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# Water Current

Millard W. Hall, Director  
Volume 10, Number 6

Karen E. Stork, Editor  
November/December, 1978

May your Christmas be merry,  
Your New Year the best,  
May the promise of peace on earth come true.

May the joy that is Christmas  
Continue through the year.  
Seasons Greetings from all of us to you . . .

## NWRC STAFF

*Barb Mitchell*      *Gary T. Lewis*      *Karen E. Stork*  
*Luth Dickinson*      *Don A. White*  
*M. L. Quinn*      *Theresa A. Bell*      *Ann Meyer*  
*Maurice V. Damm*  
*Dennis P. Miller*



FROM THE DESK OF THE DIRECTOR

They say time flies when you're having fun. Well it certainly has for me. Just a little over three years ago I was writing my first editorial for WATER CURRENT, as the new Director of the Center. Now, and what seems like only a moment later, I find myself writing my last editorial as Director. As many of you know, I've accepted a presidential appointment as Chairman of the Missouri River Basin Commission.

I'm looking forward eagerly to this challenging new assignment. It's one of the very few that could have induced me to leave the Water Center. I've enjoyed my time at the Center, I've enjoyed the people that I have been privileged to work with there and throughout the University of Nebraska and the State of Nebraska. My agenda for Center programs was not complete, and I was looking forward to more years of what I considered to be a productive association with the Center. In the final analysis, however, I felt compelled to seize an opportunity that comes but rarely.

In my first editorial I noted that my hope was to make the Nebraska Center the very best of its kind in terms of water resources research, training and public educational activities. All of you, and particularly the staff, the University faculty and the Center's executive and advisory committees have been very helpful in making what I consider to be significant strides toward this goal, and I sincerely thank you for this. But the seeking after excellence is a task that must go on at all times. I urge all of you, therefore, to continue to give to the Center and its new Director the kind of support that you have given it and me during my time in office.

Dr. Gary Lewis, my Assistant Director for most of the past three years, has already been named by the Board of Regents as Acting Director. I want to assure you of my feelings that the Center is in good hands under the directorship of Dr. Lewis. He is a thoughtful, hard working professional who thoroughly understands the Center, its objectives, its function and its programs. He can do the job. He will, however, need your help, as I have needed your help, if Nebraska is to take full advantage of the opportunity afforded it through the creation of the Water Center. I know that assistance will be forthcoming.

As a footnote, it might be of interest to you that I haven't left the State of Nebraska. My new office is in Omaha. And I continue to be interested in the water resources problems of Nebraska. I also continue to be interested in the many friends and acquaintances I have made in Nebraska during my time at the Center. I urge all of you to visit with me in Omaha, whenever you have an opportunity to do so.

Happy Holidays and a happy and prosperous new year!

Millard W. Hall

ON THE HOMEFRONT

PROPOSAL DEADLINES

Just a reminder that matching grant proposals in final form must be received by the Water Resources Center no later than December 29, 1978. These proposals must be submitted to the Office of Water Research and Technology (OWRT) by February 1, 1979, and this deadline will allow time to prepare final budgets and get all the necessary signatures.

Annual allotment proposals will be due in February 1979 for review by the Water Resources Center Executive Committee and submission to OWRT by May 1, 1979.

If you have any questions, contact the Water Resources Center, 310 Agricultural Hall, University of Nebraska, Lincoln, Nebraska 68583. Telephone (402) 472-3305.

WATER RESOURCES SEMINAR SERIES

Once again the Nebraska Water Resources Center will sponsor an Interdisciplinary Water Resources Seminar Series during the 1979 spring semester. The intent of these seminars is to bring together upper classmen, graduate students, professional persons, faculty and others interested in water topics.

This year the series will focus on "Current Water Resources Planning and Management Issues." The seminars will be held on Wednesday afternoons beginning on January 17, 1979 from 3:00 to 5:00 p.m. in the East Campus Union Building. The exact room will be listed each week on the activities calendar in the Union.

Students wishing to receive one or two hours credit should register, with their advisor's permission, in their departmental seminar and/or special studies course listings. Attendance and note-taking, along with specific reading assignments, will satisfy the one-hour requirement; a term paper will be an added requirement for anyone wishing to receive two credit hours.

A schedule of the seminar topics follows. For additional information, contact the Water Resources Center, extension 3305.

1979 WATER RESOURCES SEMINAR

<u>Dates</u>	<u>Topic</u>
January 17	Introduction to Seminar, Registration, Background
January 24	Federal and Regional Water Programs and Recent Issues, Options and Initiatives
January 31	Overview of Nebraska Water Issues and The State Water Planning and Review Process
February 7	Local Water Planning, Management and Regulation Issues
February 14	Interbasin Transfers and Conflicts
February 21	Conservation Facts and Fantasies
February 28	Water Supply and Allocation Issues and Instream Flow Values and Needs
March 7	International Water Problems: World Water and Food, Health, and Welfare
March 14	Nebraska Water Conference (March 15-16)
March 21	Class Discussion of Water Conference Issues
March 28	Spring Break (March 25 - April 1)
April 4	Ground and Surface Water User Conflicts
April 11	Water Quality and Quantity Conflicts
April 18	Urban and Flood Water Management Issues
April 25	Update: Administrative and Legislative Implementation of the National Water Policy Initiatives
May 2	Last Week of Classes - Student Papers
May 9	Final Exam Week - No Seminar this week

FY 1979 PROJECTS UNDERWAY

The following FY 1979 projects have been approved by the Office of Water Research and Technology, and work has begun or is continuing:

Allotment Program - Continuing Projects

- A-040-NEB Application of Enzyme Methods to the Determination of Pollutants in Water, Khem M. Shahani
- A-046-NEB Corrosion in Water Distribution Systems, Donald Johnson -
- A-048-NEB Development of a Multi-Objective Screening Model for Water Resources Planning in Nebraska, J. P. Dauer
- A-050-NEB Region-wide Irrigation Scheduling by Local Evapotranspiration Measurement, Walter L. Trimmer
- A-051-NEB Impact of an Introduced Fish Species (Morone americana) on the Fisheries Resources of Nebraska, Royce Ballinger and Edward J. Peters

Allotment Program - New Projects

- A-052-NEB Analysis of Legal and Institutional Arrangements Affecting Water Allocation and Use in Nebraska, J. David Aiken
- A-053-NEB Ferrate Ion: Potential Uses in Advanced Wastewater Treatment, James D. Carr
- A-054-NEB Variability in Crop Physiological and Morphological Characteristics Controlling Water Use Efficiency and Grain Yield, J.D. Eastin, C.Y. Sullivan, C.A. Francis
- A-055-NEB Empirically Derived Probability Estimates of Drought Parameters for the Western United States Back to 1700 A.D., Merlin P. Lawson
- A-056-NEB The Biological Regulation of Bloom-Causing Blue-Green Algae, Eugene L. Martin
- A-057-NEB Improvement of Irrigation Scheduling Techniques for Corn with Variable Corn Maturity Range, Plant Population and Water Supply Availability, Darrell G. Watts
- A-058-NEB Public Attitudes of Nebraskans Toward Water Policy, Susan Welch

Matching Grant - New Project

- B-048-NEB Water and Energy Conservation Using Center-Pivot Irrigation and Reduced Tillage Systems, James R. Gilley

## WATER RESOURCES IN NEBRASKA

### CONSERVATION AND SURVEY DIVISION

Chemical seepage from a tailwater recovery pit to adjacent groundwater has been analyzed by researchers from the Conservation and Survey Division, IANR and the Chemistry Department.

Ten tailwater recovery (reuse) pits and eighteen groundwater samples were analyzed for nitrate-nitrogen ( $\text{NO}_3\text{-N}$ ) and atrazine to ascertain concentrations of these heavily utilized products in surface runoff of irrigation water and groundwater beneath irrigated land in Merrick County, Nebraska. Atrazine concentrations in the reuse pit samples ranged from 1,000 to 23,000 ng/liter and in the groundwater samples from nil to 6,957 ng/liter. The significant correlation between  $\text{NO}_3\text{-N}$  and atrazine in the groundwater samples indicated that atrazine probably enters the groundwater by infiltrating the soil.

Addition of bromide and atrazine as spikes to water in an established reuse pit in hydraulic connection with groundwater indicates that the pit loses water by seepage into adjacent groundwater. Eighteen days after spiking, the bromide in downgradient shallow wells had approached one-half the pit values, and atrazine concentrations had increased at least 100 times above background concentrations. These results indicate that seepage from reuse pits during late spring and early summer probably increases the concentration of both  $\text{NO}_3\text{-N}$  and atrazine in groundwater. However, throughout the remainder of the year, when water in reuse pits generally contains less  $\text{NO}_3\text{-N}$  and atrazine, seepage from the pits probably tends to dilute the already relatively contaminated shallow groundwater.

Roy Spalding and Mary Exner (Conservation and Survey Division), Jim Sullivan (Geology Undergraduate), and P.S. Lyon (Chemistry Department) conducted the research.

### FEDERAL HIGHLIGHTS

#### 39 WATER RESEARCH GRANTS APPROVED BY OWRT

Thirty-nine water resources research proposals have been approved by the Office of Water Research and Technology (OWRT), with \$1,992,654 to be awarded to water research and development institutes in 25 states.

The dollar-for-dollar matching grant program is open to water resources scientists and engineers at colleges and universities, through the 54 water research and technology institutes located at land-grant universities in every state, District of Columbia, Guam, Puerto Rico, and the Virgin Islands. It is part of the newly-enacted Water Research and Development Act of 1978, Public Law 95-467, which combines and expands programs of two earlier Federal laws, providing Federal assistance for basic and applied water research at academic institutions, industry, and public and private water entities.

States where research is to be conducted, numbers of projects, and amounts of Federal matching funds are:

<u>State</u>	<u>Projects</u>	<u>Federal Funds</u>	<u>State</u>	<u>Projects</u>	<u>Federal Funds</u>
Alabama	1	\$47,000	Nevada	1	\$70,440
Arizona	1	49,183	New Hampshire	1	52,875
California	2	62,600	New Mexico	2	95,680
Colorado	1	49,455	North Carolina	3	128,311
Hawaii	1	39,772	Ohio	1	100,000
Idaho	2	97,903	Oklahoma	1	25,280
Illinois	1	138,904	Oregon	1	86,131
Kentucky	2	78,298	South Carolina	3	67,063
Maine	1	30,000	South Dakota	1	90,490
Massachusetts	1	50,556	Texas	1	26,482
Michigan	1	20,335	Utah	7	374,085
Minnesota	1	35,400	Virginia	1	54,864
Nebraska	1	121,547			
			Total	39	\$1,992,654

DISCOUNT RATE SET AT 6-7/8%

Leo M. Eisel, Director of the U.S. Water Resources Council, announced that the interest rate to be used by federal agencies in formulating and evaluating plans for water and related land resources will be 6-7/8 percent for the period October 1, 1978 through September 30, 1979.

The new rate is to be used by all federal agencies in plan formulation and evaluation of water and related land resources projects for the purpose of discounting future benefits and costs to a common time basis.

The rate is based on the average yield during the preceding fiscal year on interest-bearing marketable securities of the United States which have terms of 15 or more years remaining to maturity. However, the rate may rise by no more than a quarter percent in any year.

STUDY ON ENERGY CONSERVATION IN IRRIGATED AGRICULTURE

A recent article in The Ground Water Newsletter (October 31, 1978) noted that the Division of Energy Conservation of the Department of Energy has allocated \$1.5 million to increase energy efficiency in irrigation. The article mentioned a report written by Battelle Pacific Northwest Laboratory, entitled "The Analysis to Develop a Program for Energy Conservation in Irrigated Agriculture," which has been published to aid in the development of a program for use of these funds.

The study shows that while some irrigation occurs in all fifty states, 79 percent of the irrigated acreage lies within the boundaries of eleven states and that these states together use 89 percent of the total energy used



for irrigation nationally. In order of energy use these states are: Texas, Nebraska, Kansas, Arizona, New Mexico, California, Washington, Oklahoma, Idaho, Colorado and Oregon. As noted in the newsletter article, the report states that the technology to increase energy efficiency will depend on whether the source is surface water or ground water. Most of the water in Texas, Nebraska, Kansas, New Mexico and Oklahoma comes from ground water resources, and programs designed to increase well and pump efficiency would be the most effective in these locations. In addition, the adoption of energy conserving technology may depend on whether the water is distributed through an organization which can establish conservation requirements or by private individuals, in which case the price mechanism would be the most important factor. In Texas, Nebraska, Kansas, New Mexico and Oklahoma, most of the water is within the private sector. The report suggests that a detailed analysis of the irrigation economy with respect to energy be undertaken.

More than two-thirds of the total energy used in irrigation is consumed in pumping water from the source to field level. Other facts and conclusions summarized by the report are: Texas uses more than twice as much energy to irrigate its crops than any other state; most of the energy is in the form of LPG and natural gas; Nebraska, the second largest user of energy, uses more LPG than any other state and is the leading user of diesel fuel to irrigate; California uses electricity mostly; and energy consumption for irrigation tends to be crop specific. Therefore, study projects should be selected which are applicable to the production of sorghum, cotton, wheat, corn and alfalfa.

For a copy of this report, PNL 2694 UC-95f, or further information, contact: Battelle Pacific Northwest Laboratory, Richland, Washington 99352; or NTIS, 5285 Port Royal Road, Springfield, Virginia 22161.

## CONFERENCES

### SEMINAR ON SYSTEMS APPLICATIONS TO WATER RESOURCES AND ENVIRONMENTAL PLANNING AND MANAGEMENT

The University of Minnesota is presenting a seminar entitled "Systems Applications to Water Resources and Environmental Planning and Management" on January 30-February 2, 1979 at the Earle Brown Conference Center on the University of Minnesota's St. Paul Campus.

The seminar will include presentations on the systems approach as a planning tool in numerous water-related areas such as those required by P.L. 92-500. State-of-the-art case studies, optimization techniques such as linear and dynamic programming, solutions to simple and hypothetical planning problems, and panel discussions of regional issues by representatives of federal, state and local agencies are also included.

Highlights of the seminar are addresses on water issues within the state and region, a keynote address by Dr. Warren Viessman, Jr. of the Library of Congress Environmental Policy Division and a summary address by Dr. David Marks of the Ralph M. Parsons Laboratory for Water Resources and Hydrodynamics at the Massachusetts Institute of Technology.

Further information regarding the seminar can be obtained by writing to: John S. Vollum, Program Director, University of Minnesota, Department of Conferences, 222 Nolte Center, 315 Pillsbury Drive S.E., Minneapolis, Minnesota 55455. Telephone (612) 373-3157.

#### THIRD INTERNATIONAL CONGRESS ON WATER RESOURCES

The Third International Congress on Water Resources will be held April 23-27, 1979 in Mexico City. The central theme will be WATER FOR HUMAN SURVIVAL. Topics for discussion will include water for food production, water for energy production, water and rural development, education and research on water resources, and water problems in modern society.

The deadline for submitting papers for presentation at this conference is February 15, 1979. For additional information on preparation of manuscripts for this conference, contact: III Congreso Mundial Sobre Aprovechamientos Hidraulicos Comité Organizador, Apartado Postal 19-434, Mexico, D.F. A copy of the general instructions for preparation of manuscripts may also be obtained from the Nebraska Water Resources Center, 310 Agricultural Hall, University of Nebraska, Lincoln, Nebraska 68583.

#### MITIGATION SYMPOSIUM

A National Workshop on Mitigating Losses of Fish and Wildlife Habitats (The Mitigation Symposium) will be held at Fort Collins, Colorado, July 16-20, 1979. The event is sponsored by the American Fisheries Society, The American Society of Civil Engineers, the Wildlife Management Institute, and the Wildlife Society.

The losses of fish and wildlife habitat which occur as a result of development projects of many kinds, and land use changes, constitute a major national environmental problem. Of particular concern are the development projects of several agencies, including the Bureau of Reclamation, the Corps of Army Engineers, the Soil Conservation Service, the TVA, and some others. These habitat losses, sometimes necessary but sometimes preventable, are widely recognized as needing greater public attention to achieve better mitigation.

The purposes of the Symposium are to assess the magnitude of the problem and develop strategies and recommendations for achieving better mitigation, in the public interest. Sessions will deal with the problem in coastal as well as terrestrial and fresh water environments, and with all regions of the country.

For more information write Dr. Gustav A. Swanson, Program Director, The Mitigation Symposium, Fishery and Wildlife Biology, Colorado State University, Fort Collins, Colorado 80523.

## PUBLICATIONS

### NEW BOOK PUBLISHED BY WATER RESOURCES PUBLICATIONS

Water Resources Publications announces the availability of a new book entitled Water Resources and the National Welfare by Walter U. Garstka, consultant in hydrology and visiting professor in natural resources.

The book has been prepared as a broad-aspect reference work to serve as a textbook to assist in the preparation of courses to provide a working knowledge of the subject for those who will be responsible for the management of water and related natural resources. The book consists of 25 sections which include a total of 95 topics. The organization of the book and the contents of the topics are based upon teaching experience at both graduate and undergraduate levels. The presentation of the subject by topics has been found to be useful by consulting engineers. The list of references includes a total of 1,465 names.

The book is based essentially on lecture summaries written by the author while serving as Professor of Civil Engineering and Watershed Management at Colorado State University; Visiting Professor of Forest Hydrology at the Yale University School of Forestry and Environmental Studies; as Lecturer in Natural Resources at Ball State University, Muncie, Indiana; and as Visiting Professor in Hydrology and Water Resources and of Watershed Management at the University of Arizona at Tucson.

The cost of the book is \$24.00 and may be ordered from Water Resources Publications, P. O. Box 2841, Littleton, Colorado 80161.

## POSITIONS AVAILABLE

### FACULTY POSITION IN WATER RESOURCES ENGINEERING

A tenure-track position is available in the area of fluid mechanics, hydraulics, hydrology, and water resource systems at the University of Colorado. The candidate should have a doctorate in civil engineering with a specialty in the water resources field.

Responsibilities include undergraduate teaching of fluid mechanics, and graduate courses in hydrology, hydraulics, and water resources engineering. Expertise in application of systems analysis to water resources would be desirable. Candidates should be able to generate funded research, advise undergraduate and graduate students, and be involved in continuing education.

Applications should be sent to Dr. K.D. Linstedt, Chairman, Search Committee, Department of Civil, Environmental, and Architectural Engineering, University of Colorado, Boulder, CO 80309.

The University of Colorado Boulder is an affirmative action/equal opportunity, Section 504 employer.

#### CHEMICAL ENGINEERING POSITION

Case Western Reserve University announces an opening in the Department of Chemical Engineering for an assistant or associate professor. This is a tenure-track position. Research area is open, but preference will be given to candidates with specialization in water pollution or environmental engineering. Several years industrial or consulting experience desirable. This is an outstanding position in an expanding department for someone seeking to combine teaching with a strong research program.

Interested candidates should send resume and at least three references to: Professor John C. Angus, Chairman, Chemical Engineering Department, Case Western Reserve University, Cleveland, Ohio 44106.

Case Western is an Equal Opportunity/Affirmative Action Employer.

#### POSITIONS IN ENVIRONMENTAL AND WATER RESOURCES ENGINEERING

The Department of Civil Engineering at the University of Maryland has two openings for tenure-track Assistant Professorships in Environmental and Water Resources Engineering. The positions involve graduate and undergraduate teaching, supervision and counseling of graduate students and participation in sponsored research programs.

One position requires an individual with education and interests in problems of water and wastewater treatment. A background in advanced wastewater treatment, land application, toxic chemical treatment and unit operations would be desirable.

The second position requires an individual with education and interests in hydraulics, hydrology and/or water resource systems. Someone with qualifications in one of the following areas is desired: flood control, free surface flow, receiving water models, estuary hydrodynamics, hydrologic models, and water resources planning.

Interested individuals should send a complete resume to: Dr. Robert M. Ragan, Chairman, Department of Civil Engineering, University of Maryland, College Park, Maryland 20742.

The University of Maryland is an Equal Opportunities Employer.

#### CIVIL ENGINEERING GRADUATE ASSISTANTSHIPS

The Department of Civil Engineering at the State University of New York at Buffalo invites applications for graduate study and research in Water Resources and Environmental Engineering, Transportation and Societal Systems, and Structural and Geotechnical Engineering, leading to M.S. and Ph.D. degrees. Graduate assistantships are available beginning in September, 1979. Annual stipends vary from \$3,500 to \$5,500 and, in addition, usually provide for tuition waivers. For details and applications write to: Dr. Dale D. Meredith, Director of Graduate Studies, Department of Civil Engineering, State University of New York at Buffalo, Buffalo, New York 14214.

SUNY/Buffalo is an Equal Opportunity/Affirmative Action Employer.

GRADUATE STUDY IN HYDROLOGY WATER RESOURCES

The Department of Environmental Sciences at the University of Virginia offers an interdisciplinary program of graduate study with an option to specialize in hydrology and water resources. Advanced work in physical hydrology, transport processes, water resources planning and management is part of this program. Current research efforts include (1) The effect of spatial and temporal variability in rainfall on the runoff process; (2) The use of multilevel approaches in urban water quality planning; (3) Multi-objectives in water resources system analysis; (4) Analysis of effects of uncertainty in hydrologic models; (5) Transport of organic detritus and its impact on estuarine water quality; (6) Application of simplified soil-moisture models to catchment-scale prediction; and (7) Construction of sensitivity functions for large-scale water resources systems.

We invite applications from qualified students (undergraduate degree in science or engineering and a grade point average of at least 3.0) for this program in hydrology and water resources. Stipends in the form of fellowships and assistantships are available to qualified students. For further information, contact Dr. Prasanta Das, Department of Environmental Sciences, Clark Hall, University of Virginia, Charlottesville, VA 22903.

RESEARCH REVIEW

TITLE: Impact of an Introduced Fish Species (Morone americana)  
on the Fisheries Resources of Nebraska

PRINCIPAL INVESTIGATORS: Royce E. Ballinger, Assoc. Professor  
School of Life Sciences

Edward J. Peters, Ass't Professor  
Forestry, Fisheries & Wildlife

The objectives of this project are: (1) to determine the distribution and abundance of an introduced fish species, the white perch (Morone americana) in the Salt Creek drainage system; (2) to assess the impact which this introduced fish species might have on the fisheries resources of southeastern Nebraska; (3) to examine the ecological role of the white perch and the possible basis for its biological success in southeastern Nebraska; and (4) to recommend what management steps should be taken to minimize or eliminate the detrimental impact of the white perch on the fisheries resources of southeastern Nebraska.

Previous experience has shown that the introduced white perch can replace native species and thus destroy fishery resources in reservoirs of eastern Nebraska. To determine if similar events in river systems have or likely will occur, collections of over 18,000 fish from 102 localities in the Salt Valley system were made. To determine the initial mechanism of success by white perch in a reservoir, the feeding ecology and reproductive maturation were studied in Buckley Reservoir.

Results to date indicate that white perch are rare and not reproducing in the rivers, but a few old fish remain a threat to establishment of populations in reservoirs. White perch eat a wide range of foods and can apparently compete favorably with native fishes. The fact that sufficient energy reserves can be accumulated by fry in the first few months of life to permit reproduction in their first season permits this species to rapidly become established and dominate a reservoir once it is introduced there. Therefore, until all of the white perch have died from the river system, additional establishments may be possible. Fishermen and fisheries managers should be instructed to remove any white perch which they happen to catch or see in the streams to prevent these fish from becoming possible colonizers.

During 1979 selected stations in the Salt Creek system will be re-sampled for additional information of distributions of white perch. However, the principal effort will involve an analysis of the Buckley Reservoir population and an assessment on the probability of a reservoir serving as a source for distributing white perch by tracing the distribution of the fish in the Little Blue River and its tributaries.

#### NEWSLETTER ITEMS SOLICITED

The Water Current Newsletter will publish, without charge, announcements, programs for up-coming conferences, employment opportunities or other newsworthy items on hydrology, water resources or related topics. We will be happy to help advertise any water-related job openings in this newsletter. Please send any job openings you would like to have published to the editor, and we will see that they are advertised.

#### QUESTIONS AND INQUIRIES

Newsletter items and inquiries should be sent to: Editor, Nebraska Water Resources Center, 310 Agricultural Hall - East Campus, University of Nebraska, Lincoln, Nebraska 68583; or phone, (402) 472-3305.