



Wyoming Hydrogram

December 1990

University of Wyoming Water Research Center Newsletter

Vol 2, No 5

Wyoming water atlas available

A single-volume information source on Wyoming water resources and water hazards has been published and is now available through the WWRC.

The hardbound, 136 page volume contains drawings by the late Samuel H. Knight, UW geology professor emeritus, 53

computer-generated maps, and numerous photos.

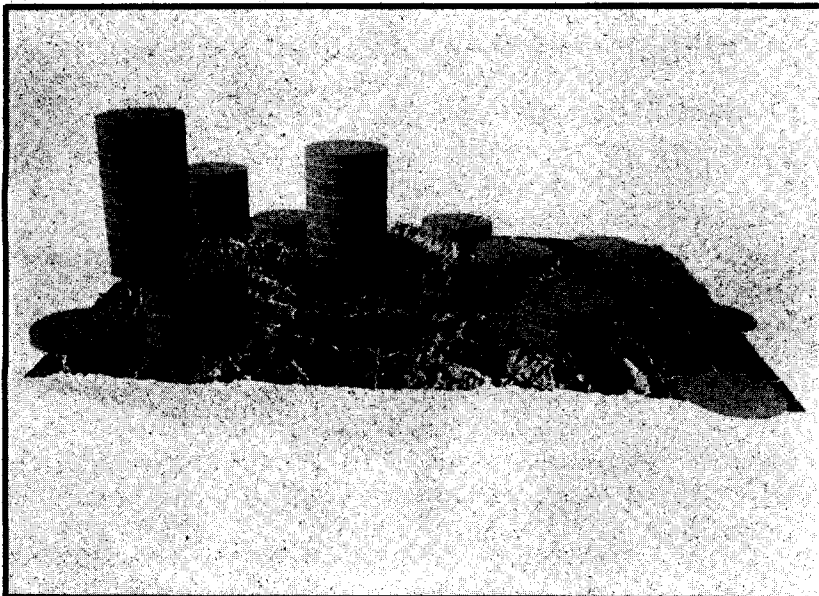
Water sources, water quality problems, and water development projects are a few of the areas covered through maps and text. Dr. Lawrence M. Ostresh, Jr., UW professor of geography, produced the maps, assisted in their design by Walter

M. Hudson, a former graduate research assistant from Laramie.

Dr. Richard A. Marston, associate professor of geography, edited the volume's text which drew upon information from the State Engineer's Office, Wyoming Departments of Environmental Quality and Game and Fish, Wyoming and U.S. Geological Surveys, and other sources.

Funding for this official Wyoming Centennial project was provided by the Wyoming Water Development Commission. Gov. Mike Sullivan wrote the foreword and the introduction was written by Michael Purcell, Wyoming Water Development Commission administrator.

To obtain a copy of the atlas, send a check or money order for \$35 (thirty-five dollars), made payable to the University of Wyoming, to the UW Water Research Center, Box 3067, Laramie, Wyoming 82071-3067. The price includes shipping and handling.



From the *Wyoming Water Atlas*: Plate 17B, a full-color, computer graphic of streamflow generated in Wyoming, southern perspective. Each band represents 500,000 acre-feet per year. Wyoming total: 16,276,900 AF/yr.

Water seminars scheduled

University of Wyoming Cooperative Extension Service and the WWRC will again this year sponsor two public Water Resource Seminars.

The first Seminar is scheduled to be held Tuesday, **January 29, 1991** at Eastern College in Torrington. The

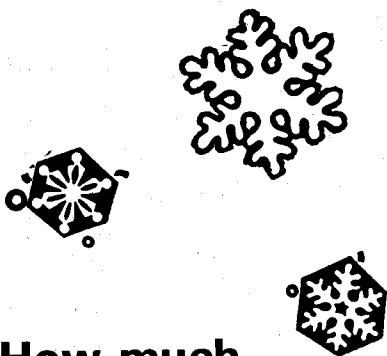
second is scheduled for **February 19, 1991**, at the Agricultural Resource and Learning Center, 2011 Fairgrounds Road, in Casper.

A wide range of local and regional water resource issues will be addressed. Past audiences have included individuals and organizations with interests in agriculture, mining, industry,

and domestic water issues.

The 1991 Seminars will include presentations and provide a forum for discussion on North Platte River management strategies, water supply forecasting, nitrates and pesticides in ground water, methods to improve irrigation efficiency, and new underground

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How much snow?

Though still quite early in the season, enough snow has fallen in Wyoming to trigger collection of *snotel* and manual readings of snowpack. Even though there has been no melting at high elevations which would reduce snowpack, percentages compared to average for this time of year continue to slide downward in most cases.

Measurements taken by the Soil Conservation Service from around the state show that early December 1990 high elevation snowpack in several drainage basins is stable but below average. The bright spot continues to be the drainages along the west side of the Big Horns with the accumulated snowpack near to slightly above average.

The southern end of the Big Horn Mountains are still much below average, with 38% of typical snowpack. The Black Hills, though improving slightly with recent precipitation, remain only 40-50% of average.

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In the southern part of the state, the Little Snake River basin is much below average (about 30%), with the Platte River drainage being only slightly better. Also along the southern border, the Lower Green River and Upper Bear River drainages are below average for this time of year.

Manual snowpack measurements are taken during the last week of each month. *Snotel* (automated) measurements are taken more frequently. More on the *snotel* collection instrument in the next issue.

Agencies overlay water information

More than a dozen agencies were represented at a meeting called by the Wyoming Departments of Environmental Quality and Agriculture and the WWRC on November 15. The purpose of the meeting was to assess the depth and scope of information being collected on ground and surface water in Wyoming.

Participants decided to have the WWRC coordinate an analysis of information needs/collection activities from individual agencies. The results of this analysis will be presented to participating agencies at a future meeting.

A peaceful and prosperous new year to you...
... from the staff of the University of Wyoming Water Research Center

New editor at WWRC

June Rain is the new research publications editor at the University of Wyoming Water Research Center. She will write and edit water quality publications with special emphasis on nonpoint source pollution and remedies. Beginning with this issue, she will also take over editorial duties for the *Hydrogram*.

Water quality publications will be produced jointly by the UW Cooperative Extension Service and the WWRC. Rain, formerly with UW News Service, studied social sciences at UW and resource sciences at the University of California-Davis.

Wyoming Hydrogram is published bimonthly by the Wyoming Water Research Center with funds provided in part by the U.S. Geological Survey, Department of the Interior, as authorized by the Water Resources Research Act of 1984.

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WWRC Research

Chemical, physical, and biological characteristics which control selenium form and distribution in soils and plants across landscapes. INTERIM REPORT: Submitted by S.E. Williams, L.C. Munn, and K.J. Reddy.

While selenium (Se) is not known to be an essential element for plants, it is essential for animals. However, Se can be toxic to plants and animals (including humans) at even very low levels. Selenium was blamed for the death of thousands of domestic livestock in Wyoming early in this century. These animals presumably had eaten plants which had accumulated selenium from soil sources.

In response to recent concerns about the element, Gov. Sullivan established a task force to evaluate Se conditions in the state. The task force made recommendations for understanding Se behavior in water, soil and vegetation as it relates to the welfare of humans and animals.

The chemistry of Se in soils is complex and controlled by biogeochemical processes. Solubility, availability, and plant uptake studies suggest that microorganisms are involved in oxidation of relatively insoluble selenium. This study is examining characteristics which control selenium form and distribution across landscapes.

The project has four components: (1) analysis of selenium content of *Astragalus bisulcatus* and *A. pectinatus* (selenium-



A. bisulcatus

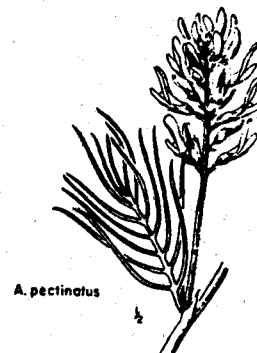
accumulating plants) from seleniferous soils along a lake margin in northern Albany County; (2) identification of selenium distribution and transformation across an upland transect on a southeastern Wyoming rangeland; (3) the impact of curing on selenium content in alfalfa; and (4) the solubility and availability of selenium in soils as affected by chemical and biological parameters.

Studies over the period 1988-90 have attempted to better understand the complex relationship between chemistry and microbial activity in altering the solubility and uptake of selenium.

Astragalus (an indicator species for selenium) studies indicate that there is a great deal of variation in selenium concentration throughout the growing season.

Preliminary data indicates that considerable Se is lost during the curing process in alfalfa. The levels of selenium lost did not appear to differ from irrigated or unirrigated fields.

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A. pectinatus

WWDA holds annual meeting

The Wyoming Water Development Association (WWDA) met for their annual meeting in Casper, Dec. 4-5, 1990. The theme of this year's meeting was "Water is Everybody's Business."

A panel of speakers representing many sides of the Wind River Basin water use dilemma presented their concerns before the WWDA. Environmental and economic issues, rehabilitation and development efforts were discussed.

During the second day of the meeting the WWDA discussed media coverage of water issues with a panel of representatives from area newspapers. The complexity of water-related issues presents a challenge to reporters seeking a balanced set of views from which to build their stories.

An election was held to determine the governing body for WWDA in the coming year.

Officers and Directors elected for 1991 are: Robert E. Johnson (Rock Springs), President; Jim Geringer (Wheatland), 1st Vice President; Beryl Churchill (Powell), 2nd Vice President; Herman Noe (Cheyenne), Treasurer; Vic Hasfurther (Laramie), Secretary; Mike Purcell (Cheyenne), NWRA Director; and Floyd Bishop (Cheyenne), Alternate NWRA Director.

Evan Green (Cheyenne) is newsletter editor. Directors are: Kathleen Sun, Rawlins; Ed Norlin, Powell; Mike Stone, Cheyenne; Craig Cooper, Riverton; Neal Payne, Lyman, Nebraska; Bob Tarantola, Casper; Leroy Schindler, Rawlins; and Jack Palmer, Cheyenne.

The WWDA will begin holding weekly legislative updates on Jan. 16, 1991. The sessions for legislators will take place at the Wyoming Department of Agriculture office in Cheyenne.

research

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Publications resulting from this research include

The solubility and availability of selenium in soils, Reddy, K.J. and S.E. Williams. 1990. American Society of Agronomy Abstracts. p. 236

The solubility and availability of selenium in a seleniferous soil, Reddy K.J. and S.E. Williams. 1990. Soil Science (in review).

A final report on the project is expected mid-1991.

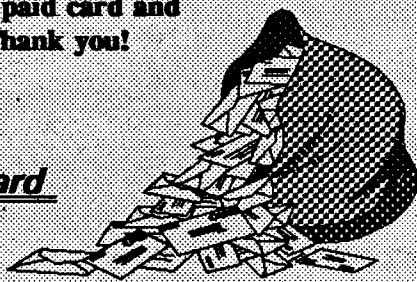
For additional information please contact Dr. Stephen E. Williams, Dr. Larry C. Munn, or Dr. Katta J. Reddy, Department of Plant, Soil and Insect Sciences, University of Wyoming, (307) 766-3103, or Dr. Reddy at the Wyoming Water Research Center, (307) 766-2143.

This research is funded by the Wyoming Water Research Center.

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Send your card today!



WATER SAVER TIP

Seventy percent of domestic water is used in the bathroom. Installing a low-flow shower head and space-occupier in the toilet tank, replacement of leaky faucet washers, repairing leaky toilets, and taking shorter showers can save thousands of gallons of water every year.

Wyoming-Idaho-BuRec sign water contract

Calling it a "water insurance policy," Gov. Mike Sullivan in October signed a contract to buy water rights in an Idaho reservoir to help maintain low-water stream flow in Wyoming's Snake River.

The agreement with the federal Bureau of Reclamation is designed to give Wyoming flexibility to maintain both adequate stream flows in the Snake River below Jackson Lake Dam and adequate water levels in Jackson Lake.

"This is an historic agreement," Sullivan said. "It is much like a water insurance policy that ensures we will be able to protect the unique fish and wildlife values of the Snake River. It will give us long-term security and the flexibility we need to properly manage our share of water under the Snake River Compact."

Under the agreement, Wyoming is purchasing uncontracted rights to 33,000 acre-feet of water in Palisades Reservoir in Idaho, just downstream on the Snake from the Idaho-Wyoming border.

With those rights, Wyoming will have the flexibility to in effect store its water upstream in Jackson Lake and use it for managing the Snake through Grand Teton National Park.

State Game and Fish officials, the U.S. Fish and Wildlife Service, and private sportsmen's

The purchase will amount to 2.75% of the capacity of Palisades Reservoir...

groups, such as Trout Unlimited, have expressed concerns over the effect of low water during dry winters on fish and aquatic habitat below Jackson Lake Dam.

The purchase will amount to 2.75 percent of the capacity of Palisades Reservoir and be the equivalent of the state's required replacement storage in the reservoir under the 1949 Snake River Compact.

The purchase will cost the state \$567,270 as its share of the construction costs of the 1950

water project, plus annual operation and maintenance costs of approximately \$3,300.

State officials, led by State Engineer Jeff Fassett, have been negotiating the complex agreement with the Bureau of Reclamation and Idaho water officials for months.

USEPA plans reorganization

The USEPA Office of Water would be streamlined, as early as Jan. 1991, from seven program offices to four under a plan prepared by LaJuana Wilcher, Administrator.

The reorganization would combine drinking water and groundwater protection offices into the Office of Groundwater and Drinking Water Protection.

An Office of Surface Water Compliance would embrace Clean Water Act permitting and enforcement. Other new program offices would be those of Water Science and Technical Support and of Ecosystem Protection. --

reprinted from the Journal of the American Water Works Assoc.

Legislative forum date set

The annual Water Resources and Law Forum for Wyoming legislators is scheduled for Monday, Jan. 7, 1991, one day prior to the start of the 1991 Legislative Session.

Water administration, litigation, development, and quality concerns will be addressed. The legislators will

take home materials useful in helping them make informed decisions about water resources issues.

The Forum is sponsored annually by the Wyoming Legislative Services Office and the WWRC in cooperation with the Wyoming State Engineer's Office, State Attorney General,

and the Wyoming Water Development Commission.

Representatives from the above groups plus the Wyoming Department of Agriculture, Wyoming Department of Environmental Quality, and the University of Wyoming, are scheduled to make presentations to interested lawmakers.

Clean coal technology studied at UW

A two year research grant of \$116,849 has been awarded to the University of Wyoming Water Research Center by the Electric Power Research Institute. The research centers on development and optimization of new carbon dioxide pressure techniques for chemical stabilization of clean coal technology (CCT) solid wastes.

Dr. K.J. Reddy, WWRC research associate and the project's principal investigator, has been working on various applications of this chemical stabilization process for the past three years.

Coal wastes reduced

Dr. S.P. Gloss, director of WWRC, and Dr. J.I. Drever, are co-principal investigators on the project. Gloss says the improved CO₂ pressure technique will help to minimize any potential environmental impact associated with disposal of coal combusted solid wastes.

Coal is the most abundant energy source in the United States and it plays a crucial role in the generation of electric power. Coal-fired sources accounted for 57% of electricity generation in 1988 and reliance on coal is expected to increase in the future.

However, the generation of electricity from coal also results in the production of solid waste materials such as fly ash which must be disposed of in an environmentally sound manner.

Enactment of new clean air legislation by the U. S. Congress mandates reduction in sulfur dioxide emissions from electric

utility power plants. As a result, various advanced clean coal technologies will likely be implemented to comply with these amendments.

Several such technologies are currently in various stages of commercial or experimental development in Wyoming where roughly one-third of the nation's coal resources are located.

The concern about reducing airborne emissions from coal-fired power plants is coupled with an equal concern about rules for land based disposal, since most of the CCT solid wastes simply convert potentially environmentally sensitive substances from the air to solid wastes.

Electric utilities are keenly aware of the need for safe disposal of CCT solid wastes. A promising approach for efficient chemical stabilization of CCT wastes is to develop an effective technique of lowering alkalinity as well as the concentration of soluble inorganic elements.

Reaction time decreased

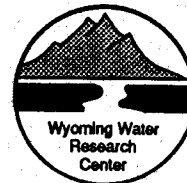
Reddy says traditional carbonation processes have been plagued by slow reaction times, sometimes taking months or years to complete. Such limitations often made carbonation an ineffective treatment process for stabilization of alkaline solid wastes.

In the improved technique, CCT solid wastes will be reacted under pressure with carbon dioxide gas. This reaction will lower the alkalinity of the wastes by neutralizing oxide and hydroxide minerals through re-

carbonation in a very short time.

Consequently, the process will precipitate insoluble solid phases and minimize the concentration of potentially deleterious elements in leachates from CCT solid wastes.

Because this process uses carbon dioxide which can be obtained either from the combustion process itself or other sources, another potential benefit is that it may help to minimize emission of carbon dioxide into the atmosphere.



WWRC Focus

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Ph.D. in Engineering Science from Washington State University.

He has been affiliated with the WWRC since 1973 and currently holds certification from the American Fisheries Society as a "Fisheries Scientist" and the American Institute of Hydrology as a "Professional Hydrologist."

In addition to his research and Extension activities at UW, Tom serves as a technical advisor to government agencies and private groups throughout the West on instream flow and river restoration issues.

Ground water hotline available

Information about ground water, especially important to Americans using ground water from wells, is now available via a toll-free hotline.

The hotline is sponsored by the American Ground Water Trust, a non-profit public foundation dedicated to increasing public awareness and understanding of this valuable resource.

Callers will be able to listen to prerecorded messages and leave messages to gain additional information, if necessary.

The toll-free number, 800-423-7748, is available 24 hours a day, every day of the year.

seminars

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storage tank regulations (what are they and what are their impacts).

New this year is an evening program to provide an additional opportunity for the public to attend the Seminars. A field trip to the Bureau of Reclamation North Platte River Management Control Facility and to a water treatment plant are being planned as part of the Seminar program in Casper.

The Seminars are held in cooperation with Goshen and Natrona County Cooperative Extension offices, Eastern College, Casper College,

Wyoming Department of Agriculture, Wyoming State Engineer, Wyoming Water Development Commission, Wyoming Department of Environmental Quality, USDOJ Bureau of Reclamation and other state and local water agencies.

There is no charge to attend the Seminars, but advance reservations will assure arrangements are adequate. Please contact UW Cooperative Extension Agents Milt Green (Goshen County, 532-2436) or Jerry Buk (Natrona County, 235-9400), or the WWRC at 766-2143 for further information and to reserve a space at the Seminars.

**Ground Water Hotline
800-423-7748**

WWRC Calendar

A Forum for Wyoming Legislators on Water Resources and Law will be held Jan. 7, 1991 in Cheyenne. A related article on the Forum is found on page 5.

The Wyoming Water Development Association will begin weekly legislative reviews on Jan. 16, 1991. Please note the article on the annual WWDA meeting on page 4.

This year's two public Water Resources Seminars will be held in Torrington on Jan. 29, 1991 and in Casper on Feb. 19, 1991. Details about the Seminars are in the article on page 1.

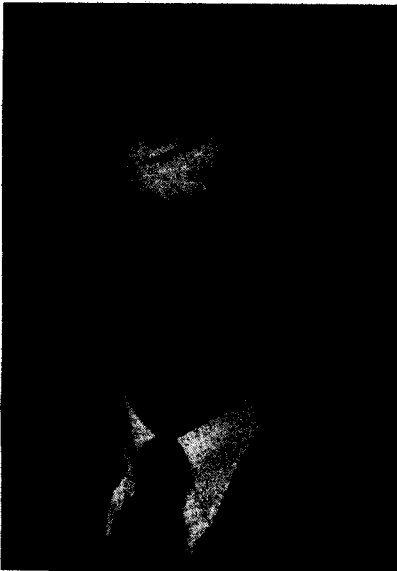
The Colorado Water Engineering and Management Conference, will take place in Denver, Feb. 27-28, 1991. The Conference is co-sponsored by the WWRC. Dr. Ari Michelsen of WWRC will present a paper, "Changes and Trends in Water Rights Prices." For more information, or to register, contact: Janet Lee Montera, Dept. of Civil Engineering, CSU, Fort Collins CO 80523, (303) 491-7425, FAX: (303) 491-7727.

A Nonpoint Source Pollution Conference, sponsored by the State of Washington Water Research Center, will be held in Tacoma WA, Mar. 20-21, 1991 -- more details in future issues.

Mar. 29, 1991 is the deadline for submission of abstracts of technical papers for presentation at the 1991 Joint Conference of the Rocky Mountain Section of the American Water Works Assoc. and the Rocky Mountain Water Pollution Control Assoc.. The conference is scheduled for Sep. 8-12, 1991 in Jackson Hole. Information may be obtained from David Engles, Sheridan Area Water Supply-Joint Powers Board, 224 S. Main St., Sheridan WY 82801, (307) 672-5280 or from Harry LaBonde, Arix-Versar, 877 N. 8th W., Riverton WY 82501, (307) 856-6505.

WWRC Focus

Thomas A. Wesche is a Research Biologist and Hydrologist at the Wyoming Water Research Center as well as holding appointments as an Associate Professor in the Department of Range Management at the University of Wyoming and Water Quality Specialist with the University of Wyoming Cooperative Extension Service.



Tom's current research projects include flushing flow requirements for channel maintenance, riparian area enhancement, sediment loading effect on

fish, trout response to instream flow changes, and evaluation of habitat improvement structures.

Prior research has concentrated on precipitation enhancement, trout habitat analysis, streambank stabilization, habitat restoration planning, and channel maintenance.

He is author/co-author of over 100 presentations, book

chapters, and articles in both refereed journals and the popular press.

Tom earned his B.S. in aquatic wildlife management (1971) and in 1973 an M.S. in water resources-civil engineering, both from the University of Wyoming. He is currently completing requirements for the

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Water under the bridge

Continuing with our Centennial theme, an article in the *Cheyenne Daily Leader* of 100 years ago was headlined, "The Irrigation Problem." The article analyzed the predicament thus: Wyoming has over twenty million acres of mountains collecting water in the form of snow, and an equal or greater amount of acreage at lower elevations which was deemed suitable for "reclamation" by farming. The "problem of irrigation," it was stated, "is to supplement the work of nature and distribute the water falling on the high mountains over these lands." In 1890, the 44th star in the flag ranked third among the states in area of irrigated land and second in number and mileage of irrigation canals. Today, merely collecting the data on irrigated land would involve more people than lived in the state a century ago. Though the engineering "problem" of irrigation remains, irrigation of arid lands now poses political, economic, and societal questions as well. Much as the settling of the new state depended on water, sound economic development of Wyoming will continue to rely on thoughtful use of a precious resource -- Wyoming Water.



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