



# Wyoming Hydrogram

January 1990

Wyoming Water Research Center Newsletter

Vol. 2, No. 1

## WWRC Requests Research Proposals

### Two Grant Programs Available

The Wyoming Water Research Center (WWRC) has requested proposals for water research projects to be considered for 1990 and 1991 fiscal year funding. Research proposals address a wide variety of state and regional water issues. Funds are provided by two separate research grant programs, one federal and one state. The research priorities, proposal guidelines, and available funds of the two grant programs are different. The proposal deadline for this year's funds under both grant programs was January 22, 1990. If you would like further information about these programs, please contact the WWRC at 766-2143.

### Federal Grant Program

Federal grant program funds are provided to the WWRC from the United States Geological Survey (USGS) under Section 104 of the 1984 Water Resources Research Act. USGS grant program funds may be used to address state and regional water issues. Issues that have been identified as program priorities include: water supply and distribution, water quality, water institutions and management, surface and ground water interaction and water use and conservation. Research proposals for projects of from one to three years in duration may be submitted. A total of \$105,000 is provided by the USGS on an annual basis for

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## WWDC Recommends \$40.7 Million in Water Projects

The Wyoming Water Development Commission (WWDC) met December 19 and 20 in Cheyenne, and approved recommendations for over \$37 million in new development projects and \$3.7 million in rehabilitation projects. Among the larger new projects recommended by the WWDC are Stage II of the Sheridan Area Water Supply Project, \$8.8 million; the Rock Springs/Green River Area Water Supply Project, \$23 million; and the Shoshone Water Pipeline Project, \$2 million. The largest rehabilitation project recommended was the Lake Hattie Water Supply project at \$1.4

*Continued on Page 2*

## What Do Teachers Know?

This fall, the Wyoming Center for Teaching and Learning surveyed 500 teachers throughout the state on their knowledge of 22 water topics and those topics' priority in the teachers curriculums. Teachers were surveyed on topics such as the water cycle, properties of water, types of water use and conservation, water quality/pollution, and aquatic plants and animals.

### Survey Results Released

In general, the survey revealed that teachers have relatively little knowledge of most of the 22 water topics surveyed and that water topics have a low priority in their curriculum, in part, because of a lack of water knowledge and education materials. The survey found that only 60 percent of the teachers surveyed have average or above average knowledge of seven



WYOMING WATER EDUCATION ADVISORY COMMITTEE - Members of the University of Wyoming's Wyoming Water Education Committee recently met on campus to examine results of a teacher survey. The survey of 500 Wyoming teachers was conducted to help develop a comprehensive water education program for use in the state's public elementary schools. Committee members in attendance included (left to right): Vince Sindt, UW Center for Teaching and Learning (UWCTL); Sid Parker, Buffalo Elementary School teacher; Dan Eager, Glenrock Elementary School teacher; Dennis Nelson, Montana State University water education coordinator; and Joe Stepan, UWCTL.

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**Research Proposals cont.**

this grant program. Typically, USGS funds are awarded to four to six research projects per year. Previous projects have included research on plant uptake of selenium, reclamation of alkaline solid wastes, and uncertainty analysis of water quality models.

**State Grant Program**

Wyoming State Grant-in-Aid funds for water research are made available to faculty members at the University of Wyoming and community colleges. These funds may be used to research a wide variety of state water resource issues including economic, social, hydrologic, health, and legal factors. State Grant-in-Aid research priorities and proposal guidelines are established in consultation with state agencies associated with water, a citizens advisory council and the WWRC's Research Review and Priorities Committee (RRPC). Six areas of research have been identified to be of particular interest in 1990-91. They include, hydrologic and water quality impacts of coalbed methane production, methods for assessment of ground and surface water interactions, human

health impacts of drinking water quality standard exceedance, analysis of weather modification, and conveyance losses in natural stream channels. Following peer review of research proposals, the Director of the WWRC makes recommendations to the RRPC who select the projects to be funded. Typically, ten to fifteen water research proposals are awarded annually by the WWRC under the State Grant-in-Aid program. Previous projects have included research on conveyance losses in streams and rivers, study of glacier water storage, and evaluation of riparian zones as a method to modify water yield, quality and erosion.

**WWDC cont.**

million. WWDC project recommendations will be considered by the Select Water Committee of the State legislature at its January meeting. Projects approved by the Select Water Committee are sponsored as legislation by that committee during the upcoming legislative session. Once legislative authorization is obtained, projects are funded as part grant and part loan from the WWDC.

**Teachers cont.**

water topics and that 40 percent or more of the teachers have either little knowledge or are unaware of fifteen of the topics. Only one topic, the water cycle, is taught by 60 percent of the teachers surveyed. More than 40 percent of the teachers surveyed give the other water topics low or no priority in their curriculums. However, the survey revealed that the majority of teachers would like to integrate water education activities into their curriculum if assistance was provided. Types of assistance desired include materials for water education, hands-on activities, and availability of qualified resource people.

**Continuing Program**

This survey is the first step in a two year comprehensive water education program for Wyoming's elementary schools designed to assess water education curriculum needs, help teachers become more knowledgeable about water, and provide materials for elementary school water education. The comprehensive water education program is being funded by a grant from Wyoming's Water Research Center.

**More Water News****Gloss Chosen To Chair Two Water Study Committees**

Steve Gloss, Director of the Wyoming Water Research Center, was recently selected to chair a committee to develop guidelines for evaluating the effectiveness of Water Resources Research Institutes (WRI). There are 54 WRI nationwide, one located in each state and U.S. territory. The WRI program is a part of Wyoming's Water Research Center. Wyoming's Water Research Center was rated among the top four in the nation in 1988. Gloss' committee, which consists of nine other institute directors, will report to the National Association of Water Institute Directors at the

annual meeting in Washington, D.C., April 23-25.

Gloss is also co-chair, with New Mexico's WRI Director Tom Bahr, of the Legislative Committee of the High Plains Study Council. This group represents the governors of the eight states overlying the Ogallala Aquifer - CO, NE, TX, OK, KS, SD, WY, NM. The High Plains Study Council is seeking funding for the Ogallala Aquifer Research and Development Program previously authorized by Congress. The Ogallala is the largest aquifer in the United States. It is of concern because extraction rates continue to exceed aquifer recharge. The research and development program would seek ways to decrease the rate of groundwater depletion in the aquifer

and to increase the vitality and longevity of the agricultural economy in the region.

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More Water News cont.

### Wyoming AWRA Section Meeting

The Second Annual Meeting of the Wyoming Section of the American Water Resources Association was held October 12 and 13, 1989 in Douglas, Wyoming. Water resource specialists throughout the state gathered to hear presentations on recent technical research and state geographical information systems that will aid future research. Papers were presented on a wide range of issues including, controlling selenium in surface water, nutrient removal from arid land runoff, irrigation efficiency testing in Wyoming, glacial ice chemistry, and government regulation of nonpoint source pollution. The conference concluded with a field trip to inspect the hydrologic features of a Powder River Basin Coal Mine.



### How Much Snow?

Measurements taken by the Soil Conservation Service from around the state show that the January 1990 Wyoming snowpack ranged from 54% to 131% of average. The Big Horn mountains in the northern area of the state have the highest snowpack measurement with 131% of average (measured in terms of water content) while the Platte River Basin in southeast Wyoming has only 75% of average snowpack. The driest portion of the state in late January was the upper Bear River Basin with only 54% of average snowpack. Although snowpack in most areas of the state is below normal, Wyoming is in relatively good shape compared with some of the other mountain states. For example, the snowpack in southern Colorado is only 10-25% of average. Snowpack measurements are taken during the last week of each month.



The second annual Willard C. and Elaine N. Rhoads Scholarship for Graduate Studies in Water Resources was awarded to "Breton Bruce (on right), University of Wyoming graduate student in Geology. In addition to the \$1,000 scholarship, his name will be engraved on a plaque on display at the Wyoming Water Research Center. Richard Marrion, (left) Associate Professor of Geography and Recreation and Chairman of the Rhoads Scholarship Committee, made the presentation during a recent "Water Talk" seminar. UW photo

## Water Calendar

### Water Forum for State Legislators

A Water Resources and Law Forum will be held for Wyoming Legislators on February 14, just prior to the start of the 1990 legislative session. The forum provides legislators with an opportunity to learn about and discuss current state water resource issues. Topics to be discussed at the forum include proposed water development legislation, water resource administration, water right transfers and marketing, and the status of ongoing water resource litigation. The forum, held annually, is presented by the Wyoming Water Research Center and the Legislative Services Office in cooperation with the Wyoming State Engineer, State Attorney General, and Wyoming Water Development Commission.

### AWRA Student Section

A meeting will be held on Monday, February 19, at 7:00 p.m. in room 216 of the Geology Building on the University of Wyoming campus to organize a student section of the American Water Resources

Association. For additional information contact Linda Barnes at 766-7316.

### WWRC to Cosponsor Groundwater Conference

The Wyoming Water Research Center is a cosponsor of the Groundwater Engineering and Management Conference to be held February 28 - March 1, 1990, in Denver, Colorado. The purpose of the Conference is to evaluate technical and management methods necessary to solve groundwater problems. The Conference will feature contributed and invited papers, and discussion related to groundwater issues. Dr. Steven Gloss, WWRC Director, will chair the session on groundwater contamination issues. For further information, contact the Wyoming Water Research Center or Dr. Neil Grigg, Director, Colorado Water Resources Research Institute.

### Application Deadline Near

Applications will be accepted through March 2, 1990 for the Willard C. and Elaine N. Rhoads Scholarship for Graduate Studies in Water Resources at the University of Wyoming. The scholarship, honoring a long-time *Continued on Page 5*

# "WATER TALK"

"Water Talk" is an interdisciplinary seminar series sponsored by the Wyoming Water Research Center to provide an opportunity to discuss water resource issues and learn about ongoing technical research. The 1990 spring semester seminars are held each Friday at noon on the University of Wyoming campus in Room 105 of the Classroom Building and are open to the public. Each presentation is video taped and the ½ inch VHS tapes are circulated to state agencies and community colleges. Individuals may also check out "Water Talk" video tapes by contacting the Water Research Center at 766-2143 or from Ann McGowan at the Economic Development and Stabilization Board Library 777-7284.

DATE	PRESENTATION/SPEAKER
January 19	"Coal Bed Methane in the Powder River Basin" Nancy Doelger, Bureau of Land Management
January 26	"Measurement of Calcite Ion Activity Products in Soils as Related to the Quality of Water" K.J. Reddy, Research Associate, Wyoming Water Research Center
February 2	"Potential Role of Option Contracts for Solving Urban-Agricultural Drought Water Supply Problems" Ari Michelsen, Associate Director, Wyoming Water Research Center
February 9	"Efficient Groundwater Drawdown Model Using Finite Layer Method" Stan Smith, Ph.D. Student, Math and Civil Engineering
February 16	"Forest Ecological Survey" Malcolm Edwards, Soil Scientist, Medicine Bow National Forest
February 23	"A Review of Winter Cloud Seeding Experiments and Results" John Marwitz, Head, Atmospheric Science Department
March 2	"Western Water Issues for the 1990's" Neil S. Grigg, Director, Colorado Water Resources Research Institute, Colorado State University
March 9	"The Hydrology of Wet Meadows Along the Platte River in Central Nebraska" Robert J. Henszey, Research Associate, Wyoming Water Research Center
March 23	"Impact of Sediment on the Aquatic Insects of High Mountain Streams: Much Ado About Nothing?" Jeff Lockwood, Assistant Professor, and Larry DeBrey Research Associate, Plant, Soil and Insect Science Department
March 30	"Soluble Salts and Sediments Along Degraded and Improving Riparian Zones in Southwest Wyoming" Marcus Middleton, MS Student, Range Management Department/Water Resources
April 6	"Geomorphic Changes in the Snake River, Grand Teton National Park" Richard Marston, Associate Professor, Geography and Recreation and Wyoming Water Research Center
April 20	"Evaluation of Water Movement Through Combusted Oil Shale Using the Watershed Climate and Simulation Laboratory" Quentin Skinner, Professor, Range-Management Department
April 27	"Fiber Optic Detection of Water Pollutants" Keith Carron, Assistant Professor, Chemistry Department
May 4	"An Economic Analysis of Water Resource Development in Wyoming" Larry Adler, Ph.D. Candidate, Economics Department

## SPRING SEMESTER 1990

Sponsored by: WYOMING WATER RESEARCH CENTER

**Scholarships cont.**

member of the Wyoming Water Development Commission, provides a stipend of \$1,500 for the 1990-1991 academic year. Applicants must be accepted into the master's degree program in water resources and a related discipline, administered jointly by the Wyoming Water Research Center and the applicant's academic department. The recipient will be selected on the basis of demonstrated academic excellence, faculty advisor recommendations, and an essay of the student's academic and career goals. Application materials and additional information about the scholarship are available at the Wyoming Water Research Center, Room 153 of the Vocational Annex Building.

**Water Quality Conference**

The Wyoming Association of Conservation Districts will hold a statewide Water Quality Conference on April 17-19, 1990, at the Hilton in Casper, Wyoming. The conference will be geared toward individual land owners and managers interested in implementing conservation practices to improve water quality. Conference sessions will be held on state water quality management plans and requirements and potential management practices that can be used to improve water quality. For more information and/or to indicate your interest in attending, contact the Wyoming Association of Conservation Districts office at 632-5716.

**Earth Day 1990**

Worldwide activities to increase public awareness about environmental issues such as water conservation, are being planned for April 22, 1990. This marks the 20th anniversary of the first Earth Day held in 1970. On that day, more than 20 million Americans participated in demonstrations and events aimed at increasing environmental awareness. For information on Earth Day 1990 and Wyoming Earth Day activities, please contact Dot Vali at 745-4516.

**SPRING "WATER TALK"**

"Water Talk," the interdisciplinary seminar series sponsored by the Water Research Center, has a full schedule for the spring semester. Water Talk provides an opportunity to learn and discuss a wide variety of water related issues and technical research. Among the topics to be covered this semester are impacts of coal bed methane production, modeling techniques for groundwater contamination, cloud seeding, western water issues in the 1990's, and an economic analysis of water development in Wyoming.

The seminars are held each Friday at noon on the University of Wyoming campus and are open to the public. A complete schedule of spring 1990 "Water Talk" is included as an insert in this issue of the Hydrogram. Each presentation is video taped and the one-half inch VHS tapes are circulated to state agencies and community colleges. Individuals may also check out the tapes by contacting the Water Research Center at (307) 766-2143.

**Water Resource Seminars**

Two water resource seminars will be held at Community Colleges (tentatively scheduled for Rock Springs and Gillette) early this spring. Keep reading the Hydrogram for seminar dates.

**Water Institute for Teachers**

A two week Water Institute for Teachers will be held during the summer school session of the University of Wyoming. The institute gives teachers the opportunity to expand their knowledge about water issues in Wyoming such as water supplies, water quality, legal issues, and watershed management. Classroom sessions, field trips, and hands-on activities will be utilized and teachers will be given the opportunity to develop concepts and activities to add to their

existing curriculum. Two semester hours of credit in Natural Science 680 will be given. For further information see upcoming issues of the Hydrogram or please contact the WWRC. Teachers may want to give this course special consideration in light of recent water education survey results (see page 1 of the Hydrogram)!

**Conserve 90**

A national conference and exposition on Water Supply Solutions for the 1990's will be held in Phoenix, Arizona, August 12-15, 1990. The conference will feature papers on water use, water conservation, drought management, planning and water transfers. Conference sponsors include the American Society of Civil Engineers, American Water Resources Association, American Water Works Association and the National Water Well Association. For more information, please call (614) 761-1711.

**WWRC Research**

Starting with our next issue, the Hydrogram will have a section that focuses on WWRC research projects and publications to keep you up to date on current water research.



## WWRC Focus

### New Associate Director

Dr. Ari Michelsen joined the WWRC staff as Associate Director of Technology and Information Transfer in December of 1989. His activities will include educational programs such as the Water Institute for Teachers, Legislative Forum, and Community College seminars, publication of the WWRC newsletter and research and technical briefs, and program development and implementation of a state-wide water quality initiative with Cooperative Extension.

Before joining the Center, Dr. Michelsen was a Senior Associate with RCG/Hagler, Bailly, Inc., an economic and environmental resource consulting firm in Boulder, Colorado. Dr. Michelsen's work there included water resource valuation, economic analyses of environmental impacts, and regulatory policy and benefit-cost analyses. For four years prior to joining RCG, he was Vice President of Coal Network Associates, Inc., an energy consulting firm in Fort Collins, Colorado.

Dr. Michelsen received his Ph.D. and Master's degree in agricultural economics from Colorado State University. His fields of specialization were in natural resource, public finance and

regional economics. His dissertation research examined the feasibility of using water supply option contracts, an alternative to traditional water supply management methods, to provide urban drought insurance while reducing agricultural impacts. Prior to his graduate studies at CSU, Dr. Michelsen worked for an economic consulting firm in the Washington, DC area. He received his B.S. degree in Conservation and Resource Development from the University of Maryland. Dr. Michelsen has authored over 40 technical reports and publications. He is looking forward to getting his feet "wet" in Wyoming water.



Dr. Ari Michelsen, WWRC Associate Director of Technology and Information Transfer.

## Water Under the Bridge

### News from the Past

One hundred years ago Wyoming entered statehood. As past newstories demonstrate, water resources were as important to the state then, as they are now. In upcoming issues of the Hydrogram, we will take a brief look at some of the stories that made water news. We would like to thank the Wyoming State Archives, Museums and Historical Department for their assistance.

### 100 Years Ago

In January of 1890, a newspaper reported that the Interstate Canal and Water Supply Company was incorporated for the purpose of building canals from the North

Platte River for irrigation, mining and manufacturing. One hundred years later, the North Platte has numerous canals to deliver water for irrigation, domestic use and manufacturing and additional water is being diverted into the river basin to meet growing demands.

The U.S. Geological Survey's stream gauging program was one year old in 1890. The program for measuring the Nation's rivers and streams began at Embudo, New Mexico on the Rio Grande, and has expanded to a nationwide network of more than 50,000 stations (Hydata, November 1989). Currently, there are 185 USGS stream and lake gauging stations in Wyoming.

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