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Water Current

November/December

WATER SEMINARS START IN JANUARY

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Topics and speakers have been selected for the 1982 NWRC seminar series on "Current Water Issues in Nebraska", which begins January 13. These hour-long seminars will provide students with a background for understanding water issues, and feature speakers who represent the broad spectrum of opinions about current water affairs.

All seminars are scheduled in the East Campus Union and begin at 3 p.m. The public is invited.

--JANUARY 13; An Introduction to Nebraska's Hydrogeography; M.-L. Quinn, Ass't. Professor of Water Resources, Water Resources Center.

--JANUARY 20; Physical Concepts of Nebraska's Surface and Groundwater Resources; Darryll T. Pederson, Assoc. Prof. of Geology and Research Hydrogeologist, UNL Conservation and Survey Division.

--JANUARY 27; The Norden Dam Alternatives Report: Physical Facilities; Marion Thacker, Planning Officer, U.S. Bureau of Reclamation.

--FEBRUARY 3; The Norden Dam Alternatives Report: Costs and Benefits; Rose McCullough, Sierra Club.

--FEBRUARY 10; The Norden Dam Alternatives Report: Costs and Benefits; Jack Odgaard, Executive Di-

rector, Nebraska Water Resources Association.

--FEBRUARY 17; Interbasin Transfers from the Platte River: Proposed Projects; Denis P. Gilbert, Water Scientist, Water Resources Center.

(con't next page)

NWRC Research Conference Planned

Scientists from throughout the University of Nebraska System, and state colleges, are invited to attend the "Workshop on Water Research Needs" scheduled for February 9-10 at the UNL East Campus Union. First on the agenda will be assessing what information exists that could alleviate the problems water users identified at a NWRC-sponsored workshop last September.

Where information is lacking, scientists at the February conference will be asked to outline needed research programs.

The Water Resources Center will study the outlines, and call for detailed proposals to seek funding to support the research.

For more details of the pending conference, contact the Water Resources Center.



Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Leo E. Lucas, Director of Cooperative Extension Service, University of Nebraska, Institute of Agriculture and Natural Resources.

NEBRASKA WATER RESOURCES CENTER



SEMINARS

--FEBRUARY 24; Interbasin Transfers from the Platte River: Procedures and Considerations on the Little Blue Project; Michael Jess, Director, State Department of Water Resources.

--MARCH 3; Transfers from the Missouri River; Robert S. Roumph, Planning Director, U.S. Army Corps of Engineers.

--MARCH 10; U.S.G.S. Ogallala Aquifer Study; William Kastner, District Chief, Water Resources Division, U.S. Geological Survey.

--MARCH 17; Nebraska Water Conference at the UNL Nebraska Center.

--MARCH 31; Results from the High Plains Ogallala Aquifer Study; Raymond J. Supalla, Assoc. Professor, UNL Dept. of Agric. Economics.

--APRIL 7; Irrigating the Sandhills: Issues and Concerns; Verlon K. Vrana, Chief, Nebraska Natural Resources Commission Planning Division.

--APRIL 14; Irrigating the Sandhills: Benefits; Gerald Abts, President, Lindsay Manufacturing.

--APRIL 21; State Water Agency Functions and Policy; Jack L. Hart, Executive Coordinator of Natural Resources and Special Assistant to the Governor.

--APRIL 28; Current State Water Law Legislation; J. David Aiken, Extension Water Law Specialist and Assoc. Professor, UNL Dept. of Agricultural Economics.

--MAY 5; To be announced.

UNL Coordinates Three University Study of 1976-77 Drought Relief Programs

The dry years of 1976-77 brought more than \$6 billion of relief programs to 26 drought-stricken states, including Nebraska. For the first time, the effectiveness of those efforts will be evaluated.

Don Wilhite, a NWRC-supported assistant professor in the Center for Agricultural Climatology and Meteorology, will coordinate the study. The research is funded by a \$88,600 National Science Foundation grant.

Wilhite told Water Current that the study will evaluate relief efforts in Texas, South Dakota and Nebraska. Climatologists and meteorologists, agricultural economists and engineers, as well as political scientists, historians and others from UNL, Texas Tech and the University of South Dakota will participate.

The teams will identify the actions and roles of state, federal and private efforts during the drought, and offer recommendations to make relief efforts more efficient in future droughts, Wilhite said.

Another important part of the NSF study will be determining what criteria and information sources relief agencies relied on to make decisions and allocate funds.

More on Four U of N Foundation Projects

Some readers have asked for more details about the four NWRC projects funded by the University of Nebraska Foundation. Here's some additional information.

--Agricultural engineer Thomas Dorn at the Northeast Station in Concord will lead a team of engi-



neers that received \$62,500 to find ways of reducing runoff and soil erosion associated with low-pressure, center pivot systems. These systems concentrate water into a small area, often causing erosion on hilly terrain before enough water can be applied to meet crop needs.

The team will document the effectiveness of conservation tillage practice that could reduce the problem in this three-year University of Nebraska Foundation funded project.

--Agricultural engineer James Gilley and agricultural economist Ray Supalla received \$38,500 to determine the potential financial benefits and energy savings of alternative irrigation management practices, which include the use of low-pressure sprinklers and irrigation scheduling techniques. They will also study efficiently designed wells and pipeline systems in their two-year research project.

--Mechanical engineer Donald Johnson at UNL will determine the service life of irrigation equipment exposed to nitrates and other corrosive substances in a one-year, \$1,600 project the foundation funded.

--UNL Law Professor Richard Harnsberger was awarded a \$10,000 grant to write a book that will review Nebraska water laws and update recent developments. The book will be helpful to legislators, planners, water users, environmental groups and others concerned about water.

The grants were awarded through the University of Nebraska Foundation's recently created Agricultural and Water Research Fund.

1980 River Basin Proceedings Published

Unified River Basin Management, the proceedings of a May, 1980 symposium in Gatlinburg, Tennessee has recently been published.

Three of the papers in the proceedings were authored by members of the Nebraska water resources community. Carroll M. Hamon, and John W. Neuberger co-authored "Planning for Integrated Management of Water and Related Land Resources in the Platte River Basin of Nebraska".

Hamon is the executive secretary of the recently formed Missouri Basin States Association. Neuberger, a former director of the Nebraska Department of Water Resources, is now with the Northern Plains Natural Gas Co. in Omaha.

Richard D. Kennedy and James R. Cook of the Natural Resources Commission contributed "Managing Water Resources Through Natural Resources Districts". M.-L. Quinn of the Water Resources Center wrote "Incrementalism--An Alternative Strategy to Comprehensive River Basin Planning". Reprints of the Quinn paper are available at the Water Resources Center.

Copies of the proceedings can be obtained from the American Water Resources Assoc.; St. Anthony Falls Hydraulic Lab; Mississippi River at 3rd Ave. SE; Minneapolis, MN 55404-2195

Water Planning Update

The Water Resources Center has been busy over the past several months providing research assistance for the Nebraska State Water Planning and Review Process.

The legislature established the process in 1978 to help state policy makers reach wise decisions regarding water conservation and use.

The Nebraska Natural Resources Commission coordinates the planning effort, and eight other agencies participate, including the center and the UNL Conservation and Survey Division.

Planning task forces were formed and eleven policy issues identified for detailed study. A study that examined instream flow needs was recently completed and released for public review in November. The report presented alternative policies on how some instream flow values (such as fish and wildlife, stock watering and aesthetics) might be addressed by administrative or legislative means. NWRC staff and associated UNL faculty helped develop and evaluate the policy options.

Another report, also released in November, discussed ways to manage Nebraska's groundwater supplies. This study was undertaken to help resolve questions associated with groundwater development. As with the instream flow study, the center was heavily involved in the groundwater task force study. The center chaired a work group of the task force, which developed and evaluated legislative policy options addressing groundwater use.

The Water Resources Center is leading the water use efficiency task force study. The study, begun in 1980 and scheduled for com-

pletion in 1984, will look at ways water users can conserve without sacrificing productivity.

--Robert E. Burns
Water Resources Planner

Irrigation Short Course in January

A cornucopia of irrigation topics will be offered in the Annual Nebraska Irrigation Short Course scheduled on Jan. 25-26 in Lincoln at the UNL Nebraska Center for Continuing Education.

The NU Institute of Agriculture and Natural Resources sponsors the event, which draws hundreds of participants. IANR scientists and extension specialists will present many of the topics.

For more information and registration forms, contact the Dept. of Agricultural Engineering, UNL East Campus, Lincoln, NE 68583- 0726.

Expect Lake McConaughy Report Soon

The Nebraska Game and Parks Commission will soon publish The Physical and Chemical Limnology of Lake McConaughy with Reference to Fisheries Management.

Melvin W. Taylor and Kit M. Hams authored the report, which presents data collected for 18 parameters from 10 stations.

The study was funded by the U.S. Dept. of Interior through the provisions of the Water Resources Research Act, and the Federal Aid in Sport Fish Restoration.

NWRC Staffer Now Fellow at UNL Great Plains Center

NWRC staff member M.-L. Quinn was recently elected as a Fellow to the Center for Great Plains Studies. The center, located on the UNL city campus, is now producing a complete edition of Lewis and Clark's journals, and publishes Great Plains Quarterly. The center also sponsors a monthly seminar as well as many other plains-related activities.

M.-L. reports that Water Current readers may be interested in the center's April 22 seminar featuring UNL extension agricultural economist Paul Gessaman. His talk is about water management issues in the Great Plains.

Other scheduled seminars are:

--Jan. 21; Plains Life in Very Ancient Times: Two Centuries of Fossil Hunting in the Niobrara Valley; Michael Voorhies, Morrill Hall State Museum.

--Feb. 25; Plains Pre-History: A Paleo Indian Site in Ash Hollow, Nebraska; Thomas Myers, Morrill Hall State Museum.

--March 11; Great Plains Theatre and Drama: A Perspective; Tice Miller, UNL Theatre Arts

--March 18-20; Great Plains Center Annual Symposium

--May 6; Romantic Science: Prince Maximilian and Carl Bodmer on the Missouri River; Joseph Porter, Joslyn Art Museum.

For more information, the center's phone number is 472-2865.

An Item of Interest From the Director

I received a letter from the World Meteorological Organization asking if the university had any staff member interested in partici-

pating in a Hydrologic Operational Multipurpose Subprogramme (HOMS).

HOMS involves 45 nations, which exchange and install operational hydrologic techniques. Those interested in participating would make themselves available for assignment to countries requesting their consulting expertise. Assignments will usually be for one month or less, with travel, per diem and a consultant's fee paid.

The World Meteorological Organization published a HOMS Reference Manual, which is a compendium of abstracts of the operational hydrologic techniques available for exchange. The manual lists techniques such as network designs for measuring river stages; weather parameters; river flow velocities; remote sensing; methods of observing water quality, sediment, groundwater, evaporation and snow depth; data transmission; data storage; and primary data processing. Interested staff members may possibly add techniques to the manual.

Please contact me if you are interested, or want more information about HOMS.

--William L. Powers
NWRC Director

WATER CURRENT

Water Current is published by the Water Resources Center, which is a division of the Institute of Agriculture and Natural Resources at the University of Nebraska-Lincoln.

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RESEARCH REVIEW

PROJECT TITLE: Distribution of Nitrogen Under Native Range Cultivated Fields in the Nebraska Sandhills.

PRINCIPAL INVESTIGATOR: Gary W. Hergert, Assoc. Professor of Agronomy, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln.

The objectives of this project were:

(1) Determine the distribution of nitrate-nitrogen and ammonium nitrogen from the soil surface to the water table under irrigated fields and adjacent native range sites at the UN Sandhills Agricultural Laboratory;

(2) Determine the time required to move appreciable dissolved solute from the soil surface to the water table; and

(3) Use the above information and other soil lithologic and physical properties to develop or refine computer models describing movement of water and solutes under a variety of crop, fertilizer N and water application situations in the Nebraska Sandhills.

Nine different areas have been sampled to the water table since the project began. Three holes per site were taken with the intent of averaging the measured parameters of nitrate-N, ammonium-N gravimetric moisture content, pH and chloride over holes by depth. Hole to hole variability at a given depth was not too large in most instances. Variation was greatest in the upper 40 feet due to soil textural differences

caused by shifting of sands in the recent geological past.

The irrigation and N fertilizer application history of each site was documented. Only slight differences between nitrate-N under alfalfa and its adjacent native range were evident. A substantial difference between nitrate-N distributions under the irrigated cool season grass and its adjacent native range was found, however. The soil under the grass was enriched in nitrate-N compared to the native range to a depth of 22 feet. Since the cool season grass was only irrigated from 1975-1977, the bulk of the movement probably occurred in three years, at an average rate of seven feet per year. Definite nitrate enrichment under irrigated corn compared to native range was shown to a 50-foot depth. Average movement of a nitrate bulge under the corn between spring 1980 and spring 1981 was seven feet. For the total seven-year cropping history, average rate of N movement was also seven feet per year.

This data can provide a good data base for verifying models used to predict nitrate-N movement under various crops grown on deep, very sandy soil. This type of information is needed, along with recharge data, to predict future changes in groundwater quality for areas of the Nebraska Sandhills under cultivation.

Nebraska Could Add Muscle to Interstate Water Negotiations

Nebraska would have more bargaining chips in interstate water negotiations by legally recognizing established uses of surface water, claims J. David Aiken a UNL extension water law specialist.

He says that surface water rights for groundwater recharge, maintaining fish and wildlife habitat, and recreation in Nebraska are unclear or non-existent in state water laws.

"Courts would resolve any dispute by first determining how much streamflow a state has appropriated to satisfy legal water rights," the UNL extension specialist says.

"It would be in the state's best interest to appropriate as much water as it can to as many uses as possible."

Since older water rights generally have precedence in legal disputes, Aiken says the earliest possible priority dates should be assigned to unprotected uses. This will give Nebraska maximum leverage in interstate negotiations, but will also be controversial, he suggests.

"It's a sensitive subject for groundwater irrigators who may suddenly become junior appropriators to surface water uses if the idea of 'first in time, first in right' is applied to groundwater," the extension specialist believes.

The recent Natural Resources Commission report on water use preferences in Nebraska recommends that municipal recharge be recognized as a use of surface water, Aiken adds.

The report, a result of the State Water Planning and Review Process that the NRC coordinates, will be submitted to the legislature.

Aiken notes that alternative ways of protecting instream flows for fish and wildlife, and recreational uses, were recently examined in another State Water Planning and Review Process study. Those alternatives, currently being reviewed by the Natural Resources Commission, will form the basis of a NRC report that recommends policy alternatives to state legislators.

"If we don't nail down some of these legal uses of surface water, Wyoming or Colorado could argue in court that even though these uses go on in Nebraska, they are not entitled to legal protection," he says. "They (Wyoming and Colorado) would have a good argument."

Job Announcements

---THE DEPARTMENT OF ENVIRONMENTAL Sciences at the University of Virginia is seeking applications for three tenure track assistant professorships beginning 9/82.

-Climatology/meteorology

-Environmental chemistry/geochemistry

-Water resources/hydrology

Applicants should have a Ph.D and expect to teach undergraduate and graduate level courses in their area of specialization, and pursue a vigorous research program within the context of an interdisciplinary department. A curriculum vitae, a brief statement of research interests and names of three references who can be contacted should be sent to George M. Hornberger, Dept. of Environmental Sciences, Clark Hall, University of Virginia, Charlottesville, Virginia 22903.

Laws Prevent Use of Permit System in Nebraska's Sandhills

The new, innovative permit system of regulating land use cannot be used to control irrigation development in Nebraska's Sandhills unless state statutes are changed, believes Paul Gessaman, a UNL extension agricultural economist.

The permit approach avoids writing a comprehensive local plan and zoning statutes. Nebraska laws, however, require a plan if a local government decides to initiate zoning.

Wyoming and Colorado now use the permit approach because it is more expedient than zoning. Both states must deal with rapid development because of the expanding energy industry and other pressures for growth.

The system's advocates contend that it reduces the number of public hearings, costly legal counsel and politics whenever changes in land use are sought.

Gessaman reports that the permit system is basically an objective checklist for determining if a proposed development will benefit a community.

"It is intended to supply incentives for desirable development as well as restrict undesirable land uses," the extension agricultural economist explains. A series of decision-making criteria form the basis of the checklist, he adds.

Unless statutes are written to allow the permit approach in Nebraska Gessaman says that rural zoning based on comprehensive planning, establishing Groundwater

Control Areas, and enacting mandatory conservation practices are the only possibilities available to local governments for regulating irrigation development.

Sheffield Optimistic About Irrigation

UNL extension agricultural economist Les Sheffield gave a bright outlook for the future of irrigation at the recent U.S. Dept. of Agriculture Annual Outlook Conference in Washington D.C.

Sheffield, quoting figures from the federally commissioned High Plains Ogallala Aquifer Study, said that the number of irrigated acres in Nebraska could expand to between 12 and 15 million by 2020.

During the 1970s, the amount of irrigated land in Nebraska increased from about four to 7.2 million acres, generating \$7.2 billion of economic impacts, he added.

Although optimistic about the future, Sheffield said some Great Plains states face serious problems because irrigation development has depleted groundwater supplies. Groundwater declines have also been recorded in areas of Nebraska.

"It is imperative that greater attention and high priority be given to the conservation and efficient utilization of our nation's invaluable water and land resources," he stressed.

He agreed that controversial center-pivot irrigation development in the Sandhills region will not be an "easy thing" because of wind erosion.

Fischbach Predicts Irrigation Scheduling Will Catch On

Irrigation scheduling will be used on 95 percent of Nebraska's 7.4 million acres of irrigated farmland because of the savings gained from this water conservation practice.

That's the prediction of Paul Fischbach, UNL extension irrigation specialist. He says "money matters alone make me sure of it", but will not speculate when scheduling will become a standard practice.

Fischbach estimates that the \$2.50 an acre farmers would pay for irrigation scheduling can trim 35 percent off the cost of water use and fuel bills.

"At present day prices, I figure that farmers using gated pipe can save \$18 an acre in fuel and nitrogen and \$32 an acre for those who irrigate with center pivots."

"We're talking about \$178 million a year for Nebraska's agriculture," he stresses, noting that \$123 million would be saved in fuel to power pumps, \$55 million in fertilizers, as well as 54 million acre inches of water.

Farmers presently schedule irrigations on about two million Nebraska acres, Fischbach says.

"It takes money and effort to start scheduling," he concedes. "Many farmers are now aware of scheduling, but present economic conditions and the effort needed to get started inhibit its use in some cases."

Fischbach cites years of research at UNL Institute of Agriculture and Natural Resources field laboratory at Mead, and at North Platte, showing that eight to 12 acre-inches of irrigation water

generally produced maximum corn yields. Most irrigators presently apply 15-20 acre inches of water to their corn during dry years.

"The dollars farmers save by using less energy and fertilizer will motivate them to schedule irrigation on most of those 7.4 million acres," he re-emphasizes.

Comments Wanted on Newsletter Format

I have assumed editing duties for Water Current from Karen Stork, who says she has been editor for "longer than she can remember". Our records show that Karen landed the editing job in 1976, and, if I might add, has done an excellent job during those five years. Karen will continue keeping NWRC in top running order as its administrative assistant now that she no longer must contend with the pressing deadline of this newsletter.

You've probably noticed the changed format and content of Water Current. The column approach, makes for easier reading. I hope you agree. There is also less of a focus on what is happening at the federal level with water, and more of Nebraska's water situation. If you miss the federal news, or have other comments about the content and format of Water Current, please contact me.

Finally the NWRC staff (Karen, Bill Powers, M.-L. Quinn, Bob Burns, Denis Gilbert, Donn Rodekoher, Sue Miller, Barb Mitchell, Danita Bright, Mary Piccolo, and I) want to wish you a happy holiday season.

--Dan Himsworth
Editor

The Institute of Agriculture and Natural Resources provides information and educational programs to all people without regard to race, color or national origin.