management, of which dams are an important component. Section 101(g), 33 U.S.C. 1251(g) states: 'It is the policy of Congress that the authority of each state to allocate quantities of water within its jurisdiction shall not be superseded, abrogated, or otherwise impaired by this [Act].' In light of its intent to minimize federal control over state decisions on water quantity, Congress might also, if confronted with the issue, have decided to leave control of dams insofar as they affect water quality to the states. Such a policy would reduce federal/state friction, and would permit states to develop integrated water management plans that address both quality and quantity." National Wildlife Federation v. Gorsuch, 693 F 2d. 156 (D.C. Cir. 1982).

Longs Peak Report. Federal point source discharge permits should be required for dams. "Subject discharges from large dams creating water quality problems to NPDES permit requirements." Recommendation 44(c), Long's Peak Report.

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# 1993 CHILDREN'S WATER FESTIVAL A SUCCESS Mary DeMartini and Jennifer Roberts

The Third Annual Children's Water Festival, organized by the Central Colorado Water Conservancy District, was held on March 30, 1993. The event attracts nearly 1,800 4th and 5th graders from the Greeley area. Each class of students participates in several classroom activities, demonstrates its



A young water festival participant is engulfed by a giant bubble

knowledge in the Water Wizard trivia game and visits the exhibition hall. The event brings together a diverse group of presenters and exhibitors.

In the classroom, children were able to determine if they had *smart water* by giving it a HACH water test. The Colorado Department of Health showed the kids some creepy creatures that can be seen with the help of an electron microscope. There were many other classroom activities that covered topics ranging from groundwater contamination to water allocation in the West. In the exhibition hall, children were able to pan for gold with the help of some volunteers from Central City. In addition, children learned about measuring snowpack, potatoes and municipal water delivery systems. Finally, the competition heats up as the schools battle it out with their water knowledge. Split-second answers are given to questions like, "What percentage of the human body is composed of water?", or "What is the longest river in South America?" The event leaves the onlookers amazed and slightly flustered.

As exhibitors, we were able to see first hand how the event develops the students' interest and enthusiasm for water. In fact, the event has been such a large success that it is being modeled by other organizations in Loveland and Fort Collins.



A group of future water professionals pose with their teacher in front of a scene depicting some of the water uses in Colorado

The CWRRI display focused on the various careers in the water scene. The animated kids were able to try on the robe of water judge, the hard hat of a miner and the lab coat of a scientist and pose for a photograph in front of a Colorado water background. One excited boy gra. <sup>4</sup> the lab coat and exclaimed, "*I want to be the scientist!*" His water, looking on, said she hoped to see him wearing that twenty years from now. Hopefully, the experience broadened their interest in the many career opportunities related to water.



A volunteer from Central City helps a young lady pan for GOLD!

# **INVENTORIES**

# UNIVERSITY OF COLORADO AT BOULDER FACULTY EXPERTISE IN WATER RESOURCES, 1992/93

The following faculty have been categorized by water or water-related expertise. <u>Faculty are listed only once</u>, under the topic most relevant to their teaching, research and/or service. Except as noted, all addresses must be completed by adding "University of Colorado, Boulder, Colorado 80309". Also, all phone extensions can be completed by adding (303) 492-xxxx.

Name	Phone Ext.	Address
Climatological Processes		
Roger G Barry	5488	Department of Geography CB 260
John Birks	7018	Department of Chemistry and Biochemistry, CB 215
R Ray Fall	7914	Department of Chemistry and Biochemistry, CB 215
Konred Steffen	4524	Department of Geography CB 260
Lakshmi U Kantha	3014	Dept of Agrospace Engineering Sciences CB 420
Laksinin n. Kanuta	5014	Dept. of Aerospace Engineering Sciences, CB 429
Economics		
Charles W. Howe	7245	Department of Economics, CB256
Mark Cronshaw	6310	Department of Economics, CB 256
Jamie Kruse	8736	Department of Economics, CB 256
William Schulze	5242	Department of Economics, CB 256
Glacier Behavior		
Mark F. Meier	7909	Department of Geological Sciences, CB 250
Peter W. Birkeland	6985	Department of Geological Sciences, CB 250
Groundwater		
James W.C. White	1696	Department of Geological Sciences
Mahmood H. Nachabe	8433	Dept. of Civil, Envr. and Arch. Engr., CB 428
Tissa H. Illangasekare	6644	Dept. of Civil, Envr. and Arch. Engr., CB 428
Donald D. Runnells	8141	Dept. of Geological Sciences, CB 250
Hydraulics		
Sedat Biringen	2760	Dept. of Aerospace Engineering Sciences, CB 429
Chuen-Yen Chow	7907	Dept. of Aerospace Engineering Sciences, CB 429
Peter Freymuth	7611	Dept. of Aerospace Engineering Sciences, CB 429
Culber B. Laney	2420	Dept. of Aerospace Engineering Sciences, CB 429
Undrology		
Padra I. Pastrana	2072	Dont of Civil From and Arab From CB 428
Vilies Custo	3972	Dept. of Civil, Envr. and Arch. Engr., CB 420
vijay Gupta	3090	Department of Geological Sciences, CB 250
Institutions and Policy		
James L. Wescoat, Jr.	4877	Department of Geography, CB 260
Law		
James N. Corbridge Jr.	6895	School of Law CB 401
David H Getches	7377	School of Law, CB 401
Lawrence I MacDonnell	1286	Natural Resources Law Center, CR 401
Daniel B. Magraw	8081	School of Law CB 401
Charles F Wilkinson	8286	School of Law, CB 401
Charles I. Wirkinson	0200	School of Law, CD 401
Management and Planning		e-reactin finding out establic surgeous
David F. Clough	3646	Department of Chemical Engineering, CB 424
James P. Heaney	3276	Dept of Civil Envr and Arch Engr CB 428
Kenneth M Strzenek	3971	Dept of Civil Envr and Arch Engr. CB 428
Gary I. Gaile	8794	Department of Geography CB 260
William F. Reibeame	6312	Department of Geography, CB 260
	0.514	Soparation of Congraphy, CD 200

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Models/Database/Decision Su	pport	
Steven C. Chapra	3972	Dept. of Civil, Envr. and Arch. Engr., CB 428
Lynn Johnson	2372	Dept. of Civil, Envr. and Arch. Engr., CB 428
Clayton Lewis	6657	Department of Computer Science, CB 430
Jacquelyn F. Sullivan	3972	CADSWES, CB 428
Marilyn D. Walker	5376	Envr., Population, and Organismic Bio., CB 334
Ilze Zigurs	3490	Dept. of Mgt. Sci. and Info. Systems, CB 419
Oceans		
Lakshmi H. Kantha	3014	Dept. of Aerospace Engineering Sciences, CB 429
William W. Hay	7370	Dept. of Geological Sciences, CB 250
Recreation Resources		
Edward Morey	6898	Department of Economics, CB 256
Sediment Transport		
John Pitlick	5906	Department of Geography, CB 260
Nel Caine	8642	Department of Geography, CB 260
Stream, Riparian Zone and La	ke Biology/Wetlands	
John H. Bushnell	6127	Dept. of Envr., Pop. and Organismic Bio., CB 334
William M. Lewis, Jr.	6378	Dept. of Envr., Pop. and Organismic Bio., CB 334
Steven C. Hand	6180	Dept. of Envr., Pop. and Organismic Bio., CB 334
James F. Saunders, III	5191	Center for Limnology, CB 334
Steven K. Schmidt	6248	Dept. of Envr., Pop. and Organismic Bio., CB 334
John T. Windell	8467	Dept. of Envr., Pop. and Organismic Bio., CB 334
Water Quality Management/M	Ionitoring	
Robert E. Sievers	7943	Department of Chemistry, CB 215
Mark Williams	8830	Department of Geography, CB 260
Water and Wastewater Treatm	ent/Environmental Engine	eering
Gary L. Amy	6274	Dept. of Civil, Envr. & Arch. Engr., CB 428
Marc A. Edwards	5736	Dept. of Civil, Envr. & Arch. Engr., CB 428
JoAnn Silverstein	7211	Dept. of Civil, Envr. & Arch. Engr., CB 428
Gary L. Amy Marc A. Edwards JoAnn Silverstein	6274 5736 7211	Dept. of Civil, Envr. & Arch. Engr., CB 428 Dept. of Civil, Envr. & Arch. Engr., CB 428 Dept. of Civil, Envr. & Arch. Engr., CB 428

# WATER SUPPLY CONDITIONS UPDATE

State Engineer's Office--Winter storms have resulted in increased snowpack statewide during February. Some sites in the south and west portion of the state show snowpack at twice the average end of February amounts. The Soil Conservation Service reports statewide snowpack at 134 percent of normal for the end of February. The southwest corner of the state had the highest amount

<u>Basin</u>	Mar 1, 1993 SWSI Value	Change From Previous Mo.	Change From Previous Yr.
South Platte	+0.9	+0.9 +0.9	
Arkansas +2.0		+2.0	+3.2
Rio Grande	+3.4	+1.0	+4.0
Gunnison	+3.1	+1.1	+4.6
Colorado	+2.0	+2.3	+4.0
Yampa/White	+0.1	+1.3	+3.0 +4.0
San Juan/ Dolores	+3.6	+1.3	
	SCAI	E	
-4 -3 -	2 -1 0	+1 +2 +	3 +4
Severe Mode Drought Drow	rate Near Norma aght Supply	al Above Norm Supply	al Abundant Supply

at 160 percent of normal while the South Platte basin had the lowest amount at 108 percent of normal. While March and April snow accumulation has a significant impact on runoff, the outlook is for above average stream flow volumes this spring and summer. Statewide reservoir storage was 107 percent of normal on February 28, with the Dolores-Animas basins having the highest storage rate at 188 percent of normal and the Arkansas basin having the lowest storage rate at 98 percent of normal. The National Weather Service 30-day forecast (March 1) is for below normal precipitation statewide. Their 90-day forecast (March 1) is for above normal precipitation.

The surface Water Supply Index (SWSI) developed by this office and the USDA/SCS is used as an indicator of water supply conditions in the major river basins of the state. It is based on snowpack, reservoir storage, and precipitation for the winter period (Nov.-Apr.). During the winter period snowpack is the primary component in all basins except the South Platte basin where reservoir storage is given the most weight. Inclusion of snowpack in winter computations results in an emphasis on present snow storage which may be available for next spring's runoff. SWSI values were computed for each of the seven basins on March 1, 1993 and reflect conditions during the month of February.

# UNIVERSITY WATER NEWS

# HCN PUBLISHER ED MARSTON IS GUEST SPEAKER AT CSU/AWRA MEETING Jennifer Roberts

The CSU student chapter of the American Water Resources Association hosted Ed Marston, the publisher of the *High Country News*, on March 4th. The *High Country News* is a regional biweekly newspaper covering the 10 western states and is published out of Paonia, Colorado.

Marston addressed a group of students, faculty and community members regarding what it means to be a Westerner. He shared stories about his personal experiences in the West and offered insight about the direction of our region. He is fascinated by the dynamic nature of our region and the force of history and demographics which is molding the West as we know it.

Some of the changes and events he specifically addressed include:

- · defeat of Two Forks
- · stop of construction of the Animas La-Plata project
- · reform of the Central Utah Project
- · end of nuclear testing in Nevada
- · end of old-growth logging in the Pacific Northwest

Chris Rowe and Cheryl Miller, AWRA student chapter President and Treasurer, respectively, with Ed Marston (right)

Marston also addressed the trend of suburbanization that can be seen throughout the region. The West historically was developed through intense usage of our natural resources. As these resources become more limited and the agricultural economy declines, the West becomes susceptible to invasion by other economic bases. This change in lifestyle and economy is termed suburbanization.

He emphasized the role that students, faculty and community members can have in the restoration of the West. The West is experiencing exciting, dramatic and changing times, in which we can all have an active role. He left the group with his hope that we will be able to hold on to our relationship with the land and the essence of the West.

Ed Marston is scheduled to return to CSU on April 13, 1993 at 1:00 pm in the Lory Student Center Room 220-222. The topic to be addressed is Science and Policy in Natural Resources Management: The Role Of Land-Grant Universities. Have the land-grant universities done research that has helped the West understand and define itself in a period of changing attitudes toward the land and natural resources?

A half-day forum will address this question posed by Ed Marston. Other speakers include: Bob Moore, State Director, U.S. BLM; Daniel Luecke, Environmental Defense Fund; William Clements, CSU Dept. of Fishery and Wildlife Biology; Ingrid Burke, CSU Dept. of Forest Sciences; and Perry D. Olson, Director, Colorado Division of Wildlife.







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## STUDENT AWARDS GIVEN AT 13TH ANNUAL HYDROLOGY DAYS

Two awards were given for "Best Student Oral Presentation at the 13th Annual AGU Hydrology Days, held at Colorado State University on March 30-April 2, 1993.

In the M.S. Category, Marsha Hilmes from Colorado State University was recognized for her presentation, "Changes in Stream Channel Morphology due to Placer Mining along the Middle Fork of the South Platte River, Fairplay, Colorado."

In the Ph.D. Category, Assam Abdel-Salam from the University of California, Irvine was recognized for his presentation, "Effects of Colloids on Contaminant Transport in a Single Fracture."

Civil Engineering Professor Hubert J. Morel-Seytoux, organizer of Hydrology Days, presented the student awards.



H.J. Morel-Seytoux presents award in M.S. Category to Marsha Hilmes

# EDITOR'S IN-BASKET

## STREAMLINING OF USDA PROPOSED

Outgoing USDA Secretary Edward Madigan has made recommendations for a major overhaul of USDA. His proposals include establishing 4 under secretary positions and consolidating the operating agencies that would report to them from the present 26 to 13. Assistant secretaries and other Presidentially appointed positions would be eliminated. Madigan also proposed that 1,191 USDA county offices and 1,056 county office locations be closed over the next 2 years. Madigan said that streamlining the department can strengthen policy development, better achieve program goals at reduced cost, boost the integrity of its management systems and better plan for the future.

In January **Mike Espy**, former Member of Congress (D-2nd MS) was sworn in as the 25th U.S. Secretary of Agriculture. At his confirmation hearings Espy said that he would review the proposals quickly and would have proposals and modifications of his own. Among other actions he plans for the Department are: placing major emphasis on expanding U.S. exports; improving rural development efforts; and increasing farm income. He used a specific example of water quality in catfish production to discuss his commitment to research.

Experiment Station Letter 2155, 1/22/93

## **MOSHER ELECTED 1993 AWRA PRESIDENT**

CHARLES D. MOSHER has been elected President of the American Water Resources Association for 1993. Mosher, a senior evaluator with the U.S. General Accounting Office, just completed a review of the U.S. Corps of Engineers military readiness support activities. In addition, he is a Planning Commissioner for the City of Bellevue, Washington, and on the Boards of the American Society for Public Administration's Evergreen Chapter and Section on Environment and Natural Resources Administration. In 1989, Mosher was elected a Fellow Member of AWRA.

In addition, the following persons were elected to take office beginning January 1, 1993: President-Elect - NANCY C. LOPEZ, Chief, Office of Water Data Coordination, U.S. Geological Survey, Reston, VA; Vice President - JOHN R. WEHLE, Assistant Executive Director, St. John's River Water Management District, Palatka, Fl, Director-at-Large -MARSHALL FLUG, Research Hydrologist and Water Resources Engineer, National Park Service/WRD, Fort Collins, CO; West North Central District Director - ROLLIN H. HOTCHKISS, Assistant Professor, University of Nebraska, Lincoln, NE; East North Central District Director - DUANE D. BAUMANN, Professor, Southern Illinois University, Carbondale, IL; Middle Atlantic District Director DOUGLAS A. HAITH, Professor, Cornell University, Ithaca, NY. Pacific Northwest District Director - RICHARD F. DWORSKY, Special Assistant to the State Director, Bureau of Land Management, Anchorage, AK.

# AWRA-COLORADO SECTION ELECTS 1993 BOARD OF DIRECTORS

The newly elected members of the Board of Directors for the AWRA-Colorado Section for 1993 are: Dave Merritt, Colorado River Water Conservation District, President; Dave Mueller, U.S. Geological Survey, Denver, Past President; Jerry Kenny, Boyle Engineering Corporation, Lakewood, President Elect;

Marie del Toro, Colorado Springs Department of Utilities, Vice President; Jim Kunkel, Advanced Sciences, Inc., Lakewood, Secretary; Nell Jaquet, Coors Brewing Corporation, Golden; Treasurer. Directors at Large are: Jim Loftis, Agricultural and Chemical Engineering, CSU; and Isabel McGowan, Engineering Technologies Assoc., Inc., Lakewood.

Source: AWRA Newsletter, Feb. 1993

# CSU'S AWRA SCHOLARSHIP WINNER REPORTS ON RESEARCH

Marsha M. Hilmes, Department of Earth Resources, has provided a progress report on her thesis, "Changes in Stream Channel Morphology Due to Placer Mining Along the Middle Fork of the South Platte River." Her research involves three phases: historical research, field work and data analysis. The historical research has been completed and included review of newspapers, aerial photographs, and other information dating back to the 1870's. (Editor's note -- Aerial photos from the

# SEMINAR SERIES

1870's are badly needed. Anyone with such data please contact Marsha at 491-5661. This information will be used to track changes in the stream channel through time. Field work has also been completed and included cross-sectional surveys at 11 stations. Data collected included channel and valley profiles, discharge and suspended-sediment measurements, bed material grain size distribution characterization, dendrochronology, soil descriptions and radiocarbon dating. The data analysis portion of the research was expected to be completed by March 1993.

Source: AWRA Newsletter,, Feb. 1993.

#### **AMERICAN WETLANDS MONTH**

May 1993 is the third annual celebration of American Wetlands Month. The celebration aims to educate, increase public awareness, and encourage appreciation of the value of wetlands. The Environmental Protection Agency and the Terrene Institute in Washington, D.C. are coordinating American Wetlands Month. For more information call Jodi Sproul, Terrene Institute, (202)833-8317, or the EPA Wetlands Hotline, (800)832-7828.

# FLUID MECHANICS, HUDRAULICS AND WIND ENGINEERING PROGRAMS College of Engineering, Colorado State University

Seminars will be held at 4:00pm. Everyone is welcome, and invited to meet at 3:45 for refreshments. For additional information call Dr. R.N. Meroney at 491-8574.

Date	Topic	Speaker
Apr. 21	Small Particle Turbulent Flow Interaction	Roger J. Peterson, Research Assistant, Civil Engineering Room 230, Lory Student Center
Apr. 28	Imposters of the Temple: Academic Consumer Fraud	Faculty/Student Debate, Colorado State University Room 203-05, Lory Student Center

# WATER EDUCATION

# WEF BROCHURE OUTLINES CAREERS IN WATER QUALITY FOR STUDENTS

The Water Environment Federation (WEF) has a new brochure promoting careers in water quality entitled, "Test the Waters! Careers in Water Quality." It explains that the water quality field is relatively new and offers a lot of opportunity for people with skills in chemistry, biology, mathematics, engineering and other sciences. Individuals with skills in political science, sociology, law, communications, and management also will be needed.

Available fields include operations, management, engineering research, regulation, and public interest are available. Specifically, career opportunities exist as engineers, operators, chemists, laboratory technicians, attorneys, regulators, and biologists. To obtain copies of the brochure, contact WEF at 601 Wythe St., Alexandria, Va, 22314. A minimal cost will be applied depending upon the quantity ordered. To learn more about careers in water quality, contact any of the following organizations:

Academy of Environmental Engineers, (410) 266-3311; American Society of Civil Engineers, (202) 789-2200; American Water Works Association, (303) 794-7711; National Science Foundation, (202) 357-9498; National Society of Professional Engineers, (703) 684-2800.

## WATER PUBLICATIONS

## **CWRRI PUBLICATIONS**

Contact the Bulletin Room, Aylesworth Hall, Colorado State University, Fort Collins, CO 80523. Phone: 303/491-6198.

Proceedings, 1993 Colorado Water Convention -- Front Range Water Alternatives and Transfer of Water from One Area of the State to Another, Information Series No. 74. The Colorado Water Convention, held January 4-5, 1993, allowed Governor Roy Romer, the Colorado Water Conservation Board, members of the public and the various water interests from around the state to meet and discuss the issues and conflict surrounding the transfer of water, with particular focus on interbasin transfer of water and the transfer of agricultural water to urban use. Speakers included Colorado Governor Roy Romer, mayors and representatives of cities, irrigation districts, and conservation districts who presented their perspectives on Front Range water needs and the role of water transfers. Members of the Colorado State Legislature discussed its role and described potential legislation in the upcoming session. A

# WATER NEWS DIGEST

#### WATER ALLOCATION

#### Forest Service Loses Water-Rights Case

The Colorado District Court for Water Division No. 1 has denied US claims to reserved water rights for instream flows to provide channel maintenance in the Arapaho, Pike, Roosevelt, and San Isabel National Forests. District Judge Robert Behrman denied the request for instream flows, but acknowledged a right to water for fire-fighting purposes and for administrative sites. At issue was whether the Forest Service was legally entitled to any water flowing through national forests in Colorado. The federal government claimed that the Forest Service withdrawals implicitly reserved the appurtenant water necessary to maintain instream flows, and requested priority dates for the reserved water rights ranging from 1905 to 1912 (the dates the forests were created). The case pitted the Forest Service against the state of Colorado, cities, and water conservancy districts in northern Colorado that divert water from the national forests. The issue was initially argued in the Colorado courts in the mid-1980's, and in 1987, the Colorado Supreme Court remanded the matter to the district court. After some delay and a lengthy trial, the district court handed down its decision. The judge based his decision on two determinations: (1) the government failed to show reserved water rights claimed are necessary to preserve timber or to secure favorable water flows for private and public uses under state law; and (2) the government failed to establish a needed minimum streamflow. The trial may come to be regarded as a benchmark in water law because the federal government's claims could have been extended to 170 million acres throughout the West.

Grand Junction Daily Sentinel 2/17/93, Montrose Daily Press 2/17/93, Western States Water 3/5/93

review of issues for a scoping analysis about transfer of water was presented. Small group workshops gave the participants the opportunity to discuss strategies that would be most successful to help assure adequate water supplies for the Front Range and what role the state has in this. Price: \$10 plus postage and handling.

## **POSITION AVAILABLE**

Center for The Management, Utilization and Protection of Water Resources, Tennessee Technological University --Application invited for position of Director, with responsibility for all aspects of the Center's operations. Begins August 1993, with screening of applicants beginning May 10, 1993; applicant pool will remain open until position is filled. Must have a Ph.D. in a discipline related to water resources, a distinguished record of research and publication, and a record of promoting interdisciplinary research and administration of research funding. Twelve month position, salary negotiable. Interested persons are invited to submit letter of application, resume, and self-assessment in relation to position requirements and responsibilities, five references to: Dr. Kari Rajan, Chairperson, Water Center Director Search Committee, Box 5004, Electrical Engineering Dept., Tennessee Technological University, Cookeville, TN 38505 tel: (615) 372-3398, fax: (615) 372-6172.

# WATER TRANSFER Water Diversion Plan Worries State Officials

Oil shale officials have unveiled a plan to build a \$200 million reservoir on the Colorado River and lease the water to Nevada, but Colorado officials greeted the plan with skepticism. Chevron Shale Oil Co. and Getty Oil Exploration Co. would lease the water -- to which they hold rights for oil-shale development -- for 50 years to Nevada. Nevada would receive 175,000 acre-feet of water a year, enough to accommodate the annual water needs of 700,000 people. The state of Nevada would finance construction of the reservoir on Roan Creek near DeBeque, located 30 miles northeast of Grand Junction. The water would be taken from the Colorado River at DeBeque and piped to a natural basin three miles away on Roan Creek for storage. Releases from the reservoir would be taken out of the Colorado River downstream by Nevada. Nevada would pay Colorado \$50 for every acre-foot delivered, or about \$8.75

million per year. At the end of the 50-year lease, the project water would revert back to Chevron and Getty for use in oil shale development. Nevada officials said the project would help meet the water needs brought on by rapid development in the Las Vegas area. Colorado Attorney General Gale Norton said the plan has "potentially threatening long-range implications" that will require "exhaustive evaluation."

## Pueblo Chieftain 2/3/93, Grand Junction Daily Sentinel 2/7/93

#### **New Lawyers Appealing AWDI Decision**

American Water Development Inc., no longer represented by its long-time attorneys Saunders, Snyder, Ross and Dickson, is being represented in its appeal to the Supreme Court by another Denver law firm, Faegre and Benson. AWDI is appealing Division 3 Water Court Judge Robert Ogburn's 1991 decision denying the company's

application for billions of gallons of San Luis Valley water for export. In its 37-page reply brief filed with the Supreme Court, the Faegre and Benson firm claims that Ogburn erred on six grounds and should be reversed. Along with its filing, AWDI has asked to argue the case orally before the high court.

#### Pueblo Chieftain 3/6/93

#### Ruling Allows Aurora to Utilize Arkansas Water

The success of a revegetation project in southeastern Colorado has led a judge to rule that Aurora may begin using water it purchased from the area in 1986. Aurora bought 8,250 acre-feet of water from the Rocky Ford Ditch Co. in 1986 to serve its municipal customers. As a condition of the purchase, Aurora agreed to revegetate about 4,000 acres of previously irrigated land in Otero County before it could begin transferring the water. Since 1987, Aurora has operated the Arkansas Valley Revegetation Project, the largest project of its kind in the nation, to establish native and drought-tolerant grasses where alfalfa and corn once grew. A water judge in Pueblo reviewed the progress on the project and agreed to allow Aurora to begin using the water in March.

Montrose Daily Press 2/16/93

#### WATER PROJECTS

## **AWDI Foe Faces Upstream Battle**

Bruce Whitehead wants to use excess water from the Rio Grande to irrigate 200 acres of his 280-acre Tres Rios Ranch to establish a wild-game preserve. Whitehead, a hydrographer in the state engineer's office in Alamosa, would use the water for pasture for cattle and horses and for wildlife habitat and recreation. He has indicated he would take water only after all senior rights to the Rio Grande are met. The Rio Grande Water Users' Association opposes Whitehead's plan, claiming it could hurt the Rio Grande Compact of 1938. If that delivery were reduced, the downstream states of New Mexico and Texas could haul Colorado back into federal court for violation of the compact. Whitehead denies his plan would hurt the compact, since he is asking only for extra water. The case goes to trial in Alamosa March 31.

# Pueblo Chieftain 2/24/93

#### Water Project Will Get Full Funding

The Clinton administration will support full funding for the Animas-La Plata water project this year according to Sen. Ben Nighthorse Campbell, who was given assurance by Secretary of Interior Bruce Babbitt. This is one indication that Babbitt might be more moderate than some people have feared. Animas-La Plata is opposed by environmental groups, but is supported by the states of Colorado and New Mexico, municipal and agricultural water users, and by two Ute Indian tribes.

#### Grand Junction Daily Sentinel 3/8/93

#### **Groundbreaking for Shavano Project Set**

Groundbreaking for construction on a new \$3 million watershed dam project above Shavano Valley was scheduled for March 31. Construction on the first phase of the project should be completed by the end of this year, and will be paid for almost entirely with federal funds. The project includes two dams of approximately 300,000 cubic feet of compacted earth that will be built just above Shavano Valley -- below the Coal Creek drainage area approximately 10 miles west of Montrose. The purpose of the dam is to control flood water in a pool and then drain it off slowly into irrigation canals over a period of two to four days. The dams will protect approximately 36 farms (both irrigated and range land), irrigation systems, fences, telephone lines, rural water lines, and roads. The area has flooded 24 times in the past 44 years with the most recent and damaging flood occurring on July 27, 1982. That flood caused more than \$1,300,000 in damages.

Montrose Daily Press 3/19/93

#### WATER QUALITY

#### **Orchard Mesa District Obtains Grant**

The Colorado Department of Local Affairs has awarded a \$75,000 grant to the Orchard Mesa Sanitation District to help install a sewer line to the Valle Vista subdivision. The decision came after discussions between the Department of Local Affairs and state health authorities. The city of Grand Junction had offered to build a package plant to handle waste for the 131-home subdivision, whose sewer lagoons have failed. The state health department felt that collection and transportation of sewage to a treatment plant was the best option.

#### Grand Junction Daily Sentinel 2/26/93

#### **\$70 Million Glenwood Desalination Plant Proposed**

Clifton Water District Manager Ray Schuster has suggested a revival of the defunct Glenwood Salt Co. desalination project on the Colorado River at Glenwood Springs. Schuster has suggested that the Denver Water Department (DWD) fund the project to compensate for increased salinity from a new Denver water diversion/exchange from Wolford Mountain Reservoir on Muddy Creek near Kremmling. Mike Walker, staff attorney for the DWD, responded that it makes sense to improve the water quality of the Colorado River, but that it ought to be done on a basin-wide approach. He suggested that the DWD consider cooperating with others on the project, but noted that opposition to the plant in Glenwood Springs could be a larger problem.

The project includes a gas-fired power plant that would distill the salty outflow from the Hot Springs Pool in Glenwood Springs, removing from 65,000 to 70,000 tons of salt from the Colorado River each year. The project was originally proposed in 1990 by the Glenwood Salt Co., and was in line for a \$6 million a year payment by the U.S. Bureau of Reclamation. The project was abruptly shot down, however, by widespread public opposition in Glenwood Springs. At the time it was thought that the plant would reduce river salinity so Denver could increase its transmountain water diversions.

The Muddy Creek Reservoir diversion/exchange plan will allow Denver to divert additional water from the Blue River and replace it with more saline Muddy Creek water. The exchange, according to Colorado River Water Conservation District engineer Dave Merritt, would increase salinity in the Colorado River by 92 tons per day. The exchange would be made only in August and September of dry years. The desalination plant, meanwhile, would reduce salinity in the Colorado River by 180 to 190 tons per day, year-round.

#### Grand Junction Daily Sentinel 1/28/93

#### **Concession Offered on Water Plan**

In a move called a first, the Denver Water Board has agreed to release water out of two additional reservoirs to control salinity it is feared the proposed Wolford Mountain Reservoir could cause downstream. Water from Williams Fork Reservoir and Dillon Reservoir would be released during dry years along with water from the proposed Wolford Mountain Reservoir to dilute the higher salinity some say Wolford will contain. The proposed construction is designed to allow Denver to transfer additional amounts of water out of Dillon Reservoir to the East Slope. Evidently upon recalculation of its water supply, Denver determined it had up to 10,000 acre-feet of water available in the Williams Fork near Parshall. Orchard Mesa Irrigation District has offered a counter-proposal seeking more information on how the releases would affect downstream growers during irrigation season.

#### Grand Junction Daily Sentinel 3/25/93

#### **Hospital Water Contaminated**

Water contaminated with coliform bacteria has found its way to the hospital at Fitzsimons Army Medical Center in Aurora, according to state health officials. The health department said initial tests collected from water samples on Jan. 26 revealed the bacteria in water supplies that served labs and barracks, but tests last week showed the contamination had spread to the hospital. None of the tests have revealed fecal matter or bacteria that can cause illnesses. Inspectors from Fitzsimons and the Denver Water Department haven't isolated the source of the coliform, but water serving surrounding neighborhoods is clean. The problem is apparently in the pipes. Tanker trucks are bringing purified water to the center and the hospital.

#### Grand Junction Daily Sentinel 2/21/93

#### Water Problems Plague Mesa Verde

Problems with a new \$2 million water treatment plant may force the National Park Service to limit access to Mesa Verde National Park. A three-month test of the water plant earlier this winter showed it couldn't produce enough water to meet the needs of 11 days of peak tourism. The Park Service is scrambling to fix the plant, which is technically sound but can't process enough water because fine grit keeps disabling pressure-reduction valves in a newly designed feeder line. Options for solving the problem include: building a settling pond for \$200,000 to \$300,000 to eliminate the silt; replacing the complicated valves with electrical or manual operated valves; or utilizing water supplied by the Montezuma Water Co., which could provide enough treated water to supply the park.

Montezuma built a water treatment plant in nearby Dolores in 1985 that can treat 8.8 million gallons a day. The park needs about

200,000 gallons a day. The company laid a pipeline two years ago that comes within a half-mile of the park's entrance. The Park Service opted to build its own plant after concluding it would be slightly cheaper than buying water from the city of Cortez and paying for a seven-mile link.

Grand Junction Daily Sentinel 3/14/93

#### State Officials Tell Denver to Stop Polluting Streams

The Colorado Health Department has ordered the City and County of Denver to stop allowing runoff from the new airport construction site to pollute three small streams in the area. The department issued a notice of violation and a cease and desist order for violating Colorado Discharge Permit System permits for the site. Denver International Airport was cited for exceeding discharge limits on sediment and for failing to implement a storm water management plan as required in its permit. The violation carries a maximum fine of \$10,000 a day, however the Health Department has not decided the amount.

#### Greeley Tribune 3/20/93

## Water Quality Monitoring Report Released

A nationwide water quality monitoring strategy calling for greater coordination, consistency, and collaboration among federal, state, and local water quality agencies was released in March by the EPA, the USGS, and 14 other government agencies. The report was prepared for the Office of Management and Budget by the Intergovernmental Task Force on Monitoring Water Quality, which was formed in 1991 to conduct a nationwide review and evaluation of water quality monitoring activities. The report recommends development of a coordinated partnership linking monitoring organizations at both national and state levels. Copies of the report, "Ambient Water Quality Monitoring in the United States, First Year Review -- Evaluation and Recommendations," are available from the USGS Office of Water Data Coordination, 417 National Center, Reston VA 22092; tel. (707) 648-5016.

## EOS 3/23/93

# ENVIRONMENT

#### **Arkansas River Cleanup Not Meeting Expectations**

The discovery of additional contaminated areas on the banks of the upper Arkansas River means the \$15 million cleanup effort there is not as efficient as originally thought. Researchers now believe the effort to clean up mill tailings on the river will solve only 10 to 15 percent of the problems there, not the 50 percent expected. John Stednick, earth sciences professor at Colorado State University, used a computer model to pinpoint hot spots in the river. He measured such variables as water quality, soil, slope, vegetation, geology, and existence of old mining claims. Stednick said most of the hot spots are abandoned mines, where the likelihood of finding a responsible party to pay for cleanup is slim. But he added that pinpointing the hot spots can cut costs by making the effort more efficient. Heavy metals are concealed all along the banks of the river -- abandoned copper, lead, zinc, and cadmium from 130 years of mining -- which are eventually swallowed by brown trout in the river. The metal in the tissues of the trout shortens their

lives to about four years. The contamination harms the entire ecology of the river as well as the fish. The EPA oversees a Superfund cleanup at the Leadville drainage, and the state oversees cleanup of the Mary Murphy Mine tailings near St. Elmo.

#### Grand Junction Daily Sentinel 2/13/93

#### Summitville Mine Cleanup Progresses

The EPA is making progress in reducing contamination at the Summitville Mine by reducing cyanide and metals in the gold mine's cyanide-laced leaching pond. The EPA is also replacing 4inch pipe lines with 8-inch lines to allow more waste to be processed in a shorter time. EPA is studying three additional ways to speed the cleanup: detoxification of the heap leach; control of the runoff; and closure of the Reynolds Tunnel near the mining site. The \$3 million allocated Feb. 1 from the EPA's superfund will take the cleanup through May. After operating on and off for years, the mine was reopened in 1986 by Summitville Consolidated Mining Co., a subsidiary of Galactic Resources Ltd. of Canada. Almost immediately the plastic liner under the settling pond for the heap leach operation began leaking, sending cyanide and heavy metals into the ground and the area's water system. By fall 1990, scientists determined that fish had been killed along several miles of the Alamosa River where it is fed by Wightman Fork, which runs along the Summitville site. Summitville Consolidated agreed to clean up the pollution and posted an additional reclamation bond. But on Dec. 15 it shut down operations and filed for bankruptcy. The EPA took over the operation, and the cleanup may cost as much as \$70 million.

#### Pueblo Chieftain 3/3/93

#### **USFS Hopes to Buy Tracts for White River Forest**

Two adjacent parcels of private land within the White River National Forest which would secure wildlife habitat and a loop trail around Battlement Peaks may be purchased by the U.S. Forest Service. The Tepee Park and Houston Mountain parcels are high on the forest service's regional list for purchases using the federal Land and Water Conservation Fund. Both parcels -- a total of 4,500 acres -- offer good winter range for deer and elk and host nesting sites for bald eagles. The parcels, made of old, patented oil shale claims, are for sale by Unocal Corp. and the Virginia Colorado Corp. The Conservation Fund, a national group, is negotiating for purchase to keep the lands until the federal government can actually purchase them. That may take a year of more, since the parcels must compete against proposals from the National Park Service, the U.S. Fish and Wildlife Service, and the Bureau of Land Management.

Grand Junction Daily Sentinel 2/17/993

#### WILDERNESS

#### All Sides Seem Happy With Wilderness Bill

The Colorado wilderness bill that nearly won congressional approval last year has won acclaim and approval during its first congressional hearing this year. Witnesses ranging from the deputy chief of the U.S. Forest Service to the Colorado Water Congress to representatives of environmental groups testified before the U.S. Senate subcommittee on public lands, national parks and forests. The bill would establish approximately 611,000 acres of new wilderness in Colorado. It strikes a compromise on the controversial issue of wilderness water rights by allowing the concept of federal rights in wilderness areas, but prohibiting the federal government from asserting such rights in the new Colorado areas. A spokeswoman for the Sierra Club, Wilderness Society, and Colorado Environmental Coalition testified at the hearing that the compromise is workable for the particular areas in Colorado.

Grand Junction Daily Sentinel 2/27/93

#### LITIGATION

#### Ecology Suit Caused Animas-La Plata Delay, GAO Claims

Days before the General Accounting Office (GAO) was to begin reviewing the Animas-La Plata water project, the study was postponed because the Justice Department thought it inappropriate with a lawsuit pending. GAO was reviewing the project at the request of Sen. Bill Bradley, D-N.J., chairman of the Senate Subcommittee on Water and Power. Drew Caputo, attorney with the Sierra Club Legal Defense Fund, says no litigation is active concerning the Animas-La Plata. "Even if it were true that litigation were ongoing, this would be no reason to halt the GAO's work. Animas-La Plata is a topic of active public concern, and the public has a right to know the facts about the project."

Grand Junction Daily Sentinel 2/6/93

#### WETLANDS

#### Telluride Ski Area May be Fined for Wetlands Loss

The Telluride ski resort could face a civil penalty and hefty cleanup costs for damaging more than 40 acres of wetlands in a case that federal officials said is the largest such violation in state history. The EPA has been negotiating a settlement over the violation for two years, and is close to a settlement. EPA declined to disclose the size of the civil penalty it is asking for, or how much the resort will spend to restore or mitigate the damage. Between 40 and 44 acres at several different sites in Telluride Co.'s Mountain Village and in the ski area were affected. The violation stems from the ski resort filling and draining a number of wetlands for its golf course, housing development and roads, and a parking lot at the base of the ski area without a federal permit, which is the violation of the federal Clean Water Act. Resort officials evidently didn't know a permit was required.

Grand Junction Daily Sentinel 3/4/93

#### WILDLIFE

#### **Fish Proposal Could Hamper Power Dams**

A proposal by the U.S. Fish and Wildlife Service to protect four species of endangered fish in the Colorado River basin could hamper the construction and operation of hydroelectric dams, but might help the rafting industry. The proposed plan would designate 1,824 miles of Colorado River basin streams in six states as critical habitat for the Colorado squawfish, razorback sucker, humpback chub, and bonytail chub. The plan would include 362 miles of the Colorado, Yampa, White, Gunnison, and San Juan rivers in Colorado. The endangered fish, once among the most common species in the Colorado River system, currently survive in less than half of their original habitat.

Biologists believe the fish thrive in conditions that simulate a wild western river, with giant springtime flows and lower levels in the fall and winter. Maintaining those river conditions could pose problems for operators of existing irrigation reservoirs, which are designed to fill in the highwater spring runoff season. Details of the plan won't be available until June, when federal biologists are scheduled to announce their recommendations for exact streamflows needed to keep the fish populations healthy.

#### Montrose Daily Press 1/29/93

#### Fish Ladder Proposed

Scientists and engineers are planning a \$1.1 million, 240-foot long fish ladder to give endangered fish passage around the Redlands diversion dam on the Gunnison River. The idea, in the works for 10 years, will allow the Colorado squawfish and razorback sucker to return to their historic habitat from Grand Junction to Delta. If successful, the process could be repeated at the Price-Stubbs and Cameo dams to have fish passage back up the Colorado River to Rifle. If not, it is unlikely the federal government will allow any further water development in the Colorado River basin. A major question yet to be answered is where the water for the ladder will come from. It is estimated the ladder will require 25 cubic feet per second, and an additional 75 cfs will be needed in the river channel below the dam. It is hoped construction plans and an environmental study can be completed and a construction contract awarded by November 1994.

#### Grand Junction Daily Sentinel 2/1/93

## **Irrigation District Opposes Surcharges**

At least one Wyoming irrigation district is opposed to surcharges the Clinton administration wants to assess on water users to help pay for fisheries and wildlife habitat improvements. The yet-to-bedetermined surcharge would be assessed on each acre-foot of federal water sold to irrigators. The money would then be collected for use in offsetting damage to fish and wildlife habitat caused by irrigation. But Lloyd Deckert of the Midvale Irrigation District in Fremont County believes the surcharge would be unfair to those irrigators who don't harm the environment. The proposal outlining the surcharge said it is necessary because the costs of offsetting irrigation damage to fisheries and wildlife habitat "are currently paid by the federal taxpayers or repaid by project beneficiaries" without interest over 50 years. The administration also believes the surcharge "would encourage more rational water use that would reduce the harmful impacts of nonpoint source pollution."

#### Greeley Tribune 2/28/93

#### Wildlife Agency to Lease Surplus Pueblo West Water

A deal to provide more water for the permanent pool at John Martin Reservoir has been struck between the Pueblo West Metropolitan District and the Colorado Division of Wildlife. A recently-signed contract will allow the division to lease all of Pueblo West's surplus shares of water in Twin Lakes Reservoirs near Buena Vista. The water will be transported during peak runoff periods each year to John Martin Reservoir east of Las Animas, where it will be used to offset losses from evaporation in the 10,000-acre-foot permanent pool. The permanent pool at John Martin Reservoir was created by Congress in 1965 to protect wildlife and recreation at the lake.

Last May, when Gov. Roy Romer created the Lower Arkansas River Commission to explore creating a state park in Southeastern Colorado, he asked the commission to find a source of water to augment the reservoir's permanent pool. The deal includes an upfront option payment of \$100,000 for 10 years, which gives the division the right to acquire all surplus shares of Twin Lakes water, and leaves Pueblo West with enough shares each year to meet its needs. The division will pay an average of \$13 per water share during the life of the 10-year contract. At some time during the 10year period, the division must acquire enough of a permanent supply of water to replace evaporation losses, which is about 3,000 acre-feet a year. The Lower Arkansas River Commission has identified five potential sources of water to satisfy that requirement, but no decision has been made on which source to purchase.

#### Pueblo Chieftain 3/10/93

#### Wildlife Officials Believe Cold Winter May Have Killed Fish

As ice melts in Front Range lakes during the next few weeks, wildlife officials are watching for signs that the harsh winter may have killed some fish. "Winterkill" occurs when ice and snow on a lake's surface block sunlight from reaching into the water for a long period of time. Without sunlight, underwater algae cannot photosynthesize and produce oxygen; as a result, oxygen levels in the water decrease and eventually cause fish to suffocate. Lakes which had water flowing through them during the winter have a good ck nce of avoiding winterkill, as moving water can carry enough oxygen into water beneath ice to maintain aquatic life.

#### Greeley Tribune 3/13/93

#### Wildlife's Survival Studied

A 3-year study on how to keep from disrupting wildlife at the Rocky Mountain Arsenal during cleanup of massive toxic-waste deposits is under way by the Denver Museum of Natural History. Cheri Jones, curator of mammalogy at the museum, said her crews are trapping rabbits and putting radio collars on them to learn which habitats animals favor. Then while waste is being removed from one area the same type of vegetation could be planted nearby so the rabbits avoid disruption. "We're studying how critical some vegetation types are to different species, how the disruption might affect them and what can be done to mitigate the disturbance," said Charles Preston, the museum's chairman of zoology and curator of ornithology.

#### Montrose Daily Press 3/4/93

#### PEOPLE

**Evans Named Deputy Director of Conservation Board** 

Peter Evans, son of former Congressman Frank Evans of Pueblo,

has been promoted to deputy director of the Colorado Water Conservation Board. Evans, 39, previously spent three years as the in-house legal counsel for the director of the Colorado Department of Natural Resources. Evans received an undergraduate degree in geology at Pomona College in Claremont Calif. in 1976, and a law degree at the University of Denver in 1985. He has worked for the Colorado Division of Mined Land Reclamation, and the Denver law firm of Saunders, Snyder, Ross and Dickson.

#### Pueblo Chieftain 2/24/93

# Clinton Administration Appointees/Congressional Updates

Rep. Jerry E. Studds (D-Mass.) has been named Chairman of the House Merchant Marine and Fisheries Committee, which has jurisdiction over the Endangered Species Act. The House Water and Power Subcommittee has been eliminated. Its duties will be assumed by a new Oversight and Investigations Subcommittee chaired by George Miller (D-CA), with jurisdiction over water, the Bureau of Reclamation, the federal power marketing administrations, and Alaska public lands, including the Arctic National Wildlife Refuge.

The new House Energy and Mineral Resources Subcommittee will be chaired by Rep. Richard Lehman (D-CA). The subcommittee will have jurisdiction over hardrock mining, coal mining, mineral leasing, offshore oil and gas development, nuclear power and nuclear waste regulation. The National Parks, Forests and Public Lands Subcommittee will have jurisdiction over federal lands under the National Parks Service, U.S. Forest Service, and Bureau of Land Management, reserved water rights, conservation areas, urban parks, non-federal recreation and land use, and some historic preservation issues. Rep. Bruce Vento (D-MN) remains as chair.

The White House has announced nominations to fill Interior positions under Secretary Bruce Babbitt. WSWC member Elizabeth Ann (Betsy) Rieke was named Assistant Secretary for Water and Science. Robert Armstrong, aide to Texas Governor Ann Richards, was named Assistant Secretary for Land and Minerals Management. George Frampton, Jr., President of the Wilderness Society, will be Assistant Secretary for Fish, Wildlife and Parks. Bonnie Cohen, Senior Vice-President with the National Trust for Historical Preservation, will be Assistant Secretary for Policy Management and Budget. Jim Baca, a New Mexico Land Commissioner, will lead the Bureau of Land Management. Former law professor and Associate Interior Solicitor John Leshy will be Solicitor. Daniel Beard has been nominated to replace Dennis Underwood as Commissioner of the Bureau of Reclamation.

# GROUNDWATER

#### Broomfield Wants Speedy Action on Toxic Wastes

The Broomfield City Council has asked state and federal agencies to step up their efforts to clean up suspected soil and groundwater contamination at a hazardous waste site. Last March, agents from the U.S. attorney's office and the EPA raided the Chemical Handling Co. at 11811 Upham St. after uncovering evidence it was illegally handling and storing barrels of corrosive and flammable waste. The company, which collected old paint and other toxic wastes and shipped it out of state for disposal, never reopened. City officials are concerned the contamination left behind by Chemical Handling has migrated off-site. Steve Way of the EPA said eight monitoring wells have been placed on and off the site to determine the extent of the groundwater problem. Way does not anticipate there will be a significant off-site problem. Removal of the on-site material is nearly complete.

#### Rocky Mountain News 2/11/92

#### RECREATION

#### Arkansas River Group Approves Plan for State Park

A plan to guide development of a state park at the Great Plains Reservoirs system in southeastern Colorado was approved on a 10-2 vote by the Lower Arkansas River Commission. The plan will be sent to the Colorado Wildlife Commission and the State Parks Board for approval. Approval is needed because the Division of Wildlife will be asked to purchase water for the park and the State Parks Board will be asked to pay for buildings and other improvements if the park is created. The plan then would be sent to Colorado Department of Natural Resources executive director Ken Salazar, the Legislature, and Gov. Roy Romer, who created the Lower Arkansas River Commission last May.

#### Pueblo Chieftain 3/6/93

# Denver Pledges Sand Creek Park

Denver will spend more than \$900,000 to turn 123 acres along Sand Creek into a nature park, according to a settlement with the Sierra Club. That is the price Denver's Stapleton International Airport will pay for violating the Clean Water Act and letting wing de-icer, a form of antifreeze, seep into Sand Creek adjacent to the airport. Denver Mayor Wellington Webb said the city would have built the open-space park regardless of the lawsuit because of the city's commitment to the environment and because potential developers of Stapleton would be attracted by such amenities. The park will include wetlands, foot bridges, nature trails, shelters, boardwalks, and educational signs. The park location will be around Bluff Lake, east of Moline Street and south of Smith Road.

Rocky Mountain News 3/9/93

# CONSERVATION

#### Denver Tightens Rules for Water Conservation

Stricter new water conservation measures for Denver's parks and public landscaping have been announced. Mayor Wellington Webb said new conservation guidelines -- including required use of lowwater vegetation, water-thrifty sprinklers and better-drained landscape design -- amounts to constructive water conservation practices that take growth and new development into account. The action fulfills a promise Webb made in opposing Two Forks Dam. The measures are expected to double the 28 percent water savings - or 137 million gallons of water -- already achieved in the past two years through conservation. The guidelines apply to new projects.

Denver Post 3/10/93

# PRINCIPLES AND APPLICATIONS OF MODELING CHEMICAL REACTIONS IN GROUND WATER

May 17-21, 1993. This course provides an overview of the important mineral-water interactions, develops the principles of chemical equilibrium, and familiarizes the participants with available geochemical models. Geochemical theory and practical descriptions of important geochemical processes provide the background necessary to understand the use of the geochemical models. The types of modeling presented in the course and used by the participants include mass-balance modeling with the program NETPATH, speciation and reaction-path modeling with PHREEQE, and reaction-transport modeling with PHREEQM. Hands on use of these models provides an understanding of the application and limitations of these geochemical tools. Fee: \$1295 before April 19, 1993; \$1495 after that date.

# FUNDAMENTALS OF STOCHASTIC MODELING OF FLOW AND TRANSPORT IN POROUS FORMATIONS

June 28-July 2, 1993. The course acquaints participants with the foundation of stochastic theory and stochastic modeling so that they will be able to apply this knowledge to solving field problems. To support this objective, the course will include exercise-solving, use of a few codes, analysis of field applications, and discussion of the most recent and future developments. Fee \$1395 before May 28, 1993; \$1595 after that date.

For course information contact: Short Course Coordinator International Ground Water Modeling Center Colorado School of Mines Golden, Colorado 80401-1887 Phone: (303)273-3103; FAX (303)273-3278

# INTERNATIONAL INSTITUTE FOR CIVIL ENGINEERING 1993 SHORT COURSE TRAINING LIST

For information contact: Janet Montera, Civil Engineering Department Colorado State University Fort Collins, Colorado 80523 Phone (303)491-7425; FAX (303)491-7727

Design of Water Quality Monitoring Networks {IICE 9301}, Dr. Thomas Sanders & other well-known instructors, June 7-11, 1993, at Colorado State University, fee \$950.00(US).

Hazardous Materials/Waste Manager Training Course {IICE 9302}, Dr. Thomas Sanders, June 15-17, 1993, at Colorado State University, fee \$350.00(US).

Activated Sludge Process Control {IICE 9303}, Dr. Thomas Sanders and Mr. Ronald Schuyler, June 21-25, 1993, at Colorado State University, fee \$695.00(US).

Design and Operation of Selected Hydraulic Structures: A Short Course and Associated Local Field Trips {IICE 9304}, Dr. Morris Skinner and other well-known instructors, June 21-24, 1993, at Colorado State University, fee \$650.00(US). (Repeated August 9-12, 1993 {IICE 9313}.)

Water Resources Development and Environmental Protection: Problems, Issues, Controversies, Conflicts, and Solutions {IICE 9305}, Drs. Vujica Yevjevich and Thomas Sanders, June 28-July 2, 1993, at Colorado State University, fee \$895.00(US).

The International Riprap Workshop, Dr. Steve Abt, July 12-16, 1993, at the Holiday Inn University Park, Fort Collins, Colorado, fee \$240.00(US).

Water Resources Management: Planning and Coordination for Systems Integration {IICE 9306}, Drs. Neil Grigg and Evan Vlachos, July 12-16, 1993, at Colorado State University, fee \$895.00(US).

Managing Complex Water Resources Systems {IICE 9307}, Drs. Evan Vlachos and Neil Grigg, July 19-23, 1993 at Colorado State University, fee \$895.00(US).

Cost Estimating, Cost Control Techniques, and Computer Applications {IICE 9308}, Drs. Matt Syal and Gary Gehrig, July 19-20, 1993, cooperatively with the Construction Management Program, at Colorado State University, fee \$525.00(US).

Project Scheduling and Progress Control Techniques and Computer Applications {IICE 9309}, Drs. Matt Syal and Gary Gehrig, July 22-23, 1993, cooperatively with the Construction Management Program, at Colorado State University, fee \$525.00(US).

Microcomputer Applications in Irrigation Data and Project Management (IICE 9310), Dr. Tom Sheng, July 26-August 16, 1993, at Colorado State University, fee \$3625.00(US).

Decision Support Systems for Water Resources Management {IICE 9311}, Drs. Darrell Fontane and Lynn Johnson, August 2-6, 1993, at Colorado State University, fee \$895.00(US).

Building Safety Evaluation and Damage Assessment Methodologies (IICE 9312), Drs. Sherry Oaks, Paul Nowak and Mr. Robert Kistner, August 6-7, 1993, at Colorado State University, fee \$525.00(US).

Design and Operation of Selected Hydraulic Structures: A Short Course and Associated Local Field Trips {IICE 9313}, Dr. Morris Skinner and other well-known instructors, August 16-19, 1993, at Colorado State University, fee \$650.00(US).

Application of GIS in Water Resources Engineering [IICE 9314], Drs. Lynn Johnson and John Labadie, August 16-20, 1993, at Colorado State University, fee \$895.00(US).

Wind Effects on Buildings and Structures {IICE 9315}, Drs. Bogusz Bienkiewicz and Jack Cermak, August 16-20, 1993, at Colorado State University, fee \$895.00(US).

Paleoflood Hydrology {IICE 9316}, Drs. Ellen Wohl and Jose Salas, August 18-20, 1993, at Colorado State University, fee \$650.00(US).

Operation, Maintenance and Rehabilitation of Dams (IICE 9317), Drs. John Nelson and James Ruff, August 23-27, 1993, at Colorado State University, fee \$895.00(US).

Statistical Analysis in Water Resources Engineering {IICE 9318}, Dr. Jose Salas, available on request, fee contract basis.

Simulation and Forecasting in Water Resources Engineering [IICE 9319], Dr. Jose Salas, available on request, fee contract basis.

# ANNOUNCEMENT AND CALL FOR PAPERS

Seeking an Integrated Approach to Watershed Management in the South Platte Basin

October 27-28, 1993 University Park Holiday Inn, Fort Collins, Colorado

Topics of interest include the following:

Competing uses and conflict resolution Coordinated planning and management of water resources Water quality and quantity interrelationships Water conservation and use efficiency Water marketing and transfer issues State and federal roles in watershed management

Submit one-page abstract by July 16, 1993 to: Colorado Water Resources Research Institute, 410 University Services Center, Colorado State University, Fort Collins, CO 80523, ATTN: Kathleen C. Klein, Coordinator.

Sponsors: Colorado Division of Wildlife, US Fish and Wildlife Service, Colorado Water Resources Research Institute, Denver Water Department, Northern Colorado Water Conservancy District, US Environmental Protection Agency, and US Geological Survey.

# **CALLS FOR PAPERS and MEETINGS**

# International Symposium on Water Resources in the Middle East: Technical, Legal and Institutional Aspects

An international conference jointly sponsored by the International Water Resources Association and University of Illinois will be held at Jumer's Castle Lodge, Urbana, Illinois near the University of Illinois campus on October 21-23, 1993. The principal organizers are Dr. Glenn Stout, Director, Water Resources Center and IWRA, Symposium Chairman and Dr. Radwan Al-Weshah, Symposium Coordinator.

The three-day symposium is designed to develop a research program with legal and institutional guidelines that can help those responsible for public water supplies and policies in the Middle East. The meeting will involve university personnel in the Middle East, Europe and North America. There will be a group of invited speakers for each panel of the Symposium. However, the organizing committee seeks a limited number of qualified presentations related to the symposium objectives.

Prospective presenters are invited to submit a two-page presentation proposal including the author's name, address (with phone and fax numbers) by May 31, 1993. Full papers are expected to be submitted by July 31, 1993. Papers will be reproduced and distributed to registered participants prior to the symposium. Send abstract to: Dr. Glenn Stout, Director, Water Resources Center, University of Illinois, 205 Mathews Ave., Urbana, IL 61801. Phone (217)333-0536; FAX (217)244-6633.

# 1994 ANNUAL CONFERENCE OF ASCE WATER MANAGEMENT DIVISION

May 23-26, 1994

**DENVER, COLORADO** 

**Call Darrell Fontane** 

(3030491-5247

# Rocky Mountain Ground Water Conference October 27-29, 1993 Albuquerque, New Mexico

Four copies of camera-ready abstract required by May 28, 1993. Cash awards will be given for the best student oral and poster presentation. For information contact the conference General Chair, Michael E. Campana, Department of Earth and Planetary Sciences, University of New Mexico, Albuquerque, NM 87131-1116; Phone (505)768-2600 - FAX 768-2617 or Technical Chair, William J. Stone, NMED-Ground Water, P.O. Box 26110, Santa Fe, NM 87502-6110 (505)827-2434 - FAX 827-2965.

# Ground Water Modeling Conference June 9-12, 1993 Golden, Colorado

The 1993 conference, organized by the International Ground Water Modeling Center in cooperation with the office of Special Programs and Continuing Education of the Colorado School of Mines, and the Environmental Education Enterprises Institute, Columbus, Ohio, will feature keynote addresses by prominent ground water hydrologists, presentation of applied modeling work, poster sessions, poster sessions with computer demonstrations, and commercial software demonstrations. Session papers and poster presentations pertain to the following areas: Parameter Estimation/Calibration; Practical Evaluation of Uncertainty; Validation-Quality Assurance-Post Audits Remediation; Non-aqueous Phase Liquids, Unsaturated Zone. For information contact:

> International Ground Water Modeling Center Institute for Ground-Water Research & Education Colorado School of Mines Golden, CO 80402-1887 Phone (303)273-3105; FAX (303)273-3278

## Water Organizations in a Changing West

The Natural Resources Law Center of the University of Colorado School of Law will offer a three-day conference June 14-16, 1993, on "Water Organizations in a Changing West." The meeting will address the broad array of issues facing both urban and agricultural water supply and management organization in the West. T h e conference will be held at the University Memorial Center on the University of Colorado at Boulder campus. The cost will be \$450 through June 7, or \$500 thereafter, with discounts available for government, academics and public interest groups. Inquiries should be directed to: Katherine Taylor, Conference Coordinator, Campus Box 401, Boulder, CO 80309-0401, phone (303) 492-1288; FAX (303) 492-1297.

# The Big Squeeze July 28-30, 1993

Water quality goals challenge agencies to do more with limited resources:

- \* The latest from the Clinton Administration
- Reauthorization of the Clean Water Act and the Safe Drinking Water Act
- Watershed-based approaches
- Environmental/Business partnerships

18th Annual Colorado Water Workshop Western State College Gunnison, Colorado 81231

Registration information will be mailed in early June. For more information call: Lucy High (303)943-7156.

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	CALENDAR
April 23	MEETING THE CHALLENGE: The Water Environment Industry in the Closing Decade of the 20th Century, Denver, CO. Contact: Contact: LaVonne Atkins, 71 So. Irving, Denver, CO 80219. Phone: (303)727-8990; FAX (303)727-8991.
May 3-5	WATER MANAGEMENT IN THE '90s: A Time for Innovation, Seattle, WA. Contact: ASCE, 345 E. 47th St., New York, NY 10017-2398.
June 2-4	GREAT PLAINS AGRICULTURAL COUNCIL 1993 ANNUAL MEETING, Rapid City, SD. Contact: Melvin Skold, Dept. of Agricultural and Resource Economics, Colorado State University, Fort Collins, CO 80523. Phone (303)491-7370.
June 6-10	AMERICAN WATER WORKS ASSOCIATION ANNUAL CONFERENCE AND EXPOSITION, San Antonio, TX. Contact AWWA, 6666 W. Quincy Ave., Denver, CO 80235.
June 18-19	APPLICATION OF ADVANCED INFORMATION TECHNOLOGIES: EFFECTIVE MANAGEMENT OF NATURAL RESOURCES, Spokane, WA. Contact: ASAE, 2950 Niles Rd., St. Joseph, MI 49085-9916; Phone 616-429-0300, FAX 616/429-3852.
June 20-23	JOINT INTERNATIONAL SUMMER MEETING OF THE AMERICAN SOCIETY OF AGRICULTURAL ENGINEERS AND THE CANADIAN SOCIETY OF AGRICULTURAL ENGINEERING, Spokane, WA. Contact: American Society of Agricultural Engineers, 2950 Niles Rd., St. Joseph, MI 49085-9659; Phone 616/429-0300.
June 27-30	COLLECTION SYSTEMS OPERATION & MAINTENANCE, Tucson, AZ. For information call: 1-703-684-2464.
June 27-30	AWRA ANNUAL SUMMER SYMPOSIA Water Resources Education: A Lifetime of Learning & Changing Roles in Water Resources Management and Policy, Bellevue, WA. Contact: American Water Resources Association, 5410 Grosvenor Lane, Suite 220, Bethesda, MD 20814-2192. Phone (301)493-8600.
Aug. 3-6	UNIVERSITIES COUNCIL ON WATER RESOURCES ANNUAL MEETING, San Francisco, CA. Contact: Dr. Howard S. Peavy, Dept. of Civil Engr., Montana State University, Bozeman, Mt 59717; 406/994-6690.
Aug. 29-31	ASSOCIATION OF STATE DAM SAFETY OFFICIALS 1993 ANNUAL CONFERENCE, Kansas City, MO. Contact: Susan Sorrell, P.O. Box 55270, Lexington, KY 40555. Phone (606)257-5146 or 5140.
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.
Oct. 14-15	COLORADO HAZARDOUS WASTE SOCIETY 7TH ANNUAL REGIONAL CONFERENCE, Denver, CO. Contact: Rick Giardina, Ernst & Young, 4300 Republic Plaza, Denver, CO 80202. Phone: (303)628-4389; FAX (303)628-4550.
Nov. 29-Dec. 1	CONFERENCE ON TAILINGS & MINE WASTE '93, Colorado State University, Fort Collins, CO. Contact: Janet Lee Montera, Department of Civil Engineering, Colorado State University, Fort Collins, CO 80523; Phone (303)491-7425; FAX (303)491-7727.

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