

WATER ITEMS AND ISSUES . . .

April 1996

THE WATER INFORMATION REVOLUTION Editorial by Robert C. Ward	2
RESEARCH OPPORTUNITIES	3
Water Research	5
Water Supply	16
Editoria In Baskat	1/
Water Dublications	18
Wet Greate on the Web	19
Water News Digest	20
Mastings	20
Call for Papers	20
Short Courses	21
Calendar	28

..... Inside:

PEOPLE AND WATER: AN INFORMATION CHALLENGE

UPCOMING:

INSTREAM FLOWS: MINIMUM DOCTRINE... MAXIMUM CONTROVERSY

COLORADO WATER WORKSHOP August 7-9, 1996 Gunnison, Colorado

What could recent legislative proposals mean to the evolution of the prior appropriation doctrine? How can various interests in instream rights all work together? To what extent should the CWCB control instream rights? How do other states answer these questions?

Contact: Pam Ayers 970/943-7156

THE WATER INFORMATION REVOLUTION

by Robert C. Ward

Water, particularly in the West, is of considerable interest to many segments of society, but obtaining information about it is not always easy. With the "information revolution" upon us, however, new technology increasingly is being used to inform the public about water.

This issue of *COLORADO WATER* contains a summary of a recently completed CWRRI Task Force report entitled "People and Water: The Information Challenge." The report provides an excellent overview of how well the public understands water issues and how it obtains information about water.

Perhaps the most intriguing means of providing water information is the rapidly developing Internet. CWRRI has operated its home page for almost a year now, and more than 1500 users have accessed it in the past four months. The CWRRI home page contains a list of Institute publications, issues of *COLORADO WATER*, and a directory of academic faculty with expertise in water. We are placing all issues of CWRRI's new "Water in the Balance" series on the CWRRI home page. Also through the CWRRI home page, you have the opportunity to ask questions of CWRRI staff via e-mail messages. The opportunities the Web offers to communicate water research information are limitless. To check out CWRRI's home page, use the following address:

http://www.colostate.edu/Depts/CWRRI/

To utilize the Web's abilities and meet the public's need for water information, a new Colorado Water Knowledge Home Page was developed during the fall semester at Colorado State University. This effort to collect and present basic Colorado water information was led by Professor Freeman Smith and Anna Perea of the Department of Earth Resources. They are to be commended for their pioneering effort to put on the Web information about Colorado water history, Colorado water rights, and maps and data about Colorado river basins. Check out this new home page at:

http://www.cnr.colostate.edu/CWK/

While internet access is not universal, it is growing rapidly. The ability to obtain new water information and have it immediately available, without publication delays and costs, is truly revolutionary. Having said that, there remains the problem of designing home pages so that information can be accessed quickly and easily. Quality control on home pages is a growing problem. CWRRI is constantly examining and updating its home page to better serve those seeking water information. Thus, as water users, managers, policy makers and the public seek to improve communication about water in Colorado, we hope the report summarized in this issue of *COLORADO WATER* and the two home pages listed here will be helpful. Please let us know if you have a question about water that is not answered on either home page.

CWRRI has published the complete report, "People and Water: An Information Challenge," in its Water in the Balance series (Number 6). Contact CWRRI at 970/491-6308 to request a free copy.

COLORADO WATER Vol.13, No. 2 Date: April 1996 Editor Shirley Miller Shirley Miller Writers Cindy Brady Julie Eyre COLORADO WATER is a publication of the Colorado Water Resources Research Institute The score of the newsletter is

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

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Robert C. Ward, Director

<u>RESEARCH OPPORTUNITIES</u>

\mathcal{X} regional water resources competitive grants program, western region \mathcal{X} \mathcal{X}

Editor's note: A final decision has been made on how the State Water Institutes Program will operate for Fiscal Year 1996. Here is information as it was received from the Wyoming Water Resources Center, the lead institute for the Western Region.

This Request for Applications (RFA) is issued as part of the programs under the Water Resources Research Act (P.L. 101-397) administered by the U.S. Department of the Interior through the Water Resources Division of the U.S. Geological Survey. Research proposals submitted under this RFA are generally intended to address water resources problems of regional or multi-state significance. Illustrative examples of research topics are listed below.

Ecosystem Approaches to Managing Riparian Areas in the Western United States **Reassessing Salinity Management Policy** Improving Decisions for Managing Major River Systems in the Western United States Impacts of Incremental Institutional Reforms for Drought Management of Western Water Resources **River Basin Level Nonpoint Source Pollution Control Native American Water Rights Issues** Water Quality Impacts of Confined Animal Production Activities Water Conservation and Artificial Recharge of Aquifers Water Quality Problems Associated with Oil and Natural Gas Exploration and Development Institutional Infrastructure Changes for Holistic Water Management Impacts of Air Pollution on Recharge and Quality of Surface Water and Ground Water Supplies **Evaluating Conservation Programs Flood Frequency Forecasting** Effects of Urbanization on Floods and Water Quality Water Reuse Hydroclimatic Variation

ELIGIBILITY: Any institution of higher learning is eligible to apply for awards. Awards are 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) established at a college or university pursuant to the provisions of Section 104 of the Water Resources Research Act and 30 CFR Part 401. Investigators not a part of the aforementioned Institutes or Centers must submit their application through and in cooperation with a principal investigator from the Institution where such Institutes or Centers are located. All applications under this solicitation must involve substantive collaboration among at least two or more states. Applications involving only investigators from a single state will not be considered.

FUNDS: Approximately \$800,000 for the Western Region. Proposed projects should be 1-3 years in duration and not request total federal funds exceeding \$350,000 per project. EACH INSTITUTE'S APPLICANTS SHALL MATCH EACH FEDERAL DOLLAR PROVIDED TO SUPPORT EACH PROPOSED PROJECT WITH NOT LESS THAN TWO NON-FEDERAL DOLLARS.

APPLICATION DUE DATE: May 15, 1996.

SUBMIT TO: ROBERT C. WARD, DIRECTOR COLORADO WATER RESOURCES RESEARCH INSTITUTE 410N UNIVERSITY SERVICES CENTER COLORADO STATE UNIVERSITY FORT COLLINS, CO 80523

Proposals will be processed by CWRRI and CSU's Office of Sponsored Programs for submission to the lead institute for the Western Region, the Wyoming Water Resources Center. The Wyoming Center will coordinate proposal evaluation by: (1) written peer reviews (at least 3 qualified scientists or managers in the area of the proposed research) and (2) a selection panel consisting of 5 or more Institute directors from the Western Region and at least one USGS employee as an *ex officio* member. The following criteria will be used: 20 points -- relevance and importance, 50 points -- scientific merit; 10 points -- feasibility; 10 points -- technology transfer; and 10 points -- qualifications of the investigators and budget (is it reasonable and adequate).

<u>AWARDS</u>: All awards will have a preferred start date of September 1, 1996 and must start no later than September 30, 1996. COMPLETE INSTRUCTIONS ARE AVAILABLE ON THE WORLDWIDE WEB AT http://www.wwrc.uwyo.edu/. OR CONTACT CWRRI OR YOUR CONTRACTS AND GRANTS OFFICE.

NATIONAL SCIENCE FOUNDATION/ XX ENVIRONMENTAL PROTECTION AGENCY AWARDS COMPETITION

The National Science Foundation (NSF) and the Environmental Protection Agency (EPA) announce their intent to support a special awards competition based on a Memorandum of Understanding signed on December 8, 1994. The MOU establishes a partnership between the two agencies emphasizing the support and merit review of fundamental, extramural environmental research. This is the second year of the joint special awards competition. Information on the FY1995 competition may be found on the Internet through http://www.epa.gov.

The three research areas targeted by this announcement are:

- Water and Watersheds--Approximately \$6 million with a projected award range from \$75,000 to \$500,000 per award per year, and an approximate duration of 2 to 3 years.
- **Technology for a Sustainable Environment**--Approximately \$5 million with a projected award range from \$75,000 to \$150,000 per award per year, and an approximate duration of 2 to 3 years.
- Decision Making and Valuation for Environmental Policy--Approximately \$2.5 million with a projected award range from \$60,000 to \$100,000 per award per year, and an approximate duration of 2 to 3 years.

EPA/NSF DEADLINE: May 7, 1996. FOR COMPLETE INSTRUCTIONS CONTACT YOUR CONTRACTS AND GRANTS OFFICE.

LEGISLATIVE UPDATE -- The State Water Institute Program

As the previous announcement indicates, FY1996 funding for the National Water Institute Program (of which CWRRI is a part) is available for regional research. This is a major change from the past state-funded water research programs.

To recap why this change has occurred -- In the proposed FY1996 federal budget, the Administration again zeroed out federal support for the SWIP. The text of the Interior's FY1996 Briefing Book contained the following quote:

> The program has yielded productive research and education; USGS (U.S. Geological Survey) has made a difficult decision to eliminate the program in order to maintain in-house research and investigations efforts which address national priorities and needs.

However, Representative Don Young (AK) took issue with the program's elimination in his March 17, 1995 Values and Estimates Report in the section under the U.S. Geological Survey, saying:

> The committee regretfully cannot agree with the Administration's request to eliminate funding for the Water Resources Research Institutes grants program within the overall WRD (Water Resources Division of the USGS) budget. This program serves additional review.

Subsequently, the House and Senate agreed on the same funding level as FY1995 for the SWIP (\$4.5 million); however, the conference report of the House and Senate appropriations committees changed the way in which the funds appropriated for the institutes will be allocated. Each institute

will receive a base grant of \$20,000 and the remaining funds will be competitively awarded based on regional program priorities approved by the USGS.

Nationally, the program has been divided into four regions for the competitive grants: The West, North Central, Northeast, and the Southeast and Islands). Each region will receive approximately \$800,000 for grants. The states included with Colorado in the Western region are: Alaska, Arizona, California, Idaho, Nevada, New Mexico, Oklahoma, Oregon, Texas, Utah, Washington State and Wyoming.

Reauthorization of the National Water Institute Program continues to proceed through Congress. The House passed H.R. 1743 in October 1995 to reauthorize the program. The bill is currently being considered by the Senate. House and Senate bills, as they currently stand, have some differences; Thus, the future of the National Water Institute Program is still being determined.

WATER RESEARCH

PEOPLE AND WATER: AN INFORMATION CHALLENGE

Marilee Long Mark Kumler Sharon Gabel James L. Wescoat, Jr. Greg Luft

by

with contributions from:

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> Carmine Iadarola AquaSan Network, Inc.

> > Trina McGuire Denver Water

Tyler Stevens Colorado Water Education Foundation

Charles (Tommy) Thomson Southeastern Colorado Water Conservancy District

A comprehensive report, People and Water: An Information Challenge, expands the discussion of water information for the public and includes the authors' references. Contact CWRRI at 970/491-6308 for a free copy. A research priority of the Colorado Water Resources Research Institute's 1994-1995 program was, "Water information for the public — how can we make it meaningful, interesting, and informative?" After a preliminary round of preproposals, the principal authors were encouraged to collaborate on a proposal that would address the general question, "How do water users and managers ensure that the public is informed about the many dimensions and roles of water in Colorado?" The authors invited the individuals listed above to join them as members of a Public Water Information Task Force. Principal investigators were Marilee Long and Greg Luft, Department of Technical Journalism, Colorado State University; and Mark Kumler, James Wescoat, Jr., and Sharon Gabel, Department of Geography, The University of Colorado at Boulder.

Although some may argue that water courts and other water agencies do a good job of managing Colorado's water and that the public does not need a greater voice in the process, most will agree that active public participation is integral to good water management. Increasingly in Colorado water policy is determined at the ballot box, and better-informed citizens make wise water decisions more likely. Public water communication efforts are important for several reasons:

- The public is increasingly concerned about water issues.
- As the state's population grows, new residents may not have a good understanding of Colorado water issues.
- The increasing population causes a greater demand for water.
- Regions of the state have diverse water requirements, and residents may not have a good understanding of the water needs in areas outside of their region.
- The federal government plays a dynamic role in state water issues and it is critical that people keep up with the changes.

Members of the Public Water Information Task Force met approximately once a month between August 1994 and August 1995 to discuss the status of water communication efforts within Colorado. They identified three objectives:

- to develop a conceptual framework for the understanding of water issues,
- to review the vehicles or methods for disseminating water information to various segments of the public and evaluate their usefulness,
- to identify a set of issues, considerations, and priorities to direct future development of water information for the public.

During the year, the task force identified two critical underlying issues:

- What are the different audiences, programs, and tools for communicating water information?
- What are the specific water-related information issues and needs?

The Challenges Associated with Conveying Water Information

The task force identified many challenges to the effective communication of water information.

- Today the public's role is expanding dramatically, and it is increasingly important that the public have a better understanding of complex water issues. Part of this challenge is gaining the interest of "information gatekeepers," such as newspaper editors and television news producers.
- Because there is currently no mechanism for getting water information to all new residents, task force members suggest working with established organizations such as Welcome Wagon, chambers of commerce, and realty associations. Water utilities could also send information packets to new customers.
- Determine what people want or need to know and distill this information into a reasonably-sized "package" of information for the general public. Even if the experts agree upon what the public *needs*

to know about the issues, this may not be the same as what the public *wants* to know. Reconciling the two ideas may be difficult.

- Correct misperceptions. Misperceptions about water are particularly dangerous when it comes to public decisionmaking concerning water issues.
- Foster and maintain long-term commitments to water education. While alerting the public in crises helps to alleviate people's short-term concerns, long-term commitments to educating the public *before* the crises occur could help to avert these concerns altogether
- Know which communication efforts are effective. It is rare for an organization to commit the resources to study the effectiveness of communication efforts, yet this is the very information that is needed to determine which messages and media work.
- Adequate funding is the final, pervasive, challenge to water communication efforts.

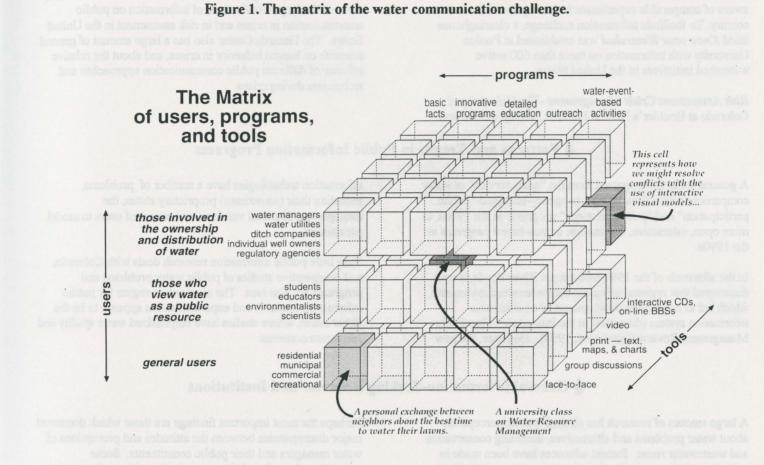
The Public Information Problem as a Matrix

To simplify the discussion of the issues, the task force attempted to classify and stratify the different components. What began as a two-dimensional table of "publics" and "problems" evolved into a three-dimensional matrix of "audiences," "programs" and "tools" (see Figure 1). The matrix should be seen as a simplified schematic representing the great variety of communication situations, not as an exhaustive inventory of all possible situations.

The vertical axis of the matrix covers the objects of the communication efforts. This axis includes those involved in the ownership and distribution of water as well as general municipal and commercial water users. While not easy to illustrate, there may be considerable overlap among the different tiers. It is possible, for example, that an individual might work for a water utility during the day, teach Colorado water law in the evening, and be an "ordinary" residential water user at home at night.

The **horizontal axis** represents the variety of communication programs that might be used. The leftmost columns might also be seen as programs that seek simply to "inform" audiences, while the rightmost columns represent more advanced programs that strive to "educate." From either perspective, it should be clear that a wide variety of communication programs exists.

The **third dimension**, indicated by the depth in the matrix, represents the variety of tools or media that might be used to communicate water information. These range from one-on-one and group discussions, through traditional print and electronic mass media, to interactive, on-line bulletin boards, CDs, and information pages on the World Wide Web.



Examples of Recent Studies and Programs

Numerous programs have been sponsored by civic organizations, public agencies, and academic institutions, a few of which are mentioned below.

Civic organizations--Colorado League of Women Voters publications have been useful in public meetings and teaching. Other civic groups have sponsored outreach projects and "town meetings." *Colorado Water: The Next 100 Years*, funded by the Colorado Endowment for the Humanities, compiled information on public concerns in the state's seven water divisions. It provides useful information for assessing changing public concerns.

State and Federal Agencies--Special mention should be made of major information efforts by large water management organizations including the U.S. Geological Survey, the Colorado Water Conservation Board, Project WET, and Denver Water.

The U.S. Geological Survey has taken an active role in making information available to the public in a variety of ways, e.g., via the Internet, outreach publications (fact sheets, circulars, videos), participation of Survey personnel in area water festivals, open houses, and education programs at schools. These activities are being accomplished while maintaining the USGS's traditional scientific data and information outlets through professional journals, societies, and meetings. The Survey also maintains the flow of information to individuals and agencies interested in waterrelated activities by sponsoring local professional technical meetings and holding semiannual liaison meetings with interested citizens in major water basins across the country.

National Efforts--At the national level, clearinghouses have been established for water information in several fields that have special relevance for Colorado. For example, Colorado has a large number of small community water suppliers in towns in the mountains and eastern plains, and these systems have special problems obtaining and disseminating useful information. To serve these groups, a National Drinking Water Clearinghouse was established in 1991 in Morgantown, West Virginia. It has a toll-free number and inexpensive publications on management, technologies, regulations, and financing of small systems.

Similarly, Colorado is experiencing renewed interest in local, citizen-based initiatives for watershed management — as are other states around the country. These groups produce small

newsletters that do not circulate very widely, and few are aware of comparable experiences in other parts of the state or country. To facilitate information exchange, a clearinghouse titled *Know your Watershed* was established at Purdue University with information on more than 600 active watershed initiatives in the United States.

Risk Assessment/Crisis Management--The University of Colorado at Boulder's Natural Hazards Library and Natural

Patterns and Trends in Public Information Programs

A general trend is recognized from the "quiet service" of water companies several decades ago, to agency-managed "public participation" and "public relations" programs in the 1970s, to more open, interactive, continuous, citizen-based programs in the 1990s.

In the aftermath of the 1993 Mississippi River floods, it was discovered that regional scientific databases were inadequate, which led to large-scale development of an electronic information system (described in the Interagency Floodplain Management Review Committee, 1994). However, the new Hazards Research Applications and Information Center have some of the largest collections of information on public communication in crises and in risk assessment in the United States. The Hazards Center also has a large amount of general research on human behavior in crises, and about the relative efficacy of different public communication approaches and techniques during crises.

information technologies have a number of problems, including their (sometimes) proprietary status, the management of model versions, and access of users to model parameters.

Very little public information research deals with Colorado, and comparative studies of public water problems and programs are also rare. The most active region for public information research and experimentation appears to be the Great Lakes, where studies have emphasized water quality and recreation concerns.

General Information-Seeking Behavior and Institutions

A large amount of research has elicited public perceptions about water problems and alternatives, including conservation and wastewater reuse. Recent advances have been made in using "contingent valuation" methods to estimate individual and collective willingness to pay for different water alternatives. Institutional research has focused on problems of coordination, integration, and efficiency in water management. One recent study, for example, examined the use of watershed planning to facilitate inter-agency communication and exchange of information — which has had mixed results. Perhaps the most important findings are those which document major discrepancies between the attitudes and perceptions of water managers and their public constituents. Some researchers have found, for example, that citizens have broader views (e.g., about environmental protection of riparian corridors and wetlands) than water managers expect. Conversely, water managers are not as risk-averse as the public often assumes; managers try to develop attitudes toward risk appropriate to their water supply situation and their consumers' preferences

Information in Relation to Risk, Crisis, and Conflict

Studies indicate that the media are a major source of scientific information for adults and that the public is interested in environmental news stories. However, the media's ability to provide detailed information on water issues is often hampered by time and space constraints, and research indicates that by highlighting certain issues, the media influences what the public thinks about. Consequently, while the mass media may be a good vehicle for placing water issues on the public agenda, it may not be a very good source of detailed information. Changes in water user attitudes may require long-term processes of education and experience, and not just new information.

WATER TASK FORCE SURVEY

Colorado water organizations spend considerable time and energy trying to inform people about water. While the efforts of individual organizations may be known, the combined efforts of these organizations have not been documented. In developing a conceptual framework for public understanding of water issues in Colorado, task force members decided to answer three questions:

What types of water information do citizens want? How do citizens seek this information? How is information typically communicated?

To achieve a representative sample, survey respondents were chosen from each of the seven water divisions administered by the Water Resources Division of the Colorado Department of Natural Resources. Five respondents were identified for each division. These respondents represented both rural and urban areas (two respondents from each category) and the state's division engineer. The survey consisted of 30 questions,

- policy issues;
 - water supply or drought;
 - their organization's programs;
 - billings and meter readings;
 - federal and state water policy;
 - leaks, spills, and disruptions;
- recreation;

ranging from the frequency and types of public inquiries to principal challenges in providing water information to the public in the future. Respondents were contacted by telephone during June 1995. Survey results were compiled and analyzed by the end of July. Officials were asked specific questions about how they respond to public requests for "information" on the following topics:

- water rights;
- wetlands, rivers, and reservoirs;
- groundwater;
- water rates and fees;
- environmental issues;
- water quality and pollution;
- odor, taste, and temperature.

Of the 44 leading Colorado water organizations contacted, 43 participated in the survey. The Scott's Pi intercoder reliabilities for the open-ended survey responses ranged from .70 to .90, which are within acceptable limits. Tables 1 and 2 provide details on the survey sample.

SURVEY RESULTS

Aspects of Organizations' Commitment to Public Information

	Number of
Organization Type	Organizations
Municipal Water	17
Conservancy Org.	14
Govt./Other	12
	Number of
Division*	Organizations
1, Greeley	9
2, Pueblo	5
3, Alamosa	5
4, Montrose	6
5, Glenwood Springs	5
6, Steamboat Springs	4
7, Durango	6

Table 2. Size of water organizations in sample (N = 43).

Number of People	Number of Organizations
1 to 12,000	11
12,001 to 69,999	16
70,000 and above	16

Most organizations had designated a staff member to handle public information requests. Of the 43 organizations in the survey, 31 had a public information (PI) person. In each division, the majority of organizations had a designated PI person; division 4 was the only division that had a designated person at each organization surveyed. Conservancy organizations were most likely to have designated PI staff. At organizations without a designated PI staff member, whoever answered the phone tried to answer the PI request, or he/she referred the caller to a specialist in the organization. One organization did not field PI requests because it had a separate service center.

Time spent responding to PI requests

varied dramatically. The amount of time per day spent responding to PI requests ranged from 3 minutes to 5 hours. The mean amount was 79 minutes, and the median was 49 minutes. As Table 3 shows, the amount of time respondents devoted to filling PI requests varied by division and organization type.

Table 3. Average amount of time spent per day responding to public information requests by division and type of organization (N = 43).

	Mean	Number of
Division*	(in minutes)	Organizations
1, Greeley	78	9
2, Pueblo	57	5
3, Alamosa	101	5
4, Montrose	78	6
5, Glenwood Springs	85	5
6, Steamboat Springs	68	4
7, Durango	86	6
Organization Type		
Municipality	72	17
Conservancy	49	14
Govt/Other	126	12

*Three respondents were not classified by division because they represent state-wide organizations.

In general, employees believe that their organizations support employee efforts to compile additional information to fill PI requests. Only one organization did not support these efforts, while six others said it depended on the request.

However, fewer than half of the organizations surveyed had a PI budget. Only 15 of the 43 organizations reported that they budgeted funds for PI. Conservancy districts were most likely to have PI budgets. The government/other organization group was the least likely group to have a PI budget.

Respondents from 13 of the 15 organizations with PI budgets knew the size of their PI budgets, which varied widely from \$5,000 to \$1,800,000, with a mean of \$182,538 and a median of \$21,000. Municipalities reported the largest budgets, followed by conservancy districts; the government/other organization group was a distant third.

For organizations with PI budgets, the budgets were considered adequate by respondents. When asked about the adequacy of their PI budgets, respondents overwhelmingly stated that their budgets were adequate. Furthermore, they overwhelmingly responded that their budgets were growing.

Most organizations did not have written public information plans to cover crises. Fewer than half of the organizations (17 of 43) had written public information plans to cover crises; two organizations were developing plans. Results also indicate that government/other organizations are most likely to have crisis plans, while crisis plans in conservancy organizations are rare. (see Table 4).

Table 4. Frequency of PI plans for crises by organization type (N = 43).

	Турс	of Organiza	tion
Status of Crisis Plan	Govt/ Other	Munic- ipality	Conserv Org.
Has Crisis Plan	9	6	2
Does Not Have Plan	3	9	12
Plan in Progress	0	2	<u>0</u>
-	12	17	14

The most common crises covered by the plans were water supply interruptions and flooding; these were followed closely by drought. To a slightly lesser degree, crisis plans covered water quality problems.

Characteristics of Information Requests

More than half of all respondents received information requests daily. Twenty-six respondents fielded daily PI requests, while 12 respondents received weekly requests.

More than half of respondents (26 of 43) said that PI requests clustered at key times. Of the key times mentioned, the most frequent answers were as follows: after rate increases or mailings (nine responses), during spring runoff (eight responses), and during crises (six responses). Not surprisingly, municipalities most often got PI requests after rate increases or mailings.

Water organizations fielded questions on a variety of areas. Table 5 summarizes this information.

Water organizations were most likely to get public information queries from customers, followed by developers, which may be indicative of the growth in the state (see Table 6). Of the additional types of people that respondents mentioned, those most frequently mentioned were realtors (mentioned six times), contractors/engineers (mentioned three times), and other water organizations (mentioned three times).

A few differences among organizational types are worthy of note. Conservancy districts and government/other organizations were more likely to be contacted by water brokers than were municipalities. Lawyers appeared to be more likely to contact government/other organizations than municipalities or conservancy organizations. This pattern is also true for state/federal officials.

Table 5. Frequency of public information questions (N = 43). Number of Respondents

	•	Some-		
Type of Ouestion	Often	times	Never	N/A•
Policy Issues	18	18	1	1
Water Rights	17	18	7	1
Water Supply or Drought	16	25	1	1
Wetlands, Rivers, Reservoirs	16	19	7	1
Organization's Programs	15	25	2	1
Groundwater	15	16	11	1
Billings & Meter Readings	15	10	12	6
Water Rates & Fees	14	14	12	3
Federal & State Water Policy	13	21	8	1
Leaks, Spills, Disruptions	10	22	9	2
Environmental Issues	9	26	7	1
Water Quality and Pollution	6	33	3	1
Recreation	5	27	10	1
Odor, Taste, Temperature	4	20	18	1

*One organization did not deal directly with information requests.

Table 6. Frequency of PI requests from groups of people (N = 43).

Number of Respondents

Group	Often	Some- times	Never	<u>N/A*</u>
Customers	32	7	3	1
Developers	23	17	2	1
State/Fed. Officials	16	24	2	1
City Officials	13	26	3	1
Lawyers	12	25	5	1
Students	8	31	3	1
Media Organiz.	6	35	1	1
Educators	5	36	1	1
Water Brokers	5	19	18	1
Activists	3	28	11	1

*One organization did not deal directly with information requests.

Table 7. Methods people use to contact water organizations (N = 43).

		Some-		
Method	Often	times	Never	N/A
Phone	40	2	0	1
Personal Visits	18	24	0	1
Public Meetings	9	30	3	1
Letter	8	31	3	1

*One organization did not deal directly with information requests.

The most common way for people to contact a water organization was by phone (see Table 7). In addition to the other methods listed in Table 7, organizations said they were often contacted by fax (19 mentions), which was followed very distantly by Internet (four mentions).

Water Organization Responses to Public Information Requests

Respondents believed that talking to people was a very effective way to disseminate PI information. Using printed material, such as maps and brochures, was judged less effective (see Table 8).

Respondents used a variety of methods to respond to PI requests. The most often named methods were press releases (11

Table 8. Effectiveness of selected methods of responding to PI requests $(N = 42^*)$.

Method	Very Effective	Mod. Effective	Not Effective	N/A
Verbal	33	8	0	
Referrals to Specialist	s 21	17	2	2
Maps	16	17	6	3
Brochures or Data	12	25	3	2

*One respondent did not answer this question.

responses), school programs (nine responses), and meetings (eight responses). Some of the less-often mentioned responses were public service announcements, newsletters, field demonstrations, and speakers' bureaus. *Respondents used many sources to fill PI requests beyond their expertise (see Table 9).*

Table 9. Sources of additional 43).		
Number of Resp	onses	
		Don't
Source	Use	Use
Public Agencies	36	7
Specialists Outside Organization	36	7
Specialists at Organization	34	9
Professional Associations	31	12
Fechnical Journals & Newsletters	31	12
Consultants	31	12
Libraries	23	20
University Professors	20	23
Non-Profit Organizations	16	27

Perceived Knowledge Levels Concerning Water Topics

To assess the overall knowledge level that water organization representatives believed the public has, a composite measure of knowledge level was created by calculating the average perceived knowledge level across all knowledge questions. The reliability for this composite score was 0.88, indicating that the score is reliable. Table 10 provides a breakdown of these composite scores.

Table 10. Perceived knowledge levels of public (1 = well-informed, 2 = adequately informed, 3 = poorly informed) (N = 42*).

> Overall Mean = 2.18 Overall Median = 2.32

By Division	Mean
Division 1	2.46
Division 2	1.56
Division 3	2.04
Division 4	2.48
Division 5	2.23
Division 6	2.14
Division 7	2.06
Other**	2.52

By	Organ	ization	nal Type	
			Mea	n
		•••		
Mu	nicipa	lity	2.19	
<u>n.</u>			515	

Govt/O	ther		22
00,10	uici	4 ,	44
	amon	dent di	l not ansv
WHE I	CSPOL	uencon	I IRA ALISY

this question. **Three respondents represented state-wide organizations.

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COLORADO WATER

Water organizations believed that the public was least informed about water rights, federal and state water policy, policy issues, and groundwater (see Table 11). The public appeared to be best informed about water consumption topics (e.g., rates and fees) and recreation.

	Well	Adeq	Poorly	
Water Topic	Informed	Informed	Informed	N/A
Recreation*	.8	29	2	3
Billing & Meter Readings	4	23	4	12
Water Rates & Fees	3	24	6	10
Water Supply or Drought	5	22	15	1
Leaks, Spills, Disruptions	4	18	15	6
Odor, Taste, Temperature	3	18	15	7
Environmental Issues*	4	21	16	1
Organization's Programs*	5	18	18	1
Wetlands, Rivers, &				
Reservoirs*	3	16	22	1
Water Quality & Pollution*	3	13	24	2
Groundwater*	5	9	27	1
Policy Issues*	0	13	28	1
Fed./State Water Policy*	0	11	30	1
Water Rights*	3	7	31	1

Future Public Information Concerns

Table 12. Most commonly named future public information challenges (N = 43). Number of Percentage of Responses Responses Challenge Presenting Information Well 12 18.2 Having Adequate Money/Resources 5 7.6 5 7.6 Having Water Quality Information Having Information on Water Costs 6.1 4 Making Information Relevant 2 3.0 Using Computers to Convey Information 2 3.0 3.0 Getting Information to New Residents 2 3.0 Coping with Growth/Water Supply 2 1.5 Don't Know/No Response 1 Other 31 47.0 66* 100.0 *Because respondents could provide multiple answers, the total number

*Because respondents could provide multiple answers, the total number of responses exceeds the total number of respondents.

again gave a variety of responses (see Table 14). Two needs mentioned often relate to public information materials, i.e., the

development of public information materials and research on

When asked about future public information and information services needs of their organizations, respondents gave an assortment of answers. The most often cited needs were for water supply and water quality information (see Table 13). No patterns were discernible for division or type of organization.

When asked about the key

challenges to providing

water information to the

respondents gave a wide

(see Table 12). Nearly 20

percent of responses had

to do with the effective

presentation of

information.

assortment of answers

public in the future,

e Table 13). No effective methods for conveying public information. Several respondents were satisfied with current efforts and were also already working with universities on specific research questions.

When asked about their future research needs, respondents

	Number of	Percentage
Information Need	Responses	Responses
Water Supply	10	13.2
Water Quality	9	11.8
Information Materials	8	10.5
Water Conservation	7	9.2
Development of Internet		
Resources	5	6.6
Water Costs	4	5.3
Don't Know/No Response	4	5.3
Water Rights	3	3.9
Rules/Regulations	3	3.9
Access to Databases	2	2.6
Water Pollution	2	2.6
Other	<u>19</u>	<u>25.0</u>
	76*	100.0

	Number of of	Percentage Of
Research Need	Responses	Responses
Development of Public Information Matls.	9	15.3
Current Research Effort Is Adequate	8	13.6
Don't Know	6	10.2
Research on How To Present Information	5	8.5
Modeling/Statistical Analysis	5	8.5
Already Working with Universities on		
Projects	3	5.1
Contaminants	3	5.1
Water Quality	2	3.4
Other	<u>18</u>	<u>30.5</u>
	59*	100.0

 Because respondents could provide multiple answers, the total number of responses exceeds the total number of respondents.

CONCLUSIONS AND RECOMMENDATIONS

Survey results indicate that the state's water organizations have made a commitment to communicating water information to a diverse group of constituencies and have developed many methods for doing so. Most organizations are willing to support employee efforts to develop information resources, and they often address the demand for information by designating a staff member to serve as the focal point. Some designated staff members spend only minutes a day while others may dedicate the greater part of the day to fulfilling information requests.

These water communicators largely believe that the public is adequately informed about residential and recreational water use. In general, the population is less informed about issues such as water rights, governmental water policy, and groundwater. Ironically, while most organizations recognize and support information development and distribution, few have written public information plans to cover crises such as water supply interruption, flooding and drought.

The results of this survey also point out some public information areas that need attention. For example, one of the major concerns of staff members who provide information is in presenting it well. Based on the results of this survey and task force discussions, the task force makes the following recommendations to further enhance water information activities in the state.

• Create a clearinghouse for water information activities in Colorado. One organization should assume responsibility, and receive support, for helping the state's water organization employees learn what their colleagues in other organizations are doing to communicate water information.

- Help water organizations develop crisis plans that include the dissemination of information. Survey results indicate that many organizations do not have written crisis plans that include steps for informing the public and other important groups. Workshops and seminars should be organized to help organizations take a proactive approach to crisis and risk communication.
- Hold communication training workshops to help water organizations learn to communicate with theirconstituencies more effectively. Depending on demand, these workshops could be based on different audiences (e.g., media representatives, residentialusers, school children) on different information delivery systems (e.g., computer-based technologies, field demonstrations, water bill inserts) or on different topics (e.g., water quality, water conservation, water supply).
- Support current efforts by water organizations to disseminate information. For organizations with public information budgets and personnel, these activities should be continued. Other water organizations need to make budgetary commitments to water information activities.
- Increase coordination of public information and education programs. Some Colorado water organizations have already established impressive education programs. These programs need continued support to serve the long-term goals of advancing public knowledge and involvement in Colorado water issues.

respondents.

April 1996

WATER RESEARCH AWARDS

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

Colorado State University, Fort Collins, CO 80523

Central Region Aquatic Resources Survey, Stephen A. Flickinger, Fishery & Wildlife Biology. Sponsor: Colorado Division of Wildlife. Stream Habitat Study with Remote Sensing & GIS, Roger M. Hoffer, Forest Sciences. Sponsor: Colorado Division of Wildlife. Evaluation of the Acid-buffering Capacity & Metal Mobility of Southwest San Luis Valley..., Grant E. Cardon, Soil & Crop Sciences. Sponsor: Colorado Dept Public Health & Environ.

Colorado Heritage Wildlife Database, Christopher Pague, Fishery & Wildlife Biology. Sponsor: Colorado Division of Wildlife.

*Methodologies for Design of Soil Covers for Waste Disposal Sites, Steven R. Abt, Civil Engineering. Sponsor: Nuclear Regulatory Commission.

Wildlife Habitat Evaluation Program for Schools, Delwin E. Benson, Fishery & Wildlife Biology. Sponsor: DOI-Bureau of Reclamation.

*Development of Environmental Contaminant Encyclopedia, John D. Stednick, Earth Resources. Sponsor: DOI-NPS-National Park Service.

- *Measurements of Ice Nucleating Aerosols in the Upper Troposphere & Lower Stratosphere, Sonia M. Kreidenweis, Atmospheric Science. Sponsor: NASA-ARC-Ames Research Center.
- *Global Change Data Assessment & Integration, Edward Elliott, Natural Resource Ecology Lab. Sponsor: Consortium for Int'l Earth Science Info.

Debris Control at Hydraulic Structures, Steven R. Abt, Civil Engineering. Sponsor: University of Nottingham, England.

*Quantification of Federal Reserved Water Rights for National Park Purposes, Thomas G. Sanders, Civil Engineering. Sponsor: DOI-NPS-National Park Service.

*Plutonium Distribution among Soil Phases Around the Subsurface Disposal Area at the Idaho. Shawkia Ibrahim, Radiological Health Sciences. Sponsor: Environmental Science & Research Found.

El Paso County Level 1 Biological Inventory, Christopher A. Pague, Fishery & Wildlife Biology. Sponsor: El Paso County Parks. **Natural Heritage Investigations**, Christopher A. Pague, Fishery & Wildlife Biology. Sponsor: The Nature Conservancy.

*Summitville Forum Conference, John D. Nelson, Civil Engineering. Sponsor: Environmental Protection Agency.

*Spatial Attributes of Intact & Subdivided Ranches, Richard L. Knight, Fishery & Wildlife Biology. Sponsor: USDA-USFS-Rocky Mtn. Experiment Station.

*Fish Composition of the Yampa..., John A. Hawkins, Fishery & Wildlife Biology. Sponsor: DOI-NPS-National Park Service

*Consumptive Use Model, Luis Garcia, Chem. & Bioresource Engineering. Sponsor: Riverside Technology, Inc.

The University of Colorado, Boulder, CO 80309

*Modeling for Design and Testing of Treatment and Remediation Technologies for Aquifers Contaminated with Organic Wastes, Tissa

Illangasekare, Civil Engineering. Sponsor: Kansas State University.

- The Role of Organic Matter in the Fate of Mercury in the Florida Everglades, Joseph Ryan, Civil Engineering. Sponsor: Colorado State University.
- *Endangered Species/Limnology, William Lewis, Environmental, Population and Organismic Biology. Sponsor: US Fish and Wildlife Service.
- *Impact of Air-Sea Interaction on Tropical Cloud Life-Cycles and Radiative Processes, Peter Webster, Aerospace Engineering. Sponsor: Department of Energy.
- *An Experimental Data Base for the Evaluation of Theories for Upscaling in Modeling of Groundwater Flow, Solute Transport, and Multiphase Fluid Flow in Aquifers, Tissa Illangasekare, Civil Engineering. Sponsor: Department of the Army.
- Land Use and Cover Change in Developing Mountain Valleys: Mapping and Modeling for SCOP, William Riebsame, Geography. Sponsor: State of Colorado.
- Actinides in the Soil Environment of Rocky Flats Environmental Technology Site..., M. Iggy Litaor, Civil Engineering. Sponsor: Colorado School of Mines.
- Collaborative Research: Scaling Theories of the 3-D Geometry and Flows of River Networks, V. K. Gupta, Geological Sciences. Sponsor: National Aeronautics and Space Administration.
- Bureau of Land Management Water, Law and Policy Training Workshop, Teresa Rice, Natural Resources Law Center. Sponsor: Bureau of Land Management.
- Colloid Mobilization and Transport in Contaminant Plumes..., Joseph Ryan, Civil Engineering. Sponsor: Environmental Protection Agency.

Arsenic Removal by Softening and Coagulation, Marc Edwards, Civil Engineering. Sponsor: Environmental Protection Agency. Denitrification Demonstration Facility Construction, Joann Silverstein, Civil Engineering. Sponsor: Town of Wiggins.

South Platte Water Rights Management System-Enhancements and Maintenance, Jacquelyn Sullivan, Advanced Decision Support for Water and Environmental Systems. Sponsor: State of Colorado.

Denitrification of Drinking Water in a Rural Community in Colorado, Joann Silverstein, Civil Engineering. Sponsor: National Water Research Institute.

Workshops on Hazardous Waste Management, James Heaney, Advanced Decision Support for Water and Environmental Systems. Sponsor: New Mexico State University.

*Drought and the Australian Outback..., Gifford Miller, Geological Sciences. Sponsor: National Science Foundation. Arkansas River Needs Assessment, Elizabeth Rieke, Natural Resources Law Center. Sponsor: Bureau of Land Management. Calfed Bay Project, Elizabeth Rieke, Natural Resources Law Center. Sponsor: Bureau of Reclamation.

*Supplement to existing award.

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 stream flow, reservoir storage, and precipitation for the summer period (May-October). During the summer period stream flow 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 on July 1, 1995 and reflect conditions during the month of August.

Ba	isin		Mar. 1, 19 SWSI Val		nange From evious Mo.		nge From ious Yr.		
	outh Platte		+3.8	in part Parpa	+0.3	and the second sec	-3.2		
Ar	kansas		-2.4		-0.1		-1.5		
Ri	o Grande		-1.7		+0.3	Soll Plasses Arrow	-4.8		
Gu	innison		+1.7		+0.9	International 740	-0.1		
Co	olorado		+1.9		-0.5	 Iswantery, Chris 	-0.8		
Ya	mpa/White		+2.7		-0.1	-Caratopher A. Pa	-2.7		
Sa	n Juan/Dolore	S	-1.7		+0.2	and A Malent,	-3.9		
				SCALE					
-4	-3	-2	-1	0	+1	+2	+3		+4
Severe Drought		Moderate Drought		Near Normal Supply		Above Normal Supply		Abundan Supply	t

AWRA 1996-1997 Richard A. Herbert Memorial Scholarships

One \$1,000 scholarship will be awarded to a full-time undergraduate student enrolled in a program related to water resources for the 1996-1997 academic year. The second \$1,000 scholarship will be awarded to a full-time graduate student enrolled in a program related to water resources for the 1996-1997 academic year. Each winner will receive a complimentary membership in AWRA for 1997.

Applicants should prepare a two-page summary of their academic interests and achievements, extracurricular interests and career goals. Include three letters of reference, a transcript of all college courses, (undergraduate and graduate) and the applicant's full name, permanent mailing address, and phone number. Mail to: Richard A. Herbert Memorial Scholarships, c/o American Water Resources Association, 950 Herndon Parkway, Suite 300, Herndon, VA 22070-5528.

Questions: Contact Dr. Stephan J. Nix at Tel 205/348-0747, FAX 205/348-0783 or snix@coe.eng.ua.edu. <u>Deadline</u> May 17, 1996.

1996 Student Paper Competition American Water Resources Association Universities Council on Water Resources Hydrolab

Award #1 given by Hydrolab Corporation for the Best Student Paper Presentation at the Annual AWRA meeting September 22-26, 1996, in Ft. Lauderdale, Florida.

- Cash prize of \$300
- One year's membership in AWRA

Awards #2 and #3 will be given by UCOWR and AWRA to the students who submit the best technical paper. One award is given for the **best undergraduate paper** and one award is given for the **best graduate paper**.

- Cash prize of \$250 for each award.
- One year's membership in AWRA for each award.

Call CWRRI for instructions for submission of papers or contact Earl Spangenbert, Tel 715/346-3624, or e-mail: !espangen@uwspmail.uwsp.ed Deadline: June 17, 1996.

COLORADO WATER

April 1996

EDITOR'S IN-BASKET

SALINITY MANAGEMENT PRACTICES RECOMMENDED BY AUSTRALIAN RESEARCHER

Editor's Note: In another part of the world with salinity problems, here is some of the thinking on managing the situation.

A report by a researcher at the Centre for Water Policy Research (CWPR) at the University of New England, Australia, has called on the Commonwealth Government to provide incentives and install a system of contractual agreements to encourage the adoption of best salinity management practices by farmers.

The report examined the identification, selection, promotion, and rates of adoption of best management practices by farmers in the Lake Goran Catchment of the Liverpool Plains region in northwestern NSW (dryland salinity) and the Tragowel Plains in the Kerang Lakes region of northern Victoria (irrigation-induced salinity). The report was funded by the Murray-Darling Basin Commission.

Compiled by Dr. Bruce Hooper, a Research Fellow at CWPR, the report recommends that a system of contractual agreements be established between the Commonwealth Government and regional resource management organizations to implement salinity management programs.

Dr. Hooper said these agreements will involve the development of appropriate cost-sharing, co-financing and co-management arrangements. "These arrangements should be linked to a process of annual reporting that will allow the Commonwealth Government and participating regional committees to be able to monitor the effectiveness of their actions," he said.

"Effective leadership and community representativeness are both achieved by empowering industry groups to promote and implement best management practices. Regional task forces, driven by industry groups, should be set up to drive Integrated Environmental Management (IEM) at the regional scale. This involvement of industry bodies to promote and implement land and water managed practices that reduce salinity impacts should be encouraged.

"The government should also provide incentives to agricultural suppliers to encourage the adoption of the practices through 'green' company incentives.

"Irrigation associations, that is, user associations and industry groups, should promote more efficient irrigation through partnership agreements with government and provide direct financial bonuses to organizations in irrigation areas if they demonstrate gains in efficient water management, reduced allocations and improved production liked to cleaner irrigation outflows.

"These should be components of the contractual system. In this way, win-win situations for industry, government and farmers for salinity management practices will result, said Hooper.

As well as the provision of incentives, the report recommends that risk-averse best management practices should be identified, selected and promoted as a matter of urgency. "Practices that avoid risk have a much greater adoption attraction to farmers," said Dr. Hooper.

"More research, especially into the financial, environmental, production and marketing risks for various salinity management options should be undertaken. Stakeholders, bankers and other financial service providers, irrigator associations, water user groups, prime farming organizations, land care groups and regional development board members should all be involved in the processes of identification, selection and promotion of best management practices," said Dr. Hooper.

For further information contact Dr. Bruce Hooper at the Centre for Water Policy Research, University of New England, Armidale, 2351, AUSTRALIA. Phone: 61 67 73 2420; FAX 61 67 73 3237; E-Mail: bhooper@metz.une.edu.au.

WATER PUBLICATIONS, DATABASES

CWRRI REPORTS

CWRRI Reports are available from the Cooperative Extension Resource Center, General Services Building, Colorado State University, Fort Collins, CO 80523. Phone 970/491-6198, FAX 970/491-2961.

WATER IN THE BALANCE

CWRRI has a new publications series, WATER IN THE BALANCE. The publications are free upon request.

Initiating a Water Management Decision Support System for the South Platte River Basin, *Water in the Balance* No. 2, by Henry Kunhardt and Darrell Fontane. Evolving demands, current status of South Platte decision support, potential DSS components, institutional issues, and an implementation plan for DSS for the South Platte are considered.

Ecological Integrity and Western Water Management: A Colorado Perspective, by Alan P. Covich, William H. Clements, Kurt D. Fausch, John D. Stednick, John Wilkins-Wells, and Steven R. Abt. *Water in the Balance* No. 3. The publication presents the combined effort by faculty in fishery and wildlife biology, hydrology, engineering and sociology to define the concept of ecological integrity and what it means to Western water management.

South Platte Water Rights Management System, by Jacquelyn F. Sullivan, Director, CADSWES (Center for Advanced Decision Support for Water and Environmental Systems, University of Colorado). *Water in the Balance* No. 4. The South Platte Water Rights Management System (SPWRMS), designed to help water administrators in the South Platte Basin, is described. SPWRMS is a computer software system that integrates historical and legal information as well as real-time river flows for numerous gauges on the South Platte and its tributaries. It is located in the State Engineer's Office, and from there users have access to the data base using workstations and local computer networks.

An Institute Runs Through It! Thirty Years of Vital Water Connections. *Water in the Balance* No. 5. This report of CWRRI activities celebrates the 30-year anniversary of the State Water Institutes Program.

COMPLETION REPORTS AND INFORMATION SERIES

Endangered Species Management: Planning Our Future, Proceedings: 1995 South Platte Forum. Information Series No. 81.

River of Dreams and Realities: The Arkansas River Basin Water Forum, 1995. Information Series No. 82.

OPEN -FILE REPORTS

Economic Factors Affecting Residential Water Demand in Colorado, by Laurie L. Walters and Robert A. Young. Open-File Report No. 5. Price: 5.00.

Field Assessment of Stream/Aquifer Interaction Under Semi-Arid Conditions and Problems with Computer Representation, by Lisa L. Bissett and Eileen P. Poeter. Open-File Report No. 6. Price: \$6.00.

An Integrated Economic-Hydrogeologic Model for Groundwater Basin Management, by Islam M. Faisal, Robert A. Young and James W. Warner. Open-File Report No. 7. Price: \$6.00.

Developing a Biotic Index for Colorado Stream Quality, by Scott A. Grotheer, J. M. Chudd, Sen-Her Shieh, N.J. Voelz and J.V. Ward. Open-File Report No. 8. Price: \$7.00.

Temporal and Spatial Variations of Hydraulic Conductivity in a Stream Bed in Golden, Colorado, by Steven R. Hannula and Eileen P. Poeter. Open-File Report No. 9. Price: \$6.00.

Use of GIS Modeling Techniques as a Planning Tool for Establishment of Wetlands as Nitrate and Pesticide Removal Facilities, by David G. Wagner and Maurice D. Hall. Open-File Report No. 10. Price: TBA



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.

Vulnerability of the Uppermost Ground Water to Contamination in the Greater Denver Area, Colorado, by Glenn A. Hearne, Mike Wireman, Angus Campbell, Sandy Turner and George P. Ingersoll. Water-Resources Investigations Report 92-4143. **Ground-Water Resources of the Florida Mesa Area, LaPlata County, Colorado**, by S.G. Robson and W.G. Wright. Water-Resources Investigations Report 95-4190. Prepared in cooperation with LaPlata County.

Application of a Sediment-Transport Model to Estimate Bridge Scour at Selected Sites in Colorado, 1991-93, by J.E. Vaill. Water Resources Investigations Report 95-4179. Prepared in cooperation with the Colorado Department of Transportation.

Quantity and Quality of Ground-Water Discharge to the South Platte River, Denver to Fort Lupton, Colorado, August 1992 through July 1993, by Peter B. McMahon, Kenneth J. Lull, Kevin F. Dennehy and Jim A. Collins. Water Resources Investigations Report 95-4110.

Bibliography, Indices, and Data Sources of Water-Related Studies, Upper Colorado River Basin, Colorado and Utah, 1872-1995, National Water-Quality Assessment Program. Open-File Report 95-450.

Characterization of Selected Radionuclides in Sediment and Surface Water in Standley Lake, Great Western Reservoir, and Mower Reservoir, Jefferson County, Colorado, 1992, by David W. Clow and David A. Johncox. Water Resources Investigations Report 95-4126.

Hydrogeologic Characteristics of the Alluvial Aquifer and Adjacent Deposits of the Fountain Creek Valley, El Paso County, Colorado, by Mary Jo Radell, Michael E. Lewis and Kenneth R. Watts. Water Resources Investigations Report 94-4129.

Regression Models of Monthly Water-Level Change in and Near the Closed Basin Division of the San Luis Valley, Southcentral Colorado, by Kenneth R. Watts. Water Resources Investigations Report 93-4209.

Water-quality Data for the Arkansas River Basin, Southeastern Colorado, 1990-93, by Russell G. Dash and Roderick F. Ortiz. Open-File Report 95-464.

MIETT SIPOTTS ON THEE MIEB

Water Information on the Web by Julie Eyre

The Colorado Water Resources Research Institute has received excellent response to this article and our web page. Many of the readers have been sending comments about the Web page as well as new addresses that we might want to include in this article. Through reader interest we are continually discovering new pools of water information.

American Water Resources Association:

The AWRA has constructed a homepage designed to assist their members. The homepage contains information on conferences, publications, and a message box is included for any suggestions. The publications include Water Resources Bulletin, Hydata News and Views, and proceeding of AWRA meetings. Information on how to become a member is also available. This page can be found at the following url:

http://www.uwin.siu.edu/~awra

Hawaii Water Resources Research Center:

Hawaii's homepage provides a description of the Center, and their faculty which includes expertise in a large variety of fields. Also available on the page is information on a water conference they are hosting in June of 1996, as all as useful links to water resources research in Hawaii and elsewhere. This page can be found at the following url: http://www2.hawaii.edu/~morav/WRRC.html

Natural Resources Conservation Service:

This page is still undergoing constant changes, however the Water and Climate Center in Portland Oregon has made some very interesting SNOTEL data available. Over 550 remote mountain sites collects data on water equivalent in the snowpack, accumulated precipitation, and air temperature. The data is grouped by major river basins, and summarizes each basin's percent of average snowpack and precipitation. Also of interest to readers is the Colorado Basin Outlook Report. It is updated monthly, and summarizes water availability in each of the Colorado's major river basins. This page can be found at the following url:

http://www.wcc.nrcs.usda.gov

Bureau of Reclamation:

This page has a lot of information regarding reclamation activities and upcoming events. The reclamation activities includes environmental activities, international activities, and native American issues. Another feature is links to area offices. Information can obtained from these links about what each area office is currently involved in. It can be located at the following url:

http://www.usbr.gov/

WATER NEWS DIGEST

THE COLORADO RIVER

Man-made Flushing of Colorado River Begins

On March 26 four huge valves were opened to release millions of gallons of Colorado River water from Glen Canyon Dam. The man-made flood will raise the flow of the Colorado River through the canyon from a rate of 8,000 cubic feet per second to 45,000 cubic feet per second. Scientists will use nontoxic red dye to track how fast the floodwaters travel. The flood is the result of environmental and engineering studies begun in 1983 to determine how to best restore 235 miles of river environment downstream from Glen Canyon Dam. Historically, the Colorado River has carried nutrient-rich sediment through the Grand Canyon and deposited it on beaches and sandbars. The dam now traps most of the sediment, and as the river flows through the canyon now, it picks up sand from beaches and sandbars and carries it further downstream. Beaches, sandbars and archaeological sites along the river are eroding away.

Originally the Colorado was a warm, muddy red river, but it is now cold and green. The cold water has turned the area below the dam into one of the nation's premiere fishing spots for rainbow trout. Until the mid'80s, water was released in a torrent in the morning as power customers turned on their lights, and was reduced to a trickle at night. Environmentalists insisted that the canyon needed free-flowing water and river guides complained that the unnatural releases of water made their jobs dangerous and washed away favorite beaches and wildlife. Scientists positioned along the river will watch the flood and its aftereffects to see if the high flow will help rebuild some of the beaches and improve wildlife habitat. They hope to get a better understanding of how much water to release, and at what time of day, to help protect the environment.

Fort Collins Coloradoan 3/22/96, Denver Post 3/22/96, 3/27/96

THE ARKANSAS RIVER

Water Judge Denies Challenge

District 2 Water Court Judge John Anderson has denied challenges by six Arkansas River Valley farmers to the State Engineer's new well restrictions, a result of the recent Colorado/Kansas Arkansas River compact decision. The judge left open the possibility that they could use takings-related evidence to argue their case in trial. The trial, postponed from March 18, should begin on April 8.

Pueblo Chieftain 3/6/96, 3/12/96

Romer Signs Bill Allowing State Loan

Gov. Roy Romer has signed legislation allowing a \$3.75 million state loan to the Lower Arkansas Water Management Association to replace well depletions under river compact obligations. The bill allows the Colorado Water Conservation Board to loan money so the association can exercise an option on more than \$3 million worth of water from the XY Ranch near Granada and two additional sources of replacement water. The bill also:

provides \$50,000 to help irrigators transmit well-pumping data to the State Engineer;

provides \$150,000 to contract with the Army Corps of Engineers for a channel restoration study of the Arkansas River (sediment has built up in the channel over the years);

allows the water judge to assess a find of up to \$500 a day for well users who violate the State Engineer's new pumping rules, including failing to supply the data.

Pueblo Chieftain 3/2/96

Groundwater Levels Have Risen in Arkansas Valley

Doug Cain, USGS Subdistrict Chief for the Lower Arkansas Valley, says a review of the last 25 years shows that groundwater levels have risen in the Arkansas valley. Cain told board members of the Southeastern Colorado Water Conservancy District that water users have asked him to look at the agency's yearly groundwater level surveys. He said about half of the 145 wells showed increases, and only about 20 percent of the wells had lower water levels during the period. The rest remained about the same. The levels are about two feet higher in the reach between Pueblo Reservoir and La Junta, about three feet higher between La Junta and John Martin Reservoir, and about a foot higher between the dam and the Kansas state line.

Pueblo Chieftain 2/16/96

THE SOUTH PLATTE RIVER

Colorado, Nebraska and Wyoming have been working since mid-1994 to reach an agreement on meeting the water needs of endangered species such as the whooping crane. Last Nov., the states put together a package to provide 95,000 acre-feet of water annually in critical habitat areas of the Platte in central Nebraska. In February, a federal review of the plan concluded that it would provide far less water than promised. Although the federal government apparently has turned down the states' initial offer, another meeting is scheduled for next month. Patty Benecke, assistant secretary of water and science for the U.S. Department of Interior served as a negotiator in the Platte River discussion. She acknowledged that the states and the federal government have a "fairly significant gap" in the amounts of water each group believes the states' proposal would provide for endangered species, but said "I think we ought to give it another try."

U.S. Water News, March 1996

FEDERAL WATER RIGHTS

Brown/Allard Reach Truce with Environmentalists

A temporary truce may have been reached in the battle over water rights in national forests. Under an agreement between Sen. Hank Brown and Rep. Wayne Allard and environmentalists, the Forest Service would be prohibited from placing any new conditions on the renewal of water-use permits for the next 18 months. The agreement was adopted by House-Senate negotiators as part of the new farm bill finalized Mar. 18. A seven-member task force will be created to try and find a solution that will ensure water for cities and communities and provide flows to sustain fish and wildlife.

Fort Collins Coloradoan 3/22/96

Apply for Easements, Says Forest Service

Owners of reservoirs or ditches in Grand Mesa National Forest who can show ownership of water systems on national forests before 1976 should apply for permanent free easements. The window for receiving easements likely will close when the Federal Land Policy and Management Act of 1976 expires on Dec. 31, 1996. Then, water system owners who did not apply for easements will have to seek annual permits costing at least \$45 per year for access across the public lands. For more information contact James Dunn at 970/874-7691 or Linda Cerise at 970/242-8211.

Grand Junction Daily Sentinel 2/2/96

RIVER PRESERVATION

Grand Junction/Mesa County Among 6 Finalists for Funds

The Colorado Riverfront Greenway Legacy Project (Grand Junction/Mesa County Riverfront Commission) has applied for \$10.26 million of the \$27 million Great Outdoors Colorado plans to award in May. The Great Outdoors Colorado money would be combined with almost \$15 million from local, state and federal entities involved in the project. The greenway project focuses on several elements: conservation of open space adjacent to the Colorado and Gunnison rivers; protection, restoration and interpretation of wildlife habitat; adding elements to existing parts of the park; providing trails, environmental education opportunities and facilities; restoring, preserving, providing and improving community riverside greenways and parks; and preserving agricultural opportunities. Project spokesmen said the Riverfront Greenway has been studied by urban planners from around the nation and by those as far away as Germany.

Grant Junction Daily Sentinel 2/11/96

Designers Map Out HARP Project Construction

The Historic Arkansas Riverwalk Project, scheduled to begin in

June, is also one of six projects which GO Colorado invited to make a formal application for funds. The HARP Commission is counting on a \$3 million grant from Great Outdoors Colorado lottery funds. Last November Pueblo voters approved \$12.85 million for the project. Worries that the Historic Arkansas Riverwalk Project could face unexpected environmental costs were laid to rest with a report to the HARP Commission that core samplings of an area that once housed a service station showed no contaminants that were above acceptable standards.

Pueblo Chieftain 1/28/96, 3/4/96

Cache la Poudre-Big Thompson Chosen in Second Round

In its second round of project selection, the Great Outdoors Colorado Board chose the Cache la Poudre-Big Thompson River Heritage Project as one of four projects statewide that can apply for funding under the board's Legacy Project. The project is designed to preserve the Poudre and Big Thompson rivers from their headwaters in Rocky Mountain National Park to their confluence with the South Platte Ricer near Greeley. Before the project is finalized, it must provide a more focused plan on how the various projects within the plan would tie together and be implemented, including incorporation of the Nature Conservancy and Colorado State University separate Legacy Project proposals into the plan. The revised plan will include adding the Nature Conservancy's plan to protect the Laramie Foothills and North Fork of the Poudre River and lands along the Poudre River near CSU's Environmental Learning Center.

Fort Collins Coloradoan 2/29/96

Gore Helps Celebrate South Platte Restoration

On March 2, Vice President Al Gore joined Mayor Wellington Webb, Gov. Roy Romer, Rep. Pat Schroeder and others in celebrating the success of the South Platte River Urban Corridor Project. Denver students met Gore and told him how they helped clean the Platte River. About 65,000 children, led by about 1,300 river-tour guides, also children, have been involved with the river under the direction of an educational specialist since 1969. The regional director of the National Civilian Community Corps said his group plans to plant 3,500 willow trees along the South Platte River this spring. Chips Barry, head of Denver Water, defended his release of 92 million gallons of water from a dam upriver to coincide with Gore's visit, saying the water would have been released in a couple of weeks anyway because area dams are full and the state's huge snowpack means spring runoff will be high.

Fort Collins Coloradoan 3/8/96, Denver Post 3/3/96, 3/8/96

WILDLIFE/ENDANGERED SPECIES

Fish Ladder Nearly Completed

Despite high water in the Gunnison River which slowed progress, builders expect to have the \$1 million fish passageway at Redlands Dam finished by March 31. Once completed, the passageway will give Colorado squawfish, razorback suckers and other fish access to their historic habitat in the Gunnison River upstream to Delta. Darrel Snyder, of CSU's Larval Fish Lab, recently discovered five young squawfish from nearly 800 larval-sized samples taken from the Gunnison River. It was the first time squawfish larvae were found upstream of the Redlands Dam between Grand Junction and Delta. The find leads researchers to believe more young squawfish may have gone undiscovered during the sampling period, and bodes well for the success of the nearly complete fish ladder.

Grand Junction Daily Sentinel 1/19/96, Fort Collins Coloradoan 3/7/96, Denver Post 2/18/96

Ski Run Expansion Endangers Cutthroat Trout

U.S. Forest Service officials say Winter Park ski resort violated its federal lease when it expanded a ski run into Little Vasquez Creek, endangering some rare Colorado River cutthroat trout. The operation widened the Big Valley trail at the base of Vasquez Ridge from 20 feet to as much as 50 feet, said federal officials. The compacted snow and ice formed a series of dams that diverted Little Vasquez Creek from its natural channel, stranding some trout. The state Division of Wildlife is investigating, according to an agency spokesperson.

Grand Junction Daily Sentinel 2/2/96

Definition of 'Recovery' Wanted

The Colorado River Water Conservation District wants to force U.S. Fish and Wildlife Service to define when endangered fish species in the Colorado River have actually recovered. The Colorado Water Conservation Board has filed for two instreamflow water rights, on behalf of USFWS, to protect the fish. The attorney for the river district plans to file a statement of opposition to the two filings. "We want to use this process to negotiate a definition of recovery," he said.

Grand Junction Daily Sentinel 1/17/96

Endangered Species Legislation Dies in Committee

For the second consecutive year, a bill that would require the state to develop plans for protecting endangered or threatened wildlife and their habitat died in a legislative committee. The Division of Wildlife estimated the law would cost an extra \$3 million a year to enforce, and committee members balked at the cost and possible duplication of work done by the federal government.

Fort Collins Coloradoan 2/2/96

Interior Reduces Endangered List

The Interior Department is removing 3,600 "candidate" species from the list of species nominated for protection but for which the government lacks information to act. Instead, it will concentrate on 182 plants and animals of immediate concern.

Fort Collins Coloradoan 2/28/96

WATER QUALITY

Agreement Reached on Cleaning Animas River Near Silverton

Sunnyside Gold Corp. And the Colorado Department of Public Health and Environment have reached an agreement aimed at improving water quality in the Animas River Basin near Silverton. It will permit Sunnside to permanently close its Sunnyside gold mine and plug the American and Terry mine tunnels that provided access to the mine. Although not created by Sunnyside mining operations, the additional waste dumps and tailings piles outside Sunnyside property were leaching metals into the Animas River. Sunnyside has invested \$9.9 million in reclamation at the Sunnyside and Mayflower Mill locations to date and estimates it will spend between \$5 million to \$10 million in two years on reclamation of the seven sites.

Pueblo Chieftain 2/18/96

Las Animas to Upgrade Water Plant

Ground has been broken for Las Animas' \$3.3 million reverse osmosis water treatment plant, and city officials hope construction will be finished by this time next year. The plant will clean calcium carbonate, sodium carbonate and magnesium carbonate from the average 500,000 gallons per day of water the city uses. Water rates for an average home will increase from \$18 per month to \$31 per month but city officials say many will probably save money because they won't have to use water softening machines.

Pueblo Chieftain 2/16/96

EPA Opposes Permit for Runoff

The Environmental Protection Agency opposes a proposed state permit that would allow the Cripple Creek-Victor Gold Mine to release water into Arequa Gulch in violation of federal standards. The company wants to divert occasional storm runoff away from its mining operations, but not wastewater from the mining itself, said mine officials. However, environmental groups voiced concerns that the proposed permit would allow high acid levels in the runoff, which would allow the water to pick up heavy metals from the soil. EPA was to provide the state a more extensive report on its objections by March 27.

http://www.usa.net/gtwork/today/loc150.html

New Water Sources To Eliminate Nitrate Problem

Weld county communities are working together to provide residents better quality drinking water. In 1993 and 1994 EPA found levels of nitrates in area water sources that exceeded federal standards. Hudson and Fort Lupton will tap into a new pipeline to bring in water from Carter Lake and the two will share a water-treatment facility to be built this summer. Gilchrest has tapped into the Central Weld Water District's supply.

Denver Post 2/25/96

Monitoring Wells Show Groundwater Pollution

Expansion of the South Side Landfill in Pueblo may be delayed due to groundwater pollutants that were found during review of an expansion plan. The solvent trichloroethane exceeded groundwater-drinking water standards in one of the Landfill's monitoring wells. The Colorado Department of Health said other inorganics -- chloride and sulfate -- have been found above levels commonly found in the soil. The department has asked for a detailed plan of action to conduct an investigation of the landfill property. A hydrogeology study will be done to determine where the groundwater is, where it is coming from, where it is going and what's in it. Results of the study were due March 29.

Pueblo Chieftain 1/20/96



Colorado Senate Committee Kills Notification Bill

An amendment to a groundwater bill that would have required pre-sale notices to be put on new homes that receive water from a source that is being depleted and cannot be renewed was killed by a Senate committee on Feb. 29. The amendment, sponsored by Rep. Ken Gordon (D-Denver) targeted new homes that receive water from the Denver Basin aquifer. The aquifer, with a life expectancy of 100 years, is not replenished by surface water. Sources disagree on how fast it is being depleted, but State Engineer Hal Simpson said, "We've been monitoring water levels for years, and they're just declining at a constant rate."

Denver Post 2/24/96. 3/1/96

Las Vegas Expanding Water System

Las Vegas' new tunnel from Lake Mead, the result of a series of water deals with California and Arizona, will increase the capacity of the city's water system to 600 million gallons per day (mgd), and by the turn of the century the system is expected to expand to 750 mgd. By contrast, Las Vegas' first water plant on Lake Mead treated only 300 mgd in 1971. Nearly 80 percent of the cost of expanding the city's system will be paid by new growth. A water connection for a new home will increase from \$840 to \$3,340, while a new connection for a casino or gold course will double to \$262,000. Water for a household using 20,000 gallons a month is \$1.92 per thousand gallons, about a third higher than average rates across the nation.

U.S. Water News, March 1996

WATER DEVELOPMENT

Aurora Looks at Aquifer as Water Source

Aurora has a new \$100 million water plan that would use underground aquifers as a source for municipal water during dry periods and as water storage reservoirs during wet times. Aurora wants access to a 100-square mile aquifer 12 miles northeast of Fairplay which is up to 6,000 feet deep and contains 16 million acre-feet of water. The city wants to pump less than 1 percent of the aquifer's water capacity into nearby streams that feed Tarryall Creek, which flows into the South Platte River, from which Aurora diverts water. Court approval and getting through the permitting process for the project could take up to 10 years.

Greeley Tribune 3/11/96

H.B. 48 Killed in Committee

The 1974 law known as House Bill 1041 provided counties with local government control on land use issues. In 1988, Eagle County used the law to reject the Homestake II water project, finding that the project's adverse impacts couldn not be alleviated. In early 1996 Colorado Senate President Tom Norton introduced S.B. 48, which would revamp H.B. 1041 by curtailing county powers to limit special-use permits that deal with public utilities and water. S.B. 48, narrowly approved by the state Senate in February, was scheduled for a hearing before the House Local Government Committee on March 11. However, believing the opposition had the votes to defeat the bill, Rep. Andy McElhany (R, Colorado Springs), House sponsor of the bill, asked that it be killed. The committee unanimously did so.

Denver Post 1/21/96, 1/29/96, Grand Junction Daily Sentinel 1/24/96, 2/29/96, GT OnLine Local News 2/16/96.

House Ag Committee Kills S.B. 145

The House Agriculture Committee of the Colorado Legislature has killed H.B.145 by an 8-4 vote. The measure would have allowed public entities to sue for damages if the denial of a water project is ruled to be a taking. Rep. Russell George (R-Rifle) said the bill would extend takings protections to public entities that never before had them. As originally introduced by Sen. Gigi Dennis (R-Pueblo West), the bill would have restricted Colorado water rights to use inside the state, prohibiting their export out of state. The second section of the bill, added by Senate President Tom Norton, provided that cities, water districts and other public entities have legal standing to assert water rights in court.

Grand Junction Daily Sentinel 3/8/96, Pueblo Chieftain, 2/19/96

Animas-La Plata Back on Congressional Agenda

James Lochhead, Executive Director of the Colorado Department of Natural Resources, has asked a House panel for \$36.5 million for 1997 to cover construction costs of the Animas-La Plata project. Lochhead was introduced by project supporter U.S. Rep. Scott McInnis, (R-CO). Lochhead and other project supporters say its completion will bring Colorado into compliance with its 1988 water rights settlement with the Southern Ute and Ute Mountain Indian tribes. The Bureau of Reclamation currently is completing an environmental impact study on the proposal.

Pueblo Chieftain Washington Bureau 3/7/96

Groups to Sue US Over Animas-La Plata

A coalition of environmentalists and taxpayers announced plans on March 14 to file a lawsuit in federal court in Denver on behalf of Taxpayers for the Animas River and the Four Corners Action Coalition. The Sierra Club, other environmental groups and some New Mexico state officials have said the project's costs far outweigh the benefits.

GT OnLine Local News 3/15/96

WATER MARKETING

Water Marketing May be an Issue Again in San Luis Valley

San Luis Valley residents are once again concerned about the issue of water marketing in the valley. Concerns center around the Baca Grant Ranch, purchased last summer by local rancher Gary Boyce. Three years ago Boyce founded the Stockmen's Water Co. with the intent of marketing a portion of the ranch's surface runoff. Boyce has hired former State Engineer Jeris Danielson to help him in the venture. Boyce stated that "There's nothing wrong with water development, done in a conscientious manner." In the late '80s, American Water Development Inc. Sought to sink about 100 deep wells, pump up to 65 billion gallons of groundwater a year, and pipe it across the Sangre de Christo Mountains to metropolitan Denver. After a six-week trial in 1991, an Alamosa water court judge denied AWDI's claim to the groundwater, in 1994 the Colorado Supreme Court upheld the decision, and in Nov. 1994 the U.S. Supreme Court declined further review.

U.S. Water News Feb. 1996

California Agency Initiates Electronic Water Market

The nation's largest water agency, Westlands Water District, in March will begin trading water rights electronically. The District, in California's arid Central Valley, distributes federally subsidized water to about 700 farmers. Water experts say the electronic market reflects a growing trend toward allowing market forces, rather than government directives, to apportion water in the West.

Wall Street Journal 2/15/96

ANSWERS TO WHIRLING DISEASE SOUGHT

Nearly 400 of the world's top trout management experts came together for a whirling disease workshop February 6-8 in Denver to share information and pool resources for future work. They called for greater research coordination to combat the parasite that can cause whirling disease in trout and salmon. The parasite attacks the cartilage of young fish, causing blackened tails and skeletal deformities in extreme cases. The damage can affect the sense of balance resulting in some young fish swimming in a whirling motion when under stress. The parasite has no impact on humans or mammals. It has been identified in the East, Midwest, Pacific Northwest, California and New Zealand, yet has had little impact on wild trout. John Hnath of the Michigan Division of Natural Resources said the first U.S. report of whirling disease was in Pennsylvania in 1956, and the disease's spread indicates it might have been introduced from Europe to several U.S. sites. James Peterson, of Montana Fish, Wildlife and Parks, said the disease was "very widespread in Colorado and Montana before we even knew we had it." The loss of 90 percent of rainbow trout from a stretch of Montana's Madison River in 1994 "brought whirling disease back into the limelight," he said.

Whirling disease was first detected in California in 1965, said John Modin of the California Department of Fish and Game. It has since disappeared from steelhead trout living in high gradient coastal streams. This may be because the combination of steep gradient and high snowpack creates large spring runoff which flushes silt out of the streams. The parasite responsible for whirling disease cannot spread from fish to fish. A bottomdwelling worm serves as an intermediary host, and silt provides ideal habitat conditions for this host, the tubifex worm.

Something similar may have happened in Colorado's Big Thompson River. In 1976, the flash flood that raced through the canyon flushed silt, sand, gravel and other sediment out. John Rold, retired Colorado state geologist and now a consultant for the Colorado Wildlife Federation, asked if that could have eliminated whirling disease from the lower Big Thompson. Barry Nehring, wild trout researcher for the Colorado Division of Wildlife, said it is possible. Scientists need to compare whirling disease conditions in steep streams to low gradient, silty streams, he said. There may be higher rates of whirling disease in streams where sediment and tubifex worms collect, like tailwaters below reservoir dams.

Nehring said declines in wild rainbow reproduction have occurred on portions of the Rio Grande, Gunnison, Poudre, and South Platte rivers after the whirling disease parasite became established. Brown trout also show clinical signs of the disease, but the population of browns has not declined.

Researchers at the University of California, Davis, and Colorado State University are developing a new DNA-based test that will make it faster and easier to detect whirling disease, both in fish and tubifex worms. If successful, the work will make management of the disease much easier by allowing for more widespread testing of streams and hatcheries. R. W. Hoffman of the Institute of Zoology at the University of Munich has found that the drug Fumagillin reduced the incidence of whirling disease in hatcheries to less than one percent of rainbows compared to 30 to 40 percent in untreated fish.

Conference participants identified several strategies where coordination and information sharing can take place, including using the Internet to share the latest research information.

The conference was cosponsored by the Colorado Division of Wildlife.

Bob Saile, author of Western Outdoors in the *Denver Post*, said in his March 3, 1996 column: "Now comes the hard work: The breakthrough research. Let's get on with it."

Source: Colorado Division of Wildlife

MISCELLANEOUS

Population to Outstrip Water Supplies in 30 Years

In a report in the journal *Science*, three researchers predict that global population will outstrip water supplies within the next 30 years. A key finding of the study is that about 26 percent of water available from rain is already being captured, as is runoff from lakes and rivers, figures that are close to the maximum possible. Building dams could increase that amount by about 10 percent in 30 years. But by that time the global population is expected to grow by 45 percent. Thus, 145 percent of the present population will have to make do with 110 percent of the present water. That is a reduction in available water of 25 percent per person.

U.S. Water News March 1996

Scientist Says Dams Affect Earth's Rotation

A geophysicist at the Goddard Space Flight Center, an arm of the National Aeronautics and Space Administration, says that reservoirs are affecting the Earth's orbital rotation. Although Earth's rate of spin is gradually slowing because of the tidal drag of the moon, the slowing would have been measurably greater if it were not for the influence of 88 reservoirs built since the early 1950s, the scientist said. Each of the reservoirs contains at least 2.4 cubic miles of water weighing 20 billion metric tons. The shift in the distribution of Earth's waters caused by the reservoirs has tended to speed the planet's spin. The reason, says the scientist, is that the shifting of water to mid-latitude reservoirs in the Northern and Southern Hemispheres has increased the amount of water in those latitudes in relation to the Equator -- with more water close to the Earth's axis. The effects are several hundred times smaller than natural variations in Earth's motion, he said, and they pose no danger to people or the global environment. The shift of water has somewhat offset the rise in global sea level, which would have been about 1.2 inches greater over the last 40 years if there had been no new reservoirs.

New York Times 3/3/96

Dams Increase Frequency and Severity of Floods, says Worldwatch

In a report issued in late March, Worldwatch says many massive dams, irrigation and flood-control systems built in the 20th century actually increased the frequency and severity of floods on such rivers as the Rhine in Europe and America's Columbia and Mississippi Rivers. Worldwatch called the Mississippi River flood of 1993 a result of "ecosystem mismanagement. ...The river was simply attempting to reclaim its flood plain." As with the Mississippi, straightening and walling the Rhine to provide a modern river highway cut it off from 90 percent of its original flood plain and sped up its flow, contributing to disastrous 1995 floods in Germany and the Netherlands, the report said. The report said the Columbia-Snake River system of the Pacific Northwest provides only 533 tons of salmon a year compared with 20,000 tons a century ago. The report is titled,"Imperiled Waters, Impoverished Future."

Fort Collins Coloradoan 3/25/1996

WESTERN WATER POLICY REVIEW ADVISORY COMMISSION

The first meeting of the Western Water Policy review Advisory Commission (WWPRAC) was held in Portland, Oregon on February 16-17. All but one of the new commissioners were present and many of the ex officio congressional members were represented.

Senator Mark Hatfield (R-OR), the Commission's sponsor and mentor, said "Adequate drinking water supplies, reliable flood control projects, and the integrated nature of all natural resources are just some of the topics that will be examined by the Commission." He added that this was also the first step towards a national water policy review commission.

Patricia Beneke, Assistant Secretary of Interior for Water and Science, also addressed the meeting, and emphasized the need to employ a watershed approach to address management challenges.

The Commission accepted the appointment of Larry MacDonnell as Executive Director, who discussed the history of western water policy and the work of past commissions. MacDonnell also outlined a draft workplan, including a number of regional public workshops to be held.

A number of interests presented statements before the Commission. Jeff Fassett, Wyoming State Engineer and Western States Water Council Vice-Chair, suggested careful targeting efforts by the Commission. He called for less rigid national regulatory edicts and more local flexibility, adding that the federal rules change constantly, and the state need to be involved as "real" decisionmakers.

Commission Chair Denise Fort remarked, "We have a strong Commission with good regional balance...We're committed to inclusiveness in the process and will attempt to reflect the many diverse voices that care about western water."

Others addressing the Commission included Zach Willey, Environmental Defense Fund, Larry Morandi, National Conference of State Legislatures, Jan Boettcher, Oregon Water Congress, Gordon Mink, Idaho Water Resources Research Institute, and Reed Benson, Oregon Water Watch.

The next meeting of the Commission was tentatively scheduled for May 16-17 in Sacramento, California.

Western States Water 2/23/96

WHAT WE HAVE LEARNED FROM THE BIG THOMPSON FLOOD -- 20 YEARS LATER Fort Collins, Colorado July 10-13, 1996

The Big Thompson flash flood on July 31 1976, killed at least 139 people and destroyed over 400 homes, trailers, and businesses. This meeting will focus on the degree to which our vulnerability to flash floods has increased or decreased in the region, the nation, and throughout the world. The conference will examine the effects of rapid urbanization and other land use changes in the American West: the contributions of national associations concerned with flood management, improvements in emergency management and weather forecasting; advancements in flood warning and other technologies; and changes in national programs and priorities. The meeting will include a one-day field trip to the sites of the Big Thompson flood and the Lawn Lake dam break of 1982. For details, contact *Eve Gruntfest, Big Thompson symposium, University of Colorado-Colorado Springs, P.O. Box 7150, Colorado Springs, CO 80933-7150; (719) 593-3531; fax (719) 593-3019; e-mail: ecg@spring.uccs.edu.* Sponsors: Federal Emergency Management Agency and others.

ANNUAL SUMMER CONFERENCE – NATURAL RESOURCES LAW CENTER BIODIVERSITY PROTECTION AND THE ENDANGERED SPECIES ACT June 10-12, 1996

The Endangered Species Act is up for reauthorization and there is much discussion of why we should protect biodiversity and how best to do so. The June 10-12 conference of the Natural Resources Law Center, University of Colorado School of Law, will examine the rationale for biodiversity protection, the legal framework of the Endangered Species Act, and examples of implementation of the Act throughout the West. Particular attention will be given to major issues raised by the Endangered Species Act that cut across all regions, including ESA and water rights, ESA and state programs, ESA and tribal rights, and the economics of the ESA. The conference will also address the ESA reform proposals. **Place**: University of Colorado School of Law, Boulder. **Cost**: \$525; with lower fees for government (\$415); academics and full-time nonprofit employees (\$260). All fees go up one week prior to program. **Inquiries**: Direct inquiries to: Katherine Taylor, Conference Coordinator, Campus Box 402, Boulder, CO 80309-0401, phone 303/492-1288; FAX 303/492-1297.

CALL FOR PAPERS

CONFERENCE ON TAILINGS AND MINE WASTE '97 January 13-17, 1997 Colorado State University, Fort Collins, Colorado

This event provides a forum for members of the mining community, engineers and scientists serving the mining industry, regulatory groups, and other interest groups concerned with environmental issues related to tailings and mine waste management. The conference has proven to be an exciting place for attendees to present ideas, learn of new developments, make contacts in their professional fields and discuss problems of mutual interest. Issues of mining, milling, environmental geotechnics, mining engineering, tailings management, geohydrology, geochemistry and other related topics will be covered in focused sessions.

Authors are requested to submit a short one-page abstract by June 14, 1996.

To submit an abstract of for information. contact:

Linda Hinshaw, Department of Civil Engineering Colorado State University, Fort Collins, CO Tel: 970/491-6081 FAX: 970/491-3584/7727

COLORADO WATER

COLORADO WATER CONGRESS Plan for the Following Meetings

CWC Summer Convention, August 22-23, Breckenridge Tentative location is the Village at Breckenridge

CWC Seminar on Colorado Water Law, Sept. 26-27 Holiday Inn, Northglenn

> CWC 38th Annual Convention January 30-31, 1997 Holiday Inn, Northglenn

SHORT COURSES

INTERNATIONAL GROUND WATER MODELING CENTER Colorado School of Mines, Boulder, Colorado 1996 Short Course Schedule

Contact: Office of Special Programs & Continuing Education (SPACE), Colorado School of Mines, Golden, CO 80401. Phone: 303./273-3314.

Date	Title. Instructors. Software	Location
June 3-5	Subsurface 3D Data Management, Analysis, & Computer Visualization for Site Assessment/Remediation. Instructors: Dennis A. Moon, SSESCO; Stephen A. Krajewski, Industrial Ergonomics, Inc.; Hisham Gaber, Intergraph Corporation; and Stephen J. Scott, Environmental Graphics, Inc.	Milwaukee, WI
June 3-7	Practical Modeling of Three-Dimensional Contaminant Transport and Remedial Action Designs using MODFLOW and MDT. Instructors: Chunmiao Zheng, Univ. of Alabama; and Christopher Neville, S.S. Papadopolus, Inc.). Software: MODFLOW, MDT.	CSM
June 17-21	Parameter Identification for MODFLOW. Instructors: Mary Hill, Richard Cooley and Richard Yager, USGS. Software: MODFLOWP, PEST.	CSM
June 24-26	An Introduction to Ground Water Modeling with Computers for Site Character- ization, Exposure Assessment and Site Remediation. Instructors: Paul van der Heijde and Forest Arnold, IGWMC; and Kenneth Kolm, Colorado School of Mines. Software:	CSM
	THWELLS, SOLUTE, CHEMFLOW, ASM.	

COLORADO STATE UNIVERSITY

DESIGN OF WATER QUALITY MONITORING SYSTEMS June 3-7, 1996 HAZARDOUS MATERIALS/WASTE MANAGEMENT TRAINING June 11-13, 1996. ACTIVATED SLUDGE PROCESS CONTROL SHORT COURSE June 24-28, 1996.

Contact Office of Conference Services, Colorado State University, Fort Collins, CO 80523 Phone: 970/491-7501 FAX: 970/491-3568

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- June 8-12 WATERSHED '96: MOVING AHEAD TOGETHER, Baltimore, MD. Contact: Water Environment Federation, 601 Wythe St., Alexandria, VA 22314-1994, or FAX 1/703/684-2471.
- June 11-14 COMPUTERS IN AGRICULTURE, 6th International Conference, Cancun, Mexico. Contact: Susan Buntjer, American Society of Agricultural Engineers. Phone 616/428-6327, FAX 616/429-3852, email: buntjer@asae.org.
- June 16-19 URBAN WET WEATHER POLLUTION FROM THE STREAM'S PERSPECTIVE, Quebec City, Quebec, Canada. Water Environment Federation. Call 1-800/666-0206, Select Option #4 to put your name on mailing list.
- June 27-29 WATER FOR AGRICULTURE AND WILDLIFE AND THE ENVIRONMENT WIN-WIN OPPORTUNITIES, Bismarck, ND. Contact: Larry Stephens, U.S. Committee on Irrigation and Drainage, 303/628-5430.
- July 14-17 WATERSHED RESTORATION AND MANAGEMENT, Annual AWRA Symposium, Syracuse, NY. Contact: American Water Resources Association, Phone 703/904-1225; FAX 703/904-1228; E-Mail: awrahq@aol.com.
- July 21-24 INDUSTRIAL WASTEWATER TREATMENT: MUNICIPAL AND INDUSTRIAL PERSPECTIVES, Indianapolis, IN. Water Environment Federation. Call 1-800/666-0206, Select Option #4 to put your name on mailing list.
- Aug. 3-7 PROMOTING WATERSHED STEWARDSHIP, THE FIFTH NATIONAL VOLUNTEER MONITORING CONFERENCE, Madison, WI. Contact: Celeste Moen, Wisconsin DNR, WR2, P.O. Box 7921, Madison, WI 53707; FAX 608/267-2800, email: moenc@dnr.state.wi.us.
- Aug. 17-22 10TH ANNUAL RESIDUALS MANAGEMENT BIOSOLIDS SPECIALTY CONFERENCE, Denver, CO. Water Environment Federation. Call 1-800/666-0206, Select Option #4 to put your name on mailing list.

- Sept. 22-25 RIVERTECH '96, 1st International Conference on New/Emerging Concepts for Rivers, Chicago, IL. Contact: Rivertech '96, IWRA, University of Illinois, FAX 217/333-9561, E-mail: nbarrett@uiuc.edu.
- Sept. 22-26 32ND ANNUAL AWRA CONFERENCE AND SYMPOSIUM, Fort Lauderdale, FL. Contact: American Water Resources Association, Phone 703/904-1225, FAX 703/904-1228, E-Mail: awrahq@aol.com.

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