

Colorado Water

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

WATER ITEMS AND ISSUES . . .

August 1993

How Did We Get Here? -- Editorial by Robert C. Ward	2
Water Research	3
Colorado Water Supply	5
Features	6
Water Education	15
University Water News	16
Water Publications	17
Editor's In-Basket	18
Water News Digest	20
Meetings, Calls for Papers and Short Courses	27
Calendar	32



Hal Simpson, Colorado State Engineer, discusses the state's evolving role in water quality

THE BIG SQUEEZE

Coordinating water challenges was the theme of the 18th Annual **COLORADO WATER WORKSHOP**

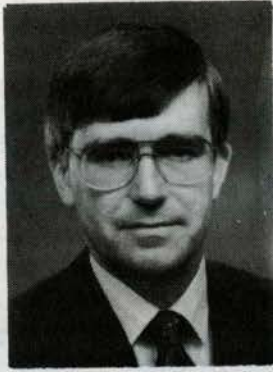
July 28-30, 1993

see page 27

Join **RADIO EXPEDITIONS** from the National Geographic Society and National Public Radio --

On November 13, National Public Radio will air **RADIO EXPEDITIONS Water: Thirsting for Tomorrow"** a one-hour radio special on freshwater issues in the United States

Co-produced by NPR and the National Geographic Society



HOW DID WE GET HERE?

*Editorial by
Robert C. Ward*

Water management in the U.S. is evolving as the needs and values of society change. As this evolution continues, new citizens begin to vote and new people enter the professional ranks of water managers. As the evolution proceeds, it is easy to get totally consumed by the arguments of the present and forget how we got to where we are today. Often, a quick assessment of the history of a particular water issue or problem can be extremely revealing and often set the stage for arriving at an agreeable solution.

This issue of *Colorado Water* presents articles that give background on two different aspects of water management in Colorado. First, the Roan Creek proposal, a rapidly developing news story, has captured its fair share of newsprint over the past few months. The article on page 10 describes the Roan Creek proposal and some of the history and issues surrounding it. CWRRI has been requested to help various groups better understand the proposal and its ramifications to Colorado's water management system. Unfortunately, CWRRI, as a water research institute, is not organized to respond in a daily or even weekly manner as a newspaper could, and as the Roan Creek news story has demanded. This does not mean, however, that CWRRI cannot develop an assessment of the situation and describe, as best it can, the history and stances being taken on an issue in a manner that attempts to educate and explain. The article on page 10 attempts to explain some of the complex facets of the Roan Creek proposal in a way that educates and explains. The article, however, in no way captures the many dimensions of the proposal and the depth of concern being expressed about it on both sides. Readers interested in such depth are referred to the references for the additional insight.

The second article addresses a topic that has not received newsprint coverage recently -- the murals in the rotunda of the Colorado State Capitol building. CWRRI has been asked: What is the message in the murals? When were they painted? Who painted them? When does their story begin and when does it end? Here is where history comes in again.

On page 6, the first of two articles on the murals, to appear in *Colorado Water*, is presented. The first reviews their history, providing background and insight into the times and personalities of the people involved. Such history, in this case, is critical to understanding the message contained in the murals. The second article, to be published in the October 1993 issue of *Colorado Water*, will provide an interpretation of the murals in light of today's concerns and values regarding water and the

environment. The murals are an excellent example of how art can help us better understand and express our values regarding water and its relationship to our daily lives. These values and relationships do change, and they are a major factor in the evolution of water management in Colorado.

Thus, whether it is the history surrounding the Roan Creek proposal or the murals in the State Capitol, knowing how we got to where we are today in water management can be extremely helpful in deciding where we, as a society, want to go tomorrow with respect to our values and relationship to water. There are often very compelling reasons for the way things are in water management today, reasons that need to be well understood before we move into a new relationship with water in the future.

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Robert C. Ward, Director

WATER RESEARCH

DEFINING COLORADO'S WATER RESEARCH PRIORITIES FOR 1994-95

by Robert C. Ward

The mandate of the Colorado Water Resources Research Institute (CWRRRI) is to help Colorado citizens, water users and water managers in their continuing efforts to improve our stewardship of water. This mandate is defined by the Federal Water Resources Research Act of 1984 (as amended, extending authorization through 1995) and Colorado statute (CRS 23:35:101-103).

While other state agencies provide water administration, planning, construction, funding and legal assistance, CWRRRI provides research support. How does CWRRRI know what water research is needed? Through many avenues; however, CWRRRI's Research Planning Advisory Committee (RPAC) plays the major role. This committee is comprised of representatives from local, state and federal agencies and the private sector. Besides identifying research priorities, it also evaluates and ranks the proposals submitted to CWRRRI.

The available CWRRRI funding for each year is allocated to projects in "seed" money amounts (ranging roughly from \$9,000 to \$15,000). The fundamental philosophy of the CWRRRI research program is to begin faculty inquiry into research areas of interest to Colorado water users, not to fully fund a particular research project (there simply is not enough money to fund more than a few "seed" projects). Faculty are encouraged to procure matching money that will more adequately fund their research efforts. About half of the projects do receive some matching money, often from a Colorado water organization.

CWRRRI soon will survey the RPAC for top water research priorities of the 1994/95 research funding cycle. If you have thoughts on CWRRRI's water research priorities, please let me, or one of the members listed below, know. CWRRRI is always seeking matching funds for water research!!

Research Planning Advisory Committee Members, 1993-94

- David Carlson	Colorado Department of Agriculture
- Ralph Curtis	Rio Grande Water Conservancy District
- Hal Simpson	Colorado Division of Water Resources
- Michael Everard	Public Service Company of Colorado
- Ed Pokorney	Denver Water Department
- Roland Fischer	Colorado Water Conservation District
- Tom Griswold	Water Utilities, City of Aurora
- John Hendrick	Hendrick Engineering
- Noel Hobbs	Camp Dresser & McKee
- David Holm	Colorado Division of Water Quality Control
- Carmine Iadarola	AquaSan Network, Inc.
- Neil Jaquet	Adolf Coors Company
- Rodney Kuharich	Colorado Springs Water Department
- Dan Law	Colorado Water and Power Development Authority
- Chuck Lile	Colorado Water Conservation Board
- Vernon Norman (ex-officio)	US Geological Survey, Water Resources Division
- Dan Parker	Soil Conservation Board
- George Reed	Kodak, Colorado Division
- Leonard Rice	Leonard Rice Consulting Engineers
- Ken Salazar	Colorado Department of Natural Resources
- Larry Simpson	Northern Colorado Water Conservancy District
- Charles (Tommy) Thomson	Southeastern Colorado Water Conservancy District
- Scott Tucker	Urban Drainage and Flood Control District
- Kenneth Wright	Wright Water Engineers, Inc.

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 A GEOGRAPHIC INFORMATION SYSTEM (GIS) WATER QUALITY MODEL, John D. Stednick, Earth Resources
 VALIDATION OF MEASURES OF ANGLER SATISFACTION, Michael J. Manfredo, Recreation Resources
 CLIMATE CHANGE IN THE COLORADO ROCKY MOUNTAINS: BOUNDING PROJECTED CHANGES IN THE REGION,
 Roger A. Pielke, Atmospheric Science
 THE CREATION OF WETLANDS AT THE ROCKY MOUNTAIN ARSENAL: MONITORING THE PATTERNS...,
 David J. Copper, Cooperative Fish and Wildlife Research
 SUCCESSIONAL CHANGES IN BENTHIC COMMUNITIES IN WETLANDS AT THE ROCKY MOUNTAIN ARSENAL,
 William H. Clements, Cooperative Fish and Wildlife Research
 ATTITUDES TOWARD THE HABITAT PARTNERSHIP PROGRAM, Michael J. Manfredo, Recreation Resources
 WILDLIFE REHABILITATORS' ATTITUDES TOWARD WILDLIFE MANAGEMENT, Michael J. Manfredo, Recreation Resources
 HUMPBACK CHUB MOVEMENT AND HABITAT USE IN DINOSAUR NATIONAL MONUMENT, Robert T. Muth,
 Fishery and Wildlife Biology
 ADVANCED STREAMBANK PROTECTION, Chester C. Watson, Civil Engineering
 SUPPORT FOR GLOBAL CHANGE RESEARCH PROGRAM, Thomas J. Stohlgren, Natural Resources Ecology Lab (NREL)
 COLORADO PREFERENCES AND USES OF WILDLIFE, Michael J. Manfredo, Recreation Resources
 DEVELOPMENT OF THE LOGICAL RESOURCE WORKSTATION, Luis Garcia, Agric. and Chem. Engineering
 THE DIURNAL AND SEASONAL RESPONSE OF BOUNDARY LAYER CLOUDS TO SOLAR WARMING,
 David A. Randall, Atmospheric Science
 GEOLOGIC AND PEDOLOGIC RECORD OF CLIMATE AND VEGETATION IN PLEISTOCENE PALOUSE LOESS...,
 Eugene F. Kelly, Agronomy
 NON-VOLATILE ELEMENT AND VOLUME FLUX IN CLEAVED ROCKS, Eric A. Erslev, Earth Resources
 UNGULATE/VEGETATION INTERACTIONS AT BIGHORN CANYON NATIONAL RECREATION AREA, James K. Detling, Biology
 THE ECONOMIC FEASIBILITY OF DEVELOPING A MANAGEMENT SYSTEM TO RECLAIM RUSSIAN Knapweed...,
 George K. Beck, Plant Pathology and Weed Sciences
 MCMURDO DRY VALLEYS: A COLD DESERT ECOSYSTEM, Diana W. Freckman, NREL
 EVALUATION OF THE WATER QUALITY IMPACTS OF POTENTIAL HAZARDOUS WASTE ON NATIONAL PARK...,
 John D. Stednick, Earth Resources
 WETLAND RESTORATION IN COLORADO RIVER WATERSHED -- ROCKY MOUNTAIN NATIONAL PARK, CO.,
 David J. Cooper, Fishery and Wildlife Biology
 PROJECTING CLIMATE AND VEGETATION CHANGE FOR THE CENTRAL GRASSLANDS BIOGEOGRAPHIC REGION...
 Roger A. Pielke, Atmospheric Science
 SENSITIVITY ASSESSMENT OF THE ASIAN GRASSLAND STEPPE TO CHANGES IN CLIMATE..., Dennis Ojima, NREL
 WETLANDS RESEARCH WITH HISTORICALLY BLACK COLLEGES, Neil S. Grigg, Civil Engineering
 MONITORING OF DROP STRUCTURE SITES, Chester C. Watson, Civil Engineering
 DEVELOPMENT AND APPLICATION OF BIOLOGICAL ASSESSMENT TECHNIQUES TO SERVICEWIDE WATER
 RESOURCES..., Glenn E. Hass, Recreation Resources
 QUANTIFICATION OF FEDERAL RESERVED WATER RIGHTS FOR NATIONAL PARK PURPOSES, Thomas G. Sanders,
 Civil Engineering
 MODELING TECHNIQUES AND TOOLS FOR WATER RESOURCES MANAGEMENT, Marshall Flug, Civil Engineering
 WATERSHED RESEARCH (WR-CPSU), Glenn E. Hass, Recreation Resources
 EVALUATION OF THE EFFECTS OF NATURAL AND ANTHROPOGENIC CHANGE ON ECOLOGICAL STRUCTURE...,
 Nancy J. Hoefs, Recreation Resources
 ECOLOGICAL EFFECTS OF RESERVOIR OPERATIONS ON BLUE MESA RESERVOIR, Brett M. Johnson, Fishery
 and Wildlife Biology
 INTEGRATED RESEARCH ON HAZARDOUS CHEMICAL MIXTURES/ENVIRONMENTAL BIOTECHNOLOGY,
 Kenneth F. Reardon, Agric. and Chem. Engineering
 AQUATIC RESOURCE ANALYSIS, Stephen A. Flickinger, Fishery & Wildlife Biology
 SOIL WATER STORAGE AND USE AS AFFECTED BY CLIMATE ZONE, SOIL POSITION AND CROP ROTATION,
 Gary A. Peterson, Agronomy
 ENVIRONMENTAL PROGRAMS MASTER PLAN FOR VAIL ASSOCIATES, INC., William A. Alldredge, Fishery & Wildlife Biology
 PREDICTING THE EFFECT OF GLOBAL CHANGE ON VEGETATION IN PARK LANDSCAPES... James K. Detling, Biology
 REGIONAL-GLOBAL INTERACTIONS PROJECT, Roger A. Pielke, Atmospheric Science
 COLLABORATIONAL RESEARCH, COLORADO DIVISION OF WILDLIFE, Alan P. Covich, Fishery & Wildlife Biology

- FORMULATION OF MULTIAXIAL CONSTITUTIVE MODELS FOR CONCRETE FOR THE ANALYSIS OF BURIED STRUCTURES**, Hon-Yim Ko, Civil, Environmental and Architectural Engineering (CEAE)
- NUMERICAL MODELING STUDY OF THE GULF OF MEXICO BASIN**, Lakshmi Kantha, Aerospace Engineering
- INTERACTIONS BETWEEN ARCTIC SEA ICE AND ATMOSPHERIC BOUNDARY LAYER IN THE PRESENCE OF LEADS; COMPARISON OF MODEL RESULTS WITH LEADEX**, Judith Curry, Aerospace Engineering
- THE RELATIONSHIP BETWEEN NON-METHANE HYDROCARBON EMISSION AND LEAF CARBON BALANCE IN THE BOREAL FOREST: AN APPROACH FOR MECHANISTIC ECOSYSTEM MODELING**, R. Ray Fall, Cooperative Institute for Research in Environmental Sciences (CIRES)
- ATMOSPHERIC FRONTAL DYNAMICS**, William Blumen, Astrophysical, Planetary and Atmospheric Sciences
- AMS 14C DATING OF ARCTIC LAKE SEDIMENTS**, Gifford Miller, Institute of Arctic and Alpine Research (IAAR)
- COLLABORATIVE RESEARCH: LAKE WEICHSELIAN (VALDI), GLACIATION AND DEGLACIATION OF FRANZ JOSEF LAND, RUSSIA**, Gifford Miller, IAAR
- DYNAMICS OF SUBGLACIER WATER ROUTING AND CHARACTERIZATION OF THE BASAL HYDRAULIC SYSTEM**, Daniel Stone, IAAR
- CONCEPTUAL PLANNING FOR INTEGRATED ANALYSES (INTEGRAL) OF WATER RESOURCE SYSTEMS AND POWER OPERATIONS**, Edith Zagana, Civil, Environmental and Architectural Engineering (CADSWES)
- ARCTIC TREE-LINE REPRODUCTIVE STATUS: A TEST FOR GLOBAL WARMING**, Harvey Nichols, Environmental, Population and Organismic Biology
- NUCLEATION AND GROWTH OF STRATOSPHERIC SULFURIC ACID AEROSOLS: IMPACT ON OZONE**, Margaret Tolbert, CIRES

COLORADO WATER SUPPLY

Cool weather in May and June has allowed the snowpack to melt in a manner which prevented the flooding feared earlier in the spring. It has allowed the runoff to extend later into the summer which should be of benefit to irrigators.

Statewide reservoir storage was 118 percent of normal on June 30, with the Rio Grande basin having the highest storage rate at 190 percent of normal.

The National Weather Service 30-day forecast (July 1) is for normal temperatures and above normal precipitation statewide. Their 90-day forecast (July 1) is also for below normal temperature and above normal precipitation over the entire state.

The Surface Water Supply Index (SWSI) developed by the State Engineer's Office and the USDA Soil Conservation Service is used as an indicator of water supply conditions in the major river basins of the state. It is based on streamflow, reservoir storage, and precipitation for the summer period (May through October). During the summer period streamflow is the primary component in all basins except the South Platte basin where reservoir storage is given the most weight. The following SWSI values were computed for each of the seven basins on July 1, 1993 and reflect conditions during the month of June.

Basin	Nov 1, 1992 SWSI Value	Change From Previous Mo.	Change From Previous Yr.
South Platte	+2.4	+1.2	+0.6
Arkansas	+2.3	-0.6	+2.2
Rio Grande	+1.3	-0.1	+2.9
Gunnison	+2.5	-1.0	+3.9
Colorado	+1.9	-0.8	+4.1
Yampa/White	+2.2	+0.5	+5.7
San Juan/ Dolores	+2.1	-1.4	+2.7

SCALE

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

FEATURES

MURALS OF WATER: A Historical Overview

by Denise Fisher

The date was October 3, 1938. The Executive council of the State of Colorado passed a resolution to accept a gift of murals from the newly formed Boettcher Foundation in honor of the patriarch of the foundation, Charles Boettcher. The murals were to be painted by local artist, Allen Tupper True, and to be placed in the rotunda of the State Capitol. The subject of the murals was to be the development of water in Colorado. Two years later, eight murals were installed in their current location in the center of the Capitol building, each mural occupying a panel of the circular structure of the rotunda.

The murals reside on these same walls in 1993. Visitors and law-makers alike pass these icons of western water development upon entering this political structure. As an artistic expression with a specific history, the murals provide an opportunity to examine the formation of regional values and attitudes toward water in Colorado and in the west. A piece of art is representative of a milieu, a paradigm, functioning like a lens that creates "sense" of the world by bringing the subject into focus--in this case, water in the west. As an embodiment of the role of water in Colorado culture, the murals offer an exceptional opportunity to examine the origins of our complex and vital relationship to water on the high plains. What better way to understand this milieu than by examining the individuals whose lives were shaped by the time and place in which they lived?

A historical analysis of the murals will help to explain the evolution of values and attitudes on water in this region, and will show how the murals are both emblematic of and a function of discourses on water in the west. How did these murals come to be? How did they come to hold their current place in the State Capitol? What were the political and ecoregional contexts of both the individuals and the communities at the time the murals were commissioned?

The perspective that this collaborative expression reflects is a product of the historical and ecoregional events of the thirties and the personal histories of Charles Boettcher, an early entrepreneur and capitalist in Colorado who commissioned the murals; Allen True, the regional artist who painted the murals; and Thomas Ferril, a well-known regional poet who wrote the verse that accompanies and underscores the murals. These men not only helped shape, but were shaped by the view of water reflected in the murals.

ECOREGIONAL/CULTURAL CONTEXT

One of the qualifying elements of "home" for human beings is water. For all of us, our first home is a world of water within

the warm wombs of our mothers. We are then born into a world whose greatest distinction from other planets is the unique and precious characteristic of a water cycle: oceans, glaciers, rivers, springs, lakes, clouds, rain, snow. As inhabitants of this planet, our psyches as well as our bodies are integrally connected to water. Typically, human beings have resided near water, by rivers, lakes, or in regions where precipitation promised an abundance of life.

The settlers of the high plains territories were no exception. These early settlers and colonists came from climates where water was a given--the non-irrigated agricultures of New England, the midwest, the south, or European areas. Their native climates did not demand the rigor of an irrigation-based culture, and the landscape they were accustomed to viewing was green, wooded, and well-watered. This was the ecoregional/cultural heritage of Boettcher, True, and Ferril.

But the climate of the high plains of Colorado was far from well-watered or wooded. In 1820, Major Stephen H. Long led an expedition to explore the headwaters of the Platte, Arkansas, and Red rivers. In his company was Dr. Edwin James, botanist, geologist, and surgeon, who kept extensive notes and made these observations of what Long had dubbed the American Sahara, or "The Great American Desert":

We have little apprehension of giving too unfavorable an account of this portion of the country. Though the soil is in some places fertile, the want of timber, of navigable streams, and water for the necessities of life, render it an unfit residence for any but a *nomad* population (Stone 56, italics mine).

Such was the lifestyle of those who were quite familiar with this ecoregion. Without a concept of "owning" the land, Native American tribes who had inhabited the region for millennia roamed the plains following their sources of subsistence, primarily waterways and buffalo. The presence of the settlers and the agrarian culture they brought with them clashed with the Native Americans and their nomadic lifestyle. Dr. F.A. Wislizenus, who kept an account of his travels through Colorado on his way to and from the Columbus river in 1839, concluded the narrative of his journal with these words:

The fate of the western Indian may be foretold by the history of those who once occupied the eastern half of the country. Civilization will conquer even the last remnant, aided as it is by disease and whiskey....The western tribes, it must be admitted, are protected from the advance of civilization by the vast sandy prairie

which stretches from the boundary of Missouri 1,000 miles to the foot of the range. They have also the great wall of the Rockies and the sand steppes beyond to add to their security.

But civilization will not find these difficulties insurmountable. Fully half of the prairie lands can be put under cultivation, and the lack of timber, which is due less to the nature of the soil than to the many prairie fires and the great herds of game, particularly buffalo, will not count for much with the advance of civilization (Stone 133).

Fifty years after Wislizenus' prophetic words, the Native American presence was confined to reservations, the Cheyennes and Arapahos having been moved to Oklahoma in 1867, hence opening the way for the Euro-American presence on the high plains landscape.

In light of this cultural shift, it is impossible to extricate the unique condition of water in Colorado from the personal needs and yearnings of the early settlers and colonists, needs and yearnings that were defined by the promise of political freedom in the west, but also elicited and defined by the evident lack of water on the high plains landscape. There was space; there was tillable soil; there was "opportunity"--but not without water. To make the desert "home," they had to transform it into an oasis. Space, soil, and even the railroad connections that were being made were pointless in a landscape of dry cactus prairie.

Equipped with little more than homesick imaginings, early settlers and colonists dreamed the water down from the Rocky Mountain glaciers onto the prairie by diverting the rivers into hand-dug canals. The scheme of irrigating the high plains was labeled by some as visionary, utopian and impractical. J. Max Clark, a Union Colonist from Greeley reminisces,

we fooled away our time in digging long canals that ran from somewhere clear down into nowhere and wound in and out and above and around gullies and ravines and draws, onto adobe flats and ridges of sand that wouldn't grow gourds or sprout black-eyed peas (104).

In spite of the hard labor required to dig the canals, the first one carried water for the Union Colonists June 10 1870 (Norris 88). Later that same year, Canal No. 2 was constructed, and the following year, the Lake Canal was built, putting more land into production. Irrigation of the Great American Desert was gaining momentum. And yet, as Clark also records:

We had worked the wonders of magic in building the town, but when we began to meddle with the supposed defects in nature's handiwork in the country, we were very soon impressed with a profound respect for the designs of the Almighty. Our canals, intended to supply a deficiency in the rainfall of the state, were found on trial to be

altogether inadequate even for the small acreage in cultivation under canal No. 2 the second year. Not many of us were overburdened with money when we began the struggle with the desert, and those of us who had any when we began, soon lost it, or expended it in improvements, which, for many years, brought back no profitable return. (Clark 68)

In addition to this inefficient water supply, farmers in the high plains faced hail, grasshoppers, unpredictable growing seasons, and years of drought during which the rivers that flowed wet from the mountains became dry, empty, meandering concaves on the prairie. The canals that had been dug proved useless during a time when even the rivers contained no water.



Charles Boettcher

BOETTCHER

Charles Boettcher was born in Kölleda, Germany (located in a region called the "Green Heart" due to its central location and green forests and meadows) on April 8, 1852. After completing his studies in the *Gymnasium*, Charles was given a trip by his parents to America to visit his older brother, Herman, who had immigrated to Cheyenne, Wyoming, several years earlier, and had found work in a

hardware store. Charles' visit turned into a permanent stay, and he joined Herman in the Hardware business which eventually expanded to include stores in Greeley and Fort Collins.

Boettcher became aware of the hardships of the settlers and colonists during these early years as a hardware merchant. His customers were the farmers who were struggling to grow crops during the drought of 1874. Although Boettcher was never directly dependent for his living on the development of water, his entrepreneurial efforts were indirectly, yet inextricably dependent on an irrigation-based culture. Boettcher's personal contact with water issues in the 1870's must have instilled an understanding of what it meant for Euro-Americans to survive in Colorado, and prompted the commission by the Boettcher foundation in 1938. Without water, there are no communities, no economies, and most certainly no capitalists.

THE 1930's

Aside from the influence of Boettcher's personal history on the commission of the murals, the 1930's saw the Colorado region and the nation interlocked in a political and climatological

drama of post-war depression and severe drought. Farmers had suffered droughts before, but none so severe or lengthy as the years of 1929, 1930, 1931, and 1932. In February of 1933, the 29th General Assembly declared Colorado a state of emergency (Wickens 45). Between 1929 and 1933, the per capita income for the state declined by one third, the twelfth lowest in the nation:

By the day President Roosevelt took office, on March 4, 1933, economic activity in the state had staggered almost to a halt. Agriculture braced itself for another year of drought and continued tumbling farm prices. Trade faltered with bank failures, currency hoarding, and a general climate of restricted business activity. Mining had come to a virtual stand still as well. Summer tourism had not yet begun. Perhaps one out of every five employables was out of work. Colorado was more than ready for a "new deal," as the nation awaited the inauguration of the age of Roosevelt (Wickens 50).

Unemployment reached its peak in Colorado a month later. People were hungry, suffering, and desperate.

Out of this unique context of historical circumstances emerged several institutions. While water had been controlled to a degree by humans all over the world, there was an unprecedented proliferation of structures and institutions dedicated to the control of water in the 1930's. New Deal proposals included Federal Emergency Relief Administration (FERA) and the suborganizations of Works Progress Administration (WPA) and Civil Works Administration (CWA).

After several years of rocky relationships with federal relief programs, Colorado received CWA assistance which used federal monies to hire single men in the service of conservation and reclamation projects--a seemingly perfect solution for Colorado's woes. CWA combined forces with the Soil Conservation Service and the Bureau of Reclamation and provided funds for projects that would both employ Coloradans and develop water via flood control or hydro-electric constructions. One of the first WPA projects in Colorado was riprapping the South Platte River. CWA not only hired engineers and laborers, but artists. Enter artist Allen Tupper True.

TRUE

Allen True was a "native" Coloradan. He was born May 30, 1881 in Colorado Springs to Henry True and Margaret Tupper True. Henry had moved from St. Louis, Missouri to Colorado Springs only ten years earlier, and established the first general merchandising store. He met and married Margaret Tupper, who was a school teacher in Colorado Springs at the time, in August, 1880.

Allen True graduated from Manual Training High School in Denver, and while he was a student there his talents gained



Allen Tupper True

attention from Mrs. William Church and her son Arthur P. Church. The Churches became True's beneficiaries, financing his study with Howard Pyle, the Dean of American illustrators in Philadelphia, in 1902-1908.

True later studied with the British mural painter, Frank Branguyn, and spent some time in Paris studying the modern mural painter, Pievis De Chavemes. True was influenced by the styles of these modernists and Europeans, but the content of True's work primarily

reflected his home: Colorado. All of his illustrations during 1902-1908 were Colorado scenes, and in 1911 he illustrated a book on Colorado.

True returned to Colorado in 1917. The following years were prolific for True both in terms of his career and in terms of his personal life. He had married Emma Goodman Eaton in 1914 and together they had four children: Frank Eaton, Jane, Edith Tupper, and Allen Tupper Jr. During this time, True painted murals in the Wyoming State Capitol, the Missouri State Capitol, the Colorado National Bank in Denver, the New Telephone Building in Denver, in addition to a one man art exhibition circulated in 29 cities by the American Federation of Arts.

In 1935, at the height of Roosevelt's relief programs, True was hired by the Bureau of Reclamation as a consultant for the color scheme and decoration of the Boulder Dam (later renamed Hoover Dam). The Boetchers commissioned True for the Capitol murals three years later.

As True was contemplating the topic of water as the subject for his murals, he was reminded of a poem by his friend, Thomas Hornsby Ferril. A Denver Post article records, "The two--poet and artist, one and indivisible--got together, drawing at pipes, talking long hours of the glory that is Colorado..." (June 30, 1940). The poem was "Here Is a Land Where Life Is Written in Water," which later came to occupy the first panel in the series of murals.

FERRIL

Thomas Hornsby Ferril was also a "native" Coloradan. Ferril's father, William C. Ferril, was born in Lawrence, Kansas less than forty miles from the Missouri River and the edge of the western frontier. He later moved to Silvercliffe in 1879 and then to Denver in 1886. There he met Alice Lawton McHarg, and they were married in 1888.



Thomas Hornsby Ferril

Born in Denver on February 24, 1896, Thomas Ferril published his first poem in 1906 at the age of ten. He attended Denver schools and graduated from Colorado College in Colorado Springs in 1918. After working for several Denver newspapers, Ferril was hired by the Great Western Sugar Company as a press agent. He worked there for 42 years.

Ferril's first volume of poetry, High Passage was published in 1925. After his next volume of poetry, Westering, came Trial By Time in which "Written in Water" first appeared in 1936. Ferril's poetry coexisted with his industrial career. Ferril once said,

It's a good thing for a poet to be engaged in industrial life. I had all the contacts of contemporary life--farmers, teachers, salesmen, factory people. I think

that I was closer to what was happening than if I had gone into library or teaching (Rocky Mountain News, 10-29-88).

His immersion in industrial life mixed with Ferril's geographical surroundings in his poetry. The rivers, the mountains, the plains, and human community of Colorado became the lens for Ferril's poetic eye.

CONCLUSION

So it came to be that Boettcher, True, and Ferril collaboratively produced the murals situated in the rotunda. Not only was each man influenced by the economic and climatological drama of the 1930's, but each man influenced the other in terms of inspiration and political ideologies. Each man was closely associated through his work to the economic struggles of the region.

Water was no less than salvation for the particular culture they were enmeshed in. Thus, the murals do not represent a truth that transcends history, but a very specific, and very *real* human and regional context that includes factors of economic and cultural power within a particular ecoregion.

In part two of this article I will be working from this historical context to explore further the value systems and views of water represented in the murals.

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NATIONAL PARK SERVICE WATER RESOURCES DIVISION

by Stephanie Ward

It is a gorgeous day for a hike in the Rocky Mountain National Park. As you hike the trails you notice the park rangers, and perhaps how clear the stream is that curves through the forest, but you do not think much beyond these observations. In fact most hikers, campers and other visitors to the national parks do not realize just how much and how varied the involvement of the National Park Service (NPS) is in maintaining the natural settings of our parks as civilization increasingly impacts them. The challenge of protecting park water resources is made particularly difficult because park boundaries rarely coincide with the watersheds of park rivers, lakes, wetlands and springs.

Within NPS the Water Resources Division assists on-site NPS staff in developing knowledge and skills needed to protect our parks' natural water environment. This division is responsible

for water planning, operations, research and studies, as well as protection of water rights in parks, monuments, historical sites and recreation areas across the nation.

The Water Resources Division is headed by Division Chief, Dan Kimball, and is part of the Park Service's Natural Resources Directorate. The Division consists of four branches, each addressing a specific dimension of modern water management. The Planning and Evaluation Branch is headed by Acting Branch Chief, Mark Flora. This branch's activities include assisting parks in preparing water resources management plans, reviewing resource management plans, evaluating complex regulatory issues and implementing the Wetlands Activity Component of WRD's Watershed Protection Program.

Three of its current projects are:

- water resources planning for Big Bend National Park
- stream restoration plans for Hog Canyon, Dinosaur National Monument; and
- Preparing the brochure, "Wetlands in the National Parks."

A second branch of the Water Resources Division is the Water Rights Branch under Branch Chief Owen Williams. This branch is involved with a wide variety of water rights issues in NPS units, such as Death Valley National Monument, Lake Mead National Recreation Area, Great Basin National Park, Black Canyon of the Gunnison National Monument and Rocky Mountain National Park. Three of the many issues the branch is currently dealing with are:

- Completing negotiations with the state of Montana for reserved water rights at Glacier National Park, Big Hole National Battlefield and the Montana portion of Yellowstone National Park;
- Negotiating with the Bureau of Reclamation for a water delivery contract to deliver water from the Aspinall Unit reservoirs to Black Canyon of the Gunnison National Monument.
- Preparing for hearings, along with the Bureau of Land Management, Fish and Wildlife Service and the Bureau of Indian Affairs, on water applications of the Las Vegas Valley Water District in Nevada.

Another branch is the Water Operations Branch, whose Branch Chief is William Jackson. The Water Operations Branch directly assist parks in groundwater impact assessments, water supply development, floodplain assessments, water resources/Geographic Information Systems, water quality inventory and monitoring, and watershed and stream management. New projects in 1992 for this branch are:

- NPS Water Quality Data Management System;
- National Cooperating Agency Water Quality Monitoring Initiative;

- Water Quality Inventorying and Monitoring Technical Guidance;
- Development of a computer "Encyclopedia" on the environmental effects of aquatic containments; and
- Glen Canyon Dam environmental studies.

Finally there is the Applied Research Branch of the Water Resources Division with Acting Branch Chief Marshall Flug. This branch, which is scheduled to be transferred to the National Biological Survey, conducts research in: water allocation, watershed studies, population and community analysis of macroinvertebrates and fishes, water quality, risk analysis, and multiple use analysis of park waters. This research is designed to help aid National Park Service managers in protecting, regulating and using water resources. Just a few of the many and diverse projects the Applied Research Branch is working on include:

- Use of biological indicators to guide regional management of water quality. Applications are underway at:
 - 1) St. Croix National Riverway
 - 2) Sleeping Bear Dunes National Lakeshore
 - 3) Pictured Rocks National Lakeshore
 - 4) Six Prairie Parks Inventory and Monitoring
- Long-term watershed/ecosystem studies:
 - 1) Sequoia National Park
 - 2) Rocky Mountain National Park
 - 3) Isle Royale National Park
 - 4) Olympic National Park

National Parks play an important role in the restoration and preservation of our nation's natural lands and resources, and water is a vital part of the environment in the parks. The Water Resources Division provides the technical expertise necessary for the National Park Service to carry out its mandate for preservation, protection and management of water in our National Parks. The Water Resources Division office is located in Ft. Collins at 1201 Oak Ridge Dr. Suite 250. For more information or for questions contact the Water Resources Division at (303) 225-3500.

THE ROAN CREEK PROPOSAL - A BOON OR BUST?

by *Stephanie Ward*

The land was rolling, sandy waves with sagebrush. It looked like the rest of the desert -- uninhabitable, isolated, barren and dry. This is where Las Vegas is located now with its lights flashing, huge glass-walled buildings, waterfalls in hotel lobbies, grass lawns a deep green from sprinklers, water being used everywhere. In the early 1900's there was only barren desert where Las Vegas now sits, and Nevada did not need a large

portion of Colorado River water. There were few people to support and little or no agriculture that required irrigation.

It was at this time, 1922 to be exact, that the states of the Colorado River Basin divided up the water of the Colorado River. A few years later, in 1928, the Boulder Canyon Act specifically defined Nevada's share of Colorado River water. At that time, unfortunately, no one knew that Las Vegas would

Roan Creek is a proposal that involves leasing some of Colorado's allotment of Colorado River water for temporary use in the Law Vegas area. There is disagreement about the similarity of the Roan Creek proposal to past proposals for interstate water transfers (e.g., Galloway and RCG proposals). Some feel Roan Creek is different from past proposals because it does not use other people's water rights. Others view Roan Creek as the same as past proposals because there is government storage in Colorado, the transfer of water between states, and the lease arrangement is temporary.

One of the best examples of proposed interstate water transfer arrangements is the 1984 Galloway Proposal. The plan involved leasing a portion of Colorado's share of Colorado River water to San Diego. San Diego would lease 300,000 to 500,000 acre-feet for forty years and would transfer the water through the Metropolitan Water District of Southern California (MVD) facilities (Wahl, 274). The Galloway Proposal ran into opposition from many sides. The MVD did not want to pay the fees for surplus water, which it received free from Colorado and other Upper Basin States (Wahl 278). The MVD prepared more than 30 pages of arguments stating that the Galloway Proposal went against the Law of the River (Wahl, 276). The Lower Basin states registered their opposition to the Galloway Proposal, while some of the Upper Basin states showed some interest in the whole concept of leasing water to other Colorado River Basin states but did not endorse the Galloway Proposal (Wahl 278).

A similar plan was the 1989 Resource Conservation Group Inc.'s (RCG) Proposal often referred to as the "son of Galloway." RCG's plan called for the lease and transfer of water from Colorado, Wyoming and Utah farmers every third year to supply cities in the Southwest with water (Denver Post 12/31/89). The RCG plan included, among several water sources, the rotating dry-up of agricultural lands. Ironically enough, this proposal was endorsed by several former governors of Lower Basin states that had previously opposed the Galloway Proposal (Denver Post 12/31/89).

Thus the Roan Creek Proposal is not a new concept, but it has some differences from previous proposals and consequently is the subject of many news stories and conversations within the Colorado River Basin. What exactly is the Roan Creek Proposal? It is a project proposed by Chevron Shale Oil Company and Getty Oil Exploration Company to lease 100,000-200,000 acre-feet of Colorado's share of Colorado River water to Nevada for 30-50 years, and to provide recreation and fish and wildlife enhancement (Chevron 1993). Nevada would build the pumping plant on the Colorado River at DeBeque, a 4.5 mile pipeline up Roan Creek and a 155 foot-high dam on Roan Creek, all for \$200 million (Daily Sentinel 2/7/93). Nevada would then pay Colorado \$50 per acre-foot per year in fees. The lease would also require that Nevada have a replacement source of water by the end of the lease term.

Chevron and Getty Oil already have rights to the water which they plan to use for developing oil shale. However as the oil shale industry has declined, use of the water for oil shale

development is unnecessary at this time. In order to make beneficial use of the water, which the law of prior appropriation requires and to protect against California's growing dependency on Colorado's currently unused water, Chevron and Getty proposed the Roan Creek Project. This proposed use of the water would allow them to have the water for oil shale development at a later date when needed. The leasing of Colorado River water from the Roan Creek project is the Interim Phase, while the Long Term Phase is to use the water for oil shale development in Colorado (Chevron, 1993). The controversy surrounding Roan Creek seems to focus on three fundamental issues, legal, economic and environmental.

LEGAL ISSUES

Perhaps the main legal issue regarding the Roan Creek project is the debate over whether such interstate leasing of water is allowed under the Colorado River Compact. Additional issues include the availability of water for the Front Range during drought conditions, and whether or not Roan Creek would adversely affect Native American rights to Colorado River water. The Colorado River Compact of 1922 is the foundation for the "Law of the River" and, because the Colorado River is a main source of water for many of the western and southwestern states, it is important that this compact not be undermined. The compact divided the Colorado River watershed into two basins, the upper and lower, and allocated 7.5 million acre-feet of water to each basin and 1 million acre-feet to Mexico. The Upper Basin's 7.5 million acre-feet is subject to delivery of the 7.5 million acre-feet to the lower basin, no matter what the total acre-feet water yield is that year. The Upper Basin needed the Compact in order to avoid the prior appropriation doctrine allocating most Colorado River water to rapidly developing lower basin states and to, thus, protect their entitlement of water while developing at their own pace (Lochhead Oct.1991). The separate basins then allocated their respective 7.5 million acre-feet of water among the states in each basin at later dates. For example, the Upper Basin states of Colorado, New Mexico, Utah and Wyoming drew up the Upper Colorado River Basin Compact in 1948 to determine how their water was to be allocated among themselves, on a percentage basis.

The biggest problem in relation to the Colorado River Compact is whether the compact allows for the transfer of water between basins at all. One side argues that the compact does not allow for water to be transferred between the upper and lower basins. The major basis for this argument is in Article III (a) which states, "There is hereby apportioned from the Colorado River System in perpetuity to the Upper Basin and to the Lower Basin respectively the exclusive beneficial consumptive use..." in which "exclusive" is the key word. Sharon P. Gross argues this exclusive use means use within the portion of the basin in which the water was originally allotted. Gross claims that Article VIII further demonstrates interstate/basin transfers are not allowed when the compact states, "All other rights to beneficial use of waters of the Colorado River System shall be satisfied solely from the water apportioned to that Basin in which they are situate" (940). Those opposing Roan Creek feel it is

contradicting "Delph Carpenter's basic purpose in negotiating the Colorado River Compact: preserving Colorado's right to develop in perpetuity, by protecting Colorado from the market forces of the Lower Basin (Lochhead, 4/29/93)."

Proponents of interstate water transfers, like Roan Creek, claim the Colorado River Compact does not specifically prohibit interstate transfers but rather, in Article VI, says such transactions should be dealt with outside of the operations of the compact (Ross and Williams, 1993). Article VI says when any claim or controversy arises between two more of the states, the Governors of the states affected will consider the claim or controversy. Many in Colorado are worried that if allowed by the compact, this leasing of water to Nevada would open up an unregulated water market on the Colorado River (Daily Sentinel 2/3/93). This could result in Colorado farmers selling their water rights to wealthy downstream users. The oil companies argue that an open water market would not go unregulated. There would be third party protection, a court order would be required to allow exportation which would include reasonable protection for others, and the Department of Natural Resources would protect Colorado's interests (Ross and Williams, 1993).

Another area in which the Colorado River Compact is not clear concerns whether water is an article of commerce. The case of *Sporhase vs. Nebraska* addressed this question when it decided states have the right to regulate their water resources as an article of commerce as long as it is reasonable and constitutional (Ross and Williams, 1993).

A legal issue is the availability of water for the Front Range. Roan Creek could affect availability of water for the Windy Gap project which transports Western Slope water to northeastern Colorado. The Roan Creek Project would be senior to Windy Gap in priority for water during times of drought. The feeling of many Front Range politicians is summed up in a Denver Post editorial of Feb. 13, 1993 which said, "In an extended drought, Front Range residents might have to quit watering their gardens so the casinos in Las Vegas could keep their artificial waterfalls running."

The effect on Native Americans is another political issue surrounding Roan Creek. Ten Native American tribes have rights to water in the Colorado River, and there is concern that the Roan Creek project may upset negotiations over an interstate leasing proposal the ten tribes are trying to work out (Daily Sentinel, 5/15/93). So far the tribes have not expressed any concern, according to the oil companies, and many feel this is not an issue in the Roan Creek debate. The oil companies say Roan Creek should not deter the Native American tribes from pursuing leasing of their Colorado River rights, and that the Roan Creek Project could actually help pave the way for leasing the Native American water rights (Ross and Williams, 1993).

ECONOMIC ISSUES

Economics is another area in which much controversy surrounds the Roan Creek Proposal. Probably the most important

economic issue is the possibility of short-term gains for long-term losses and litigation costs. There is concern that Colorado would not have water available for later economic development if the oil companies successfully lease the state's water. Without the water the state could lose billions of dollars in the future (Pueblo Chieftain 3/6/93). Roan Creek advocates claim there will be water for use in Colorado after the lease expires, and that the water being transferred is only a very small portion of Colorado's share under the compact (Ross and Williams, 1993). Those opposing Roan Creek feel that the availability of Colorado River water after a 50-year period is an open question that will have to be dealt with legally, which may or may not restore the water to Colorado. Further, the advocates of Roan Creek suggest that the lease can contain provisions allowing earlier termination if the oil companies need the water and can provide an alternate source for the remainder of the lease term.

The long and complex legal battles over Roan Creek could last for years and cost water users and taxpayers millions of dollars (Romer, 1993). With the recent passing of Amendment 1 and tax limitations, the possible high legal costs are a concern of politicians since the money issue would not go over well with taxpayers and voters.

Additional economic advantages put forth by advocates of the Roan Creek Proposal are that the construction financing is solid, most environmental permits are in place, the oil companies are not profiting from the project, and the ranchers along Roan Creek will still be in business.

ENVIRONMENTAL ISSUES

Environmental issues also pervade the proposed Roan Creek Project, as they do every water project. The Colorado River between DeBeque and Las Vegas is proposed as critical habitat for endangered fish such as the razorback sucker, humpbacked chub, bonytailed chub, and Colorado squawfish; yet the dam on Roan Creek also holds possible benefits for the fish. The dam could control flows down river, and the fish need a steady flow part of the year and higher flows just before spawning (Rocky Mountain News 2/21/93).

Land is another environmental aspect but does not pose too many problems. Chevron and Getty own most of the land around the dam site, and the 800 acres that would be flooded are unoccupied. Also, no adverse impacts on irrigated agriculture have been identified (Daily Sentinel 2/7/93).

NEVADA'S PERSPECTIVE

Although Nevada would receive much-needed water for 30-50 years, some Nevada lawmakers have voiced concerns about the temporary nature of the Roan Creek Proposal, the high costs, and the secrecy surrounding the negotiations (Montrose Daily Press 2/8/93). Senator Joe Neal, (D-North Las Vegas) voiced criticism of the Roan Creek Proposal in Nevada. Neal said of the project's temporary nature and costs, "We would get the

water temporarily until we find some other sources, yet we'd pay for a dam in Grand Junction, Colo. (Montrose Daily Press 2/8/93)." Neal also did not like the way in which the Colorado River Commission conducted the negotiations for a deal in secrecy. Neal pointed out that it is the people who would pay for the project and therefore have a right to know what is going on. There is no doubt Las Vegas is in great need of water, and as Interior Secretary Bruce Babbitt said, "[B]ecause Las Vegas...under existing law...cannot take more water from the Colorado River, which runs right by its own doorstep... I pledge to find a market mechanism to help Las Vegas enter a new era of water management (Western States Water #997)." Roan Creek is an example of a "market mechanism."

CONCLUSION

In the modern west, all water projects are required to go through considerable litigation and debate. Many issues have to be studied, debated and approved before a project can move into the construction phase. Roan Creek is just beginning on this long road, and somewhere along the way it may be stopped or postponed. The project must pass legal, economic and environmental tests, and only the future will tell whether the Roan Creek Project will succeed or whether it will fall by the wayside like many earlier water proposals.

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(Editor's Note: the following two articles have been adopted from the Divining Rod, the New Mexico Water Resources Research Institute's newsletter. June 1993 p. 3-5.)

PARK CITY PRINCIPLES: A NEW APPROACH TO WESTERN WATER MANAGEMENT

by Stephanie Ward

Water in the west is not plentiful -- it is a valuable commodity that is fought over, built around and used almost to the last drop. The West has always realized the importance of its water and created a system that worked well to manage it. Recently however, things have changed. There is now virtual gridlock in water management. Why this change? What went wrong?

There are a number of reasons for this gridlock: rapid urban growth which requires more water resources; the recognition of Native American water rights; enforced endangered species laws; public concern for instream flow and the environment in general; no support for new water projects; lack of public funds; conflicting and overlapping laws and programs; and isolated competing parties.

With all these problems, the search is now on for new western water management. The Western Governor's Association (WGA) and the Western States Water Council (WSWC) conducted a search for answers through a series of three workshops over a period of two years. The workshops were

held in Park City, Utah and included a wide variety of people involved in water management. This group produced the Park City Paradigm.

The paradigm established a set of principles for considering the "public interest," or perhaps more appropriately, many different interests. The principles that the Park City Paradigm established are:

- Recognize diverse interests. There should be meaningful legal and administrative recognition of diverse interests in water resources planning.
- Use problemshd approach. Problems should be approached in a holistic or systemic way that recognizes cross-cutting issues, cross-border impacts and concerns, and multiple needs within the broader "problemshd" - the area that encompasses the problem and all affected interests. The capacity to exercise governmental authority at problemshd, especially basinwide, levels much be

area that encompasses the problem and all affected interests. The capacity to exercise governmental authority at problemshed, especially basinwide, levels much be provided to enable and facilitate direct interactions and accommodate interests among affected parties.

- Be flexible, predictable, adaptable. The policy framework should be responsive to economic, social and environmental considerations. Policies must be flexible and yet provide some level of predictability. In addition, be able to adapt to changing conditions, needs, and values; accommodate complexity; and allow managers to act in the face of uncertainty.
- Decentralize to states. Authority and accountability should be decentralized within national policy parameters. This includes a general policy of recognizing and supporting the key role of states in water management as well as delegation to states and tribes of specific water-related federal programs patterned after the model of water quality enforcement.
- Use negotiation and market-like approach. Negotiation and market-like approaches as well as performance standards are preferred over command and control patterns.
- Advocate joint policy participation. Broadly based state and basin participation in federal program policy development and administration is encouraged, as is comparable federal participation in state forums and processes.

THE POWELL CONSORTIUM: A BASINWIDE APPROACH TO WATER RESEARCH

by Stephanie Ward

John Wesley Powell was geologist, teacher and philosopher and probably one of the best-known environmentalists of the late 1800's. He chartered the Colorado River and wrote extensively about it. Now, in the early 1990's, in recognition of John Wesley Powell, the Powell Consortium is trying to improve the technical and scientific foundation for water and environmental decisionmaking.

The Consortium is appropriately made up of the water institutes from the seven Colorado River Basin states of California, Arizona, Nevada, Utah, Wyoming, Colorado, and New Mexico. For almost 20 years these members have used their expertise to develop solutions to water problems in the Colorado/Great Basin Region. The Consortium usually generates \$17.5 million in funding per year and currently there are over 250 active research projects involving graduate and undergraduate students in the seven water institutes.

Not only did the group meeting in Park City come up with the above principles but also with a list of paradoxes which recognize the complexity of the principles. The paradoxes are:

- The tradeoff between certainty and flexibility.
- The tradeoff between federal mandates as motivators for states and others to solve their own problems.
- The tradeoff between data sufficiency and overkill (recognizing there is frequently a need to act in the face of incomplete information).
- The tradeoff between public involvement and expeditious decision-making.
- The tradeoff between fragmentation and tidy but potentially narrow and unrepresentative systems.
- The tradeoffs between individual rights and the public interest.
- The problem of "multiple problemsheds" (a basin with a number of issues, each of which involves a different problemshed).

The Park City Paradigm resulted in many important statements and realizations. Most importantly, the Park City Paradigm recognized that solving our water problems involves everyone who is interested and affected by water. Hopefully the principles drawn up at Park City will lead to solutions for present and future water management problems.

Recently these institutes began discussions with the Western Governor's Association (WGA) and the Western States Water Council (WSWC) to study federal statutes and their relation to the Park City Principles (discussed in the previous article). The Park City Principles, in part, call for decentralization to the states in water management, authority and accountability. The study looks at federal regulations and court decisions that effect the ability of non-federal organizations to manage water resources and resolve water conflicts over competing interests.

A group of five legal scholars prepared individual "White Papers" which examined the following: species protection, water quality, interstate issues and hydropower. The White Papers were prepared for the fourth workshop, which was organized to continue discussion and debate about setting in motion the Park City Principles. Through the White Papers and discussion the feeling of the workshop was one of action. Finally the

discussion around the Park City Principles was becoming something that could work in the real world. Here are a few examples of the kind of planning that came from the scholars that prepared the White Papers:

Larry McDonnell from the University of Colorado suggested ways in which states could pursue their own objectives in relation to the Clean Water Act without the need to change federal law.

Brian Gray from the University of California produced a study on the effects of transferring the Bureau of Reclamation's Central Valley Project to the State of California.

Chuck DuMars from the University of New Mexico discussed the interstate allocation of water and how present conflict resolution compares with the Park City Principles.

The Powell Consortium is an important contributor to the study and discussion of the many water issues that affect the Colorado River Basin. The study on federal statutes that came about after the Park City Principles is just one example of the kind of important research and debate that the Powell Consortium conducts to help everyone better understand the issues and to hopefully also come up with solutions.

WATER EDUCATION

COLORADO WATER EDUCATION FOUNDATION DEVELOPS COLORADO WATER MAP

The Colorado Water Education Foundation (CWEF) was incorporated in February, 1992 to develop and disseminate impartial water education programs in Colorado. Its objective is to provide various viewpoints on water, with no advocacy position taken on any issue, and to foster a broader understanding of water challenges among the general population.

The foundation is governed by a 33-member board of trustees representing various facets of water from both the West and East slopes. Interests represented include conservation, education, environment, water providers, developers, agriculture, and public agencies. CWEF is a recognized non-profit, tax-exempt 501(c)(3) organization, and depends on the contributions, donations, and the support of individuals and public and private organizations.

CWEF projects in progress include development of a series of water maps. The first will be a Colorado Water Resource Map. This full color, poster-size map features an aerial depiction of the topography of the state, emphasizing Colorado's rivers, lakes, dams, and diversion tunnels, drawn by noted local artist James Niehues. Several vignettes will describe topics such as sources of Colorado water, seasonal and annual stream flow

information, the many uses of water including recreation and agriculture, comparison of Colorado's water resources to other states, and depiction of various river basins and major groundwater basins. The Colorado Water Resource Map will be suitable for classroom use, and CWEF will produce accompanying lay-person guides.

According to CWRRI Director Robert Ward, the maps will serve an important purpose in filling a current void in Colorado water resource information.

Prices for the Colorado Water Resource Map are:

individual map	\$8.50/ea.
100 or more	\$7.00/ea.
1,000 or more	\$6.00/ea.

Add 0.038% ST for Colorado orders. Make checks payable to: Colorado Water Education Foundation, and mail to: Colorado Water Education Foundation, 21593 Hill Gail Way, Parker, CO 80134-7247. TEL: 303/840-2845; FAX: 303/840-2846

RESIDENTIAL WATER USE

As part of an environmental series leading up to Earth Day, 1993, *USA TODAY* printed the following residential water use statistics from the U.S. Environmental Protection Agency:

- Shower -- 5-10 gallons per minute
- Tub bath -- 50 gallons, if full
- Flushing -- 5-7 gallons per flush
- Dishwasher -- 15-25 gallons per cycle
- Washing machine -- 35 gallons per cycle
- Lawn watering - 35 gallons per half-acre

UNIVERSITY WATER NEWS

TEAM ACHIEVES CONCRETE CANOE SUCCESS

by Mary DeMartini



CSU Team with "Civil Frenzy"

With inspiration gained after hosting the National Concrete Canoe Competition last June, the Colorado State civil engineering team challenged themselves to build a sleek and maneuverable canoe of concrete to prove it is a versatile material and can be used to build swift watercraft. The competition is sponsored by the American Society of Civil Engineers (ASCE) and Master Builders, Inc.

The CSU team began early, during the fall semester, discussing ideas, experimenting with various concrete mixes and designing the hull shape. Matt Javernick led the Concrete Mix design committee that developed a high-strength, workable, light-weight concrete mix. "This is not your regular sidewalk concrete," said Dr. Paul Nowak, ASCE CSU student chapter advisor. "It gets pretty fancy." Mike

Meade led the Hull Design committee and used Auto-Cad to arrive at the unique design: a 17-foot asymmetrical canoe with an extreme rocker and shallow-V cross section. With these characteristics, the canoe's tracking ability was compromised to improve its maneuverability. The idea was to overcome tracking weakness through paddling experience. During winter vacation the canoe mold was built and soon after spring semester started the canoe was poured. Much time was spent in the finishing work of sanding and painting before the "Civil Frenzy" was born and ready to compete.

In early April, the CSU team went to the Rocky Mountain Regional Conference held in Logan, Utah and competed against 10 other teams for the championship, since only the winner moves on to nationals. The big rivalry was between CSU and the South Dakota School of Mines and Technology, the regional winner in previous years. The teams were judged on: design paper (25%), oral presentation (15%), poster display (10%), finished canoe (10%), and race performance (40%). The contest strives to reward well-rounded engineers: those with engineering design knowledge, communication skills, and some athletic ability.

A REGIONAL FIRST PLACE! --The CSU team was excited with a first place finish at Regionals and prepared anxiously for its first national showing in Sacramento, California in late June. The competition brings together 20 Regional champions from around the country. Master Builders Inc. awards \$9,000 in scholarship money to the top teams. The competition provides a unique opportunity for undergraduate civil engineering students to work together as a design, construction, and presentation team and use their developing engineering skills in an innovative way. Also, it is interesting to hear how others approached the challenge of building a concrete canoe and to see how their designs work in action.

A NATIONAL FIFTH PLACE!

The University of Alabama at Huntsville dominated the competition with their 78-pound canoe, "Rock-It". In Second Place was Michigan State University. The defending champion University of California at Berkeley placed third. The University of New Orleans finished fourth, and Colorado State University came in fifth.

Said crew captain Matt Javernick, "We not only met expectations but surpassed them. It was an excellent time." Team advisor Paul Nowak said, "This is the first time a rookie first-year team has placed in the top five. "We came out of nowhere and surprised a lot of people."



Mary DeMartini-Andre rows toward finish line

WATER PUBLICATIONS

CWRRI REPORTS

Information Series No. 75, "Showdown on the Colorado River," Proceedings of the 17th Annual Colorado Water Workshop held at Western State College in July 1992. The proceedings encapsulates the modern debate over allocation of Western water with panels and individual presentations on the topics including: "law of the river;" Native American water rights, interstate compacts and water marketing; the impact of the Endangered Species Act on water development and allocation decisions; rural-to-urban water transfers; and the concept of an interstate water bank. Price: \$30 (includes cost of transcribing the conference).

WATER RESOURCES PUBLICATIONS

A Colorado company publishing and distributing books and monographs in water resources and associated disciplines

In 1971 Dr. Vujica Yevjevich, Professor of Civil Engineering at Colorado State University (CSU), started a publishing partnership, entitled Water Resources Publications, known as WRP. His objectives were to accelerate the printing of technical publications written and/or edited by professors at CSU specializing in water resources and related areas. Publications distributed by WRP include the CSU Hydrology paper series, the continuing Water Resources paper series, several publications by American Society of Agricultural Engineers (ASAE) and American Society of Civil Engineers (ASCE)), publications from the International Institute for Land Reclamation and Improvement (ILRI, Wageningen, The Netherlands), and Kultura (Budapest, Hungary).

WRP offers authors and editors several options for printing their manuscripts; either WRP or the author/editor can produce the camera-ready manuscript and/or pay for the printing of the publication. WRP works jointly with the authors and editors to promote the book(s). As a small publisher, WRP gives authors and editors more personalized service, offers typically larger royalty payments, and manuscripts are printed relatively quickly. New books published by WRP recently include:

- *Sediment Transport Technology and Solution Manual*, by D.B. Simons and F. Senturk
- *Hydraulics of Water Wells; Determination of Hydraulic Conductivity of Porous Media from Grain-size Composition*, by M. Vukovic and A. Soro

Forthcoming publications include:

- *Cybernetics in Water Resources Management*, by B. Djorkjevic
- *Hydraulics of Dams and Reservoirs*, by F. Senturk
- *Urban Storm Drainage*, edited by C. Cao, B.C. Yen, and M. Benedini

Catalogs are available from WRP, P.O. Box 260026, Highlands Ranch, CO 80126-0026, TEL: 303/790-1836.

AMBIENT WATER QUALITY MONITORING IN THE U.S.: A Progress Report to the Office of Management & Budget -- The Intergovernmental Task Force on Monitoring Water Quality (ITFM) submitted its first-year review, evaluation, and a set of 11 conclusions and recommendations to the OMB in December 1992. To obtain copies of the report, contact U.S. Geological Survey, Office of Water Data Coordination, 417 National Center, Reston, VA 22092. Phone: 703/648-5023.

NEW POLICY DIRECTIONS TO SUSTAIN THE NATION'S WATER RESOURCES, a report on a recent briefing series on emerging water issues, sponsored by the Environmental and Energy Study Institute. Send check or money order for \$25 per copy to EESI, 122 C St., NW, Suite 700, Washington, DC 20001.

NEW AWRA PUBLICATIONS

GEOGRAPHIC INFORMATION SYSTEMS AND WATER RESOURCES, Edited by John M. Harlin and Kenneth J. Lanfear.

FIRST INTERNATIONAL CONFERENCE ON GROUND WATER ECOLOGY, Edited by Jack A. Stanford and John J. Simons.

CHANGING ROLES IN WATER RESOURCES MANAGEMENT AND POLICY, Edited by Donald F. Potts

WATER RESOURCES ADMINISTRATION IN THE UNITED STATES, Policy, Practice and Emerging Issues, Edited by Martin Reuss

AQUIFERS OF THE FAR WEST, Edited by Keith R. Prince and A. Ivan Johnson -- describes analyses of various parts of the 28 Regional Aquifer System Analysis (RASA) studies of the U.S. Geological Survey.

SOFTWARE

Hydrosphere Data Products Inc. has developed GIS products for the monthly summary records of Hydrodata USGS Daily Values and Climatedata NCDC Summary of the Day. The databases are available on one disk each. For information call 1-800-949-4937.

The American Water Works Association is offering a software package that can help evaluate the three primary corrosion control strategies included under USEPA's Lead and Copper Rule, as well as model water quality at any point of a water supply treatment process. For information call 1-800-926-7337.

EDITOR'S IN-BASKET

RECLAMATION'S DEPUTY COMMISSIONER ANNOUNCES RETIREMENT

Joe D. Hall, Deputy Commissioner for the U.S. Department of the Interior's Bureau of Reclamation, formally announced his retirement on June 1. Hall had served in this position since 1987 and had 33 years of Federal service, mostly with Reclamation. Hall spearheaded Reclamation's 1987 assessment, which recognized the need for increased emphasis on improved management of projects and the protection of environmental values. This assessment led to a significant reorganization of Reclamation in 1988. He played a leadership role in preparation of Reclamation's Strategic Plan, which sets forth the long-term framework for the agency's future.

Hall's career is highlighted by many awards, including the Department of the Interior's Distinguished Service Award, the most preeminent award within the Department. He was also presented with the National Water Resources Association's Distinguished Service Award. Hall's retirement will be effective July 2, 1993.

Bureau of Reclamation

EXPERT WRAPS UP CHRONICLE OF ARKANSAS VALLEY WATER PROJECT

Retired farmer and water expert Frank Milenski has published his second book, detailing the history of the Southeast Water Conservancy District and development of the Fryingpan-Arkansas Water Project. His newest book, *In Quest of Water*, is mostly devoted to minutes of conservancy district meetings and contains numerous facts and statistics. In his first book, *Water: The Answer to a Desert's Prayer*, Milenski traced the development of irrigation canal companies in the Lower Arkansas Valley.

Milenski is a charter member of the Southeast Water Conservancy District board and the only original member still serving. He calls the Fryingpan-Arkansas Water Project the most important development in the history of the Arkansas Valley. The water project and the conservancy district's winter water storage program have brought agriculture a firm supply of water that farmers didn't have before. Since 1977, irrigation canal companies have been able to store water in Lake Pueblo and later in John Martin Reservoir during the winter, then call for it when the growing season arrives.

In Quest of Water is available from the author or at Walt's Book Stop in La Junta. The cost is \$40 per copy.

EPA PROJECT TO ASSESS CONDITION OF HEADWATER STREAMS IN ROCKY MOUNTAINS

EPA Region 8 is initiating a project that will use the Regional Environmental Monitoring and Assessment Project (R-EMAP)

approach to assess the condition of and risk to headwater streams in the mineralized area of the southern and central Rocky Mountains ecoregion of Colorado, Wyoming, and New Mexico. Questions to be answered by this project include:

- What is the current condition of these headwater streams and their resident aquatic biota?
- What is the relative magnitude (severity and extent) of mining-related problems posing a risk to these ecological resources?
- What are the appropriate environmental indicators for assessing ecological condition and risk?
- What are the appropriate reference conditions against which to judge condition and trends for this subset of water resources?
- Will a high-resolution probabilistic survey allow targeting and problem analysis at the needed level of detail?

Pilot work will occur in FY 1993, with full implementation of the project in FY 1994 AND FY 1995. For additional information, contact Phil Johnson at TEL: 303/293-1581.

WHY EPA SHOULD BE A CABINET DEPARTMENT

Editor's Note: The following is a brief summary of EPA Administrator Carol M. Browner's statement delivered to the U.S. Senate Committee on Governmental Affairs on February 18, 1993.

The administration supports elevation of EPA to a cabinet department. The question is not whether to create a department on the environment, but when. The answer is now, at the beginning of this nation's third decade of federal environmental protection. A decade in which we will move from command-and-control, media-specific regulation to alternative approaches oriented toward pollution prevention, ecosystem protection, and incentive-based policies. We must move "upstream" and examine individual pollution sources as elements of larger systems. Preventing pollution by elimination or reduction of waste at the source is key. A cabinet that includes an environment department will ensure that the environment is fully engaged and integrated into the president's examination of and decisions on national issues.

In the past 20 years...significant progress has been achieved. The air, water, and land are demonstrably cleaner as a result of our joint efforts. Our "command-and-control" approach has worked well but has tended to focus on a relatively small number of large point sources of pollution. In addition, its limited scope ignores creative opportunities in terms of pollution prevention and ecosystem approaches.

In 1993, concern for the environment affects individual, corporate, and governmental behavior. We now understand that

we live in an enormously complex global ecosystem: "solving" one environmental problem can create a new one. Cleanup of surface water has contaminated groundwater and solutions to groundwater pollution have polluted the air. We also know that assessment of environmental achievement is a relative measure: our "successes" are meaningful only in terms of reducing overall risk. We have learned that we must not limit ourselves to cleanup, but must also seek to prevent pollution at the source -- we must force ourselves to address long-term and not just short-term consequences.

Environmental protection is not a mere footnote, but encompasses all of the earth's resources and human activity...It shapes our daily thinking, strategies, and budgets in every conceivable issue area. We are moving beyond thinking of environmental protection as a luxury or as a hindrance to economic growth. The growth of our economy depends on the availability of a clean, safe environment and the long-term availability of natural resources.

In conclusion, I assure you that I believe the creation of an environment cabinet department means more than a new chair. Joining the cabinet ensures direct access to the president, and, consequently, a voice on behalf of citizens concerned about the environment their children will inherit and industry seeking to mesh environmental and business concerns.

NOTED WATER EDUCATOR DIES

John E. "Ernie" Flack, 64, of Boulder, died Thursday, July 22, 1993 at University Hospital in Denver. Flack, an outstanding water educator, came to the University of Colorado in 1995, was a faculty member in Civil Engineering and anchored the department's water program. He retired in May 1992. "Ernie" Flack was born in Fort Collins, graduated from Fort Collins High School in 1946. He received his bachelor's degree from Colorado State University, his master's degree from Iowa State University, and a Ph.D from Stanford University. He was a member of the American Society of Civil Engineers, the American Water Works Association and the Universities Council on Water Resources. We will miss Ernie.

COLORADANS CANDIDATES FOR EPA POST

Coloradans said to be under consideration for the post of Region VIII EPA Chief are former State Senator Martha Ezzard, an attorney; David Getches, former Director of the Colorado Department of Natural Resources and now a law professor at the University of Colorado; and Bill Miller, former manager of the Denver Water Department, who has been endorsed by the American Water Works Association. Two Montanans mentioned for the post are Missoula County Commissioner Janet Stevens and State Senator Bill Yellowtail. Yellowtail has the endorsement of U.S. Senator Max Baucus, who chairs the Senate Environment and Public Works Committee.

Source: *Water Matters*, July 1993

PEOPLE

John Hendrick will head the Colorado branch office of Williams Technologies, Inc., a Tulsa-based consulting engineering firm. Hendrick, located at 5984 S. Prince St., Littleton will specialize in water resources consultancy. Hendrick serves on CWRRI's Research Planning Advisory Committee.

Source: *Water Matters*, July 1993

Bob McWhinnie, former Chief Executive Officer, Metropolitan Denver Water Authority and the Metropolitan Water Providers, has been appointed Program Manager for the Denver office of Harris Group, Inc., an industrial engineering firm headquartered in Seattle. The Group is officed at 650 S. Cherry St., Suite 900, Denver. McWhinnie formerly was Director of Planning for the Denver Water Department and managed URS Consultants.

Source: *Water Matters*, July 1993

Members, Water Quality Control Commission, and expiration dates of terms:

Shirley Phillips Ela, Grand Junction - 1995

Mary J. Gearhart, Denver - 1994

Sue Ellen Harrison, Boulder - 1996

Florine Raitano, Dillon - 1995

Laura Davis, Fort Collins - 1994

Roger Bill Mitchell, Monte Vista - 1994

Connie King, Colorado Springs - 1995

Peter D. Nichols, Carbondale - 1996

David Pusey, Fort Collins - 1996

Source: *Water Quality News*, Colorado Water Congress 6/20/93

CWCB RECEIVES PHASE I REPORT ON FORT LYON CANAL COMPANY STUDY

The Colorado Water Conservation Board has received and distributed for review and comment the Phase I Report, Fort Lyon Canal Company Water Transfer Alternatives Study. The report was prepared by Gronning Engineering Company for the CWCB under an authorization approved by the Colorado General Assembly (SB92-87). The report described the Fort Lyon Canal Company, its facilities and operations, the surrounding communities, and then describes and assesses potential impacts of various alternatives to the usual ways in which irrigation water rights are transferred in Colorado. The results of Phase I, and ensuing discussions, will be used to decide the direction of Phase II. The CWCB will make this decision at its September 9-10 meeting in Alamosa. CWCB will consider oral comments on the Phase I report at that meeting. A public meeting to obtain comments and suggestions was held August 11 in Las Animas. (The views expressed in the report are those of the CWCB, its staff, and/or GEC. The Fort Lyon Canal Company has not yet confirmed estimates contained in the report, nor the appropriateness of proposed alternative transfer mechanisms described in the report).

WATER NEWS DIGEST

WATER PROJECTS

First Pipelines for New Water District are Laid

The first of some 17 miles of pipelines to serve the new Huerfano Water District southeast of Vineland have been laid. The construction marks the end of a two-year project to bring potable household water from the St. Charles Mesa Water Association to the area. The project has been financed by selling \$100,000 in initial tap fees, and receiving a \$400,000 Farmers' Home Administration grant and a \$187,000 low-interest loan. The job includes installation of a 150,000 gallon tank and 60 water meters. The agreement between St. Charles Mesa Water Association and Huerfano Water District calls for a maximum of 250 taps to the area. The project is expected to be complete by September 1, 1993.

Pueblo Chieftain 6/4/93

Districts Planning to Sue

Two southwest Colorado water districts plan to sue the U.S. Fish and Wildlife Service (USFWS) over delays in the Animas-La Plata water project concerning endangered fish. The action is an effort to force the agency to prepare an environmental impact statement before designating 244,000 acres of critical habitat for four endangered fish species. The Animas-La Plata and Southwest water districts claim the National Environmental Policy Act requires USFWS to consider alternatives to the proposed designation and to study economic, as well as social, biological, or administrative impacts. The Animas-La Plata itself is snagged over an EIS issue -- the result of a Feb. 1992 lawsuit filed by the Sierra Club Legal Defense fund on behalf of environmental groups. The suit claimed the environmental act required the U.S. Bureau of Reclamation (USBR) to update the 1980 EIS on the water project. The bureau agreed in part. As a result, the project has been delayed a year. Now the Ute Mountain and Southern Ute tribes have offered to take over environmental studies to speed up the process. The Utes could take the funds allotted for the study, hire the necessary experts and get the answers much sooner. The tribes and USBR officials were to meet in July to start the process of turning the studies over.

Montrose Daily Press 6/4/93, Grand Junction Daily Sentinel 7/1/93

Water Storage Increase Asked by Ditch Firm

The Sanchez Ditch and Reservoir Co. wants the state engineer to lift a storage restriction on its reservoir so it can store 5,000 to 10,000 additional acre-feet (af) of water. Currently Sanchez Reservoir, with a capacity of 103,000 af, is restricted to storing 35,000 af of water. State Engineer Hal Simpson has agreed to re-evaluate the situation once the peak runoff has subsided. Last

year, \$200,000 was needed to repair a sinkhole, making the reservoir safer and sturdier. The consensus of the ditch company and county officials is that the reservoir should be allowed to hold more water. Allowing it to hold 45,000 acre-feet would not even put it at 50 percent of capacity.

Pueblo Chieftain 6/5/93

Grand Junction Does About-face on Wolford Mountain

The Grand Junction City Council has backed away from a staff-level decision made in May (Grand Valley water users, Denver Water, and the Colorado River Water Conservation District) to mitigate Wolford Mountain reservoir's salinity impacts on the Colorado River. The city council says it now wants a long-term solution to rising salinity in the river before it will sign off on the proposed reservoir. The deal would have cut more than half the salinity impacts of a proposed water exchange to Denver, which would use Wolford Mountain as a replacement source allowing additional water diversion from Dillon Reservoir through the Roberts Tunnel to the East Slope. But the deal would still increase the river's salinity by about one-half of 1 percent. The Palisade and Orchard Mesa irrigation districts and the Colorado Water Conservation District have agreed to the plan. The Clifton Water District board will reconsider at least five points of the agreement at its next board meeting. The Colorado River Water Conservation Board has signed contracts to build the reservoir, and construction is scheduled to begin on Sept. 1. The dam should be finished in 1995 and can start storing water in 1996.

Grand Junction Daily Sentinel 6/23/93, 7/15/93, 7/20/93

Hydroelectric Plant Sponsors Will Try Again

The Uncompahgre Valley Water Users Association and Montrose Partners, sponsors of the proposed AB Lateral hydroelectric plant outside Montrose, hope to renew their efforts to get the project off the ground. The group will submit another application to the U.S. Army Corps of Engineers for the federal permit needed to build the project. The corps denied the permit in April because the sponsors had supplied insufficient information in their application. The proposed plant would divert water from the Gunnison River to generate the power, then dump the water into the Uncompahgre River, increasing its flows. The sponsors also lost a contract in April to sell the power to Public Service Co. of Colorado, but discussions continue regarding a power contract with both Public Service Co. and Tri-State Generation and Transmission.

Grand Junction Daily Sentinel 6/29/93

Water Tunnel Construction Nearly Complete

After nearly five years of construction, a water delivery system

to accommodate most of Colorado Springs' growth during the next century is nearing completion. The last portion of the three-mile Stanley Canyon water tunnel has been hoisted into place. When completed this fall, the tunnel will receive water from Rampart Reservoir. Plans also call for construction of a 25-megawatt hydroelectric power plant near the base of the tunnel, and the proposed McCullough Water Treatment Plant.

Grand Junction *Daily Sentinel* 7/11/93

Austin Dam Plan Surfaces

Tri-State Generation and Transmission Association, the power wholesaler that took over most of the assets of Colorado-Ute Electric Association, is looking at dusting off dormant water rights that could allow it to put a dam on the Gunnison River near Austin. The company hopes to have a consultant's report by the end of the summer. The rights would allow the company to store up to 72,650 af of water, and run up to 6,000 cubic-feet per second of water through a hydroelectric power plant. The plan is similar to one Colorado-Ute looked at eight years ago.

Grand Junction *Daily Sentinel* 7/12/93

WATER TRANSFER

San Luis Valley Water Dispute May End

American Water Development Inc. (AWDI), the Denver company seeking to transfer groundwater from the San Luis Valley to the Front Range, may be giving up on its quest for water rights. Crestone rancher Gary Boyce has signed a contract to buy 10,000 acres from AWDI, with an option on all of AWDI's remaining valley properties, totaling an additional 100,000 acres. Boyce is interested in dealing with surface water transfer, selling options to willing ranchers, then finding municipal customers who need additional water. This, he believes, would keep control of the valley's water in the hands of local ranchers and out of the hands of international investors. Boyce hopes to close on the first two pieces of property within a month.

Denver *Post* 6/20/93

Romer: Water Study Could Ease Pressure on Arkansas Valley

Gov. Roy Romer believes a new study of alternative water supplies for the Denver metro area may take pressure off proposed transfers of water from the Arkansas River. The study of future water supplies follows a study of alternatives for keeping agricultural water in the lower Arkansas River valley. One result of the earlier study is the state's decision to spend at least \$5 million on water rights for recreational purposes at a new Great Plains State Park, soon to be developed between Eads and Lamar. In addition to creating southeastern Colorado's first state park, the goal is to put water to beneficial use so it is not subject to speculative sales outside the Arkansas River basin. Growing urban demand for water is the primary force driving

conflicts over whether to protect basins of origin from Front Range water needs.

Pueblo *Chieftain* 6/25/93

WATER QUALITY

Study to Chart Path for South Platte Revival

A \$2 million, three-year study of a stretch of the South Platte River downstream of Denver will help determine whether the Metro Wastewater Reclamation District (Metro) must build an expensive facility to address high ammonia and low oxygen levels in the river. Each day Metro treats 150 million gallons of wastewater from the metro area. Until about 10 years ago, the South Platte downstream from Metro was virtually a biological desert, but conditions have improved with the recent installation of a plant that removes ammonia from the treated water. Now EPA wants Metro to address the problem of low levels of dissolved oxygen in certain segments of the river downstream from Metro. The study should help determine the cause of the low oxygen levels and possible solutions besides construction of a \$112 million plant. One less-expensive alternative to the expensive facility might be a series of artificial waterfalls in the ponded areas of the river where the levels of dissolved oxygen are the lowest.

Rocky Mountain *News* 6/17/93

Las Animas Secures Funds for Water Treatment Plant

Las Animas has secured the final grant it needs to finance construction of a new \$2.4 million water treatment plant. The plant will be the first in the lower Arkansas River Valley to utilize reverse osmosis technology to purify its domestic water supply, which forces water through a tubular, semipermeable membrane that filters out salts and other impurities. The city's water supply comes from eight wells, all located within city limits, and is reputed to be some of the worst water in the region. The city also has been pressured by state health and federal environmental officials to rectify water quality problems in its sewer lagoons near the Arkansas River. The reverse osmosis unit should improve the quality of water in the lagoons. And although the city will have to charge more for water to pay for the treatment plant, local residents will not have to purchase or rent water softeners, which cost most residents about \$45 a month. The plant should be completed within 18 months.

Pueblo *Chieftain* 6/3/93

Lowry Not on Superfund List

Lowry Air Force Base has several potentially hazardous waste problems, but not enough for inclusion on the Superfund list, according to the EPA. The EPA is concerned about contaminated groundwater at the base. Samples taken from a well near Lowry's commissary have shown high concentrations of trichloroethylene (TCE), a once-common industrial solvent, suspected of causing cancer. The nearest drinking wells --

which belong to Glendale -- are two miles away and don't show problems. However, if future tests reveal those wells have been contaminated, EPA can re-evaluate Lowry for the Superfund program. Other wells within a mile of the base are used for irrigation and weren't evaluated. But EPA urged Lowry officials to test those wells for contamination and to determine the source of the TCE.

Montrose Daily Press 6/23/93

Protective Reservoir Proposed Near Rocky Flats

Officials of several northern metro-area cities have developed a new plan to keep Rocky Flats runoff from flowing into Standley Lake, the drinking water supply for 200,000 residents. The plan calls for construction of a 1,000 acre-foot reservoir on Woman Creek between Rocky Flats and Standley Lake linked by pipeline to Great Western Reservoir, which supplies Broomfield with water. The pipeline would prevent potentially contaminated water from flowing into Standley Lake by storing the water in the reservoir on Woman Creek, and then diverting it into Great Western. Runoff caught in the new reservoir would be tested and treated as needed, then pumped to Great Western where it would again be treated if necessary before being released into the South Platte River.

The \$80 million cost of the project includes \$53 million for Broomfield to abandon Great Western Reservoir as a water source and purchase water rights from the Windy Gap Project in northern Colorado. Thus far the federal government has paid the cities \$60 million, and the Department of Energy is committed to coming up with the rest of the money. The project also enables Coal Creek water to bypass Rocky Flats via pipeline to Standley Lake. In May, a proposal to build a series of water-diversion canals around Standley Lake was scrapped after hundreds of angry residents said they feared possible contamination of water running near their homes.

The currently-proposed plan is crucial to the upcoming \$1 billion Superfund cleanup of Rocky Flats. Scheduled to begin within three years, the cleanup will involve earthmoving that could unsettle contaminants buried beneath the surface. Plutonium-contaminated buildings will be torn down and the Woman Creek landfill, which is full of 50-gallon barrels of contaminants, will be emptied. Should an accident occur during the cleanup, contaminated water could flow into Standley Lake if a plan is not implemented. Reaction to the plan has been mixed. During a public meeting in Westminster, several residents argued that Woman Creek Reservoir should be located at Rocky Flats to stop the spread of contamination from the facility.

Denver Post 6/28/93, 7/2/93 Rocky Mountain News 6/24/93

EPA Studies Pueblo Sludge

A culvert beneath an old smelter in Pueblo is dumping a bright reddish-orange substance into the Arkansas River. The Colorado Department of Health and the EPA are studying

whether the site is endangering human health and the environment. The EPA report is in the draft phase, with a complete report not expected for another couple of months. But a test in 1989 showed the sludge is high in iron and contains elevated levels of zinc. Although not toxic to humans, there is concern other heavy metals may also be reaching the river. The St. Charles Mesa Water District surface water intake is located about 100 yards downstream from the leaking culvert. The district serves about 3,000 residential and 200 commercial customers. No tests of the water indicate any kind of contamination, and the water is tested regularly.

Pueblo Chieftain 6/21/93

ENVIRONMENT

ASARCO Won't Appeal Globeville Lawsuit

If a recent settlement between ASARCO and Globeville residents is approved by Denver District Judge Morris Ben Hoffman, Globeville residents will get their neighborhood cleaned up by 1998 and will divide as much as \$24 million in damages. A Denver jury in March awarded the residents \$28 million in cleanup costs after deciding ASARCO's metals refinery had negligently spewed cadmium and other metals into the air and soil for more than 50 years. Under the agreement, property owners could get more money in damages than the jury awarded. Jurors thought it would take \$20 million to clean up residents' homes, and awarded \$8 million for inconvenience during cleanup. But ASARCO will do the cleanup for \$10 million and will pay as much as \$24 million in damages to Globeville property owners and former residents of a nearby housing project. Judge Hoffman is likely to give final approval of the settlement this fall after residents have time to comment on the settlement. Cleanup could start as soon as the judge gives his approval.

Rocky Mountain News 6/22/93

\$8.7 Million to Help Fund Mining Cleanup

The EPA and the state will collect \$8.7 million from mining companies to help pay for cleanup at California Gulch, according to documents filed in federal court. Under the consent decree, which must be approved by a judge, the state will receive \$575,000. More than \$8.1 million will go to the EPA's Superfund trust fund. Most of the work has been at the Yak Tunnel, which drains Leadville-area mines into the Arkansas River. The firms in the settlement are ASARCO Inc., Resurrection Mining Co., Newmont Mining Corp., and the Res-ASARCO Joint Venture.

Rocky Mountain News 6/26/93

EPA Will Monitor Children at Mill Site

The EPA announced an expansion of its Superfund cleanup of Smuggler Mountain to include monitoring the blood-lead level of young children. The change is in line with recommendations

of a nation panel of lead experts that convened in Aspen in October 1992 and released its findings in January. Smuggler Mountain was the site of lead and silver mining and milling. About 110 acres of the cleanup site now is mostly residential. The expanded cleanup plan also calls for the Mollie Gibson Park and other common-use areas to be covered with clean soil and revegetated. Residents will also be directed to plant vegetable gardens in at least 12 inches of clean soil, and the Aspen-Pitkin Environmental Health Department will evaluate site construction projects and land use changes to assess potential exposure to contaminated soil.

Grand Junction *Daily Sentinel* 6/14/93

Idarado Cleanup Starts

The \$15 million Superfund cleanup has begun at the Idarado Mining Co. complex near Telluride, where earthmovers will re-contour seven heaps of mine tailings on Red Mountain. The cleanup of decades of hardrock mining will take at least four summers. Workers will till hay, manure, and limestone into the tailings so native grasses can be planted in an experimental "direct revegetation" program. Direct revegetation is pivotal to Idarado's court-approved plan of reclamation. After five years of watering and fertilizing, the tailings' grasses must thrive on their own in a ten-year demonstration period to test the method's effectiveness. The company had to post millions of dollars in bonds to pay for alternative cleanup if revegetation fails. Crews are also re-grading one of five tailings piles on the Ouray side along Red Mountain Pass. The start of the cleanup is the result of nearly 10 years of litigation and negotiations.

Montrose *Daily Press* 6/1/93

Leadville Pollution Case Settlement Seen As Possible

The government and defendants in a lawsuit to clean up polluted sites in Leadville have told a federal judge they believe they can reach settlements without a trial. The case was to begin on Aug. 16. It is a consolidation of cases brought in 1983 and 1986 by the state and the federal government to clean up Superfund sites polluted with toxic residue from more than a century of mining. The trial has been postponed until Dec. 20 to give the parties time to work out cleanup plans.

Pueblo *Chieftain* 7/18/93

WILDERNESS

Miner Gains State Permit to Operate Wilderness Quarry

Stefan Albouy has obtained a state reclamation permit for his proposed black marble quarry in the Maroon Bells-Snowmass Wilderness, but he must still win a special use permit from Pitkin County, and the city of Aspen may challenge Albouy's operation under its watershed ordinance. Those actions will likely take another year to process. The state Mined Land Reclamation Board approved a \$5,800 reclamation bond for Albouy's quarry, and limited his operation to 180 days a year.

He must clear all structures and equipment out of the quarry area during the winter months. The project has stirred controversy since it was first proposed because it lies within a wilderness area near a very popular hiking trail, and because the U.S. Forest Service spent \$1 million to buy the land. But the transaction did not include the mineral and timber rights, which Albouy obtained later.

Grand Junction *Daily Sentinel* 6/1/93

Colorado Wilderness Bill Passes

After 12 long years, the U.S. Senate has approved a Colorado wilderness bill which designates 19 new wilderness areas, protects 611,000 acres of forested land, and another 174,000 acres from mining and timber cutting. The Senate action follows recent passage of the bill in the U.S. House, where it left on a suspension, signaling quick passage in the Senate. In the past, legislation has bogged down in disagreements over whether the federal government should have a legal right to water flowing through federal lands. The current legislation tiptoes all around the water issue and says that there neither is or isn't a water right. President Clinton is scheduled to sign the legislation into law when he is in Denver on Aug. 13.

Fort Collins *Coloradoan* 8/5/93

Land Swap Meets Stiff Opposition

The U.S. Forest Service has received between 70 and 80 comments from Telluride opposing a land exchange of real estate developer Tom Chapman's 240 acres in the West Elk Wilderness area for 105 acres in Alta Lakes near Telluride. At the fore of that opposition are the San Miguel County Commissioners. They oppose the land exchange because privatization of currently-public lands would create growth beyond that contemplated by the existing county master plan. Several other comments also question the validity of the appraisal of \$640,000 on the Alta Lakes property, calling it low. Chapman is in the process of building a luxury log cabin on his property in the West Elk Wilderness. He plans to continue to a point, which will be dictated by public reaction to the exchange.

Grand Junction *Daily Sentinel* 7/6/93

WILDLIFE

Tiger Muskies to be Stocked

The Colorado Wildlife Commission has chosen possible West Slope sites for stocking tiger muskies, prized hybrid game fish that grow to trophy size in Colorado. The division recommended six reservoirs: Harvey Gap, Juniata and Hollenbeck in northwest Colorado, and Sanchez, Platoro, and Continental in the southwest. The commission also agreed to consider three other reservoirs suggested by a sportsman's group: Gurley in the southwest and Williams Fork and Rio Blanco in the northwest. A final decision won't be made until

a related policy on stocking non-native fish is completed later this year and other state and federal agencies comment on the proposal. One concern is that tiger muskies could possibly escape from stocked reservoirs and compete or prey on four endangered Colorado River fish: the Colorado River squawfish, humpback chub, bonytail chub, and razorback sucker. The earliest any stocking could take place is fall 1994.

Montrose Daily Press 6/12/93

West Slope Hearings on Fish Habitat Urged

U.S. Sen. Ben Nighthorse Campbell wants the U.S. Fish and Wildlife Service (USFWS) to hold hearings on the West Slope of Colorado to receive public input on its actions to specify "critical habitat" for several species of endangered fish. Campbell has concerns about a proposal to designate more than 2,000 miles of the Colorado River basin as critical habitat for the Colorado squawfish, razorback sucker, humpback chub, and bonytail chub. The USFWS is required to hold hearings once it completes draft economic and biological studies, but not necessarily in Colorado. Campbell requested hearings in Grand Junction and possibly other locations such as Craig, Rifle, and Durango because they are primary areas of critical habitat for the endangered fish, and because of some of the communities' ongoing efforts and participation in endangered fish recovery programs.

Montrose Daily Press 6/17/93

Greenback Trout Make Comeback

After more than 20 years of restoration efforts in headwaters of northern Colorado streams, greenback cutthroat trout are on the way to being removed from the federal list of threatened species. Greenback cutthroat trout are native to the South Platte and Arkansas river drainages, but their numbers fell dramatically in the late 1800's because of over-fishing and competition from other species of trout introduced into the state such as rainbows, browns, and brook trout. Once thought to be extinct, pure populations were found in two locations during the 1960's, and the fish was listed as endangered in 1973. Today the South Platte drainage, including Rocky Mountain National Park and the headwaters of the Cache la Poudre River, have 17 stable populations of greenbacks. Two other reproducing populations are in the Arkansas River drainage. Wildlife officials hope to take the fish off the endangered list by the year 2000 when they hope the state has 20 self-sustaining populations. The greenbacks' range will not expand far from isolated streams and lakes because they do not co-exist well with other species.

Greeley Tribune 7/1/93

Squawfish Study Declares Species Self-Sustaining

A new study of the Colorado squawfish by a California biologist concludes that the federally protected species is a viable population that can sustain itself in the wild. The findings have come under strong criticism from the U.S. Fish and Wildlife

Service (USFWS), which commissioned the study. The study reports the squawfish is found in sufficient numbers, ages, and places throughout its range to guarantee survival. FWS biologists worry that the water development community will call for removal of the squawfish from the endangered list. The FWS is looking for the most accurate way of learning at what point the fish are recovered. The report is to be circulated among scientists for intensive review.

Grand Junction Daily Sentinel 7/20/93

PUBLIC LANDS

House Passes Bill to Transfer Clear Creek County Land

The U.S. House of Representatives has passed a bill to transfer ownership of 14,000 acres in Clear Creek County from the Bureau of Land Management to the county, two towns, the state, and the U.S. Forest Service. The bill, introduced by Rep. David Skaggs, D-Colo., would give most of the land to the state, the county, Georgetown, and Silver Plume. The BLM could sell the land, but it would first have to survey it, which would cost around \$18 million because the acreage is broken up into dozens of oddly shaped parcels. The market value of the land is about \$3 million. The bill, which next goes to the Senate, would transfer 3,500 of the 14,000 acres to the Forest Service, to be added to the Arapaho National Forest.

Rocky Mountain News 6/22/93

Push to Make Cherokee Park Public Continues

Colorado members of the House and Senate are pushing for a \$2.7 million federal purchase that would preserve Cherokee Park as a national forest. The 18,761 acres which comprise the park 25 miles northwest of Fort Collins were given to the Union Pacific railroad at the turn of the century, and now the railroad is interested in selling the property. Preservationists would like to save the land from houses and subdivisions, such as those that already surround it, but a land trust brokering the deal has an option to buy the land from Union Pacific before December. After that, the land could be sold to developers.

Rep. David Skaggs, D-Colo., sits on the controlling panel of the Land and Water Conservation Fund, which has collected more than \$9 billion in royalties from offshore oil drilling since 1965, and by law must be spent preserving wild land. But the fund has been manipulated to cover the deficit and has not been used for its created purpose. The U.S. Forest Service has been trying to buy the park for years, because the checkerboard land patterns resulting from federal land grants to promote railroad development in the 19th century makes the entire area difficult to manage. Whatever the outcome, the Union Pacific will retain mineral rights to the land, where diamonds have been found scattered amid rock formations near Diamond Peak.

Denver Post 6/14/93

Interior Mulls Ban on Future Water Rights on Public Lands

Ranchers would no longer gain ownership of water rights for stock-watering improvements they make on federal rangelands under a policy now under consideration. The proposal would apply only to future water development, and only to grazing allotments on BLM lands. At present, ranchers who develop wells, springs, and other water projects on BLM land gain control of those water rights, and can eventually sell the rights for use elsewhere. This current policy does not apply to U.S. National Forest allotments. The proposed change reflects a view that the government should not give away something that rightly belongs to the public, to the federal government.

Grand Junction *Daily Sentinel* 7/15/93

LITIGATION

Denver Suburbs Lose Water Suit

A claim by 20 suburban cities and utility districts that Denver had overcharged them \$100 million on water sales has been rejected by District Court Judge Connie Peterson, who also ruled that the suburbs pay all of Denver's \$100,000 court costs. Some suburban customers pay more than twice as much for Denver water as city residents. The suburbs argued that they were shouldering an unfairly high share of the cost of running Denver's water supply system. Peterson ruled that if Denver adopted an accounting method favored by the suburbs, metropolitan population growth would not be paying for itself. The three-year court battle cost Denver Water Department \$1 million in lawyer fees and the suburbs \$1.6 million.

Pueblo Chieftain 7/16/93

Cut in Snowmass Streamflow Upheld

A Denver District judge has ruled that the Colorado Water Conservation Board acted properly in lowering the minimum streamflow on Snowmass Creek last winter from 12 cubic feet per second (cfs) to 7 cfs. The change was made to correct a mistake made in the original 1976 water court filing. Area residents sued the water board, in part because the change allowed the Aspen Skiing Co. to boost snowmaking at the Snowmass Ski Area, what the residents argued was a gift of public water to a private company. An attorney for the residents is concerned that the ruling shows the state's minimum streamflow program is weak, but has not decided yet whether to appeal the ruling. The snowmaking project must be approved by the U.S. Forest Service, and will not begin this season as a decision isn't expected until later this fall.

Grand Junction *Daily Sentinel* 7/21/93

LEGISLATION

Mining Law Bill Signed by Romer

Gov. Roy Romer has signed a bill that overhauls the state's

mining law, a measure that was spawned by the pollution disaster at the Summitville Mine in southern Colorado. The new law gives state regulators the power to veto mine proposals with unresolved health or environmental concerns. It also forces existing mines to comply with new environmental requirements and strengthens the ability of regulators to demand higher bonds from miners to pay for cleanup work. Each of the provisions was in response to the lack of state regulation at Summitville, where environmental laws were repeatedly violated, decimating a trout fishery and polluting downstream irrigation supplies.

Montrose Daily Press 6/4/93

Legislation to Raise Park Concession Fees Backed

The Clinton administration has expressed strong support for legislation to make national parks concessionaires pay higher fees, with the intent on ensuring concessionaires adequately serve park visitors rather than getting more money out of them. Senator Dale Bumpers' (D-Ark.) bill would also require competitive bidding for concessions contracts, erase the preferential right given existing concessionaires to renew their contracts, and eliminate concessionaires' right to own buildings and other capital improvements they finance. The 620 concessionaires that operated in national parks in 1991 grossed \$622 million in revenues, and paid \$18 million in franchise fees -- an average 2.9 percent return to the government. A concessions industry representative argued that Bumpers' figures were misleading, and that concessionaires actually paid about 13 percent of gross revenues to the government when their taxes and capital improvement costs were taken into account.

Rocky Mountain News 6/25/93

RECREATION

Ski Area Fees Discussed

Government auditors told the House Environment, Energy and Natural Resources Subcommittee that mismanagement and an antiquated fee structure prevents the government from collecting fair fees from Colorado ski areas and other businesses that operate on public lands. Part of the problem is a 20-year-old fee structure that has never been updated, and which allows many large ski areas to pay 2 percent or less of their annual sales to operate in national forests and parks. But ski industry officials disputed some of the auditors' numbers and maintained that they are paying a fair share. The testimony came as lawmakers consider revising the fee schedule and making concessionaires more accountable to the U.S. Forest Service, National Park Service, and other federal agencies.

Montrose Daily Press 5/28/93

Stream Access Opened

The Colorado Division of Wildlife delivered on its promise this spring to provide access to new fishing opportunities. Nearly 30 miles of the South Platte and its tributaries in South Park are

now accessible. Near Parshall, nearly two miles of the Colorado and one and a half miles of the Williams Fork rivers will open next month, providing access to some of the best fishing in the state. Other waters near Colorado Springs, along the Gunnison River, and in the San Luis Valley have also opened, offering more fishing and wildlife recreation. Together, the properties cost more than \$8 million. Special restrictions are in place for all the waters, limiting the type of bait and the number of fish that can be kept. The regulations are included in the division's fishing brochure, which is available at division offices and license agents around the state.

Montrose Daily Press 5/26/93

Denver to Sell Winter Park for \$53 Million

The city and county of Denver has agreed to sell the Winter Park Ski resort for \$53 million to finance a plan to expand urban parks. The deal, which could take 16 years to complete, rids the city of a 99-year lease that former Mayor Bill McNichols negotiated with a non-profit association in 1979 that yields the city almost no money. The plan calls for payments starting next year to endow a trust fund that will add more parkland to the city than at any time in its history. The Winter Park Recreational Association, which operated the area for 40 years, has the option to keep making payments rather than buying the resort, but that is unlikely.

Rocky Mountain News 6.25.93

Use of Lead in Fishing Lures, Weights to be Banned

A landmark agreement between the U.S. EPA and the Environmental Defense Fund calls for regulatory action to ban the manufacture, processing, and distribution of lead fishing sinkers in the United States. Virtually all sinkers contain lead because it is heavier, more malleable, and much less expensive than other substances. It has been demonstrated that waterfowl, including common loons and trumpeter swans, have died from ingesting lead fishing weights while feeding. A New York-based environmental group had filed a lawsuit in federal district court in Washington to compel EPA action on the matter. The ban, if it is expanded to include most lures containing lead, will affect hundreds of millions of dollars' worth of equipment in the inventory of manufacturers and retailers. The impending ban is the latest in a series of federal strictures against lead in the wake of mounting evidence its' toxicity contributes heavily to waterfowl mortality.

Denver Post 6/23/93

Developers Won't Build East Fork Ski Resort

American Express Co., and an Illinois partner won't develop the proposed East Fork ski area near Pagosa Springs, and the property is up for sale after years of opposition from environmentalists. The initial 2,000 acres of ranchland for the resort was purchased in 1970, and a permit for a ski area on 4,600 acres of U.S. Forest Service land was also granted. The

USFWS permit lapses in 1994 and the developer, East Fork Venture, failed to obtain an extension until 1997. The property is a corridor between two wilderness areas, and environmental groups filed suit to block the resort. A knowledgeable spokesman in the ski industry estimated the development would cost at least \$50 million, and the ski industry in southwest Colorado isn't strong enough to support the resort.

Rocky Mountain News 6/26/93

Aspen Ski Areas to Merge

The owners of the Aspen Skiing Co. and the prospective owner of Aspen Highlands have announced plans to merge the two family-owned operations into a unified, four-mountain resort. The Crown family, owners of the Aspen Skiing Co., and Texas developer Gerald Hines have agreed to jointly develop and operate the Aspen Highlands ski village and a proposed base village. The deal is contingent on Hines' purchase of the area from Harvard University and longtime owner Whip Jones, and approval of the purchase by Pitkin County and the U.S. Forest Service. Under the merger, skiers would be able to ski at all four Aspen mountains with one pass or lift ticket.

Greeley Tribune 7/12/93

Monarch Ski Area Expansion Planned

The Rocky Mountain Ski Corp. has proposed an expansion that would double the amount of skiable terrain at the Monarch ski area, and has begun an environmental study of the area within San Isabel National Forest. A site plan filed with the U.S. Forest Service shows that Monarch plans to increase the daily capacity of skiers from 1,900 to 5,600, expand the skiable terrain from 275 to 575 acres, and construct new restaurants, warming huts, four new chairlifts, and a new sewage plant. Monarch has shown steady growth over the past dozen years.

Grand Junction Daily Sentinel 7/8/93

Rafting Limitation Approved

After two years of work, a plan to limit the number of rafts on the Arkansas River has been approved. Managers of the Arkansas Headwaters Recreation Area, which covers the river from Leadville to Pueblo, developed the proposal. The Bureau of Land Management and the Colorado State Parks Department have also approved it. The plan governs those periods when there is "bumper to bumper" rafting in the Royal Gorge and Browns Canyon sections. If that occurs six times in a season, only 45 rafting outfitters will be allowed the use the river. Now, 67 outfitters raft the Arkansas. The cut will occur through attrition. When a companies go out of business, new permits will not be issued unless the number falls below 45. The provision also will prohibit an outfitter, who historically runs kayaks, to switch to rafts and begin taking an increased number of people down the river.

Montrose Daily Press 7/14/93

MEETINGS

TOP-DOWN VS. BOTTOM-UP: WHERE IS WATER QUALITY MANAGEMENT HEADED?

The theme of the 18th annual Colorado Water Workshop held at Western State College in Gunnison July 28-30 was *THE BIG SQUEEZE*. According to Conference Director Lucy High, this theme was chosen because of the current conditions surrounding water quantity and quality in the U.S., and reflects her observation that there are "a lot of limits now -- financial and other[wise] -- that are putting the squeeze on us" in the water quality arena. The U.S. government is pressuring states with federal water quality mandates, and as High and other speakers noted, Colorado's Amendment 1 also puts a financial squeeze on county and municipal governments within the state.

The title of the workshop, *THE BIG SQUEEZE* has been interpreted to focus on water quantity issues, but it is also an accurate portrayal of the current conditions surrounding water quality in the U.S. Much of the "easily addressed" point source pollution has been mitigated through legislation, wastewater treatment, and pollution controls. What remains (the last 5 percent of point-source pollution and most non-point sources) will be difficult and expensive to correct, putting financial pressure on business, consumers, and the economy.

In addition, the Clean Water Act is up for reauthorization in Congress and could bring dramatic changes in water quality requirements and monitoring. The country faces difficult questions regarding how cleanup should progress, who will pay for it, and what kind of approach to take in addressing water quality problems.

The debate at the conference centered around the politics and concepts of "Integrated Watershed Management" (IWM). In terms of water quality, IWM refers to approaching water quality on a watershed level (whatever the size of the watershed), while simultaneously attempting to integrate all aspects of the watershed (wildlife and biota conditions, human activities, etc.) into water quality decisions -- a holistic or inclusive approach.

IWM began in the 1980's, according to David Holm, Director, Colorado Water Quality Control Division. Prior to this, municipalities were overwhelmed trying to meet water quality standards. IWM attempts to take the process a step further, and stop the water quality problem at its source rather than addressing it after it has affected a water body.

John Cairns, Distinguished Professor of Environmental Biology, Virginia Polytechnic Institute and State University, challenged the status quo by questioning the prevailing paradigm of science. In drawing an analogy from the Nuclear Age to what today may well be the Water Age, he quoted Albert Einstein: "The scientific problems that we face cannot be solved by the kind of thinking that created them." Cairns suggested that we can't depend on technology or predictive models, and that natural

systems are much cheaper than technology. As an example, Cairns recited the voluntary changes Brad Phelps, a Gunnison area rancher, had made in improving the riparian habitat on his ranch. Using simple, common-sense methods, Phelps created a water source high on the ridges, strategically placed salt blocks, and with the additional help of his dogs, enticed cattle to stay out of the riparian zone, thus contributing to habitat recovery and reducing erosion. It worked and it didn't take a lot of scientific monitoring or federal funds to succeed.



David Freeman

David Freeman, professor of Sociology at CSU, expounded on the concept that "We Get What We Organize For!" Freeman identified communication as problematic in organizing for water management. Why? "Because we pride ourselves on being rationalist critters," Freeman contends. And there is not just one kind of rationality, or a socially neutral rationality. Freeman identified four categories: technical, economic, political, and ecological. Non-socially

neutral rationality results in an organizational dynamic: you can't get a *whole* view. The result is, competing knowledge. "To a person with a hammer," Freeman joked, "the whole world is a nail." Therefore, we need to have linkages between organizations and interdisciplinary analysis. He also emphasized that the "uneducated" have a different, but equally valuable knowledge, which he called "site specific."

Frequently referred to during the conference were the *top-down* and *bottom-up* approaches to IWM. Top-down usually refers to state or federal imposition of water quality standards on water bodies. This often involves local communities being forced to meet certain water quality standards through modification of wastewater treatment, and even limits on economic growth if water quality is impaired.

Problems with this approach include the uniformity of water quality regulations applicable to the entire country, which do not take into account differences between water bodies, climate, topography, etc. This approach often involves federal agencies such as EPA, and requires compliance with certain water quality standards. It is this kind of control that has fostered resentment of and hostility towards federal agencies.

Bottom-up refers to a local, watershed level of control where water quality goals can be met with local interests and methods in mind, and with a creativity and flexibility which is unlikely via federally imposed standards. Critics of this approach argue that water quality standards cannot be met through incentives to meet goals at the local level, but that strict water quality standards must be imposed if water quality is to improve (the stick rather than the carrot).



Paul Frohardt

Paul Frohardt, former administrator of the Colorado Water Quality Control Commission who will soon resume that position, addressed the history, current conditions, and future of water quality standards and IWM.

Twenty-five years ago raw sewage was still being dumped into U.S. water bodies, and an occasional burning river made the evening news. With time water quality standards were adopted, permit

programs were established, and instream-flow concerns surfaced.

According to Frohardt, the evolution of pollution control standards should be based on the concept of *ecological integrity*. This is an attempt to be concerned with more than just

COLORADO

Four States Irrigation Council Biennial Summer Irrigation Tour, August 18-19, 1993 -- The tour will include visits to Cedar Bluff Reservoir (Kansas Department of Wildlife and Parks); Colby, Kansas Experimental Field; Webster Reservoir; Fort Hays Experiment Station; Wet Walnut River and a tour of the Cheyenne Bottoms; a presentation by Groundwater Management District No. 5 on the Rattle Snake River and the water supply for Quivera Wildlife Refuge, and a tour of Quivera Wildlife Refuge. For information contact: Richard D. Black, Extension Agricultural Engineering, Kansas State University, 237 Seaton Hall, Manhattan, KS 66506-2917. Phone 913/532-6944; FAX 913/532-6944.

A New Era For the Western Public Lands, September 19-21, 1993, Natural Resources Law Center, Boulder, Colorado -- The future of the western public lands in an era of unsettled policy will be discussed. Primary themes of the conference include: conflicts between public values and private rights in the use of public resources; the changing context of public lands policy; and emerging ideas about integrated management of

percentages of chemicals in water bodies -- to instead look more broadly at the overall health of ecosystems. There are competing views of what ecological integrity means -- conditions of an ecosystem before man ever impacted it, the present situation, or something in-between. But humans are not benign and separate from the natural environment, and rather than narrow water quality goals, the focus should be on the health of the ecosystem as one factor in holistic management.

Frohardt points to the historical context (burning rivers, etc.), saying that a top-down approach made sense for the times. Today, he sees the need for more bottom-up management at the watershed level, but that this type of management must be implemented without damaging current rights to water -- it must be centered in Colorado's current water quantity system.

Perhaps the most eloquent presentation of a "bottom-up" approach was delivered by Kevin Campbell, a Judge from Grant County, Oregon. Within his own state, the Oregon Watershed Forum was held which brought together six watershed basins to identify common goals for watershed management. According to Campbell, watershed management is most cost-effective if it takes place in the grange hall or the city hall rather than in Congress. "There is no free lunch. People have to put their money where their mouth is. Federal government is broke; state government is broke." He quoted Margaret Mead as a summation of his position: "Never doubt the ability of a small group of people to change the world, because that's the only thing that ever has."

Published proceedings of the 1993 Colorado Water Workshop will be available through the Colorado Water Resources Research Institute. Proceedings of the 1990, 1991, and 1992 workshops are also available.

resources within ecosystems and watersheds. Cost for the conference is \$250 through Sept. 10, or \$275 thereafter, with discounts available for representatives of government, academics, or public interest groups. For a full agenda and registration information, contact: Katherine Taylor, Coordinator, Natural Resources Law Center, Campus Box 401, Boulder, CO 80309-0401, TEL: 303/492-1288, FAX: 303/492-1297

Seeking an Integrated Approach to Watershed Management in the South Platte Basin, Oct. 27-28, 1993, Fort Collins, Colorado -- How can integrated management of South Platte Basin resources be implemented? The 1993 South Platte Forum will provide a setting for discussing these questions and developing a strategy for an integrated approach to resource management in the basin. The format will include invited presentations that seek to define the concept of integrated management and provide case studies of integrated approaches. In addition, technical presentations and discussion sessions will be held to facilitate a better understanding to the "integrated" approach. For information contact: Kathleen C. Klein, Conference Coordinator, Colorado Water Resources Research

Institute, 410 Univ. Services Center, Colorado State University, Fort Collins, CO 80523. Phone 303/491-6308; FAX 303/491-2293.

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

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

NRLC "Hot Topics" Luncheon Series -- The Natural Resources Law Center, CU Law School, will again offer a series of lunch programs on "Hot Topics in Natural Resources." The series will be held beginning at noon in the 32nd floor conference room at Holland and Hart, 555 17th St., Denver. Registration will be limited due to space restrictions, so *prepayment* as well as preregistration will be required to hold a space. The series will include:

<u>Date</u>	<u>Title</u>
9/30/93	After Summitville: The Colorado Mined Land Reclamation Act of 1993
10/19/93	Clean Water Act Reauthorization
11/16/93	What's New from the Colorado Air Quality Control Commission

For registration information contact:

Katherine Taylor
Natural Resources Law Center
Campus Box 401
Boulder, CO 80309-0401
TEL: 303/492-1288
FAX: 303/492-1297

REGIONAL AND NATIONAL

CONSERV93 -- The New Water Agenda, Dec. 12-16, 1993, Las Vegas, Nevada -- This important conference, which builds on the momentum generated at **CONSERV90** in Phoenix, will continue to address and provide solutions to the most pressing

water supply problems in North America. The program is multidimensional, offering a series of technical presentations, poster presentations, workshops, roundtables, panel discussions, and an impressive product exhibition of water conservation-related products and services. **CONSERV93** is jointly sponsored by the American Society of Civil Engineers, the American Water Resources Association, and the American Water Works Association. For information contact the American Water Works Association, 6666 W. Quincy Ave., Denver, CO 80235.

Drinking Water Laboratory Certification Workshop, Sept. 14-15, 1993, Reno, Nevada -- The workshop will convey the latest information about drinking water laboratory certification requirements and cover the latest U.S. EPA drinking water regulations and anticipated future changes. Participants will receive information about upcoming regulations on disinfectants, disinfection by-products, radionuclides, sulfate, and arsenic, and learn new information on the Office of Groundwater and Drinking Water's laboratory certification program. The registration fee is \$105 for American Water Works Association (AWWA) members and \$125 for nonmembers. For more information, contact the Technical and Professional department at AWWA, TEL: 303/794-7711.

AWWA, Distribution System Symposium, Sept. 26-29, 1993 -- The American Water Works Association (AWWA) will sponsor a Distribution System Symposium focusing on the special problems of drinking water distribution and storage systems Sept. 26-29, in San Diego. The conference is designed for anyone involved in the planning, design, installation, operation, and maintenance of water distribution systems. Registration fee is \$380 for AWWA members who sign up before Sept. 3; nonmembers and on-site registrants pay \$455. One-day registration runs \$75 to \$265. For more information, contact George Craft at the American Water Works Association, TEL: 303/794-7711.

AWWA Water Quality Technology Conference, Nov. 7-11, 1993, Miami, Florida -- This AWWA conference will explore the latest information on laboratory quality analysis. Technical and special topic sessions will review the U.S. Environmental Protection Agency's upcoming proposal on arsenic, watershed management and how it affects water quality, and control of water taste and odor. Seminars will be offered on drinking water laboratories' role in emergency preparedness and response, enhanced coagulation, and *Cryptosporidium* as a public health issue. Training courses will be available on flavor profile analysis and methods for detecting *Giardia* and *Cryptosporidium*.

Registration cost for the technical sessions and exhibits is \$235 for members and \$390 for nonmembers. Seminars are \$50 for members and a\$70 for nonmembers. The training session on methods for detecting *Giardia* and *Cryptosporidium* is \$250 and the flavor profile training workshop is \$200 for all participants. For more information, contact Ralph Leidholdt at AWWA 303/794-7711.

American Water Resources Association

1993 Meetings:

Aug.29-Sept.2 -- INNOVATIONS IN GROUND WATER MANAGEMENT and EFFLUENT USE MANAGEMENT, Tuscon, Arizona. For information, contact Herb Osborn, TEL: 602/883-4517.

1994 Meetings:

April 17-20 -- RESPONSE TO CHANGING MULTIPLE-USE DEMANDS: NEW DIRECTIONS FOR WATER RESOURCES PLANNING AND MANAGEMENT, Nashville, Tennessee. For more information, contact Ralph H. Brooks, Tennessee Valley Authority, Knoxville, Tennessee, TEL: 615/632-6770.

June 26-29 -- EFFECTS OF MAN-INDUCED CHANGES ON HYDROLOGIC SYSTEMS, Jackson Hole, Wyoming. For more information, contact David Naftz, USGS, Salt Lake City, TEL: 801/975-3389.

Nov. 6-11 -- 30TH ANNUAL CONFERENCE, NATIONAL WATER QUALITY; NATURAL WATER QUALITY ASSESSMENT PROGRAM; FUTURE QUALITY OF THE GREAT LAKES, Chicago, Illinois. For more information, contact Phillip E. Greeson, USGS, Norcross, Georgia, TEL: 404/409-7700.

CALLS FOR PAPERS

Second International Conference on Life Support and Biosphere Sciences, Huntsville, AL, Feb. 22-23, 1994. Submit abstracts to: Life Support and Biosphere Sciences, Attn: Ann Yelle, The University of Alabama in Huntsville, Conference Department, Wilson Hall, Rm 129, Huntsville, AL 35899-0700. FAX: 205/895-6760. Deadline: September 3, 1993.

SHORT COURSES

COLORADO STATE UNIVERSITY Soil Liners and Covers for Landfills January 17-18, 1994

This course covers fundamental considerations in the design and construction of landfill liners and cover systems under four basic areas: design considerations, laboratory testing, construction, and field testing. The emphasis is on understanding and practical application of basic principles in each of the above areas. Design considerations, types of potential liner materials, compaction principles, laboratory and field hydraulic conductivity testing, compatibility in terms of hydraulic conductivity, migration of contaminants, construction practice,

Symposium on the Application of Geophysics to Environmental and Engineering Problems, Boston, MA, Mar. 27-31, 1993. Send 250-500 word abstract to Tom Fenner, SAGEEP '93, Technical Program Chairperson, Geophysical Survey Systems, Inc., 13 Klein Drive, P.O. Box 97, North Salem, NH 03073-0097. Deadline: Oct. 1, 1993.

Second International Conference on Ground Water Ecology, Atlanta, GA, Mar. 27-30, 1994. Submit abstracts to: General Chairperson: John Simons, U.S. Environmental Protection Agency Ground Water Protection Division, Mail Code WH550G, 401 M Street, SW, Washington, DC 20460. TEL: 202/260-7091. Deadline: Nov. 16, 1993.

Fifth International Microirrigation Congress - Microirrigation for a Changing World: Conserving Resources/Preserving the Environment, Orlando, FL, Apr. 2-6, 1995. For conference content information contact: Allen Smajstrla, Co-chair, Univ. of Florida, Agr. Eng. Dept., Gainesville, Florida 32611. TEL: 904/392-9295. FAX: 904/392-4092. BITNET AGS@IFASGNV INTERNET AGS@AGEN.UFL.EDU Deadline: Nov. 19, 1993.

AWRA 30th Annual Conference, National Symposium on Water Quality, and Symposium on National Water Quality Assessment (NAWQA), Chicago, IL, Nov. 6-10, 1994. Submit abstracts to: Gary L. Pederson, U.S. Geological Survey, Spalding Woods Office Park, 3850 Holcomb Bridge Rd., Ste 160, Norcross, GA 30092. Deadline: Nov. 15, 1993.

7th Annual Symposium on Individual and Small Community Sewage Systems, Atlanta, GA, Dec. 11-13, 1994. Submit abstract to: Mike Hoover, Dept. of Soil Science, Box 7619, No. Carolina State Univ., Raleigh, NC 27695-7619. FAX: 919/515-2167. Deadline: Oct. 15, 1993.

and construction quality control are described in detail. Concepts will be explained in conjunction with case histories, research, and actual field studies. Participants will benefit from exposure to some of the most recent data collected at actual landfill sites.

For more information contact Janet Lee Montera, Department of Civil Engineering, Colorado State University, Fort Collins, CO 80523. TEL: 303/491-7425, FAX: 303/491-7727.

**COLORADO SCHOOL OF MINES
IGWMC Groundwater Modeling Short Courses**

<u>Date</u>	<u>Course</u>
August 23-27	Parameter identification for MODFLOW (Hill, Cooley), Software: MODFLOWP
Sept. 13-17	Introduction in Groundwater Modeling and Aquifer Testing (Poeter, Dawson, van der Heijde, Paschke), Software: THWELLS, SOLUTE, ASM
Oct. 19-23	Principles and Application of MODFLOW and Accompanying Modules (Andersen), Software: MODFLOW, MODPATH
Nov. 17-19	Flow Modeling Using the Analytical Element Method (Strack, Haitjema), Software: Public domain version based on analytical element method

Contact: Institute for Groundwater Research and Education
Colorado School of Mines
Golden, CO 80401-1887
TEL: 303/273-3103
FAX: 303/273-3278

**THE ROLE OF SCIENCE IN FORMULATION OF
NATURAL RESOURCE POLICY**

As the awareness and magnitude of environmental challenges accelerates, we have even greater opportunities to design research that is relevant to real issues. Whether the inquiry involves forests, wildlife, watersheds, rangelands, or outdoor recreation, our research will have greater use if we, the practitioners, are more facile in focusing our findings toward policy formulation.

In the Fall Semester, a graduate student seminar will explore implications of science on natural resource policy issues. Students will be expected to take a policy issue revolving around a natural resource and demonstrate how science could be used in policy formulation. The natural resources covered will include: water, forest, range, wildlife and outdoor recreation.

For more information contact Rick Knight, Department of Fishery & Wildlife Biology (491-6714) or Dan Binkley, Forest Sciences (491-6519).

CALENDAR

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.
Aug. 29-Sept. 2	AWRA 29TH ANNUAL CONFERENCE & SYMPOSIUM, "EFFLUENT USE MANAGEMENT" , Tucson, AZ. Contact: AWRA, 5410 Grosvenor Lane, Suite 220, Bethesda, MD 20814-2192. Phone (301)493-8600.
Sept. 6-17	DESIGN AND CONSTRUCTION OF ROLLER COMPACTED CONCRETE DAMS , Denver, CO. Contact: David Schaack, American Water Foundation (303)628-5516.
Sept. 7-9	THIRD SYMPOSIUM ON THE SETTLEMENT OF INDIAN RESERVED WATER RIGHTS CLAIMS , Bismarck, ND. Contact: Western States Water Council, Creekview Plaza, Ste A-201, 942 East 7145 South, Midvale, UT 84047; Phone (801)561-5300, FAX: (801)255-9642.
Sept. 9-11	WORKSHOP ON WESTERN WETLAND AND RIPARIAN AREAS , Snowbird, UT. Contact: Thorne Ecological Inst., 5398 Manhattan Circle, Ste 120, Boulder, CO 80303. Phone (303)499-3647; FAX (303)499-8340.
Sept. 17-19	RESTORING URBAN WATERS -- FRIENDS OF TRASHED RIVERS , San Francisco, CA. Contact: California Natural Resources Foundation, 1250 Addison St., #107, Berkeley, CA 94702.

- Sept. 19-21 **A NEW ERA FOR THE WESTERN PUBLIC LANDS**, Sept. 19-21, 1993. Contact: Katherine Taylor, Coordinator, Natural Resources Law Center, Campus Box 401, Boulder, CO 80309-0401, TEL: 303/492-1288, FAX: 303/492-1297
- Oct. 7-8 **MANAGING THE EARTH'S RESOURCES IN THE 90S**, Denver, CO. For information call (303)292-6919.
- Oct. 3-7 **WATER ENVIRONMENT FEDERATION 66TH ANNUAL CONFERENCE AND EXPOSITION**, Anaheim, CA. Contact: WEF'93 c/o Galaxy, P.O. Box 3918, Frederick, MD 21705. FAX (301)662-6579.
- Oct. 11-22 **OPERATION, MAINTENANCE AND MANAGEMENT OF IRRIGATION AND DRAINAGE PROJECTS**, Loveland, CO. Contact: David Schaack, American Water Foundation (303)628-5516.
- Oct. 14-15 **COLORADO HAZARDOUS WASTE MANAGEMENT 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.
- Oct. 27-30 **INTERAMERICAN DIALOG ON WATER MANAGEMENT**, Miami, FL. Contact: So. Florida Water Management Dist., 3301 Gun Club Rd., West Palm Beach, FL, 33406. Phone (407)6887-6105; FAX (407)687-6010.
- Oct. 31-Nov. 5 **RISK BASED DECISION MAKING IN WATER RESOURCES VI**, Santa Barbara, CA. Contact: Donna McArdle, Engineering Foundation, 345 E. 47th St., New York, NY 10017. Phone (212)705-7836; FAX (212)705-7441.
- Oct. 31-Nov. 3 **1993 INTERNATIONAL IRRIGATION EXPOSITION AND TECHNICAL CONFERENCE**. Contact: The Irrigation Association, 1911 North Fort Myer Drive, Suite 1009, Arlington, VA 22209-1630.
- Dec. 12-16 **CONSERV93**, Las Vegas, NV. Contact: American Water Works Association, 6666 W. Quincy Ave., Denver, CO 80235.

COLORADO WATER CONGRESS MEETINGS

Seminar on Colorado Water Law
Sept. 23-24, 1993

Legal Ethics in Water and Environmental Law
Oct. 19, 1993

**Workshop for Board Members of
Water Conservancy/Conservation Districts**
Oct. 20, 1993

**Workshop on Federal and State
Water Quality Developments**
Oct. 21, 1993

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