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Water Current

January/February 1984

DIRECTOR'S REPORT

The 1984 Nebraska Water Conference will be held March 14-15 at the Nebraska Center for Continuing Education in Lincoln, NE. The theme for the 1984 conference is "*The Future of Water Management in Nebraska: Developing a Consensus.*"

Future water management depends upon a consensus of interested parties and available financing. This year's conference will provide an opportunity for various groups to present differing viewpoints related to the development and wise use of Nebraska's water resources.

The conference is divided into three main sessions: (1) concurrent water activity sections on federal agency updates, legislative and statistical update, and state and regional activities; (2) finance and economics of water projects; and (3) riverine habitat management. The keynote address will be presented by Leonard Wilson, State Planning Director for the State of Vermont. Governor Robert Kerrey will speak at the conference luncheon on Wednesday, March 14.

The conference pre-registration fee is \$55, with a registration fee of \$60 on the day of the conference. The public is invited to attend.

For additional information on the conference program, contact the Nebraska Water Resources Center. To register for the conference, contact Department of Conferences and Institutes, 205 Nebraska Center, University of Nebraska, Lincoln, NE 68583-0900.



NEBRASKA WATER RESOURCES CENTER

WATER POLICY ALTERNATIVES

Governor Bob Kerrey introduced his water bill LB 1106 when the Legislature's Public Works Committee met February 2. LB 1108 and LB 1109 were introduced also. Kerrey called his bill a chance for Nebraska to move forward in water management after years of stagnation.

"Nebraska appears to be at the crossroads in the management of our water resources. The bill represents a consensus — a compromise of diverse interests," Kerrey said.

According to J. David Aiken, NU water law specialist, "LB 1106 is historic in the sense it is the only major piece of water legislation introduced by a governor in recent history, and perhaps the only major water bill introduced by any Nebraska governor."

Committee Chairman Sen. Loran Schmit, Bellwood, said there was no consensus on LB 1106, but he hoped for some type of compromise bill during this session of the Legislature.

LB 1106, based on recommendations of Gov. Kerrey's Water Independence Congress, would: (1) establish a Water Management Board; (2) establish a Director of Natural Resources (appointed by the Governor) to replace the Natural Resources Commission executive secretary; (3) create a Nebraska Water Management Fund for water development projects; (4) require large surface water appropriations to be evaluated by the Water Management Board; (5) authorize NRC instream flow, fish and wildlife appropriations; and (6) require natural resource districts to prepare and implement groundwater management plans.

Instream flow provisions in LB 1106 were supported by the Nebraska Game and Parks Commission as necessary to protect fish and wildlife that use rivers and streams. Environmental groups supported the instream flow provisions as "a first step in the preservation of streams." About half of Nebraska's 24 natural resources districts were represented at the early February hearing. They, and the Natural Resources Commission, opposed the bill's instream flow provisions.

LB 1108, Sen. Schmit's alternative to the governor's LB 1106, would leave things the way they currently exist. The governor would, therefore, have less involvement in water allocation and project financing under LB 1108 which contains many of the provisions that are included in LB 1106.

And LB 1109 is Sen. Schmit's alternative to the instream flow provisions of LB 1106. It would specify that domestic, agricultural and manufacturing water uses would be considered legally superior to instream appropriations. Aiken points out that in LB 1109, if irrigation project sponsors needed to acquire an instream flow appropriation from the state in order to have enough water for the project, they could do so only by paying just compensation, or through condemnation proceedings.

The Nebraska Game and Parks Commission would not identify stream segments with fish and wildlife values in LB 1109. LB 1106 would authorize releases of stored water to direct streamflow appropriations for fish and wildlife purposes and would put instream appropriations on a legal par with agricultural and manufacturing appropriations. LB 1109 would subordinate instream appropriations to domestic, agricultural and manufacturing water use preferences, Aiken said.

Other related bills which would include financing water projects are LB 1110 for a \$10 million per year allocation and LR 244, a constitutional amendment which would allow the state to issue bonds for water projects.

Pat Larsen
Communications Associate

COMPUTERIZED PIVOT MANAGEMENT TESTED

Computerized monitoring and control of center pivot irrigation systems may save labor, energy and other management costs for Nebraska operators in the near future. LaVerne Stetson, professor of agricultural engineering with the USDA Agricultural Research Service (ARS) at the University of Nebraska-Lincoln, said a 15-pivot computerized management system has been successfully field tested. The computer system integrates four distinct management functions: monitoring, pump control (start up and shut-off), irrigation scheduling and electric load control. The system appears to have potential value to practically all irrigators with center pivots, Stetson said, particularly those relying on electric power who can get reduced rates for participating in load control programs.

The system consists of a microcomputer located in the farm office, remote terminal units with microprocessors and two-way radios mounted on each of the 15 pivots, and an automated weather station with sensors for measuring solar radiation, temperature, humidity and wind movement located near the center of the farm. Rain gauges mounted above the sprinklers measure precipitation on each of the fields.

The computer polls the weather station and each of the 15 center pivot systems at 15-minute intervals around the clock, Stetson said. The information gathered includes the presence or absence of pressure in the pivot pipeline, the amount of precipitation received by the field, the position of the control relay (on or off), and the position of a bypass switch (which allows on-site control of the pivot). This information is then stored in the microcomputer and can be recalled later to determine operating times and to calculate the total water applied to each of the irrigated fields. An alarm system enables the computer to notify the operator of any system malfunctions or unscheduled shut-downs.

Stetson said the irrigator can start and stop any system from the keyboard of the microcomputer or he can schedule a date and time for the pivot to be started or stopped. The farm foreman has estimated a savings of three hours and 60 miles of driving a day by relying on the computer. Now all pumps can be started in about 15 minutes, as compared with two hours when manual start-up was necessary, and a quick glance at the computer terminal can tell him anytime what is happening and where.

The computer system can also reduce pumping costs, Stetson said. Significant increases in electrical demand have occurred in much of Nebraska and Colorado during the recent expansion of center pivot irrigation systems, and as a result, electric power suppliers have been forced to add transmission and generation capacity to meet the higher peak demands during the irrigation season. Many of these suppliers have introduced load control programs to reduce these peak demands and have offered lower rates to irrigators who allow the supplier to interrupt power during peak demand hours. But as currently practiced in the High Plains, these load control programs give the irrigators little or no control over which irrigation pumps are interrupted. As plant water needs can vary from field to field, this can result in crop water stress or over-irrigation on some fields.

The computer's integrated load control and irrigation scheduling system allows the irrigator control over which pivot systems are stopped. The computerized scheduling program calculates an order of priority for implementing load control should an interruption signal be received from the power supplier. Stetson noted that when this signal is received by the computer, systems are shut down according to which fields can most afford a delay in watering.

No detailed analysis has been done on expanded use of computerized pivot systems, Stetson said. However, he projected that the use of similar systems could become economical for many irrigators, particularly where substantial energy costs could be reduced.

FEDERAL WATER PUBLICATIONS

The U.S. Geological Survey has recently released a publication entitled *National Water Summary 1983 - Hydrologic Events and Issues*, which discusses changes and trends in the availability, quantity, quality and use of water resources. This summary provides both an hydrologic and state perspective on water issues.

The central discussion of the publication is devoted to an analysis and mapping of state water issues provided through contact with hundreds of state and federal officials. Four categories of water issues are outlined: (1) water availability; (2) water quality; (3) hydrologic hazards and land use; and (4) management issues.

Another new publication entitled *Water in America 1983* prepared by the now abolished Office of Water Policy in the U.S. Department of Interior adds policy analysis to several of the national management and development issues raised in the Summary.

Like the Summary, this report focuses on the need for future water development, but the primary discussion is on "the urgent need for new mechanisms for funding." Several innovative ideas are discussed including a national water development bank, special tax treatment of water development bonds, loan guarantees, and block grants.

Copies of *National Water Summary 1983 - Hydrologic Events and Issues* (USGS Supply Paper 2250) are available for \$9 from the Branch of Distribution, Text Products Section, USGS, 604 South Picket St., Alexandria, VA 22304. Copies of *Water in America 1983* may be obtained from the Director, Office of Policy Analysis, Department of Interior, Washington, D. C. 20240.

RESEARCH REVIEW

Project Title: *Water Conservation Through Limited Irrigation of Corn and Grain Sorghum in the Great Plains*

Principal Investigator: *Darrell G. Watts, Assoc. Professor, Department of Agricultural Engineering, UNL*

The overall purpose of this project was to conduct agronomic and economic evaluation of the potential of limited irrigation of corn and grain sorghum for conserving and extending water supplies in the central Great Plains. Specific objectives were: (1) develop production functions of relative yields vs relative evapotranspiration for selected corn and grain sorghum genotypes; (2) evaluate the transferability of the production functions from objective #1 to other geographic (climatic) areas and/or soil types; (3) determine the extent to which water use efficiency of both corn and sorghum (under conditions of limited water availability) can be increased through stress conditioning and other management procedures; and (4) evaluate alternative farm management strategies for maximizing farm income under limited water availability conditions.

The line source sprinkler gradient irrigation system, as modified with two lines on opposite sides of the plots, has proven to be a useful research method for limited irrigation studies with a relatively small land area. Using this system, research was conducted on the responses of corn and sorghum to limited irrigation at two locations—the Sandhills Agricultural Laboratory in west central Nebraska, and the Rogers Memorial Farm near Lincoln, NE.

A high linearity was found in the relationship between yield and evapotranspiration (ET) at both locations and with both crops. The maximum yields in 1981 were obtained with less ET than in 1980, and the slope for yield reductions with decreased ET (limited irrigation) was greater in 1980 than in 1981. Higher mean relative humidity in 1981 may have contributed to this. When a factor was added to account for the effect of the relative humidity, the yield reductions became nearly constant.

Since project data shows that the yield-ET regression is usually linear, a water supply which fails to meet the conditions for full ET demand would be expected to reduce yields. The rate of reduction, or slope of the regression, may differ with environment, crop and variety.

When ET-yield functions were normalized and expressed on a relative basis, the slopes for all varieties of a specific crop and at a particular location were very similar. In fact, the slopes for corn and sorghum were also similar for locations and years. However, on an actual yield-ET basis, differences in genotypes were apparent.

The difference in the responses of corn and sorghum was most obvious under conditions of low irrigation or when drought stress occurred. Particularly in 1980, when a wider range of ET occurred, the slopes of ET on yield were considerably higher (steeper) for corn than sorghum. At higher ET values, corn equaled or exceeded sorghum yields. On the basis of these results, grain sorghum should, therefore, be considered when conditions mandate a low level of limited irrigation.

CALLS FOR PAPERS

National Symposium on Erosion and Soil Productivity

The American Society of Agricultural Engineers is sponsoring a National Symposium on Erosion and Soil Productivity to be held December 10-11, 1984 in New Orleans, Louisiana. The purpose of the symposium is to disseminate information on the effects of soil erosion on soil productivity, including techniques for quantitative assessments, site specific and regional effects, and methods for maintaining productivity.

Papers are invited on the following general topics: (1) quantifying effects of erosion on soil productivity — quantifying erosion, characterizing soil productivity, techniques for separating technology and erosion, national and local significance of erosion damage; (2) maintaining productivity on eroded land — fertility, tillage, rotations, structural means, assigning priorities and selecting efficient remedies; and (3) reclaiming severely eroded land — fertility, reshaping, structural means, revegetation, economics. Presentation proposals should be submitted by MARCH 1, 1984, on specific proposal forms. Abstracts should not exceed the space provided and should summarize the contents of the proposed paper.

To obtain proposal forms and for additional information, contact Clarence W. Richardson, Program Chairman, USDA-ARS, P. O. Box 748, Temple, TX 76503.

Ogallala Aquifer Symposium II

The second Ogallala Aquifer Symposium will be held June 4-7, 1984 in Lubbock, Texas. Technical papers are solicited on subjects relevant to the water resources of the Ogallala Aquifer.

Examples of topic areas for which abstracts will be accepted include: hydrologic characteristics, geologic characteristics, aquifer recharge, water and contaminant sampling and transport, augmentation/conservation, modeling, economic consideration, and development/decline.

The deadline for submitting abstracts is MARCH 1, 1984. Authors will be notified by April 1, 1984. Abstracts from 300 to 500 words should be sent to either of the technical program co-chairmen: Dr. Bill Claborn, Texas Tech University, Box 4630, Lubbock, TX 79409; or Mr. Don Smith, High Plains Underground Water Conservation District No. 1, 2930 Avenue Q, Lubbock, TX 79405.

International Symposium on Lake and Watershed Management

An International Symposium on Lake and Watershed Management: Local Involvement, sponsored by the North American Lake Management Society (NALMS), will be held October 16-19, 1984 in McAfee, New Jersey. The symposium will present material relating to lake/watershed management techniques and research oriented toward management goals, including grass roots participation.

Abstracts of not more than one double-spaced page are being solicited. The following topic codes will be used to identify papers: A1, Water Quality Assessment Methods; A2, Restoration Techniques; A3, Quality Criteria and Standards; A4, Economic Benefits of Improving Water Quality; B1, Point Source Pollution Control Techniques; B2, Waste Load Allocation Techniques; B3, Nonpoint Source Pollution Control Techniques; B4, Watershed Management; B5, Land Use Options for Management Purposes; C1, Modeling Techniques and Innovations; C2, Toxics in Surface Waters; C3, Macrophyte Control; C4, Taste and Odor Control and Dynamics; C5, Biomanipulation Techniques; C6, Fishery Management; D1, Acidic Precipitation Effects on Surface Waters; D2, Agricultural Runoff and Water Quality; D3, Urban Runoff and Water Quality; D4, Mining Effects on Water Quality; E1, Political Realities of Lake Management; E2, The Role of Lake Associations and Watershed Districts; E3, Public Awareness and Education Concepts; E4, Distributional/Financial Options for Water Quality Management; E5, Case Studies on Successful Water Quality Improvements; E6, Case Studies on Trends of Eutrophication in Surface Waters; E7, Reservoirs and Lakes — Similar or Dissimilar; and F1, Other (specify).

Abstracts must be submitted by APRIL 15, 1984 to Harry Gibbons, Jr., Dept. of Civil and Environmental Engineering, Washington State Univ., 141 Sloan Hall, Pullman, WA 99164-2912. For additional information, contact NALMS, 1815 "H" Street, N.W., Suite 1000, Washington, D. C. 20006. Telephone: (202) 833-3382.

MEETINGS AND CONFERENCES

- March 19-21, 1984 Design Installation and Sampling of Ground Water Monitoring Wells, a short course sponsored by the National Water Well Association (NWWA), Boulder, CO. For additional information, contact David Nielsen, Director of Research and Education, NWWA, 500 West Wilson Bridge Rd., Worthington, OH 43085. Telephone: (614) 846-9355.
- April 2-4, 1984 Second National Symposium and Exposition on Ground Water Instrumentation, sponsored by the National Water Well Assoc. (NWWA), Las Vegas, NV. Registration fee \$250 for NWWA members and \$300 for non-members. For additional information, contact David Nielsen, NWWA, at above address.
- April 8-11, 1984 13th Annual Rocky Mountain Ground Water Conference to be held in Great Falls, Montana. For additional information contact Wayne Van Voast, Montana Bureau of Mines and Geology, Room 111, Sixth Avenue Plaza, 3021 Sixth Avenue North, Billings, MT 59101.
- May 21-25, 1984 Water Quality Modeling Short Course to be held at Lake Tahoe, Nevada. Objectives are to define the need and justification for water quality criteria, establish constraints imposed by current regulations, present fundamentals of modeling techniques, and demonstrate their applicability to rational solution of water quality management problems. For additional information contact R.H. French, Water Resources Center, Desert Research Institute, 1500 East Tropicana Ave., Suite 201, Las Vegas, NV 89109. Telephone: (702) 798-8882.

JOB ANNOUNCEMENTS

Director, OSU Water Research Center

Oklahoma State University (OSU) is seeking applications for the position of Director of the Water Research Center. The Center conducts a comprehensive water research program that specifically addresses the management of Oklahoma's water resources, and is designed to effectively coordinate the water research efforts at OSU and to provide service to state agencies.

A Ph.D. degree with several years' experience in water resources is highly desirable. A record of effective interaction with governmental entities is important. Successful development of contract and grant programs and an outstanding publication record, as well as excellent communication skills are essential. Research administration and graduate level teaching experience are desired. Salary will be commensurate with qualifications.

Deadline for applications is March 1, 1984. Letter of application, resume, transcripts and a list of three references should be submitted to: Dr. W. A. Sibley, Oklahoma State University, 101 Whitehurst Hall, Stillwater, OK 74078.

Oklahoma State University is an Equal Opportunity Employer.

Manager of Equus Beds Groundwater Management District

The Equus Beds Groundwater Management District is seeking applicants for Manager of the district in south central Kansas. Applicants should have a B.S. or M.S. in geology, hydrology, natural resources management, or a related field and should have two or more years experience in their area of expertise. Experience in groundwater resource evaluation is desirable.

Salary range is from \$22,000 to \$26,000, but is negotiable based upon the qualifications of the individual. Applicants should send their qualifications, resume, salary requirements, and other supporting information to the Equus Beds Groundwater Management District No. 2, 243 Main Street, Halstead, KS 67056.

PUBLICATIONS

The following publications have been received by the Water Resources Center during December 1983 and January 1984. They have been forwarded to C.Y. Thompson Library on UNL's East Campus for cataloging. Persons on campus may obtain the publications through UNL's library system. Others are encouraged to request copies they desire from the organization issuing the publication.

- (1) *Flood Control Effectiveness of Systems of Dual Purpose Detention Basins*, Project B-084, January 1983, Center for Coastal and Environmental Studies, Rutgers - The State University, New Brunswick, NJ 08903.
- (2) *Nitrogen Cycling and Phytoplankton Growth in the Neuse River, North Carolina*, Project A-126-NC, August 1983, Water Resources Research Institute, 124 Riddick Building, North Carolina State Univ., Raleigh, NC 27650.
- (3) *Water Resources Management in a Federal System: A Comparative Analysis*, Project B-135-NC, September 1983, Water Resources Research Institute, 124 Riddick Building, North Carolina State Univ., Raleigh, NC 27650.
- (4) *Proceedings from a Workshop on Research Needs Relating to soil Absorption of Wastewater*, August 1983, Environmental and Water Quality Engineering Program, Division of Civil and Environmental Engineering, National Science Foundation, Washington, D. C. 20550.
- (5) *Land Use, Nutrient Yield and Eutrophication in the Chowan River Basin*, Project B-127-NC, August 1983, Water Resources Research Institute, 124 Riddick Building, North Carolina State Univ., Raleigh, NC 27650.
- (6) *Microbial Attachment Properties in Expanded-Bed, Activated Carbon Anaerobic Filters*, Project A-111-ILL, October 1983, Dept. of Civil Engineering, Univ. of Illinois, Urbana-Champaign, IL 61801.
- (7) *Nitrate Loss from Agricultural Drainage Waters: Implications for Nonpoint Source Control*, Project B-129-NC, September 1983, Water Resources Research Institute, 124 Riddick Bldg., North Carolina State Univ., Raleigh, NC 27650.
- (8) *Improved Methods and Guidelines for Modeling Stormwater Runoff from Surface Coal Mined Lands*, Project B-069-KY, 1983, Water Resources Research Institute, Univ. of Kentucky, Lexington, KY 40506.
- (9) *The Red River Gorge: The Existence of Recreational Niches and Their Management Implications*, Project A-079-KY, September 1983, Water Resources Research Institute, Univ. of Kentucky, Lexington, KY 40506.
- (10) *Water Requirement for Coal Slurry Transportation*, Project A-089-KY, Water Resources Research Institute, Univ. of Kentucky, Lexington, KY 40506.
- (11) *Use of Flumes in Measuring Discharge*, Book 3, Chapter A14, 1983, Distribution Branch, U.S. Geological Survey, 604 So. Pickett Street, Alexandria, VA 22304.
- (12) *State Laws Mandating Water Conservation*, Project A-066MD, August 1983, Maryland Water Resources Research Center, University of Maryland, College Park, MD 20742.

WATER CURRENT

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