Colorado Water

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

WATER ITEMS AND ISSUES . . .

October 1996

Instream flow issues held the attention of approximately 200 workshop participants

INSTREAM FLOWS: MINIMUM DOCTRINE/ MAXIMUM CONTROVERSY

A summary of the 1996 Colorado Water Workshop

see page 7

Colorado State University

MINIMUM FLOW – MAXIMUM CONNECTIONS!

Editorial by Robert C. Ward

The Colorado Water Workshop, held on the campus of Western State College in Gunnison each summer, has a long-standing tradition of addressing current water conflicts in a thoughtful and enlightening manner. The 1996 Workshop was no exception. The title of this summer's workshop was "Instream Flows: Minimum Doctrine/Maximum Controversy."

I was impressed at the volume and quality of information provided to attendees. The information came in a very organized manner: from an excellent overview of the legal basis for Colorado's instream flow program; through a historical review of the program's creation and evolution; to current thoughts about where the program is today and where it needs to go tomorrow.

This issue of *COLORADO WATER* contains summaries of presentations, panel discussions, breakout sessions and overall workshop observations. I hope we have captured, in summary fashion, the excellent information exchange that took place in Gunnison.

Colorado's instream flow program faces many challenges as competition increases from evolving uses such as growth and recreation. Many questions arise from the material presented in this summary of the Gunnison workshop:

- How much water is needed to maintain a healthy ecosystem in a stream?
- When is such water needed?
- How do you compute a minimum streamflow for warm-water fisheries?
- How will drought impact the instream flow program?

Faculty in Colorado's higher education system have a long tradition of assisting in the creation of knowledge to answer such questions. I was surprised and dismayed, therefore, to find that I was the only faculty member from any of Colorado's higher education institutions who attended the Colorado Water Workshop! It is obvious to me that a very tenuous thread connects Colorado's faculty expertise to the problems of Colorado's water users and managers. It is a thread that hopefully can be strengthened in the 1997 session of the Colorado legislature when CWRRI seeks to be reauthorized and funded (CWRRI's legislative authorization expires in July 1997).

CWRRI attends as many Colorado water meetings as possible. We summarize the key information generated at those meetings in *COLORADO WATER*, as we have done in this issue with the Colorado Water Workshop. Hopefully, this information connects faculty to the water management problems of the state. *COLORADO WATER* has a long tradition of summarizing university-based research to inform water managers and users about the creation of new water knowledge.

As CWRRI approaches the legislature to seek reauthorization and funding in 1997, your support and guidance will be most helpful. There is hope that a newly formulated and funded CWRRI can turn the existing thread into a strong rope, a rope that benefits both the Colorado water management community and the water research and education community in Colorado's higher education system.

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Robert C. Ward, Director

WATER RESEARCH

PROJECTS SELECTED FOR WESTERN REGIONAL GRANTS PROGRAM

As explained in the April issue of *COLORADO WATER*, The Western Regional Grants Program for Water Resources Research replaced the traditional State Water Institute Research Program for FY1996. Awards were available only to Water Research Institutes or Centers in the Western Region (AK, AZ, CA, CO, ID, NM, NV, OK, OR, TX, UT, WA, WY). Criteria for proposals included substantive collaboration among at least two or more states in the Western Region.

The regional competition received 30 proposals involving over 65 different universities. The WRGP selection panel met July 19, 1996 to evaluate the top ten ranked proposals competing for program funds. Written reviews by peer scientists and input from reviewers in the water management fields of each competing state were provided to the panel for use in the evaluation process. Six projects were recommended for funding (one alternate project was suggested) and forwarded to the U.S. Geological Survey in Washington, sponsor of the State Water Institute Program.

NM/CO/TX Proposal Ranks First

Ranked first in the competition was a proposal submitted by the New Mexico Water Resources Research Institute, the Colorado Water Resources Research Institute, and the Texas Water Resources Institute, titled "Institutional Adjustments for Coping with Prolonged and Severe Drought in the Rio Grande Basin."

The Regional Problem

The economies of the southwestern United States and northeast Mexico have been built by establishing a reliable water supply in a largely arid land. To overcome seasonal and multi-year water shortages and meet projected future demands in the Rio Grande Basin, federal and state governments have built an extensive network of water storage and conveyance systems. Regional water management systems have developed and linked the water resources of the Rio Grande to serve users in Colorado, New Mexico, Texas and Mexico. However, the occurrence of drought and its adverse consequences is an ever-present concern in arid regions. Adverse impacts of droughts are felt by both instream and offstream users of water including reduced agricultural output, falling hydropower production, deteriorating water quality, damages to recreation users, and groundwater overdraft.

The Regional Research Objectives

Project investigators will evaluate institutional adjustments for coping with severe drought in the Rio Grande Basin of Colorado, New Mexico and Texas – the geographic area bound by the Rio Grande Basin from the Colorado headwaters to the Gulf of Mexico. The project will:

- Formulate credible drought scenarios by assessing the probability of a prolonged and severe drought and develop drought scenarios for the major water resource systems of the study area.
- Develop a hydrologic/economic model that accounts for sources and uses of water in the Rio Grande Basin under present water laws, policies, and management institutions. The model will be the basis for evaluation of the hydrologic and economic impacts of droughts of various severity and duration.
- Identify economic damages associated with selected drought scenarios by measuring the magnitude, location and distribution of drought damages under present laws, policies and management institutions.
- Incorporate institutional responses in the model for mitigating economic damages of drought by identifying available legal and institutional flexibility to limit drought damages.
- Operate the model to assess hydrologic and economic impacts of alternative drought management policies.

It is hoped eventually to extend the research into Mexico, where Mexican and American teams of researchers are already collaborating on water research.

Project Investigators

The project director is Tom Bahr, Director, New Mexico Water Resources Research Institute. Investigators for the project are:

From New Mexico State University --
Frank Ward, Principal Investigator
Department of Agricultural Economics
and Agricultural Business

Tom McGuckin, Co-Investigator
Department of Agricultural Economics
and Agricultural Business

J.Philip King, Co-Investigator and Leader,
New Mexico/Colorado hydrology effort
Department of Agricultural Engineering

From Colorado State University --
Robert Young, Co-Investigator and
Colorado Leader
Department of Agricultural and Resource Economics
Marshall Frasier, Co-Investigator
Department of Agricultural and Resource Economics

From Texas A&M University --
Ronald Lacewell, Co-Investigator and Texas Leader
Department of Agricultural Economics
John Ellis, Co-Investigator
Department of Agricultural Economics
Raghavan Srinivasan, Co-Investigator and leader of
Texas hydrology effort.
Texas Agricultural Experiment Station

Frank Ward, Tom McGuckin and J. Philip King of the New Mexico team are graduates of Colorado State University. Ward received his B.S., M.S. and Ph.D in Economics from Colorado State University; King received his M.S. and Ph.D in Agricultural Engineering from Colorado State University; and Tom McGuckin received his M.S. in Economics from Colorado State University. McGuckin received a Ph.D in Agricultural Economics from the University of Wisconsin in 1980.

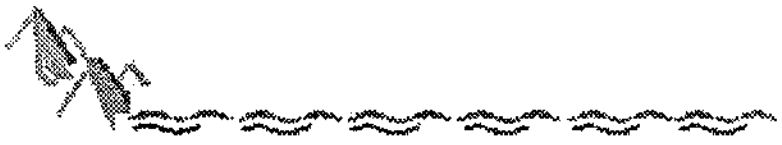
Other participants are Charles DuMars, Professor of Law at the University of New Mexico, and James F. Booker, Assistant Professor of Economics and Environmental Studies, Alfred University, Alfred, New York. DuMars is a nationally recognized authority on water law in New Mexico and the Rio Grande basin. Booker, while a Ph.D student under Robert Young, developed the approach to linking hydraulics and economics that will be used in the study.

The project will have an advisory council comprised of the three participating WRRI directors and about 15 key water managers in the Rio Grande Basin drawn from major irrigation districts, cities, utilities, and federal and state agencies in Colorado, New Mexico and Texas.

LIST OF PROJECTS SELECTED FOR FUNDING
REGIONAL COMPETITIVE GRANTS PROGRAM

Title	Principal Investigators	Submitting Institute
Institutional Adjustments for Coping with Prolonged and Severe Drought in the Rio Grande Basin	F.Ward, J.P.King & T.McGuckin (NMSU) R.Young & M.Frasier (CSU) R.Lacewell, J.Ellis & R.Srinivasan (TXA&M)	New Mexico Water Resources Research Institute
Enteric Pathogen Reduction by Artificial Wetlands	C.Gerba, M.Karpiscak & K.Foster (U. of AZ) M.Yates (U of CA-Riverside) R. Fuijoka (U. of HI).	Arizona Water Resources Research Center
Paleohydrological and Hydroclimatological Analysis of the Magnitude and Frequency of Large Floods in the Verde River Basin, Central Arizona	S.Wells & P.House (U. of NV) V.Baker (U. of AZ) P. Pearthree (AZGS)	Water Resources Center, Desert Research Institute
Effectiveness of Irrigation District Conservation Price Programs	A.Michelsen & R.Huffaker (WSU) T.McGuckin (NMSU) G.Taylor (U of NE)	State of Washington Water Research Center
Near-Surface Hydrology of the Eastern Palouse Region	P.McDaniel & J.Hammel (U of ID) L.King (WSU)	Idaho Water Resources Research Institute
One Thousand Years of Colorado River Flow: The Proxy Record of Oxygen Isotopes in Marine Mollusks from the Colorado Delta	K.Flessa & D.Dettman (U of AZ J.Zachos (U of CA)	Arizona Water Resources Research Center
Selected as an Alternate for Funding: Enhanced Land-Treatment of Heavy Metal Contaminated Waters	S.Fendorf & S.McGeehan (U of ID) J.Harsh (WSU) P.Grossl (USU)	Idaho Water Resources Research Institute

Note: Three of the investigators for the project awarded to the State of Washington Water Research Center (Michelsen, McGuckin and Taylor) are also graduates of Colorado State University and former students of Robert A. Young, Department of Agricultural and Resource Economics.)



WATER RESEARCH AWARDS

A summary of water research awards and projects is gi en 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

*Arkansas Darter Recovery: Defining Habitat Requirements & the Spatial Dynamics of Population..., KURT D. FAUSCH, Fishery & Wildlife Biology. Sponsor: Colorado Division of Wildlife.

Assistance for Image Display Techniques & Data Analysis, KENNETH E. EIS, CIRA. Sponsor: DOI-NPS-National Park Service.

A Study of Sustainability as Applied to Soil Conservation, DANA L. HOAG, Agricultural & Resource Economics. Sponsor: USDA-NRCS-Natural Resources Conservation Service.

*A System for Conservation Planning -- 1995-1997, N THOMPSON HOBBS, Natural Resource Ecology Lab. Sponsor: Colorado Division of Wildlife.

Biological & Chemical Monitoring of Soda Butte Creek, Montana..., STEPHEN A. FLICKINGER, Fishery & Wildlife Biology. Sponsor: DOI-National Biological Survey.

*Convective Cloud Systems in Climate Models, DAVID A. RANDALL, Atmospheric Science. Sponsor: NSF-GEO-Geosciences.

*Debris Control at Hydraulic Structures, STEVEN R. ABT, Civil Engineering. Sponsor: University of Nottingham, England.

*DEC Monitoring Sites 1996-1998, CHESTER C. WATSON, Civil Engineering. Sponsor: DOD-ARMY-Corps of Engineers.

*Developing Tools to Predict Persistence and Extent of Reintroduced Colorado River Cutthroat Trout...KURT D. FAUSCH, Fishery & Wildlife Biology. Sponsor: Colorado Division of Wildlife.

Development of a Monitoring Program for Juvenile Colorado Squawfish in the Colorado River, ROBERT T. MUTH, Fishery & Wildlife Biology. Sponsor: DOI-NPS-National Park Service.

*Development & Application of Biological Assessment Techniques, GLENN E. HAAS, Nat Resource Recreation & Tourism. Sponsor: DOI-National Biological Survey.

Development of User-friendly Graphical Interfaces for Ecological Simulation Models..., DEBRA P. COFFIN, Natural Resources Ecology Lab. Sponsor: NSF-Biological Centers.

East Anatolia Watershed Training Project - Group 10 - France, MERLE H. NIEHAUS, International Research & Development, CID-Consortium for Internati. Development.

Ecology of Western Reservoirs, DARRELL G. FONTANE, Civil Engineering. Sponsor: DOI-National Biological Survey.

*Effects of Changing Land Use on Wildlife Diversity, JOHN A. WIENS, Biology. Sponsor: Colorado Division of Wildlife.

*Effects of Woody Vegetation on Channel Roughness, STEVEN R. ABT, Civil Engineering. Sponsor: DOD-ARMY-Corps of Engineers.

*Effects of Non-Uniform Cloud Drop Composition on Pollutant Transformation & Removal..., JEFFREY L. COLLETT JR., Atmospheric Science. Sponsor: Environmental Protection Agency.

*Embankment Overtopping, JAMES F. RUFF, Civil Engineering. Sponsor: DOI-Bureau of Reclamation.

*Establishment of Baseline Water Quality Conditions in the National Park Service, JOHN D. STEDNICK, Earth Resources. Sponsor: DOI-NPS-National Park Service.

*Field to Farm to Ecosystem Scale Decision Support Models, JOSE D. SALAS, Civil Engineering. Sponsor: USDA-ARS-Agricultural Research Service.

*Field Studies & Modeling of Cropping Systems & Their Impact on Water Quality ..., GARY A. PETERSON, Soil & Crop Sciences. Sponsor: USDA-ARS-Agricultural Research Service.

Fish & Invertebrate Biomass Estimates Using Hydroacoustics, BRETT M. JOHNSON, Fishery & Wildlife Biology. Sponsor: Colorado Division of Wildlife.

*Global Change Data Assessment & Integration, EDWARD T. ELLIOTT, Natural Resources Ecology Lab. Sponsor: Consortium for Int'l Earth Science Info.

Great Outdoors Colorado Programs - County Land Use Planning, DENIS J. DEAN, Forest Sciences. Colorado Division of Wildlife.

Improving Nexrad-Based Estimates of Precipitation Rates & Hydrometeor Classification..., STEVEN A. RUTLEDGE, Atmospheric Science. Sponsor: NSF-GEO-Geosciences.

*Irrigation Enterprise Management Study, JOHN R. WILKINS-WELLS, Sociology. Sponsor: DOI-Bureau of Reclamation.

*Landsat TM Data for Vegetation Type Mapping of the South Platte Watershed, ROGER M. HOFFER, Forest Sciences. Sponsor: Colorado Division of Wildlife.

Measuring Societal Perceptions, Attitude & Economic Benefits of Ecological Integrity..., JOHN B. LOOMIS, Agricultural & Resource Economics. Sponsor: Environmental Protection Agency.

*Measuring the Value of Threatened & Endangered Species, JOHN B. LOOMIS, Agricultural & Resource Economics. Sponsor: DOI-Bureau of Reclamation.

*Optimal Feeding Strategies, DAVID R. ANDERSON, Cooperative Fish & Wildlife Research. Sponsor: Colorado Division of Wildlife.

Precision Farming to Protect Water Quality & Conserve Resources, LEE E. SOMMERS, Soil & Crop Sciences. Sponsor: USDA-ARS-Agricultural Research Service.

Predicting Risk of Extinction of Greenback Cutthroat Trout, KURT D. FAUSCH, Fishery & Wildlife Biology. Sponsor: USDA-USFS-Forest Research. START

*Public Attitudes Towards Agriculture in Colorado, GEORGE N. WALLACE, Nat Resource Recreation & Tourism. Sponsor: Colorado Department of Agriculture.

Regional Assessment of Freshwater Ecosystems & Climate, ALAN P. COVICH, Fishery & Wildlife Biology. Sponsor: DOI-US Geological Survey.

Remedial Design for Bioremediation Projects, KENNETH F. REARDON, Chemical & Bioresource Engineering. Sponsor: Camp Dresser McKee.

***Responses of Hydrologic & Aquatic Ecosystem Processes to Potential Climate Change...,** JILL S. BARON, Natural Resources Ecology Lab. Sponsor: DOI-NPS-National Park Service.

Roaring Fork - A Natural Heritage Inventory, CHRISTOPER A. PAGUE, Fishery & Wildlife Biology. Sponsor: Pitkin County, Colorado.

Snow Distribution & Runoff Forecasting, Kings River Basin, California, KEVIN J. ELDER, Earth Resources. Sponsor: DOD-ARMY-Corps of Engineers.

***Spread Creek Material Source Study,** ALBERT MOLINAS, Civil Engineering. Sponsor: DOT-Federal Highway Administration.

Support for Global Change Research in Rocky Mountain National Park, Colorado, THOMAS J. STOHLGREN, Natural Resources Ecology Lab. Sponsor: DOI-NPS-National Park Service.

***Systems Analysis Methods for Water & Natural Resources Decision Making,** MARSHALL FLUG, Civil Engineering. Sponsor: DOI-National Biological Survey.

Table Mountain Ecological Evaluation, CHRISTOPHER A. PAGUE, Fishery & Wildlife Biology. Sponsor: Boulder County, Colorado.

Toxicological Studies at the Eastern Municipal Water District Wetlands, Hemet, CA, BRUCE A. WUNDER, Biology. Sponsor: DOI-National Biological Survey.

Uncertainty & Risk Analysis Under Extreme Hydrologic Events, JOSE D. SALAS, Civil Engineering. Sponsor: National Science Foundation.

Use of Tiger Muskie in Colorado, STEPHEN A. FLICKINGER, Fishery & Wildlife Biology. Sponsor: Colorado Division of Wildlife.

Use of Zeoponic Mixtures for Sand-based Turfgrass Culture, ANTHONY J. KOSKI, Horticulture & Landscape Arch. Sponsor: Boulder Innovative Technologies, Inc.

U.S. New Zealand Cooperative Research: A Review of Salmonid Invasions Worldwide, KURT D. FAUSCH, Fishery & Wildlife Biology. Sponsor: National Science Foundation.

Validation of Razorback Sucker Daily Otolith Increments..., KEVIN R. BESTGEN, Fishery & Wildlife Biology. Sponsor: DOI-Bureau of Reclamation.

Water Quantity/Routing Model Development, Klameth River Basin, Oregon & California, MARSHALL FLUG, Civil Engineering. Sponsor: DOI-National Biological Survey.

Water Resources Inventory & Assessment of Watersheds at Salinas Pueblo Mission, NM, FREEMAN M. SMITH, Earth Resources. Sponsor: DOI-NPS-National Park Service.

The University of Colorado, Boulder, CO 80309

***Ozone-Induced Biodegradability of Disinfection By-Product Precursors,** GARY AMY, Civil Engineering. Sponsor: National Water Research Institute.

Valuing Biodiversity: The Issue of Invasive Species, ANNA ALBERINI, Economics. Sponsor: USDA/Forest Service.

Meltwater Flow through Snow, MARK WILLIAMS, Geography. Sponsor: USDA/Forest Service.

South Platte Water Rights Management System—Enhancement and Maintenance, JACQUELYN SULLIVAN, CADSWES. Sponsor: State of Colorado.

***Modeling for Design and Testing of Treatment and Remediation Technologies for Aquifers Contaminated With Organic Wastes,** Civil Engineering. Sponsor: Kansas State University.

Groundwater contamination by Organic Wastes: Pilot-Scale Laboratory Investigation for Field Up-Scaling, TISSA ILLANGASEKARE, Civil Engineering. Sponsor: Kansas State University.

Biogeochemical Processes and Hydrologic Characteristics of Alpine Talus, MARK WILLIAMS, Geography.

***A Pale Lake Sediment Calibration Network for the Eastern Canadian Arctic,** JONATHAN OVERPECK, Geological Sciences. Sponsor: National Science Foundation.

***Competitive Binding of Polycycle Aromatic Hydrocarbons by Aqueous Organic Matter, Mineral-Bound Organic Matter, and Mineral Surfaces Effects on Groundwater,** JOSEPH RYAN, Civil Engineering. Sponsor: National Science Foundation.

***Geostatistical Methods for Determination of Roughness, Topography, and Changes of Antarctic Ice Streams from Sar and Radar Altimeter Data,** UTE HERZFELD, Institute. of Arctic and Alpine Research. Sponsor: NASA.

***Determination and Applications of Satellite-Derived Atmospheric Water Characteristics in Oceanic Regions,** Judith Curry, Aerospace Engineering. Sponsor: HASA.

***Impacts of Flows and Geomorphology on Food Web Dynamics of the Colorado River Native Fish Community,** JOHN PITLICK, Geography. Sponsor: DOI/U.S. Fish & Wildlife Service.

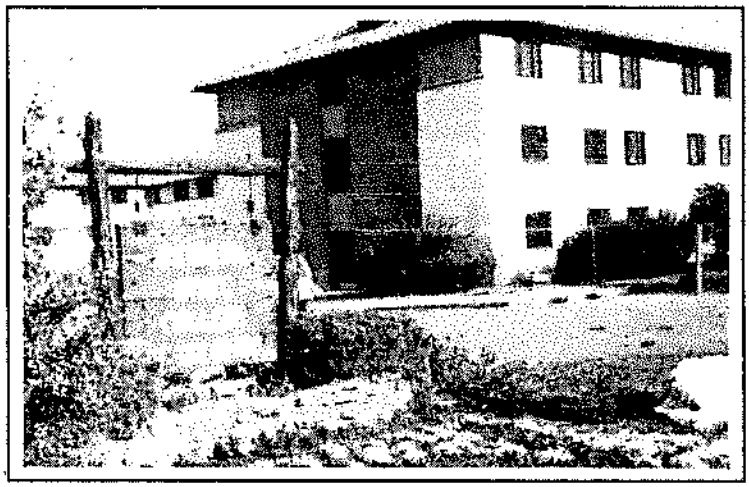
Numerical Coupling of River Discharge to Shelf/Slope Sedimentation Models, James Syvitski, Geological Sciences. Sponsor: DOD/Department of the Navy.

***Theoretical and Experimental Studies of Hydrological Properties of Rock Fractures During Active Deformation,** SHEMIN GE, Geological Sciences. Sponsor: Department of Energy.

*Supplement to existing award.

INSTREAM FLOWS: MINIMUM DOCTRINE/MAXIMUM CONTROVERSY

The 21st Annual Colorado Water Workshop held August 7-9, 1996 at Western State College in Gunnison, Colorado, provided participants the joint opportunity to visit one of Colorado's foremost recreation areas and to learn more about instream flows in the West.



This issue of *COLORADO WATER* presents highlights of the Workshop including:

- A history of prior appropriation as it relates to instream flows by Supreme Court Justice Greg Hobbs;

- The evolution of instream flow policy, with individual comments and discussion by Fred Anderson, legislative consultant, Harris Sherman, Arnold & Porter P.C.; Robert Weaver, Hydrosphere; and Scott Balcomb of Delaney & Balcomb P.C.;

Pam Ayers, Workshop Coordinator, chats with participant

- Summary reports by moderators of breakout sessions :
  - instream flow quantification,
  - monitoring and enforcement,
  - cooperative efforts,
  - allowing entities other than the Colorado Water Conservation Board to hold instream flow rights,
  - how to adapt the instream flow program to better address federal environmental issues, and
  - how the CWCB can ensure adequate notice and opportunities for comment when it files for new water rights.

- Comments by Sara Duncan, Denver Water; and Larry MacDonnell, Lawyer and Consultant.

Workshop Sponsors: Colorado Department of Natural Resources, City of Aurora, City of Colorado Springs, City of Gunnison, Denver Water Department, Colorado River Water Conservation District, Southwestern Water Conservation District, Upper Gunnison River Water Conservancy District and Gunnison County.

Workshop Co-Sponsors: City of Grant Junction, Colorado Rural Water Association, Municipal Subdistrict, NCWCD, U.S. Bureau of Reclamation, Northern Colorado Water Conservancy District, Water Resources Research Institute, U.S. Environmental Protection Agency, Ute Water Conservancy District, and the Coors Brewing Company.

COLORADO, PRIOR APPROPRIATION, INSTREAM FLOW PIONEER

Greg Hobbs

I would like to read a poem I composed, "Discourse," my view of how a Coloradan might see a river and its power:

DISCOURSE

Rivers have an endless way of Fascinating,
They make Music. To each, a different Melody.
Where one chooses to Stand on a River
Is a matter of Geography and Elevation.
At the top or bottom rung, Rivers have Utility and
Glimmer.

Possibility. Be the Waterbug or the Tugboat?
Consider how The Waterbug, as Ferril says,
Can drift but several feet Unto another Ocean.
And when is leveled out the Hills, How full the
Barges ply betwixt far, lower, Delta Islands.

Families work and play Between, grow and
Eat the yellow Corn fruit, ride the Flowing Horse.
From the Heart of the Continent, morning walks a
Riverine Discourse and Colorado's forth, to bend
And bid along. Great blue heron, Watches.

G.H. 7/13/96

There are many other views. Here is how Thomas Hornsby Ferril described the Divide-swimming waterbug:

WATERBUG

I climb to a lily-pad lake
at the top of a mountain pass,
some of the water flows to the east,
some of it goes west.

Look how that struggling waterbug
is pushing sundown back
on golden golden ripples
of the lake.

Which ocean will he blunder to?
He does not know, nor I,
but I can feel the wonder
of the blue bandanna sky.

Ferril, from "Anvil of Roses."

Colorado waterbugs we are. The sky, the Divide, the mountains and the streams fill our minds -- always present, shaping our orientation, and consequently, our law and lives.

When Thomas Jefferson sent Lewis and Clark into the vast newly acquired public lands of the Louisiana Purchase, afraid that Lewis might venture towards Santa Fe and be captured by the Spanish, and the great expedition rendered naught, he gave his student Meriwether Lewis this instruction: "The object of your mission is single, the direct water communication from sea to sea formed by the bed of the Missouri and perhaps the Oregon."

Of course, there existed no broad and flowing avenue across the Continent. The Great Falls of the Missouri and the spine of the Continent intervened. As western pioneers traced the land upward, torrents turned to trickles and disappeared. The American Age of Scientific Exploration yielded to the facts of western aridity, and Congress disclaimed the common law of riparianism to allow the Territories and the States to choose a water law that might suit their circumstances.

Since the inclusion of the doctrine of prior appropriation in our State constitution in 1876 (Colo. Const. Art. XVI, Secs. 5&6) and consequent abolishment of the applicability of common law riparianism within Colorado, we have learned much about the strengths and limitations of our Colorado water law. First, Colorado's water resource is a public good that can be captured, possessed, and controlled by appropriation and beneficial use to serve public and private purposes. A water right, once perfected, is a property right for purposes of the Colorado and United States Constitutions. Second, appropriation and use of the water resource is considerably shaped and constrained by statutory law enacted by the Colorado General Assembly , e.g., C.R.S. 37-92-101 et seq. Colorado courts have paid significant deference to the Assembly's role in defining regulation and use of water.

Coloradans have asserted much about their doctrine of prior appropriation, rightly and wrongly, so I want to consider first the significant errors which have been argued and corrected over the years by this continuing dialogue that we, the generations before us, and the generations that follow us, will surely continue to have.

First assertion: Upon statehood, Colorado received the title to all waters arising on and flowing through its boundaries. **Wrong.** This was argued as recently as 1982 in the City and County of Denver case.

The court ruled that dual jurisdiction to create property rights in unappropriated water exists between the federal and state governments. The presumption that state law is the primary mechanism by which water rights are brought into being can be interrupted by Congressional creation of express or

implied federal reserved water rights and the navigation servitude. That is how the Indian reserved rights, the Wild and Scenic reserved rights, and other federal water rights arise, by reservation; and the implied doctrine of the primary purpose of a land reservation requiring water was able to fit into state and federal law, in that the federal water right operates on unappropriated water then existing at the date of the reservation.

The United States Supreme Court, in my opinion, did a brilliant job in reconciling the fact that Congress, in Winters, had allowed the states to create these property rights, but allowed the Congress to intervene, explicitly or by necessary implication, to then have a water right in priority out of the unappropriated water subject to the senior rights that had been settled. Changes in water law that are made prospective are the ones that are most successful. Those that are made retroactive to disturb existing rights probably are suspect, because there is a dual jurisdiction that exists with regard to the unappropriated water resource.

States sharing an interstate stream system are entitled to an equitable apportionment effectuated through the original jurisdiction of the United States Supreme Court or by interstate compact executed by two or more states and approved by Congress. We learned in the Hinderlider case in the mid 1930s from the U.S. Supreme Court, after two very truculent opinions of the Colorado Supreme Court asserting that state water rights prevailed over the interstate equitable apportionment jurisdiction and even compacts, that property rights a state can create in the water resource operate as to the water allocated to that state either by equitable apportionment or by compact.

The Colorado era of compacts prevailed over equitable apportionment because, very frankly, we didn't like the results in the Colorado/Wyoming case. Delph Carpenter and others negotiated nine interstate compacts, because the state wanted some certainty as to what the water resource available to Colorado would be for the future. Once you have a compact that is enforceable, and Colorado has found this out in the Kansas case, we have an interstate resource to share.

Second assertion: The law of prior appropriation and instream flow cannot be reconciled. **Wrong.** This is another great error.

Diversion, according to the Colorado Supreme Court, is not a Colorado constitutional requirement. The General Assembly may properly enact a statutory program for the appropriation of water for beneficial use instream, without diversion, by a state agency while requiring that all other water rights effectuate a means of capture, possession, and control. The Colorado constitutional right to divert is not denied by allowing some unappropriated water to be appropriated pursuant to a legislatively delegated state administrative program.

That was and is revolutionary. The Supreme Court found a way to get there in that the minimal amount necessary to preserve the environment to a reasonable degree could be appropriated instream without diversion when the Legislature so determined to have that kind of program. Remember, what is preserved in the Colorado Constitution is that the right to divert shall never be denied. The Supreme Court found that in a carefully prescribed program the diversion requirement could be imposed with respect to all other types of water rights, but for this unique type of water right and with this kind of program the deferral to the Legislature was appropriate. This is what the Court was saying previously in 1965:

> *There is no support in the law of this state for the proposition that a minimum flow of water may be appropriated in a natural stream for piscatorial purposes without diversion of any portion of the water appropriated from the natural course of the stream.*

That sounded pretty definitive, but as it turns out what it really said was that our statutory law can accommodate these kinds of appropriations. The traditional type of appropriation obviously had been an appropriation out of the stream for uses for farming, mining, manufacturing, etc. One conclusion you must draw about Colorado water law is that, despite some of the charges made against it, it is a very flexible, adaptable law. It takes into account the public interest and the public desires of Coloradans to integrate new uses, in priority, while protecting proprietary right in preexisting uses.

Beneficial use is not defined by the State Constitution. It has been a common law and a legislatively prescribed law. Beneficial use of water in storage and released from storage to be administered and delivered downstream includes in-channel fish, wildlife, and recreational uses. Beneficial use also encompasses Colorado Water Conservation Board (CWCB) instream flow rights for preservation of the environment to a reasonable degree.

Third Assertion: A conditional water right entitles the holder of that right to apply water to beneficial use and thereby perfect the water right. **Wrong.**

Conditional water rights preserve an antedated priority among water rights priorities, based on reasonable diligence in pursuit of the appropriation. A water right, however, can arise only by application of water to beneficial use.

Land use and environmental requirements, along with financing and engineering considerations, among others, may constrain or prevent the perfection of a water right. That has been a hard lesson for Coloradans. It is a lesson that still requires concentration and provokes great consternation, but it is not possible, standing here in 1996, to deny the fact that a conditional water right is not a guarantee that you can perfect a water right. There are other legal requirements, land use requirements, financial requirements, accommodation, compromise, court decisions, etc. There can be no doubt that any water project in these days is a community project.

Other Significant Aspects of Colorado's Law of Prior Appropriation

Colorado's prior appropriation law provides security, stability and flexibility in water use.

- A decreed water right entitles the holder or beneficiary of the right to capture, possess, control, and utilize a specified amount of available water for beneficial use from the specified point of supply to the exclusion of all other uses not then operating in decreed priority. It is an extremely valuable right. The State Engineer is required to enforce the decrees of the Court and to shut down the juniors in favor of the seniors when there is a lack of available supply to serve all priorities. Not all water law systems do this.

- Colorado pioneered the ability to sell, purchase, or change a water right in the amount of its historic consumptive beneficial use, so long as decreed conditions will prevent injury to all other rights. In 1986, state legislation gave the CWCB the authority to acquire and change senior rights and convert them to instream flow.

Augmentation and substitute supply plans allow out-of-priority diversion and use, if replacement water is supplied to satisfy senior priorities. Even if you have the most junior of priorities, you can divert out-of-priority by replacing the injury to the senior by water management -- by injecting nontributary water, by bringing in reservoir water, or by developing other supplies, or by making exchanges. Suddenly, the doctrine of priority becomes the doctrine of innovation.

Federal law continues to defer to Colorado water law in the creation and administration of water rights.

- The McCarran Amendment, 43 U.S.C. 666, as interpreted by three leading cases arising in Colorado, provides for the adjudication of all federal water rights claims in the state's water courts, so that federal reserved rights and federal appropriations made under Colorado law can be identified, decreed and integrated into the system of priority administration. Again, this huge innovation made by Congress in the early 1950s took litigation in Colorado to bring to reality, because Justice Department attorneys couldn't believe that the McCarran Amendment said what it said.

- It is very important to understand that the instream flow water right has taken its place along with all other water rights. It is not a secondary, cheaper water right. It is a water right in priority, subject to being enforced in priority, to be appropriated by an appropriator -- the CWCB, a public body with public responsibilities, that has a process for listening to all interested parties before it makes the appropriation. The CWCB also has the power to make agreements, as it sees fit, to have conditions attached to a decree for the enforcement of that appropriation.

- The Colorado and United States Supreme Courts have ruled that instream flows are a secondary, or supplementary, purpose of the National Forests. Since implied federal reserved water rights exist only for the primary purposes of federal reservations, state law is the mechanism by which instream flow water rights may be established as to streams in Colorado, including on the National Forests. State law provides for federal agencies
- to make their instream flow recommendations to the CWCB.

- Claims of the United States for federally reserved water rights are subject to the postponement of priority doctrine, as with state-created water rights. Claims which could have been made but were not asserted in the original McCarran proceeding will be subject to setting of an administrative priority as of the year they are sought and, within that year, will have a date based on the original reservation (U.S. vs. Bell, Colo. 1986). Again a pioneering Colorado Supreme Court case, which held that if the United States misses its first opportunity to adjudicate the right in the state forum upon joinder, it falls in line as every other water right.

- Colorado has been able to move into an adjudication system where those who had the senior rights had to speak up and get their priority date decreed or else they moved back in line to prove their water right as to its quantity, use and date of appropriation. Despite the fact that Colorado has a constitutional doctrine of appropriation, the Legislature has much to say about how water rights will be recognized, enforced, and how new uses are to be integrated.

Colorado water law has changed with the needs and values of the citizens of the state.

- Beneficial uses include a variety of private and public entity purposes, such as agricultural, domestic, municipal, commercial, industrial, flood control, dust control, mined land reclamation, passage of float boats, fish, wildlife, recreational, and preservation of the natural environment to a reasonable degree by the CWCB. People raised their eyebrows when Justice Mullarkey, writing for the court, held in the Thornton/Fort Collins case that a boat chute could be point of diversion to which to call water and float boats through. She distinguished this from being a minimum stream flow, which is an appropriation between two points on the stream without diversion, and found that water directed to that point, the boat chute, was for a beneficial use -- recreation.

- In the pioneering Gunnison case, water released from storage into the stream for fishing and recreation was recognized as a proper use, in priority, for augmentation of the stream, again distinguished from an instream flow. Why? There was a method of capture, possession, and control, reduction of the water in priority for a beneficial use, and administration by the State Engineer of the reservoir release. Again, the decisions reflect the common law being worked out among the water user community, the citizen and environmental community; the Legislature, and the courts.

- Instream flow water rights in priority have been created without resort to the public trust doctrine. This is another pioneering innovation of Colorado water law. In other states, the courts have had to step in and impose the public trust to provide water for recreation, fish and wildlife. Our Legislature, in 1973, determined that the proper way to do this was to integrate the new uses into the property-based system of appropriative water rights. So, the courts in Colorado have not found it necessary to impose the public trust.

- Like other water rights, instream flow water rights are subject to being protected against injury in the change of other water rights. The Aspen Wilderness Workshop Case surely proves to us that the instream flow appropriations have teeth. There were several attempts in the '70s and early '80s to either repeal instream flow legislation or to subordinate instream flows to other uses. One of those bills actually passed, and was vetoed by Governor Lamm. The rolling subordination idea was argued in the 1979 case challenging the constitutionality of the instream flow law. Justice Groves held no, the CWCB appropriation is a water right and is entitled to be enforced.

- The CWCB may utilize augmentation and exchange plans in connection with the instream flow program and may acquire and change senior rights by purchase, grant, contract, or other voluntary means of acquisition. Again, to do this conversion within a property-based system requires investment, obviously. One of the big criticisms of the instream flow program has been the junior nature of the priority. Well, everybody is in the same boat. The municipalities were junior to the farmers and the miners. How did they firm up their water rights? They built storage, implemented exchange or augmentation plans, or bought out senior rights.

Colorado Water Law Accomplishments

Colorado's minimum stream flow law was a pioneering piece of legislation for a prior appropriation state whose practitioners and advocates were rooted in a tradition opposed to the common-law doctrine of continuous flow that came out of the Justinian Code. This doctrine existed as the common law until the 1866 Mining Act, when Congress disavowed it and left it up to the states to determine what their own water law should be. In retrospect, the passage of this law in 1973 is one of the most significant accomplishments of Colorado water law, basically a law of vested water rights relying on capture. Yet, Colorado's version of prior appropriation has been flexible enough to embrace changing needs and values through the creation and administration of nontraditional junior rights.

I would consider other significant accomplishments in Colorado water law to have been the state constitutional provisions regarding water, the early Colorado Supreme Court decisions recognizing trans-basin appropriation and use and the change of water rights from one use to another, the negotiation and execution of Colorado's nine interstate compacts, the reclamation partnership between local districts and the federal government for construction of Colorado water projects, the McCarran decisions regarding federal water rights claims, the designated Ground Water Act, the 1969 Adjudication Act involving the integration of surface water and ground water of natural streams in priority and providing for adjudication of exchange and augmentation plans, and the acts defining and regulating non-tributary groundwater. The doctrine of continuous flow does not fit an arid state. These are tried and true principles that we have worked with, but innovations to them are still being made.

To include the instream flow law among these other significant Colorado water law accomplishments is to recognize the tremendous contribution that Colorado legislators made in establishing that the flowing resource of our streams is a public good to be protected within the water rights system. Accordingly, Colorado owes acknowledgment to those who pioneered this law change (S.B. 97, 1973 Colo. Sess. Laws 1521). These lawmakers relied upon tradition and respect for law and legal relationships while weaving fundamentally new rights into the enforceable fabric of community life in this state. Legislative explanations of intent appearing in the transcript of the proceedings include the following:

- The minimum flow water rights would be junior to all other appropriations made before them.

- The State Constitution protects senior water rights, whose owners need not fear these junior appropriations.

- Eminent domain would not be employed as part of the minimum stream flow program.

- Only the state would have authority to appropriate minimum stream flows. This is emphasized at least five or six times in the debate.

- Beneficial use, not defined in the constitution, can be statutorily defined to include minimum flows appropriated by the state between specific points on natural streams to preserve the natural environment to a reasonable degree.

- Federal reserved water rights were being asserted by the United States on the basis that Colorado had no mechanism for preserving minimum stream flows, and Colorado, not the federal government, should decide how to deal with this issue.

- A proposed constitutional amendment had been circulated the year before which would have allowed any person to appropriate instream flows, and having a state agency undertake this program is preferable.

- Amendments to place an elevation limit below which such appropriations could be made were rejected; these suggested elevation limits were 8,000 feet and 5,000 feet.

(Legislative debates of March 9, March 13, April 2 1973.)

It is clear that a statutory change, at least, was needed. The Colorado River Water Conservation District's attempt to appropriate minimum streamflows for instream piscatorial use was rejected by the Colorado Supreme Court in 1965 because no diversion was effectuated. The Court referred to the attempted appropriation as a forbidden riparian right, suggesting that diversion might be a constitutional prerequisite for an appropriation. S.B. 97 eliminated the

statutory diversion requirement while providing the CWCB with the authority to appropriate minimum stream flows. The law was challenged on the assertion that diversion was a constitutional requirement. On May 1, 1979, the Colorado Supreme Court disagreed, holding that the General Assembly had the authority to redefine the statutory requirements for an appropriation to include a beneficial use without diversion. Seven weeks later, on June 22, 1979, by Senate Bill 481, the General Assembly reimposed the statutory requirement for any appropriation, except for CWCB minimum stream flow appropriations, to require that water, for the ripening of a water right, must be "diverted, stored, or otherwise captured, possessed, and controlled and. . .applied to a beneficial use." (1979 Colo. Sess. Laws 1368).

The Colorado Supreme Court decision upholding the minimum stream flow statute's constitutionality made several key points:

- The legislative objective is to preserve reasonable portions of the natural environment in Colorado.
- The factual determinations regarding which areas are amenable to preservation and the life forms to be protected were delegated to an administrative agency which may avail itself of expert scientific opinion.
- The CWCB appropriations are enforceable in priority.
- The CWCB, in making the appropriation, should take into account Colorado's water compact interests.

Subsequent actions of the General Assembly and decisions of the Colorado Supreme Court have reiterated that the integration of instream flows into the state's system of prior appropriation is essentially a legislative task to define. Colorado's instream flow law was implemented by a carefully drawn statute and was not tantamount to the institution of the doctrines of natural flow, riparian water law, or the public trust. Hence, the Supreme Court in its 1979 opinion was able to say:

> *We conclude that the General Assembly has established "what job must be done" with sufficient clarity. It also has answered "who must do it" since it is specifically the Colorado Water Board which is authorized to appropriate waters to accomplish the legislative purpose. It has sufficiently described the scope of the Colorado Water Board's authority.*

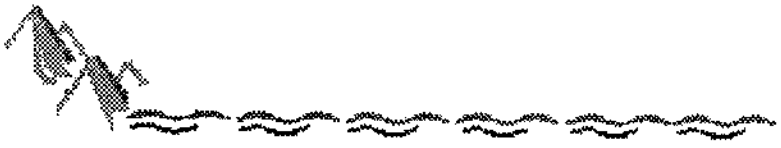
Shortly after its decision upholding the CWCB authority, the Colorado Supreme Court rejected the public trust doctrine as the basis for providing recreational access involving privately owned beds and banks of streams in Colorado. In 1981, by S.B. 414, 1981 Colo. Sess. Laws 1784, the General Assembly added criteria requiring protection for any senior right, whether or not decreed, and that the Board determine that there is a natural environment that can be preserved with the water available to be appropriated.

In 1986, through S.B. 91, 1986 Colo. Sess. Laws 1095, the General Assembly gave authority to the CWCB to acquire senior water rights by purchase, donation, or contractual agreement and change them to instream flows. Subsequent legislation, S.B. 212, 1987 Colo. Sess. Laws 1305, reiterated that only the CWCB can appropriate minimum stream flows. In 1994, S.B. 54, 1994 Colo. Sess. Laws 766, the General Assembly provided that the acquisition of senior water rights for the CWCB program shall not include conditional water rights. In Board of County Commissioners v. United States, 891 P.2d 952, 972 (Colo. 1995) the Colorado Supreme Court again acknowledged the role of the General Assembly in defining how environmental uses are to be integrated into the system of prior appropriation water rights.

In 1996, through S.B. 64, the General Assembly, after the Supreme Court's decision in Aspen Wilderness Workshop, reaffirmed the discretion of the CWCB to appropriate minimum stream flows, including for the Colorado River endangered fishes as part of the recovery implementation program, and defined the process for CWCB consideration of any modification of an existing minimum flow appropriation. CWCB appropriations operate within the priority system and are made by a citizen board, appointed by the Governor and confirmed by the Senate. The CWCB is also responsible for protecting Colorado's interstate water allocation entitlements. Over 7500 miles of Colorado streams have minimum flow appropriations on them. Accountability occurs as the result of administrative, legislative, and judicial proceedings. There are considerable legal requirements related to individual appropriations, including instream flow appropriations. The CWCB, like other appropriators, must adhere to applicable law in the course of making and exercising its appropriations on behalf of the people of the state.

I hope this background of past historical and legal developments regarding Colorado's prior appropriation law, which now includes CWCB water appropriations for minimum flows, will assist your study in the coming days of this conference. Here, you will continue that discourse of Coloradans which is essential to our law and our local, regional, and state communities. The goal is not unanimity of thought but thoughtful and respectful discussion as you exercise your public interest role as elected officials, attorneys, engineers, consultants, association members, and Colorado citizens.

Finally, of course, I do not speak for the State of Colorado or the courts in the remarks I have made. I offer the foregoing discussion as part of the educational purpose of this forum which long has been a venue for expressing differing views on the power of rivers. We are a pool of the community:



POOL

What about a pool
Attracts? Peace of it,
Danger of falling in,
Bugs?

A pool looks back,
You see yourself
Within, above,
Behind.....

You desire rocks to throw
You think you see a fish,
Cloud fleet passes
Over you, you Disappear.

G.H. 3/13/96

Greg Hobbs, long-time water and environmental practitioner, was appointed to the Colorado Supreme Court effective May, 1996

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THE EVOLUTION OF INSTREAM FLOW POLICY

Comments by Fred Anderson, Colorado Legislative Consultant and Sponsor of Colorado's Instream Flow Law

When I introduced Senate Bill 97 in 1973, the headline read: "Dave Rice, Colorado cattlemen along with Farm Bureau, hang Fred Anderson." A good friend of mine who was district judge in Northern Colorado, later commented: "Well, Anderson, remember this. It's the Legislature in its wisdom, but it's the court in its infinite wisdom." And it was – it was not just historic, it was revolutionary when we introduced the instream flow concept. We knew what we wanted, but we were trying to look into the future and at the same time be very careful. We knew if this were wide open, the mischief that could have been played was tremendous. That was why, in the development process, we said, "Only the Colorado Water Conservation Board will have the ability to make this type of appropriation."

All the amendments from 1973 through Senate Bill 64 in this last session simply redefined what was originally there, saying that the legislative intent was that this is a hybrid right, that it will take care of environmental needs, and keep a live stream alive if that habitat is there to be preserved. Accommodating many different aspects is what makes our system of water law operate as efficiently as it does. Accommodations can be made, in my opinion, as long as we remember the one thing that I see as the basis of the Doctrine of Prior Appropriation --that we consider injury. Our system works so broadly and so well because we always try to protect a vested water right against injury. As long as you use that test, anything else can be made to work.

When this went into effect, there was a great deal of concern as to its constitutionality. At one point, a consideration was to have me testify that it was unconstitutional, and I could not really argue at that time that it was constitutional. But the fact is, it worked. If we continue with the instream flow as it was originally conceived and make accommodations, things such as endangered species and recovery programs can be melded. But I have a concern when I see, for example, rafters who want to have an instream flow for rafting purposes. It can be provided for; all you have to do is make the investment. Acquire the water. Offer it to the CWCB, and you will have water in the stream. But to make a provision without taking care of that accommodation as far as other existing rights are concerned will, I think, cause real trouble.

Comments by Harris Sherman, Arnold and Porter P.C., Denver, Colorado

I am pleased to have been part of building this program, a model that has served Colorado and other states well. We have been fortunate in building a first-rate staff and bringing balance to the program. I want to focus my comments on the future of the program – where it is going, particularly from a policy perspective. The Chinese curse, "May you live in interesting times," is here with the CWCB. The instream flow program is in for some interesting and potentially troubling times. It will require good judgment by all concerned. Let me outline a few issues.

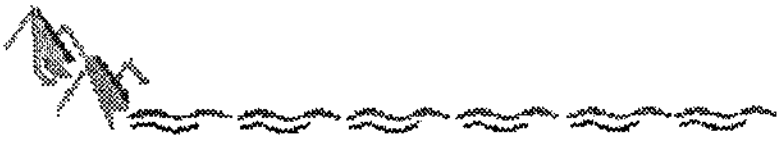
First, Colorado is experiencing very intense growth. Increased population and increased water use is inevitable at a time when we are trying to protect the environment. This will be a challenge. In this context, where CWCB files for new minimum streamflows will be an issue. In past years, CWCB focused primarily on headwater areas. I think you will see more downstream filings where the population is located. You will also see a movement from strictly cold-water fisheries to more warm-water fisheries.

Second, we should expect a new activism by federal agencies in the setting and enforcement of minimum streamflows. This is clearly a departure from past federal practices of deferring to the state. Recent examples abound. The CWCB's Recovery Program is in part a response to the U.S. Fish and Wildlife Service's threatened and endangered species programs; of greater importance is the new way in which the Forest Service and Bureau of Land Management are inserting themselves in instream flow issues. There is an increasing tendency for these federal agencies to do their own evaluations and substitute their own judgments for those of the state. These federal standards are incorporated as conditions to federal permits. The result is the subordination of senior water rights to junior water rights. How this will work in the future is of great concern.

Third, another factor is the sheer complexity of the minimum streamflow program. As an example, in 1978, the CWCB had one simple filing for Snowmass Creek: a minimum streamflow of 12, applied summer and winter, for a 17-mile stretch of stream. In 1992, because of controversy over water uses in the stream, the 17-mile stretch was divided into three segments and given separate summer and winter flows for each segment. A month and a half ago, upon settlement of new Snowmass Creek controversies, the stream now not only has three segments with summer and winter numbers, but also new weekly numbers for average, below-average, and above-average streamflow years. The sheer complexity of such an arrangement poses a daunting task for the staff, Board, and interested parties.

Another example of the complexity of the program relates to the methodology used to determine instream flows. A decade ago, the methodologies were clear and well-accepted. Now, there are sharp differences amongst the experts. Many of the earlier methodologies are under attack. It will be very challenging to work this out.

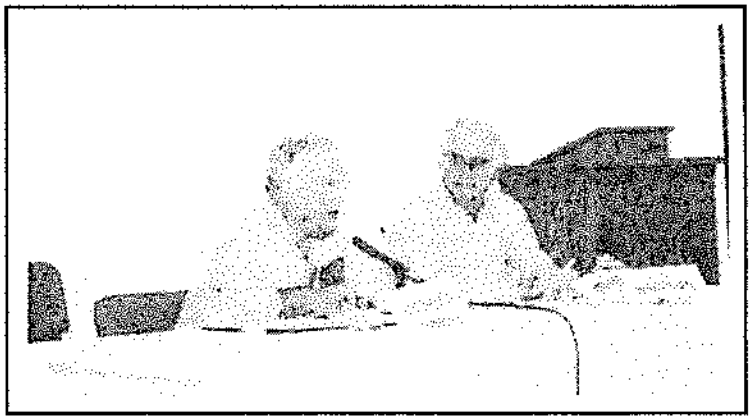
A final example demonstrating the complexity of these issues relates to which standards will ultimately be applied to instream flows. What are we protecting? The aquatic environment? Aesthetics? Opportunities for rafters? Biodiversity? Each will require different standards. Ultimately, who will provide these directions?



Fourth is the issue of public involvement. Senate Bill 64 provides a very elaborate framework for the public's participation in the future when the CWCB is considering a decrease in the minimum streamflow. This process provides for full discovery, which could include everything from depositions to interrogatories to the sharing of data. It includes cross-examination during the proceedings. It is a comprehensive process that was designed to protect the public interest and to protect the public-s right to comment. That same process may well also apply to those who are interested in challenging the initiation of expansion of minimum streamflows. As instream flows become more contentious, managing public participation will be another formidable task for the Board.

As we face this brave new world, it is not all bad, and I am hopeful that the balance Fred talked about will remain, because that is what makes this program workable and successful.

Fred Anderson
and
Harris Sherman



Comments by Robert Weaver, Hydrosphere, Boulder, Colorado

My involvement in the issue of protecting instream flows started back in 1971 when I went to work for Trout Unlimited. In those days, just like today, the Colorado economy was booming and there was a lot of concern about the impacts of growth, development, and loss of open space. T.U. was leading a campaign for what we called "Statewide Water Planning," and we had the support of a group of legislators that included former Governor Dick Lamm, John Bermingham, and Mike Strang.

Governor Love responded by placing water planning on his call to the 1972 session of the State Legislature, and he also retained John Carlson from the law firm of Holland & Hart to do an in-depth study of certain Colorado water law problems. When the legislature failed to respond, environmental organizations launched an initiated referendum that would have amended the Colorado Constitution to recognize instream flows as a beneficial use of water, allow individuals to appropriate water within the priority system for instream flows, and provide for basin-of-origin protection. This petition drive is what really drove the approval of SB 97 and establishment of the state's instream flow program.

The idea of changing the definition of beneficial use by statute to include instream flows came from Felix Sparks, then Director of the CWCB. Mr. Sparks was primarily responsible for shepherding the bill through the State Legislature with the help of Legislators Fred Anderson, Dick Lamm, and others. Sparks was also responsible for effectively implementing the instream flow program and fighting off several attempts to weaken and dismantle the program.

The expectations of the environmental community and the water development interests were very divergent. Some in the environmental community saw a state-held water right for an instream flow as an important entree to dealing with all kinds of water allocation issues. The concept was that if the State of Colorado could appropriate instream flows all over the state, it would have standing in water court proceedings to raise not only water rights issues but other public interest issues – environmental, socioeconomic, etc. – associated with changes in water rights and new appropriations. Obviously that has not happened, and the focus of water court proceedings has continued to be water rights. The other issues have been addressed through federal, state, and even local permitting processes such as those associated with 1041 land use regulations.

Appropriation of instream flows for recreational and environmental purposes – the CWCB has done a great job of implementing this program, but it has been criticized for construing instream flow water rights as solely for the protection of fish and aquatic life. Why not look at the possibility of appropriating or acquiring instream flows to maintain riparian environmental habitat, or a recreational flow, or even an aesthetic flow?

Private ownership of instream flow water rights – It is a good concept that anyone can enter the marketplace, buy a water right, convert it to an instream flow, and have it protected. However, the requirement that the instream flow water right then be donated to the state may have a chilling effect. I don't agree that anyone should be able to appropriate individually a new instream flow water right, but I do think we should look at the idea of private ownership of water rights that are acquired and converted to instream flows.

Appropriation of instream flows for endangered fish and compact entitlement issues – The Colorado River mainstem provides about 35 percent of the Colorado River flow that originates in the state, yet about 55 percent of our Colorado River basin consumptive use is coming out of the mainstem. Water users on the mainstem could become caught in a squeeze between growing transmountain diversions and instream flow appropriations for endangered fish.
Other instream flow program challenges – What about acquiring or appropriating instream flows on an interruptible flow basis? Look at the possibility of protecting certain stream reaches where water isn't always available by making agreements between water users to coordinate and manage their diversions to maintain instream flows but allow them to be interrupted under certain conditions. Look at augmentation plans for instream flows and more creative approaches to acquiring, appropriating, and maintaining instream flow water rights.

Comments by Scott Balcomb, Delaney & Balcomb P.C.,Glenwood Springs, Colorado

All of the speakers have tried to describe the difference between Colorado then and Colorado now. We were much more parochial even as late as the '60s and early '70s than we are now. Transportation systems have shrunk Colorado to the point where it is perceived more as a state than as regions within a state, and that makes an atmosphere in which compromise can occur. The legislation that came to be the minimum streamflow enabling legislation in 1973 was a result of that gradual trend.

Colorado has changed. Most of my ski-area clients who have required me to interact with the CWCB since the legislation was enacted are very supportive of this law. They see it as a key to bringing people to the resorts, especially during the summer, which is an essential part of their program. You will not see them viewing the law in a negative sense, but on the other hand, they are concerned about protecting their investments including their snowmaking systems and ability to take domestic water.

Senate Bill 64 represents a substantial change in the minimum streamflow program. No longer do the courts have primary supervision over the establishment of minimum streamflow rights. A key component of the compromise in 1973 was the essential fairness of the judicial supervision of the CWCB like any other water user.Ripping that out of the minimum streamflow law has caused water users to become much more suspicious. I see the environment of cooperation that has existed since 1973 substantially eroding because of this. And I am just trying to tell it like it is. No one in my business trusts an administrative agency that has a staff that tells it what to do. The board has a theoretical right to say "No, we won't do what the staff recommends," but if they don't follow the staff recommendations the majority of the time, what good is the staff? What you have now, I think, is a kangaroo court from the water users' point of view. My clients and I are very nervous about the situation. I am concerned about the long-term impact it will have on what has been a very successful and broadly supported program.

David Harrison, Robert Weaver, and Scott Balcomb

The second component to this is the minimum streamflow claims, which will be very controversial. They also represent the potential for driving a wedge between the water users and the environmental community that has, over 20 years, cooperated in an astounding way to make this program work.

HIGHLIGHTS OF THE OPEN DISCUSSION -- David Harrison, Moderator

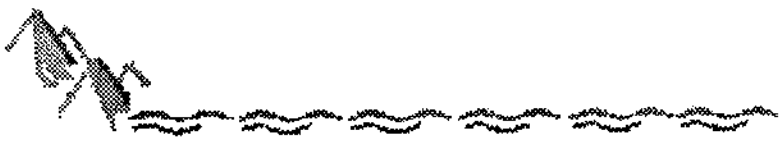
FA – Why do you feel that Senate Bill 64 makes that drastic a change? I don't see that much of a change. Prior to '64, the CWCB said it was going to file for an instream flow, you had public comment, and CWCB decided whether to file or not to file. Most of the problems were solved during the negotiations and then CWCB filed with the problems taken care of. SB64 just puts in statutory form some of the things that were actually taking place prior to that time.

SB –I have specific reference to the section that no longer requires the CWCB to file a water right application and to make proof like any other water user. Now the important hearing, if there is a hearing at all, takes place before the board itself. We are talking about cross-examining witnesses, introducing evidence before the CWCB, and meetings that probably will last weeks. The board now is the judge and jury of the minimum streamflow program subject only to administrative procedure after review in the Denver District Court. I question whether the people of Gunnison County want to go to Denver to talk about a minimum streamflow water right.

DH – The review is in water court, although it is subject to APA standards, but the point is well taken.

HS – I would like to take some exception to what Scott has said. First, I strongly supported Senate Bill 64. I think it was a good piece of legislation. The staff and the board have worked well with water users, and in most situations there has been a resolution of whatever issues have been created over a given minimum streamflow problem. We must remember that this is a balancing act, a political process, and not strictly a technical, legal issue. Many of us feel that the CWCB is a political body and the best entity to consider these kinds of balancing issues. But I want to emphasize that if there has been an abuse of discretion, if there is not substantial evidence in the record to support the decision of the CWCB, you can take this issue to a water court which does have the option of rejecting the CWCB decision.

SB: -- I agree that the staff has worked very well with the water users under previous law. That is what worries me. One of the reasons the staff has worked with the water users is that every now and then they lost a case. The impetus to settle a case that you might lose is powerful, even for a state agency. I don't see any possibility that they will lose any more cases.



DH: -- To clarify what has been said, the question is whether, on the review of a board decision, it is determined in the water court in what we would call de novo fashion -- whether the water court, on a clean slate, takes all evidence and makes a decision, or whether the review is limited in an important way as it is in a lot of administrative proceedings where the court gives deference to what the agency decided. Scott is saying that the important hearing is no longer the one in front of the water judge, but the board itself. Harris is saying that these are mixed issues of fact and policy – hard to turn that over to a water judge to make a policy decision. This was one of the hard questions, and it is still very much on the table.

HS: -- The appeal here, as I understand it, is to the water court. It is not to the Denver District Court.

DH: -- The water court, under APA standard. So it is limited review, it is not the de novo, but it is in the water court.

FA: -- Right. That is why, then, if you feel that you have been injured you can go to the water court – you don't go into Denver District Court for that review. But you don't have a trial de novo. This is one of the problems when you have legislation like this. You hope it will meet the test of time. Clearly, in my mind, the action that the CWCB took on the Snowmass situation was perfectly proper and within terms and conditions of the statute. That should have been negotiated and not have gone to the State Supreme Court. When that happens, there is no choice but to come back and try to clarify it legislatively, which is not a perfect solution either. It is the perception that must be worked out so that everyone understands where they are. I hope that in the next session or two we don't have more legislation introduced, because I think that will be the undoing of the whole program. It needs time to work. Scott, you may prove in the long run to be right, and if that happens there is no choice but to clarify it one more time.

Private Instream Flow Water Rights

FA: -- This would be the biggest mistake that could ever happen, and was the fear many of us had to begin with, because it would be like a gold rush. What I have watched happen over the years is that once you start tinkering with something like this you can ruin a good program.

SB: -- On the issue of private ownership of minimum streamflow rights, I think it would be great for lawyers.

HS: -- I would emphasize that I do think this program is a public program, in large part. There are a number of important public issues at stake. To not have the public at the table, having some control over how the program is used, would be a mistake. If there are private appropriations in minimum streamflows, this would have to be run through a public process where issues could be brought to the table. If public interests are not considered, we will have a program that will quickly unravel. The pendulum, if it swings back, could wipe out the good and progressive things that have been accomplished.

RW: -- I was talking about the possibility that an individual or a corporation with an interest in maintaining an instream flow could go to the marketplace, buy water, and then go through the public water court process to change that water right to an instream flow, recognizing that the change of water right could not injure other water rights. Now an individual can do that and ask the CWCB to change that water right. The way it is implemented would be at the discretion of the CWCB, which would have standing to come into a water court proceeding and enter an appearance should an individual do that. I do not see a lot of difference in an individual holding an instream flow water right that he has acquired on the free market and a water right that is held by the CWCB.

FA: -- What if that same individual a few years later wants to sell that instream flow water right? Can you see, then, the litigation that will be there including the public interest, the public trust question – I think you will have a real mess.

SB: -- If there is no difference, I question why we need to do it in the first place. I see a big difference. Now, the CWCB is required to take the public interest into account, and sometimes the public interest favors a development project. Once you let the cat out of the bag, you have strangling water rights held by individuals who have no responsibility for the public interest. They could represent a serious development constraint that potentially would be bad for the public. That is the only reason for wanting someone other than the CWCB board to hold the water rights, and the very reason why I would be afraid of it.

DH: -- The CWCB is reluctant to get into the business of reviewing the public interest of having or not having a development. The CWCB involvement so far has included only water policy. Does this preclude or inhibit the ability to develop the compact entitlement? Does it protect the natural environment to a reasonable degree? Does it provide some potential for injury or constraint on the administration of water rights? Whether a ski area expansion is a good idea or not is not the board's business.

Instream Flow Appropriations for Endangered Fish

DH: -- One of the concerns is that federal agencies may see that appropriation as a target flow and would be motivated to impose bypass flow requirements on interests that might affect that instream flow – in the context of land use permits, 404 permitting, or other federal permits.

SB: -- I don't think there is any doubt that during the history of the program federal agencies have taken the CWCB decreed flows as a given. Harris has correctly indicated that may be changing right now, but the problem is: (1) it gives the CWCB a super priority whenever anyone needs a federal permit (which isn't all bad but wasn't part of the original plan in 1973); and (2) the jury is still out on whether we need the CWCB involved in the Endangered Species program.

HS: -- It is important that state and federal government decide who takes the lead in these programs and what methodologies will be used to evaluate minimum streamflows. Without that consensus, we have a form of chaos that is unfair to all parties. In the Snowmass situation, we had four or five competing methodologies that were proposed for review of minimum streamflows, and each had to be accompanied by an expert who championed that methodology. Each issue was very hotly contested, and again there was no direction from any particular source as to which provided the best result. The state easily could have reached a different result than the federal government. Unless we work together on this we will have a chaotic mess that is very expensive, time-consuming and counterproductive.

21ST ANNUAL COLORADO WATER WORKSHOP BREAKOUT SESSION REPORT

Introduction. The 21st Annual Colorado Water Workshop provided participants with a special opportunity to communicate their concerns and ideas directly to the policymakers who are responsible for implementing the State of Colorado's Instream Flow and Natural Lake Level (ISF/NLL) Program, specifically members of the Colorado Water Conservation Board's (CWCB) Instream Flow Subcommittee and ISF/NLL Program staff. A full morning of the conference agenda was devoted to a series of breakout sessions focused on six different topics, three of which were identified through the ISF Subcommittee's stakeholder process and the other three suggested by workshop participants. They were:

Topics Selected by ISF Subcommittee and Stakeholders

- Defining the Natural Environment: What criteria could be used to define a water-dependent natural environment? What methods could be used to quantify the water necessary to protect it?
- Non-state ISFs: To what extent and under what conditions should entities, private or public, other than the CWCB be allowed or not allowed to hold ISF rights? For each, identify pros and cons.
- Cooperative Partnerships: What are the opportunities for cooperative partnerships that could strengthen the ISF program? What are the potential benefits and costs?

Topics Suggested by Workshop Participants

- Enforcement of ISFs: What suggestions do you have for strengthening the monitoring and enforcement of ISFs? Identify resource needs and availability, i.e., potential resources.
- Federal Issues: In what ways could the ISF program be adapted to address current federal environmental issues (e.g., bypass flows, threatened and endangered species, wilderness, etc.)?
- Post SB-64 Process: In the post-SB 64 era, what can the CWCB do to ensure adequate notice and opportunities for comment when filing for ISFs?

Workshop participants were also asked to indicate the topics that they were most interested in discussing, and based on their preferences, multiple sessions were conducted on some topics to maximize the opportunity for each participant to comment upon the topics of greatest concern. A total of nine sessions were conducted with three sessions held concurrently during each of three 40-minute periods. This allowed workshop attendees to participate in their choice of three breakout sessions on three different topics.

Background -- In May 1995, the Colorado Water Conservation Board adopted a revised Long Range Plan which included goals and objectives for environmental conflict resolution. One of the objectives included a provision for "Program Evaluation" to establish an Instream Flow Advisory Committee with representatives from water development, environmental and wildlife interests with local, state and federal agencies for the purpose of identifying significant public concerns and to provide strategies for resolving any identified concerns.

WHAT HAPPENED HERE?
Sara Duncan, Denver Water

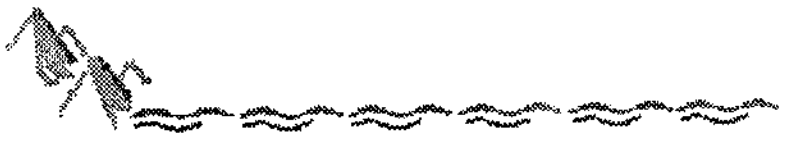
The existing CWCB program takes instream flow water rights out of the free market place. The CWCB will not sell or probably cannot sell its instream flow rights to any one else, and yet if we had private holders of instream flow rights, perhaps there would be more adjustment to social values as the rights continue to be used and developed.

I think the complexity of the instream flow program is an unintended consequence. The idea of having certain flows at certain times of the year for certain kinds of fish and certain kinds of hydrographs is one that could have been anticipated, but was not. If there were some way to go back to a simpler time, I think that would be a very good idea.

The political consequences of the instream flow program are very interesting to me. While many politicians take credit for the success of the instream flow program, you would have thought that many of these people, just a few years ago, would have condemned it as some kind of environmental ploy. Those legislators had the foresight to put the instream flow program together in such a way that it could work within the existing system. I hope that people here are ready to defend it, because it has been a very good program.

Clearly, water is property, but if "water runs uphill to money" were an immutable truth, we would have had Two Forks. I would say that it does not run uphill to money. With the problem of the overlay of federal requirements on the existing system, we have not tuned in all the way yet, but I think we are working on it. I am reminded that Ruedi water really is federal water, so if the feds take it for the fish, that may not be quite as outrageous as it was portrayed to be.

My favorite quote of the whole conference was, "Life is simpler in Montana." Too bad we don't have a Yellowstone River; it would be simpler for all of us. With compact rights, federal legislative changes, and state legislative changes that need to take place, there is still flexibility in the program in that it can work within the existing prior appropriation doctrine. We have not addressed the area of modifiable recovery flows, but that may contain a component of speculation. I really wish it had been addressed a little more because normally when you go in for a water right you know exactly how much water you need and why. Here we are asking for a lot of water for instream flows, because we are not quite sure how much we will need but we are pretty sure that it will be less than we are asking for. It will be interesting to see how the judge addresses that question, because I am sure it will be raised by at least some of the objectors.



A subcommittee of the board was created to assist in implementing this objective. The board members serving on this committee are: David Smith, Yampa-White drainage; Eric Kuhn, Main Colorado drainage; Janice Sheftel, San Miguel-Dolores-San Juan drainages, Patricia Wells, City and County of Denver; and Alan Hamel, Arkansas drainage.

The subcommittee's first meeting was held April 30, 1996. Notice of this and subsequent subcommittee meetings was mailed to more than 550 interested parties. After much discussion, the meeting participants decided that, in lieu of a formal advisory board, a less formal process would provide better opportunity for open forum discussions among the interested publics, board members and staff. The meeting participants also scheduled a series of four meetings to identify "significant public concerns," which would then be followed by a series of meetings to identify strategies for the board's consideration in addressing those concerns.

WHAT HAPPENED HERE?

Larry MacDonnell, Lawyer and Consultant

The instream flow program, as valuable and as important as it is, needs to be put in context. We are talking about trying to set aside some portion of what is left after 150 years of water development in the state of Colorado. That 150 years of development has done a lot of good and is important to the state, but we are now down to what water is left and we are arguing over what to do with it. It amazes me that we can even question the need to do this, but we do. I am concerned that people view the program as scary, intimidating, and overreaching. From my perspective it is narrow, limited, and barely scratches the surface of what is necessary.

I do not have to remind you that water does a lot of things. We live in Colorado because it is a wonderful place to live. I hope we reach a point where we can put on one table the question, What are the benefits that we want to enjoy from the water resources of the state and how best can we enjoy those benefits? I do not think there is any question that increasingly those benefits will be instream flows. I believe that people living in Colorado will value those uses enough that we will have to find ways to put more water back in the stream and hopefully hold onto that part not already developed.

Water is property -- the property of all Colorado citizens, subject to appropriation. We subject it to appropriation to increase the benefits we all enjoy from the use of that water. This seems so fundamental, so basic, that it concerns me that it somehow becomes a matter of us versus them, because we are all in this together. This is a shared resource that we enjoy as citizens of Colorado, and collectively we need to resolve how we should make that resource serve our interests and needs. Every time someone draws a line and says, "That's mine -- I don't want to talk to you," I wonder what we are afraid of. I wonder what it takes for us to look at it more openly -- "Yes, you have a property right; let's talk about it." There are ways, within the context of that property right, to bring greater benefits to all of us from that water resource. This is not a frightening question, it is not a question we should avoid, and it certainly is not a question that should be litigated. It is a question we should be talking about.

It is important that we have operated the instream flow program as a water rights program. It works well in our system. Now, we need to consider what the next steps will be and how we can move forward. Historically, we have focused on very narrow purposes for the instream flow program. We have left out other values. I would like to see the instream flow program develop and respond to those other values.

How can we, as a state, make it possible to enjoy more of those benefits? One way is build upon existing watershed initiatives. I happen to be involved in the effort to improve Clear Creek's water quality via a trading system. This involves relying on the market to make it possible for someone who has a regulatory requirement to buy improvements, different from his regulatory requirement, that bring greater benefits to the stream. Innovative approaches such as this, operating on a site-specific basis, watershed by watershed, are the wave of the future. If we want to collectively think through what it is we care about, we should start at the watershed level.

Once we have a better sense of what we are trying to accomplish, we need to think about tools. Instream flow appropriation is one of those tools. Do changes need to be made in the CWCB program? Yes, I think so. We will have a better sense of that when we know what we want and compare that with what we have. Then, we may need to make some changes.

The state can be an important facilitator in the process. It can provide resources, encouragement, and state agency action that may be necessary and appropriate. But the kind of change I am talking about will take place, if at all, because people within a watershed start to work on what it is they would like to see happen. Important progress already is being made. Much remains to be done.

The subcommittee's second meeting was held June 6. At this meeting, ISF/NLL staff provided participants with an overview of different program areas, policies and procedures. The meeting participants worked with a facilitator to develop a list of issues and concerns for discussion at future meetings. From this list, the group selected topics for further discussion

during breakout sessions at the 21st Annual Colorado Water Workshop.

The purpose of the breakout session discussions was to enhance the subcommittee's existing efforts to obtain additional public input on strategic program and policy issues related to the ISF/NLL Program.

Future subcommittee meetings are scheduled for: the week of October 7 in Glenwood Springs with a focus on identification of the natural environment and quantification of instream flow needs, expanding upon discussions at the Colorado Water Workshop; and the week of December 9 in Denver with a focus on prioritizing issues and developing a report to submit to the full board in January 1997.

For more information about Colorado's Instream Flow and Natural Lake Level Program or to get added to the Instream Flow Subcommittee mailing list, contact ISF/NLL Program Director Dan Merriman at (303)866-3441.

Breakout Session Summaries. Following are summary reports on each of the breakout session topics.

Topic 1: Defining the Natural Environment

Questions:

What criteria could be used to define a water-dependent natural environment for instream flow purposes?

What methods could be used to quantify the water necessary to protect it?

Background -- Historically, the CWCB has used the presence of a self-reproducing population of coldwater fish (e.g., trout) as the primary criteria for establishing the existence of a "natural environment" for instream flow purposes in the majority of the board's instream flow and natural lake level filings. This definition has proved useful because it identifies an indicator species for which methods exist to quantify the water needed to sustain them. The utility of this approach is evident in the large number of streams and lakes in which the CWCB has appropriated water rights since the ISF/NLL program's inception 20 years ago. However, the board has used other criteria, such as habitat for endangered fish species on the Colorado mainstem and Yampa rivers. And the board recognizes that protection under the instream flow program may be appropriate for other water-dependent natural environments that do not support coldwater fisheries. A specific example is Hanging Lake area near Glenwood Springs, which hosts rare populations of birds that depend on mist from a waterfall and yellow columbines that depend on water seeping through limestone formations.

Criteria for Defining a Water-dependent Natural Environment -- Workshop participants in three sessions identified many criteria that could be used to define a natural environment. Roughly, these criteria could be grouped into two major categories:

- Inside-the-bank criteria -- channel-forming flows; channel maintenance flows; other indicator species, such as warmwater fish, macroinvertebrates, aquatic plants, etc.; communities of indicator species and the relationships among them; life stages of indicator species to address issues like spawning habitat; water quality; water temperature.

- Outside-the-bank criteria -- riparian areas including native plants and animals, side channels and beaver ponds; birds and animals that depend upon the stream and/or riparian habitat, including migratory species; vegetation ecotones; buffer areas; impacts of other land uses; natural treatment and assimilation functions; sub-surface water table and ground water recharge.

Some participants also suggested that the Colorado Water Conservation Board consider establishing priorities, such as: habitat for declining, threatened and endangered species; wilderness areas; areas that are unique for other reasons such as aesthetic values and spiritual values.

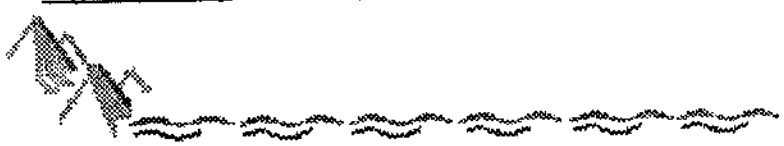
Others suggested that recreation should be another criteria. Recreation was recognized as an important component of Colorado's economy , and several participants suggested that water rights for recreational uses could be acquired/appropriated through water courts as a "beneficial use" like other human uses and would not appropriately fit within the ISF/NLL program's legal mission which focuses on water-dependent "natural" environments.

Methods to Quantify the Amount of Water Needed -- Participants identified a number of methods that could be used to quantify water needed to protect water within the stream and within riparian areas that included:

1. Studies and/or modeling of hydrology and geomorphology -- historic streamflows, bank-full flows, groundwater recharge, seasonal flows.

2. Studies of biological needs of indicator species -- life history of native vegetation such as cottonwood trees, life stage studies of indicator species.

3. Legal availability -- there might not always be adequate water legally available to achieve the program's mission.



However, much of the discussion focused on broader themes and issues:

1. Maintenance versus recovery -- Is the ISF/NLL program's goal to maintain the existing environment or rehabilitate the environment to a more "natural" state?

2. Appropriate versus acquire -- Should the CWCB acquire water rights since junior appropriation dates may not be adequate in many cases to "preserve the natural environment to a reasonable degree"?

3. One size does not fit all -- Different criteria and different methodologies may be necessary on a case-by-case, watershed or even stream reach basis.

4. Public values -- The issue that drew the most comment was how public values could be integrated into the decision-making process. Specific suggestions included: conducting surveys or focus groups; using social science experts to help define methods/processes for assessing public values; asking the legislature to fund a process for working with local communities to define "desired future conditions" for their watersheds and ways that the state can help them achieve those visions. For unique areas, such as the Hanging Lake microsystem, the argument that widespread public support for preservation of all available water might hold up in court because it would be difficult for an opposer to prove that a depletion would not harm the natural environment -- at least as that environment is experienced by the thousands of people who visit the site specifically to enjoy it in its present state.

Topic 2: Non-state ISFs

Question: To what extent and under what conditions should entities, private or public, other than the CWCB be allowed or not allowed to hold ISF rights? For each, identify pros and cons.

The group was clearly divided on whether or not anyone other than the CWCB should hold instream flow water rights, and some expressed very strong feelings that nobody other than the CWCB should hold instream flow water rights. However, others felt that entities beside the CWCB should be allowed to hold instream flow water rights and offered the following suggestions:

- Anyone
- Anyone who can demonstrate beneficial use
- Individual landowners whose property the stream runs through
- Cities
- Land managers (i.e. state & federal agencies like USFS, BLM, & CDOW)
- Water utilities
- Waste water treatment utilities
- Conservation groups

Pros -- The group identified the following benefits that could be provided by allowing others to appropriate instream flows.

- Additional benefits other than just protection of the natural environment in the stream could be provided for. For example, channel maintenance flows might be a possibility.

- Provides additional economic benefits. For example, higher instream flows could alleviate the need for a new wastewater treatment facility by maintaining a certain level of flow for dilution purposes.

- Allows public support for instream flows to be addressed in a more timely manner by making additional resources available to do the job.

- Greater participation in the instream flow program in the area of buying, selling and transferring water rights. Free market could work whereas it does not with only one agency allowed to hold instream flow water rights.

- Assists in the maintenance of dilution flows and the reduction of environmental impacts and treatment costs.

- Use instream flows to help maintain wetlands and groundwater levels.

- If federal agencies like USFS could hold instream flows, it could lessen their desire for bypass flows and help diffuse that issue.

- No one would have to petition the CWCB to file for an instream flow as is the current practice. Federal agencies could file for and own instream flow water rights.

Cons and Concerns -- The following concerns were expressed about having anyone other than the CWCB file for and own instream flow water rights.

- There would be greater potential for injury to intervening water right holders.
- How do we assure certainty (dependable water supply) for private water rights holders? It was noted that no water right holder has any certainty or permanence associated with their water rights today and this will not change.
- Concern was expressed that privately held instream flows would be used to maintain competitive advantage by appropriating instream flows to simply try and tie up all the water resources of a stream. This would be far more effective than filing for a conditional water right.
- How do you protect the investments in capital that have been made by water right holders?
- Numerous instream flow filings can greatly increase the difficulty of making water right changes, particularly when several or multiple instream flow filings could exist for the same stream reach but for very different purposes. This condition has the potential to "freeze" water use conditions on the river.
- Concerns were expressed about the potential subordination and enforcement of water rights changed to instream flows and in particular the adverse impacts of those changes on existing water rights and uses (changed use and return flow patterns) particularly if the rights are donated to the CWCB.
- Major concerns were expressed about the consistency in settling opposition if there were multiple owners with different purposes. Stipulations would be more difficult to obtain in water right change cases. There would be lost flexibility for water rights and water use.
- There would be a significant lack of coordination and purpose among instream flow water right filings.
- The ability to fully develop the state's compact entitlement would be greatly reduced.

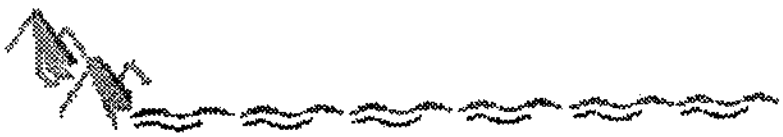
Criteria -- The concerns raised generated the desire and need to develop some criteria for those who would be allowed to file for instream water rights. It was suggested that the criteria consider the inclusion of the following:

1. The owner of any privately held instream flow should have a vested interest in the stream or adjacent lands (riparian doctrine).
2. The owner should be able to demonstrate a need or beneficial use for the instream flow.

Suggested Improvements to the CWCB Instream Flow Program

1. The process for instream flow modifications needs to be simpler, better defined and protect the original purposes for making the instream flow (no total abandonment).
2. The CWCB should consider utilizing leases of water for instream flow purposes such as Montana has done.
3. The CWCB should provide incentives for others to appropriate and keep instream flows or at least assist in the appropriation of instream flows.
4. The CWCB should make instream flow filings for recreational and water quality purposes or at least consider these needs when appropriating instream flows.
5. The CWCB should seek changes to the instream flow statute that would allow others to own instream flow water rights.
6. The CWCB should take more of a "watershed approach" in determining instream flow needs.
7. The CWCB should continue to make new instream flow appropriations, but make it easier for others to change existing water rights to instream flows and donate them to the CWCB. The current donation process is too cumbersome in requiring that a case be made before the CWCB and then the Water Court. Additionally, perhaps via cooperative agreements or enforcement agreements, the CWCB should seek on-ground administration of instream flow water rights.

Conclusion -- In conclusion, among breakout session participants, there was a fair amount of support for allowing others to hold instream flow water rights largely because the CWCB's current program was not broad enough in scope to support all the instream flow uses people envisioned. Furthermore, many felt the instream flow appropriations were simply not large enough to protect the natural environment to a reasonable degree (suggesting a need to review the methodology used to determine the instream flow requirements). Finally, some felt that the free market system should be allowed to function in all areas, not just certain ones and that, if the instream flow program was creative enough, it could do this successfully without impairing Colorado's ability to develop its compact apportionments.



Topic 3: Cooperative Partnerships

Questions: What are the opportunities for cooperative partnerships that could strengthen the ISF program? What are the potential benefits and costs?

Participants generally expressed support for the types of cooperative partnerships and agreements that the CWCB has pursued in implementing the ISF/NLL program. Only one person cited an example where an existing ISF water right might defeat its original purpose. The general understanding was to use cooperative agreements as a tool to satisfy a variety of multi-purpose water needs. The group suggested several examples of existing cooperative agreements. These included the following:

- Endangered Fish Recovery Program, which is aimed at recovering fish while allowing water development to occur.
- Donation agreements such as the agreement with the City of Boulder.
- Rafting agreement on the Arkansas River.
- Exchange agreements, such as Dillon Reservoir/Green Mountain Reservoir agreement or Fraser/Clinton agreement.
- Delivery contracts, such as the Grand Valley Water Users contract with the Bureau of Reclamation which provides water for power generation, irrigation and municipal purposes. A side benefit to this delivery operation is maintaining water in the stream.
- Poudre River agreement which supplements winter flows.

The group also proposed the following suggestions to improve the ISF Program:

- Use of new surface water storage as well as ground water storage facilities to enhance the flow in the streams. (The CWCB may allocate a portion of the stored water in storage facilities that it finances or through other contractual agreements such as cost sharing to store excess water for release during critical periods.)
- Lease of water for the enhancement of instream flow -- the Montana example.
- Cooperation between water users and coordination of reservoir operations to maintain higher instream flows. For example, the agricultural water users may develop crop rotation programs on a regional basis where not all water is diverted at the same time. Likewise, during winter months, municipalities and ski industries should alter their diversions to accommodate instream flows.
- Water taxing -- in Oregon, for example, the state requires applicants who file for changes of water rights to allocate a percentage of their water to augment instream flows.
- Use of salvaged water. For example, agricultural water users may choose to dedicate to stream the water they may save from changing their irrigation patterns from less efficient methods such as flood irrigation to more efficient methods like sprinkler systems.
- Promoting public education.
- Promoting the donation program and soliciting donations in critical streams, as many people are not aware that they can donate water for instream uses.
- Making the donation process easier and less expensive.
- The CWCB should make it easier for entities to participate in planning stages of its program, such as diversion, reservoir construction and community studies.

Cons -- Having an ISF water right is not the panacea to maintain flows in the stream. The ISF rights may in fact prevent entities from making water available in the stream by limiting certain exchanges of water. For example, Denver Water has a contractual agreement with the Burlington Ditch Company, whereby Denver Water releases water from Chatfield Reservoir during summer, which provides a live stream through the Denver metro area and is then stored in Barr Lake. In exchange, Denver Water withholds in Chatfield Reservoir an equal amount of water during winter when the Burlington Ditch Company's storage rights are in priority.

Conclusion -- Overall, the group generally leaned towards promoting partnerships and cooperation among water users to maintain and enhance the flows in Colorado's rivers and streams. Additionally, many supported more public education and active participation in the CWCB's programs.

Topic 4: Enforcement of ISFs

Question: What suggestions do you have for strengthening the monitoring and enforcement of ISFs? Identify resource needs and availability, i.e., potential resources.

Two primary areas of concern were identified regarding enforcement and monitoring of instream flow water rights:

1. Monitoring potential impacts that result from a change of water rights.
2. Monitoring/enforcing ISF rights to protect against junior diverters.

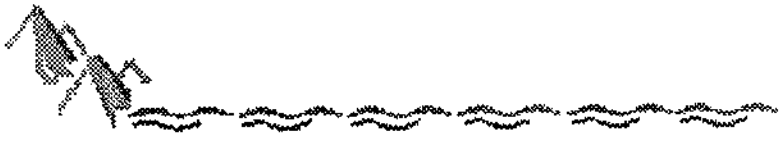
The general consensus from both breakout sessions was that the CWCB does not have an adequate network of gages to protect against impacts resulting from change cases or junior diverters. The following suggestions to improve monitoring and enforcement of ISF rights were obtained from the audience:

- Enter into cooperative agreements with communities that can act as agents for the CWCB to monitor ISF rights. The example was given of the current agreement between Boulder and CWCB with regard to monitoring on Boulder Creek
- Cooperate with other groups and/or the local constituency of a group to monitor and enforce ISF rights. Such an arrangement could work in a manner similar to the "Stream Watch Program." It was also suggested that the existing Stream Watch Program be modified to include flow measurement.
- Rely on the Division of Water Resources and its water commissioners for enforcement and monitoring of ISF rights. It was indicated that this approach would only work if there was a network of measuring devices on streams in critical locations.
- Develop a program for monitoring that focuses first on critical ISF reaches. After identifying these reaches it was suggested that CWCB work with local, state and federal governments to seek ways to fund gages on these reaches. Ideas included cooperative agreements with the USGS and/or the State Engineer's Office plus local communities and other stakeholders. One suggestion that was brought up in both sessions was the use of Great Outdoors Colorado Lottery funds. It was also questioned whether CWCB should attempt to fund some gages.
- Require all new ISF appropriations to have staff gages installed for monitoring and protection against new junior water rights. It was identified that the major drawbacks to this approach are funding and identification of the correct location to place the gage on the reach.
- Have CWCB establish a "Hot line Number" where anyone can call upon the staff to investigate a concern that an ISF right may be in priority but is not receiving its water. It was emphasized that this would require a quick response from the staff in order for it to be effective.
- Move away from "self administration" of ISF rights and have stringent requirements for an applicant in a change case to install stream gages that can be used to monitor stream flows and thus prevent injury to the ISF right that may result from the proposed change.
- Make sure that settlements in change cases allow for legal recourse in the event that an ISF right is injured. Have a method by which damage to the natural environment can be assessed and impose penalties if there is a violation.
- Consider ISF rights to always be on call because of their non-consumptive nature and require the Division of Water Resources to administer them in this manner.

Topic 5: Federal Issues

Question: In what ways could the ISF program be adapted to address current federal environmental issues (e.g., bypass flows, threatened and endangered species, wilderness, etc.)?

This group engaged in a wide-ranging discussion of federal environmental issues and identified approximately five ways in which current administration of the Instream Flow Program could more effectively address these issues. This group also concluded that similar attention should be directed toward meeting local needs. The following suggestions are summarized in the same general order they were identified by the group. They are not ranked or evaluated in terms of their relative priority.



This breakout group suggested that many opportunities depend upon early action by the Colorado Water Conservation Board (CWCB) to anticipate and avoid conflicts. In a sense, Colorado could "preempt" federal action by protecting instream flows that "preserve the natural environment to a reasonable degree" before federal action is considered. Examples include possible future designation of BLM wilderness study areas (approximately six of the 45 identified areas could pose significant water resource controversies), EPA's proposed development of "biocriteria" for protection of water quality and Fish and Wildlife Service evaluation of declining native aquatic species which may soon warrant federal protection under the Endangered Species Act.

A second suggestion was that the scope of "values" protected by the CWCB instream flow water rights should be broadened to include water quality and riparian habitat and perhaps to recreation opportunities and aesthetic qualities. The group recognized that the existing statutory authorization ("to preserve the natural environment to a reasonable degree") provides the CWCB with considerable latitude to give greater consideration to a broader range of environmental values (most of the CWCB effort to date has been based upon cold water fishery considerations) and suggested that more attention should be directed toward the sciences available for quantifying flow needs associated with these values. The group also recognized, however, that protection of certain recreational and aesthetic values are considered to be outside the current statutory authorization.

This breakout group also suggested that federal agencies should be urged to purchase water rights needed to protect identified federal interests. This suggestion was discussed in the context of concerns that federal permitting requirements have sometimes been considered or imposed in a manner which would be inconsistent with state water law. The terms "extortion" and "blackmail" are sometimes associated with these situations. The group also questioned whether federal agencies should be encouraged to appropriate their own water rights in priority through the same process as other water users (with various participants asserting affirmative and negative answers).

It was also suggested that the CWCB could expand its own biological expertise. This suggestion was made in connection with concerns that the Colorado Division of Wildlife (CDOW) experts must deal with their agency's internal struggle to balance recreational hunting and fishing interests with environmental interests. Concern was expressed that CDOW may have emphasized management of wildlife for recreational purposes in recent years at the expense of environmental protection (to the extent these interests can be clearly distinguished).

Finally, this breakout group suggested the establishment of incentives to redirect future development into parts of Colorado where impacts to streams won't be as harmful. This suggestion was derived from concerns about instream flow protection in the mainstem of the Colorado River for endangered fish recovery where the cumulative impact of existing water supply development overlaps with a significant probability for development of future supplies. The impact of additional development of water supplies from the Colorado mainstem and the South Platte River could be substantially greater (on an acre-foot-for-acre-foot basis) than the same development of water supplies might be in the Gunnison, Yampa and White River Basins (where a smaller portion of the available supplies has been developed). Group discussion of this suggestion was limited by time and did not include consideration of the divergence between these suggested incentives and the traditional application of Instream Flow Program (i.e., incentives to redirect future development patterns as opposed to protection of stream flows where they are still available because development has occurred elsewhere).

Topic 6: Post SB-64 Process

Question: In the post-SB 64 era, what can the CWCB do to ensure adequate notice and opportunities for comment when filing for ISFs?

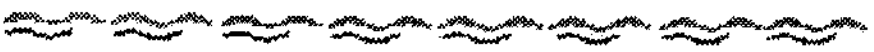
This group discussed how the board could provide more and better information to the public regarding instream flow appropriations and instream flow modifications more efficiently. This group also discussed the public's concern regarding allowing sufficient time for the public to respond to the board's proposed action. The main areas of concern and the suggested methods to resolve those concerns are discussed below:

Concern -- All interested parties or affected individuals are not notified of upcoming board action. The group suggested three main ways the CWCB could improve its noticing method/procedure:

1. Place all Preliminary and Final Notices in a state circulated newspaper (*Denver Post*) and a local area newspaper. The group did not like the idea of publishing the information in the legal notices part of the paper because they felt the average citizen did not read that portion of the paper. The group suggested the CWCB staff work with a local newspaper reporter to publish a "story" regarding the notice or the CWCB should take out an advertisement explaining what the CWCB is requesting to do in easy to understand language.

2. The Department of Natural Resources could produce a weekly newsletter, similar to the State of Oregon's, describing the different activities of the department, and mail it to all interested parties. If possible, this newsletter would be free and if not, a small fee could be charged to subscribers.

3. DNR/CWCB should use the Internet to post Preliminary and Final Notices and update the status of recommendations. Information could be updated weekly/monthly and comments could be provided directly to the board and staff using E-Mail.

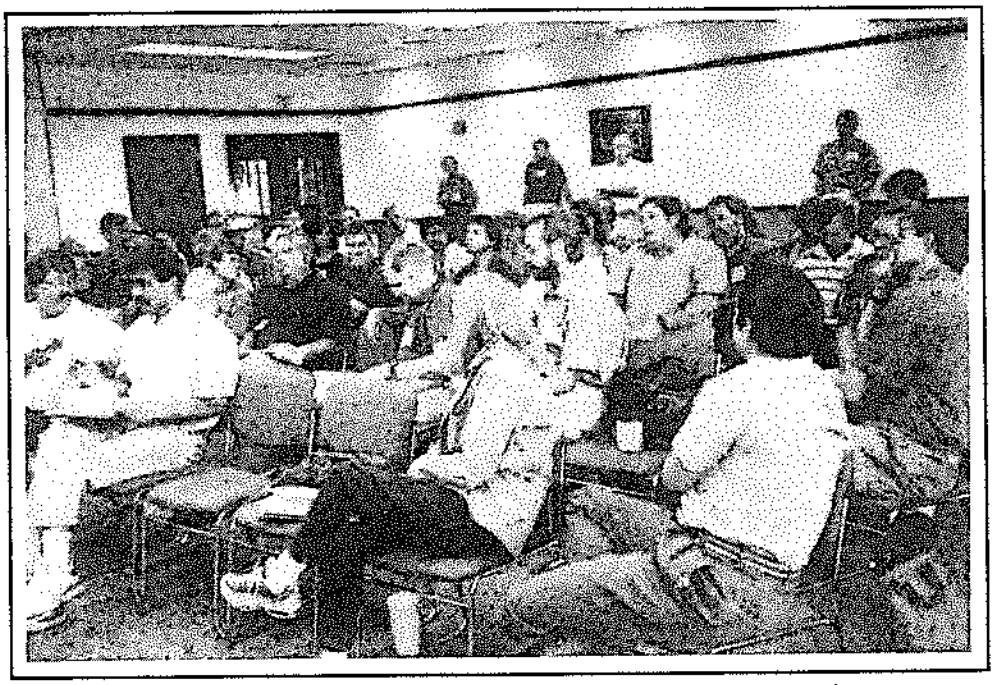


Concern -- More time needed for the public to get involved. The group was concerned the existing time frame (90 days) for public participation was too short. The public would like more time to participate in the process, as well as to get educated on the issues. CWCB Notices should clearly state what the deadlines for comments and/or participation in the process are.

Concern -- More information should be made available at local level for review. The group suggested three ways the board could provide more information to the public at the local level:

1. Work more closely with Division Engineer and local Water Commissioners early in the process.

2. Public meetings should be held in the local area. Staff and board members should attend meetings to address local area concerns.



Workshop breakout sessions were well attended

3. More detailed information (maps, hydrographs, fish data) should be posted in the local area (i.e., Division Engineer's Office, conservation districts, county courthouse).

Concern --A longer public review period also allows other water users to get to the Water Court before the CWCB. This group also discussed the ramifications of a longer review process on the appropriation date of new ISF appropriations. It was suggested the board claim the date when the data was collected as the appropriation date of their recommendations.

COLORADO INSTREAM FLOW PROGRAM PUBLICATIONS

The Colorado Water Conservation Board has the following publications available for sale relative to the State's Instream Flow Program. To place an order send a check or money order payable to the Colorado Water Conservation Board, 1313 Sherman Street, Room 721, Denver, CO, 80203. Please include your name, address, organization and phone number, and identify the requested publication.

Tabulation of Instream Flow Water Rights - January 1996 $20.00

The Tabulation summarizes each of the instream flow segments which the Board has appropriated or acquired since the Instream Flow Program's inception in 1973. Each record contains fields for Case Number, Stream Name, Watershed, County, Upper and Lower Termini, Reach Length, USGS Quadrangle(s), Flow Amount, Appropriation Date, Application Status, Decree Status, and a field which identifies whether Special Conditions are contained in the Decree. Records are sorted by water division and stream name.

Development of Instream Flow Recommendations in Colorado Using R2Cross $20.00

R2 CROSS is one of the standard techniques employed by state and federal agencies to model instream hydraulic parameters. This publication provides an overview of Colorado's Instream Flow Program and documentation for the Board's R2CROSS Lotus Macro. The publication comes with the R2CROSS Macro on a 3.5" disk. The Macro requires Lotus for Windows V 4.0 or higher.

Statement of Basis and Purpose and Rules and Regulations Concerning the Colorado Instream Flow and Natural Lake Level Program $20.00

The Rules and Regulations identify the procedures to be followed by the Colorado Water Conservation Board when administering the ISF Program. The Basis and Purpose elaborates upon and clarifies the policies and procedures that are addressed in the Rules and Regulations. The Rules and Regulations were adopted by the Colorado Water Conservation Board on November 10, 1993, and amended on September 13, 1994.

SEMINARS AND SHORT COURSES

COLORADO STATE UNIVERSITY
SIGMA XI FALL SPEAKER SERIES
Fridays: 12:00 - 1:00 p.m.
Room 165 Student Center (Near Food Court

For further information, contact the Sigma Xi Program Chair, Allan Kirkpatrick, Mechanical Engineering, 491-5500.

Nov. 1 **Agricultural Research Programs in Colorado,** Lee Sommers, Interim Director, Agricultural Experiment Station.

Nov. 15 **Central and Eastern Europe - Regional Environmental and Infrastructure Challenges,** Richard Gutkowski, Civil Engineering Department.

Dec. 6 **Wildlife Conservation Biology and People: Issues of Compatibility in East Africa,** Kathleen Galvin, Anthropology Department.

COLORADO STATE UNIVERSITY
NATURAL RESOURCE AND AGRICULTURAL ECONOMICS
LUNCH TIME SEMINAR SERIES
Wednesdays - 12:10 to 1:00, 110 Animal Science Building

Oct. 23 **Agriculture's Roles in the General Economy: A Social Accounting Matrix Analysis of South Africa's Western Cape,** Jerry Eckert, Sociology Department.

Oct. 30 **Modeling Hourly Hydropower Operations with Constraints: An Application of Mathematical Programming,** David Harpman, U.S. Bureau of Reclamation.

Nov. 6 **Aquarius: A State of the Art Model for Efficient Water Allocation: Theory and Demonstration,** Gustavo Diaz, Civil Engineering, and Tom Brown, U.S. Forest Service.

COLORADO SCHOOL OF MINES
Using the USGS MODFLOW Ground Water Flow Modeling System
in Your Own Project
December 2-6, 1996

This unique course will focus on problem-solving using various MODFLOW components. Opportunity to use your own project data during the course. Course will address basic principles of MODFLOW design, model setup using MODFLOW features, case studies, and calibration using heads and fluxes. Data input and analysis of results will be supported by Groundwater Vistas for Windows. For information, contact SPACE at 303/273-3321, email space@mines.edu.

COLORADO STATE UNIVERSITY
SOIL AND CROP SCIENCES DEPARTMENTAL SEMINAR
Thursday, 3:10 p.m., C146 Plant Sciences Building

Oct. 31 **Simulation of Nitrates in a Regional Subsurface System: Linking Surface Management with Groundwater Quality,** Maurice Hall, USDA/ARS Great Plains System Research Unit, Fort Collins, Colorado.

Nov. 21 **Nitrogen Soil Fertility Research in Pennsylvania,** Visiting Professor Richard Fox, Penn State.

UNIVERSITY OF COLORADO AT DENVER
College of Engineering
Continuing Engineering Education Program

The University of Colorado at Denver, College of Engineering, Continuing Engineering Education Program is offering the following non-credit certificate courses.

NCES 8380 Western Water Rights
Nov. 5-21 (Tuesdays & Thursdays)
5:30 - 8:10 p.m.
$495

This course is designed for engineers, hydrologists, managers, and planners who need an understanding of the effects of water rights on water resources. Participants will acquire information in the following areas: water rights doctrine, water rights changes, transfers, administration, plans for augmentation, and the implications of the above factors for water resource management.

NCES 8410 Buried Pipes
Dec. 11-13 (Wednesday - Friday)
8:00 a.m. - 5:00 p.m.
$695

This course will provide a forum for the sharing of information now available from recent tests, proven emerging principles, and the new experiences of pipeline engineers in regard to the following areas: the testing, engineering, and transfer of information on buried pipe technology.

For information call 303/556-4907.

UNIVERSITY OF COLORADO
ENVIRONMENTAL ENGINEERING SEMINAR SERIES
Fridays, 4:00 p.m., Locations to be posted

For information contact Joe Ryan, 492-0772; joeryan@spot; or Mark Hernandez, 492-5991, hernando@stripe.

Oct. 25 **Tracing Abiological and Biological Degradation of Hydrocarbon Contaminants in the Subsurface using Stable Isotope Monitoring,** Mark Conrad, Lawrence Berkeley Laboratories, Berkeley, CA.

Nov. 1 **Management and Economic Issues in Hydrocarbon Recovery Cleanups,** William Novak, URS Consulting, Inc., Denver, CO.

Nov. 8 **Colloid Charge Titration: Its Application in Water Technology,** Roger Jorden, Clear Corp., Longmont, CO.

Nov. 15 **Overview of Downstream Management of Hard Rock Mining Wastes,** Tom Willingham, U.S. Environmental Protection Agency, Denver, CO.

WATER SUPPLY

The Surface Water Supply Index (SWSI) developed by the State Engineer's Office and the USDA/SCS is used as an indicator of mountain-based 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-October). During the summer period streamflow is the primary component in all basins except the South Platte, where reservoir storage is given the most weight. The following SWSI values were computed for each of the seven basins for September 1, 1996 and reflect conditions during the month of August.

Basin	Sept. 1, 1996 SWSI Value	Change From Previous Mo.	Change From Previous Yr.
South Platte	+2.8	+0.2	-0.3
Arkansas	+0.5	-1.3	-3.3
Rio Grande	-2.2	+0.3	-4.9
Gunnison	-0.7	-0.3	-4.3
Colorado	-0.1	+0.8	-3.9
Yampa/White	-1.4	-2.4	-3.0
Animas/La Plata	-3.5	-0.9	-6.8

SCALE

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

WATER PUBLICATIONS

U.S. GEOLOGICAL SURVEY REPORTS

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

Pesticides in Streams Draining Agricultural and Urban Areas in Colorado, by Robert A. Kimbrough and David W. Litke. Reprinted from Environ. Sci. Technol., Vol. 30, No. 3, Pages 908-916, Copyright by American Chemical Society. This report describes and compares the occurrence and distribution of pesticides in streams in an agricultural and urban land-use setting within the South Platte River Basin by using analyses of water samples collected at the mouths of two tributary streams from April 1993 through April 1994. Results indicate that both agricultural and urban areas are probable sources of pesticides in streams. The year-round detection of some pesticides in both areas at consistently low concentrations, regardless of season or streamflow volume, could indicate that these compounds persist in the shallow alluvial aquifer year-round.

Sources and Loads of Nutrients in the South Platte River, Colorado and Nebraska, 1994-95, by David W. Litke. Water Resources Investigations Report 96-4029. This report presents estimates of the magnitude of nutrient-source inputs to the South Platte River Basin, describes nutrient concentrations and loads in the South Platte River during different seasons, and presents comparisons of nutrient inputs to instream nutrient loads. Principal nutrient sources were wastewater-treatment plants, fertilizer and manure applications, and atmospheric deposition.

Snowpack Chemistry at Selected Sites in Northwestern Colorado During Spring 1995, by George P. Ingersoll. USGS Open-File Report 96-41.

WET SPOTS ON THE WEB

Find Water Related Information Quickly and Easily

by Julie Eyre

Since the last "Wet Spots" article, more water resources information has continued to become available. Some of this information has been brought to our attention by the readers of *Colorado Water*, and some has been discovered by surfing the web. In any case, we have found several more pages that we think will be of interest to water professionals.

Government Information Available -- The U.S. Government Printing Office has made available government documents through the world-wide web and dial-in access. The Congressional Record, Federal Register, and congressional bills are all available to search free of charge. Also accessible through the home page is information available through Federal Depository Libraries and the Consumer Information Catalog, which allows the public to order publications produced by numerous Federal Agencies. All of this information can be found at the following url:

http://www.access.gpo.gov/su_docs;

through telnet:
telnet to swais.access.gpo.gov; then login as guest;

or through dial-in:
call 202-512-1661; type swais and login as guest.

Water Conservation Districts -- The Southwest Water Conservation District has gone on line. Available on the home page is information about the history of the Southwest Water Conservation District, an excellent list of water terms and definitions, and water information for the Four Corners area. The url is located at:

http://web.frontier.net/SCAN/wip/wiphome.html.

Graduate Degree in Water Resources Science -- For those interested in a graduate degree in Water Resources Science, the University of Minnesota has created a home page with this information available. Program requirements, application requirements, faculty, and curriculum can all be found on this home page. The url is located at:

http://www.soils.agri.umn.edu/academics/gradstudes/wrs

Colorado Water Resources Research Institute -- CWRRI has developed an on-site waste water treatment homepage. The purpose of developing this page was to give homeowners some ideas on their options when central sewer is not an option. Some of the articles contain information particular to Colorado, while others contain more general information. A list of links was also compiled that relate to on-site waste water treatment. The url is located at:

http://www.colostate.edu/Depts/CWRRI/onsite/home.html.

Water Web -- This home page provides a large amount of water information quickly. It is designed to provide water users around the world with information regarding all water technology. The url is located at:

http://www.waterweb.com/.

International Association of Hydrological Sciences -- The International Association of Hydrological Sciences (IAHS) is the international nongovernmental organization which deals with hydrology and water resources. The IAHS has created a home page that contains information on IAHS statutes and bye-laws, newsletters and lists of publications and conferences. The home page is still under construction, but stop by and check it out. The url is located at:

http://www.wlu.ca/~wwwiahs/index.html

WATER NEWS DIGEST

WATER MANAGEMENT

Nebraska Legislature Passes Conjunctive Use Law--Implementation of new water management legislation in Nebraska may expand the state's need for more research on groundwater/surface water interaction. LB108 is Nebraska's "conjunctive use" water law, which incorporates the concept of integrated groundwater/surface water management. It was passed in 1996, with several amendments, after vigorous debate spanning more than two years. The legislation consolidates existing statutes regarding groundwater control areas, groundwater (quality) management areas and special (groundwater quality) protection areas, creating a single category – a management area.

The bill was prompted in part by the threat of a lawsuit by Kansas. It first will be applied in the Republican River basin, where Kansas says Nebraska isn't delivering enough Republican River water. The legislation has highlighted a need for more research in the basin, and The Nebraska Association of Resources Districts has said it intends to establish an interagency, interdisciplinary technical task force to examine research needs.

Inst. of Agric. & Nat. Res. *Resource News*, Summer 1996

WATER QUALITY

Poudre Most Polluted in Colorado—The Cache la Poudre River receives more legal pollutants than any other river in Colorado, according to a study released September 25 by three environmental groups. The report, part of a national study on industrial pollution, was based on company disclosures under the federal Toxic Release Inventory,.

Fort Collins Coloradoan 9/25/96, Denver Post 9/26/96

Reservoir Reclamation to be Attempted--The Orchard City Irrigation District has appointed a committee to attempt to bring the dead Fruit Growers Reservoir back to life. Once a site for water recreation, the reservoir was closed in 1989, and since has been used only as a source of irrigation water. To compound the problem, in July an accident at Cedaredge's wastewater treatment plant dumped 800,000 gallons of untreated sewage into the reservoir. The committee includes representatives of the U.S. Environmental Protection Agency, Bureau of Reclamation and local governments.

Grand Junction Daily Sentinel, 8/18/96, 8/22/96

Dredging May be Needed at Strontia Springs—Because of the flooding in the Buffalo Creek area this summer, Denver Water may have to start dredging sediment from the Strontia Springs reservoir some 25 to 30 years ahead of schedule. Earlier, enough water was released to drop the reservoir's level by 60 feet in an effort to flush out sediment and clean debris screens on the water intake towers. Officials have taken measurements in the reservoir to figure out how much Buffalo Creek sediment ended up behind the dam, and a final calculation is expected in a few weeks.

Denver Post 9/21/96

Petroleum Leak in Spring Creek--Gasoline leaking into soil and ground and surface water, including Spring Creek, has been traced to a Texaco gas station. To keep the product from contaminating the Yampa River, the City of Steamboat had installed an oil-absorbent boom, and a system which detects hydrocarbon in soils and cleans it up was installed at the Texaco.

Steamboat Pilot 8/28/96

Summitville Operators Sued—The State of Colorado and the Federal Government are suing former operators of the Summitville gold mine to recover the more than $100 million spent to clean up the site. The U.S. Department of Justice and the Environmental Protection Agency also froze $152 million work of stock acquired by Summitville's former chief executive to assure there is enough money to repay the government for cleanup costs if he is found liable.

GT OnLine Local, State News 8/24/96, *Gazette Telegraph*

Residents Reject Landfill Waste From California--The Midway landfill near Fountain, in El Paso County, was to be the destination of thousands of truckloads of soil containing traces of DDT and Dieldrin from California, soil dredged from San Francisco Bay as part of a federal Superfund cleanup. California requires any waste with a DDT concentration greater than 1 ppm to be treated as hazardous. After performing risk assessments, Colorado regulators declared the waste nonhazardous, noting that their assessment approach is the same as that of EPA. They also said the landfill is technologically adequate to prevent the waste from escaping into surrounding soils and groundwater. However, because of public opposition to the plan expressed at a public meeting in Fountain, the soil is now headed to a landfill about 40 miles southwest of Phoenix.

GT Online Local, State News 8/15/96, 8/20/96, *Gazette Telegraph*

WATER SUPPLY

Water Preservation Commission Moves Ahead--Fort Collins Mayor Ann Azari and Larimer County Commissioner Janet Duvall are moving forward to create a water preservation commission for Northern Colorado. Azari and Duvall will recruit local water experts to serve on a planning team to lay the foundation for the commission. The group would be comprised of 8-12 people including representatives from Fort Collins, Larimer County, Colorado State University and local water districts. Azari and Duvall met in early September with Bill brown, a water attorney, and Mike Applegate, a water engineer. The four will meet again on

September 24 after contacting possible water group participants to see who is interested in serving.

Fort Collins Coloradoan 9/6/96

ENDANGERED FISH SPECIES

USBR to Install Check Dams--The Bureau of Reclamation plans to install seven check dams on the Government Highline Canal and a pumping system on Highline Lake to save water that could be used in the Colorado River to help recover endangered fish. The check dams would hold back pools of water at headgates, reducing the need for what is called "carrying water." Lateral ditches could still tap the canal, even though it would contain less water. Plans call for a three-year, $5 million construction project to build:

- A pumping plant at Highline Lake so it could be used to store irrigation water.
- Seven check structures in the unlined portion of the Highline Canal, and an automated system to raise and lower the gates.
- A bypass pipeline near Palisade so water could be sent back to the Colorado River if demand drops suddenly, rather than running the water to the end of the canal.

The project would result in a savings of 28,500 acre-feet of water a year, with the greatest savings in August, September and October.

Although the USBR cannot use Green Mountain water directly for instream flows for fish, the Grand Valley Power Plant at Palisade could use the water to generate extra electricity and then turn it loose into the river. Whether this arrangement can protect the saved water remains to be seen. The USBR is expected to release a draft environmental study on the initiative by early November, to be followed by a 30-day public comment period.

Grand Junction Daily Sentinel 8/25/96

Drain and Stock Program Pilot Program Planned--State and federal wildlife officials have announced a pilot program in which they intend to spend $80,000 to drain two area ponds and restock them with razorback suckers and squawfish. Half of the cost of the pilot project will be borne by the federal government, the other half by revenues generated by Colorado hunting and fishing license fees. The experimental project could pave the way for a $200,000 project to stock as many as 300 Grand Valley ponds with endangered fish -- if it shows positive results. State wildlife officials hope to get half of that cost funded by the Fish and Wildlife Service. Several options will be presented to private pond owners in coming years, including a lease-per-acre payment in exchange for the use of ponds for stocking endangered fish.

Grand Junction Daily Sentinel 8/19/96, 8/21/96

RECREATION – FISHING

DOW Looks at Stocking Options--Starting next year, the state's public waters will be stocked with 1.3 million fewer catchable rainbow trout, a 37 percent reduction from what has been stocked in past years. The Colorado Division of Wildlife will be looking into the merits of establishing trout catchout ponds similar to those found in Missouri and Arizona. To fish in these ponds holding catchable trout, anglers will have to buy an additional license or permit. When you have caught your limit, you would have to buy another license if you wanted to continue fishing. To help pay for the increased cost of producing catchable trout, the DOW also will examine requiring the purchase of a trout stamp to fish waters stocked with catchable trout. The stocking of fish, most notably trout, is the backbone of Colorado's $900 million sportfishing business. Reduced stocking of trout likely will reduce the number of license sales and negatively impact businesses reliant on anglers.

Fort Collins Coloradoan 8/12/96

Improve Streams to Fight Whirling Disease—Harold K. Hagen, Professor of Fishery and Wildlife Biology at CSU, says in a *Coloradoan* article dated 8/11/96:

"There is only one situation in which chronic whirling disease can evolve in a wild trout population. It would need a fully degraded stream section, or a section threatened with degradation to a level where tubifex worms or similar pollution indicators can thrive. It could be a substrate where whirling disease spores might mature. It must be a section where spawning has or could occur, or a nursery area where newly hatched trout are developing close to thriving pathogens. It cannot normally evolve in ponds, lakes or reservoirs. It does develop in hatcheries but can be easily controlled there. Stress is the catalyst...

Why not locate susceptible stream sections and separate the pathogens from immature trout? This can be done by stream improvements that relieve stress factors favoring the pathogen and replacing them with factors favoring young trout...there is yet only one short stream section in Colorado where some evidence of significant young trout loss exists. This section on the upper Colorado River is severely degraded and has a spawning area, restricted by dams, in the vicinity of habitat most favorable to many pathogens including whirling disease."

Rifle Falls Hatchery Site of New Disease—Sick rainbow trout at the hatchery, sent to a lab in California for testing, were found to suffer from a microorganism called *nucleospora salmonis*, a disease discovered only five years ago in sea run fish from the pacific Northwest. Only a handful of fish were affected, and only one tested positive for the organism. It is known that this microorganism needs no intermediate host, in contrast to whirling disease. Nucleospora was confirmed two months ago in rainbow trout at the Ennis, Montana national fish hatchery and at two hatcheries in Nebraska which received eggs from Ennis. The Ennis hatchery supplies trout eggs to six Colorado hatcheries, but no diseased eggs have come into Colorado.

Besides Rifle, clinical signs (but no spores) of nucleospora have been found at he Hotchkiss Federal Fish Hatchery and four state-owned hatcheries, including Pueblo, Mount Shavano, Bellvue and the Crystal River hatchery. The presence of nucleospora at Crystal particularly confounds state fish pathologist Pete Walker. The hatchery is one of the state's whirling disease-free hatcheries, and the last time it received a shipment of rainbow trout eggs was eight years ago, and that was not from the Ennis facility. Walker speculates the disease may have been present for years. He said infected fish can recover and then have an immunity to further infection from nucleospora. The disease appears to kill less than 10 percent of the fish it attacks. The new disease appears to be water-temperature sensitive, and most of Colorado's hatcheries water supplies are below the optimum of 59 to 65 degrees. When the organism was found at Rifle Falls the temperature was at 54-56 degrees.

The Division of Wildlife has curtailed stocking of any new waters with fish from Rifle Falls and other infected hatcheries. Samples from fish already planted by Rifle Falls are being collected and the 10 other hatcheries raising fingerlings are being tested.

Grand Junction Daily Sentinel 8/18/96

WATER PROJECTS

City of Colorado Springs Requests Hold on Elephant Rock--Colorado Springs Utilities wants to put off its request to take water from the Arkansas River near Buena Vista. It decided in February to pump future water from the Pueblo Reservoir instead. CS Utilities wants to delay a decision for six years while officials make sure the plan to bring water from Pueblo can work, and will ask a state water court judge to put the case on hold until about 2002.

GT OnLine Local, State News, *Gazette Telegraph* 9/24/96

Animas La Plata Funding Continued--On September 12, congress agreed to provide $8.5 million to help plan the system of canals and reservoirs for the Animas-La Plata water project. The compromise, part of a 1997 spending bill for water and energy programs, must still be approved by the full House and Senate and signed by the president. The Environmental Protection Agency, however, has obtained a 90-day extension of its delayed deadline to refer the project to the president's Council on Environmental Quality. The agency has the authority to refer proposed projects to the council for resolution when it finds there is an "unsatisfactory impact" on human health or the environment.

Denver Post 8/27/96, 9/12/96

Louisville Residents Must Approve Water Purchase--The City of Louisville wants to buy 2,500 acre-feet of water from the Northern Colorado Water Conservancy District. The city's water now comes from the South Boulder Creek Drainage. To get the water, the city already has paid about $5 million in fees for membership in the district and for its share of transport costs through the Carter lake delivery pipeline. To close the deal, the city needs signatures from 5 percent of its property owners, twice. One set goes on a petition for Colorado Big Thompson water, and the other goes on a petition for Windy Gap reservoir water. The process is dictated by Colorado's 1937 Conservancy District Act. A 1992 study showed that Louisville's water demand will grow steadily and exceed even average annual supplies by 2008.

Denver Post 9/8/96

MISCELLANEOUS

Endangered People--An angler fishing on the Colorado River in early September pulled a 14-inch piranha from the river. A second piranha also was found in a small pond not far from a mall in Grand Junction the same week. A fisheries biologist said most likely someone grew tired of keeping the piranha as a pet and dumped it in the Colorado, a river too cold to support the species. Breeding and raising piranhas is legal in Colorado,while some warm-water states outlaw their breeding and raising. The fish now swims in a 55-gallon aquarium where it feeds on goldfish.

GT OnLine Local, State News, *Gazette Telegraph* 9/7/96; *Grand Junction Daily Sentinel* 9/6/96

PEOPLE

William F. Horak has been named new District Chief of the Colorado District, U.S. Geological Survey. Horak started his career in the Arid Lands Hydrology program in Denver. From there, he transferred to the North Dakota District to work on the Coal Hydrology program. In 1984 he transferred to the Oklahoma District as Studies Chief, and in 1989 returned to the North Dakota District as District Chief.

Don Glaser was appointed to the position of Executive Director to the Western Water Policy Review Advisory Commission effective September 12, 1996. Glaser recently retired as the Bureau of Land Management Colorado State Director. He has also served as Assistant Commissioner and Deputy Commissioner Bureau of Reclamation's Washington office. In 1993, he also served as the Acting Assistant Secretary for Water and Science, Department of the Interior.

AWARDS

A project that reduced salts, nutrients and pesticides reaching the Arkansas River has won a Governor's Smart Growth and Development Award. The Patterson Hollow Hydrological Unit Area Project is a joint effort of Colorado State University Cooperative Extension, the Farm Services Agency and the Natural Resources Conservation Service of the U.S. Department of Agriculture. The project reduced contaminants by improving irrigation practices on nearly 60,000 acres, which cleaned up return flows to the Arkansas river. Over the course of the six-year project, the NRCS directed the structural improvements and encouraged improved management techniques. CSU Cooperative Extension's role was to provide educational information to farmers and organize on-farm demonstrations of best management practices.

Fort Collins Coloradoan 8/8/96

MEETINGS

BRINGING THE RIVER BACK ... TO THE FUTURE:
URBAN AND RURAL WATERSHED MANAGEMENT
The 7th Annual South Platte Forum -- October 29-30, 1996
The Holiday Inn, Northglenn, Colorado

The **South Platte Forum** will continue its tradition of presenting multi-disciplinary dialogue on timely South Platte Basin resource issues. The **7th Annual Forum** will examine the context for multiple objective land and water management and the ongoing projects evolving to meet these objectives. Your participation in this year's Forum will help focus the collective vision defining the future for the South Platte Basin. Specific sessions to be presented at the one and one-half day conference include:

- What future do we seek?
- The context for integrated projects.
- Project planning and development, including the role of GOCO lottery funds.
- Integrating improvements among competing needs.
- South Platte Basin water in a free market economy.
- Measuring success and adaptive management.
- Case studies in the South Platte River Basin.

There will be an informal social hour following the first day of presentations. A field trip to Denver's South Platte urban corridor the following afternoon will allow participants the opportunity to see project implementation while it happens.

Confirmed speakers include:

Denver Mayor Wellington Webb and
Mr. Ken Salazar; Parcel, Mauro, Hultin & Spaanstra, P.C.

For information about the conference or exhibit space, call or write:

David Graf, Coordinator
Colorado Water Resources Research Institute
410 University Services Building, CSU
Fort Collins, CO 80523
Phone 970/491-6308, FAX 970/491-2293

3RD ANNUAL ARKANSAS RIVER BASIN WATER FORUM
January 22-23, 1997 – Pueblo, Colorado
Occhiato Student Center, University of Southern Colorado

PLAN TO JOIN YOUR COLLEAGUES AT THE ARKANSAS RIVER BASIN WATER FORUM. TAKE THIS OPPORTUNITY TO SHARE YOUR IDEAS AND LEARN MORE ABOUT THE DEMANDS ON COLORADO WATER.

The Arkansas River Basin Water Forum has and will continue to serve as a gathering place for sharing of ideas and methods of addressing opportunities presented by the various needs for the water flowing in the Arkansas River. Topics this year will focus on agricultural and environmental issues. An update of the Kansas vs. Colorado litigation plus a look at the effect of augmentation rules and the replacement of water to the Arkansas River will highlight this year's program.

The Forum is designed to accommodate interests of individuals involved in recreational, agricultural and municipal uses and environmental concerns of Colorado water, especially in the Arkansas River drainage basin. This year the committee has arranged for a web site for continued participation before, during and after the forum. The web site address is: <http://www.uscolo.edu/arkriver>.

The e-mail address for more information on the Forum and registration is: <pueblo@coop.ext.colostate.edu>.

COLORADO WATER CONGRESS WORKSHOPS
Holiday Inn, Northglenn, Colorado
I-25 & 120th Avenue

Oct. 25	**LEGAL ETHICS IN WATER AND ENVIRONMENTAL LAW**
Nov. 1	**WHAT YOU SHOULD KNOW ABOUT THE LEGISLATIVE PROCESS: THE LAW, THE RULES AND THE PRACTICES**
Nov. 7	**WORKSHOP ON GROUNDWATER**
Nov. 8	**A REVIEW OF FEDERAL ENVIRONMENTAL LAWS IMPACTING WATER INTERESTS**
Nov. 13	**THE FEDERAL PROCESS: LOBBYING FEDERAL AGENCIES AND THE CONGRESS**
Nov. 20	**16TH ANNUAL WORKSHOP ON FEDERAL AND STATE WATER QUALITY DEVELOPMENTS**

For information contact:

Colorado Water Congress
Phone 303/837-0812
FAX: 303/837-1607

CALLS FOR PAPERS

The Great Plains Symposium 1997
The Ogallala Aquifer
Managing for Drought and Climate Change
March 10-12, 1997 -- Lincoln, NE

The third symposium will address regional management responses to drought and climate change which would lead to regional sustainability. For abstract instructions contact CWRRI or Robert Kuzelka, Phone 401/472-7525, FAX 402/472-3574, e-mail to rkuzelka@unlinfo.unl.edu. Deadline: November 15, 1996.

8TH National Symposium on Individual and Small Community Sewage Systems
March 8-10, 1998 -- Orlando, Florida

Sponsored by ASAE - The Society for engineering in agricultural, food and biological systems. For abstract instructions and form contact CWRRI or Dr. Karen Mancl, Associate Professor, Extension Water Quality Specialist, Department of Food, Agricultural and Biological Engineering, 590 Woody Hayes Drive, The Ohio State University, Columbus, OH 43210-1057. Voice: 614/292-6007, FAX 614/292-9448. Deadline: December 1, 1996.

WEFTEC'97
Oct. 18-22, 1997 -- Chicago, IL

Join water quality and wastewater treatment professionals to learn about the latest developments and to see cutting-edge technology. For abstract format instructions contact: Water Environment Federation, Attn: WEFTEC '97 Program, 601 Wythe Street, Alexandria, VA 22314-1994, Phone 800/666-0206, FAX 703/684-2471, or E-mail confinfo@wef.org. Deadline: December 16, 1996.

1997 Rocky Mountain Symposium on Environmental Issues in Oil and Gas Operation
July 14-15, 1997 -- Colorado School of Mines, Golden, CO

The Colorado School of Mines and the U.S. Bureau of Land Management will sponsor the third symposium on all aspects of environmental protection, remediation, and reclamation involved with oil and gas operations. For abstract instructions contact CWRRI or Office of Special Programs and Continuing Education, Colorado School of Mines, Phone 303/273-3321, FAX 303/273-3314, or email space@mines.edu. Deadline: January 3, 1997.

CALENDAR

Oct.29-Nov. 1	THE CLEAN WATER COMPLIANCE INSTITUTE, Breckenridge, CO. Contact: Government Institutes, 4 Research Place, Rockville, IMD. Phone 301/921-2345, FAX 301/921-0373, E-mail giinfo@aol.com.
Oct. 31-Nov. 2	HYDROGEOLOGY OF THE SAN LUIS VALLEY AND ENVIRONMENTAL ISSUES DOWNSTREAM FROM THE SUMMITVILLE MINE, a field trip in conjunction with the 1996 Geological Society of America Annual Meeting, Denver, CO. For information call Isobel McGowan (303/477-5338), Doug Cain (719/544-7155 X130), Kathleen Smith (303/236-5788) or Alan Davey (719/657-3304). Nov.2
Nov. 3-6	THE IRRIGATION ASSOCIATION'S 17th ANNUAL INTERNATIONAL IRRIGATION EXPOSITION and ASAE'S TECHNICAL CONFERENCE, San Antonio, TX. Contact: The Irrigation Association, 8260 Willow Oaks Corp. Dr., Suite 120, Fairfax, VA 22031. FAX 703/573-1913.
Nov. 14-15	COLORADO SECTION, SOCIETY FOR RANGE MANAGEMENT, 1996 ANNUAL WINTER MEETING, Colorado Springs, CO. Held in conjunction with the Colorado Chapter of the Soil and Water Conservation Society. Contact: Ken Lair, Phone 303/236-2886 x210.
Nov. 18-20	109TH ANNUAL MEETING, NATIONAL ASSOCIATION OF STATE UNIVERSITIES AND LAND GRANT COLLEGES, San Diego, CA. Contact: NASULGC, One Dupont Circle, NW, Suite 710, Washington, DC 20036-1191. Phone 202/778-0818, FAX 202/296-6456.
Dec. 5-7	COMPETING INTERESTS IN WATER RESOURCES -- SEARCHING FOR CONSENSUS, Las Vegas, NV. Contact: U.S. Committee on Irrigation and Drainage (USCID), 1616 Seventeenth St., Suite 483, Denver, CO 80202; Phone 303/628-5430, FAX 303/628-5431, E-mail stephens@uscid.org.
Dec. 9-11	9TH INTERNATIONAL IGT SYMPOSIUM ON GAS, OIL, AND ENVIRONMENTAL BIOTECHNOLOGIES, Colorado Springs, CO. Contact: Mary Ann at Phone 708/452-0025 or FAX 708/452-0262.

PROFESSIONAL DEVELOPMENT SHORT COURSES

Dec. 3-4	NEGOTIATING YOUR NPDES PERMIT – WHAT YOU NEED TO KNOW	Denver, CO
Dec. 3-4	IMPLEMENTING THE PART 503 BIOSOLIDS REGULATION	Denver, CO
Dec. 3-5	UNDERSTANDING BIOLOGICAL & CHEMICAL NUTRIENT REMOVAL	Denver, CO
Dec. 5	UNDERSTANDING & EVALUATING FLOW MEASUREMENT	Denver, CO
Dec. 5-6	INTRODUCTORY PRETREATMENT REGULATORY COMPLIANCE	Denver, CO
Dec. 6	OPTIMIZING CLARIFIER PERFORMANCE	Denver, CO

For information contact: the Water Environment Federation
601 Wythe Street
Alexandria, VA 22314-1994
Phone 703/684-2452