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Researchers Pool Talents To Protect Nebraska's Premier Trout Fishing Locale

by Steve Ress

Nebraska's premier public rainbow trout fishery since the 1940s suffers a vexing problem. In late summer, the 650-acre lake suffers inexplicably low levels of dissolved oxygen contributing to fish kills. An interdisciplinary team of researchers have embarked on a project to try and solve this and other related problems.

"This is the first lake modeling study based on water flow and dissolved oxygen (DO) that I am aware of in Nebraska on such a large scale," said University of Nebraska-Lincoln lake ecologist Kyle Hoagland, one of five UNL researchers involved in an intensive, four-day study of the lake last summer.

Since UNL researchers have expertise in many of the areas needed to do the study, the Nebraska Game and Parks Commission contracted them to do the study. UNL in turn subcontracted with Jim Ruane who owns Reservoir Environmental Management of Chattanooga, TN since he is experienced in lake modeling and DO problems.

They and about 35 other researchers from the Game and Parks Commission, Nebraska Department of Environmental Quality, Central Nebraska Public Power and Irrigation District and Nebraska Public Power District want to determine what causes these DO and flow problems and find ways to alleviate them.

Unlike previous unrelated research, Hoagland said this study scrutinizes both water flow and dissolved

oxygen levels to help understand the problems. Hydrogen sulfide and ammonia from adjoining Lake McConaughy can exacerbate Lake Ogallala's low dissolved oxygen levels, further contributing to fish kills. Researchers theorize that water low in dissolved oxygen often flows through Lake Ogallala in well-defined waves, or "slugs," as water from adjoining Lake McConaughy is released into Lake Ogallala through Kingsley Dam, which separates the two.

Last summer, researchers intensively sampled the lake's water from four testing platforms on the lake and from 30 underwater sampling sites. Lake McConaughy sampling sites provided references to determine the quality of water entering Lake Ogallala.



An interdisciplinary research team is trying to identify and solve fish kill problems in Lake Ogallala that may be related to periodically low levels of dissolved oxygen in the lake. This view of the lake looks toward Kingsley Dam and Lake McConaughy (photo: Kyle Hoagland).

"The sampling was so intensive we had to sleep in four-hour shifts," Hoagland said.

To monitor water flow patterns, researchers injected traceable dye into Lake Ogallala and monitored its concentrations around the lake. Water samples and aerial photos provided additional clues to water flow patterns.

(continued on page 8)

INSIDE

- 3 Meet The Faculty
- 4 LB 699 Guest Column
- 4 30th Annual Water Conference
- 7 Water Tour Plans June Dates
- 7 Water News Briefs

USGS Water Research Grant Awards Announced; Annual Water Conference is March 12 in Grand Island

from the DIRECTOR



Kyle D. Hoagland

Each year the Water Center is fortunate to receive U.S. Geological Survey (USGS) 104(b) program funds, which serve several important functions in furthering water research and education efforts at the University of Nebraska.

A majority of these funds are used to support faculty research in water science. By law, the proposals are reviewed by a panel of scientists from several state and federal agencies, including the USGS, Nebraska Departments of Environmental Quality, Natural Resources, and Health, as well as by the Water Center. The projects funded typically are important both to Nebraska and the Great Plains region. Many times they have

national and international applications and they contribute to the overall goals and mission of the USGS.

Three proposals received funding this year. They represent a broad range of research disciplines and academic units across UNL. Vitaly Zlotnik and David Loope, Department of Geosciences; and Joseph Mason, Conservation and Survey Division (CSD) will conduct a study entitled, *Evaluation of conductive properties of the surficial aquifer in the Nebraska Sand Hills* to develop and test a new method for measuring the permeability of sandy sediments in the shallow aquifer of western Nebraska, particularly for areas currently inaccessible by conventional drilling and testing equipment.

Investigations of microbially-influenced copper corrosion in Nebraska drinking water systems by Matthew Morley and Bruce Dvorak, Department of Civil Engineering, will examine conditions under which copper corrosion can occur in small community drinking water systems and the specific role bacteria plays in this process. Copper pipe corrosion can be a problem in untreated rural water systems, so this research holds great promise in addressing a water issue of particular importance to rural Nebraska and the midwest.

Xun-Hong Chen and Jim Goeke, CSD (Chen is also in the School of Natural Resource Sciences), will conduct a study entitled *Investigation of the directional hydraulic conductivities of streambeds and evaluation of their roles in stream-aquifer interactions.*

This project will develop a novel method for more accurately measur-

ing stream-groundwater interactions in the Platte and Republican Rivers. Information produced by this method is currently quite scarce, yet it is an important component of every model used to predict stream-aquifer exchanges of water and contaminants.

We are excited about these projects for several reasons.

They represent a diverse cross-section of water science research disciplines and expertise at NU, they address problems with both basic and applied aspects and they look to develop new methods which can be applied to problems far beyond the life of the individual project.

A fundamental goal of the USGS 104 grant program is to provide modest seed money to stimulate research in new directions rather than fund entire, long-term research programs. This year's projects meet that goal.

Additionally, a majority of the funds for each project will be used to support and train graduate students. Thus, USGS 104-supported research also provides long-term benefits to water science research, education, and outreach.

We believe these research funds will be very well invested in terms of potential gain by the entire state and region and we heartily congratulate the recipients!

Other noteworthy accomplishments include another research paper published in the prestigious scientific journal, *Science*, by UNL water science faculty member

(Continued on page 6)

WATER CURRENT

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Meet the Faculty

Dr. James W. Merchant

Remote sensing/GIS specialist with interests in landscape ecology, management and conservation of natural resources, and biogeography. Professor and Associate Director, Center for Advanced Land Management Information Technologies (CALMIT), UNL School of Natural Resource Sciences and Conservation and Survey Division since 1989.

Education:

Ph.D. in Geography, University of Kansas, Lawrence, KS, 1984.
M.A. in Geography, University of Kansas, Lawrence, KS, 1973.
B.S. in Geography, Towson State University, Towson, MD, 1969.

Current Research/Extension Programs:

– Emphasis is on satellite remote sensing applied to land cover characterization; applications of remote sensing and geographic

information system (GIS) in land and water management; assessment of biodiversity.

- Current projects include: Nebraska Gap Analysis Program <http://www.calmit.unl.edu/gap/> assessment of the extent to which Nebraska's vertebrate biodiversity is sufficiently protected; funded by USGS. The STORM project (<http://www.calmit.unl.edu/storm/>) collaborative research with the NOAA Severe Storms Laboratory, Norman, OK, to assess means for improving numerical weather forecasts by incorporating land cover data in models; funded by NSF Land cover assessment with Landsat-7 collaborative research with USGS/EROS Data Center to explore applications of Landsat-7; funded by NASA Characterization and classification of Nebraska's lakes collaborative research with John Holz, Kyle Hoagland and other UNL faculty focusing on applications of remote sensing and



Jim Merchant

GIS in lake water quality assessment; funded by EPA and NDEQ.

- Associate Editor of the journal Photogrammetric Engineering and Remote Sensing

Teaching:

- NRES/GEOG 412/812 - Geographic Information Systems
- NRES/GEOG 418/818 - Introduction to Remote Sensing

(continued on page 5)

Dr. Alan S. Kolok

Animal Physiologist, Environmental Scientist and Assistant Professor, Department of Biology, University Nebraska at Omaha since 1998. Research focusing on determining the physiological mechanisms that allow individual fish to maintain performance after they have been



Alan Kolok

exposed to toxic compounds. Laboratory research currently being conducted to determine the physiological mechanisms associated with the observed resistance some individuals exhibit after toxic compound exposure.

Education:

- Ph.D. in EPO Biology, University of Colorado, Boulder 1991.
- M.S. in Fisheries and Oceanic Sciences, University of Washington, Seattle, 1982.
- B.S. in Zoology, Miami University, Oxford, OH, 1978.

Samples of Current Research:

- Laboratory research using non-lethal methods to designate resistant individuals from susceptible ones. Most other research in this field classifies the relative resistance of

individuals based upon whether the fish survive an exposure to a given toxic compound. In using non-lethal methods to discriminate between susceptible and resistant individuals, all individuals can be kept alive for subsequent physiological and genetic testing. This is essential if the physiology mechanisms underlying susceptibility and resistance are ever to be elucidated.

Other Recent Research:

- Ongoing projects emphasize the value of the approach discussed above. One involves the effects of methanol and ethylene glycol on the swim performance of Gulf of Mexico fishes. Research projects have found that Florida pompano are susceptible to ethylene glycol,

(continued on page 5)

LB699 As A Sales Tax for Natural Resources Programs

by Dean E. Edson,
Executive Director,
Nebraska Association of Resources Districts

Currently, less than two percent of the state budget goes toward management of Nebraska's natural resources. However, this year a large percentage of that will be spent defending Nebraska water rights. Since 1987, state funding for natural resource programs has been stagnant. Most recently, \$2.5 million in annual state funding for NRD water quality programs was eliminated.

During the past 10 years, natural resource issues have expanded more from local issues to basin-wide issues that require more attention and funding. Examples include, but are not limited to: 1.) The Platte River Cooperative Agreement, 2.) Republican River Basin Lawsuit, 3.) Blue River Basin Water Quality Issues, 4.) Lower Platte River Corridor management, 5.) Niobrara Scenic River, 6.) Elkhorn, Lower Platte and Loup River Basin Water quantity issues relating to Pallid Sturgeon needs and 7.) new programs such as total maximum daily loads (TMDLs) and livestock waste management.

Since the creation of the Nebraska Environmental Trust, demand for the program has increased significantly. During the past year, applications for projects exceeded \$40 million. However, slightly more than \$4.5 million is available this year for new projects. Thus, about one-tenth of project requests will be funded this year.

Resource development projects such as Lake Wanahoo near Wahoo, Antelope Valley in Lincoln, Sarpy County Dike near Omaha and the Platte River recharge project in central Nebraska will need almost \$30 million in funding over the next four fiscal years. Currently the appropriation level is slightly above \$2 million per year, far below the funds needs.

In the Nebraska Legislature this year, Senator Ed Schrock, Chairman of the Natural Resources Committee, introduced LB 699, which dedicates a quarter-cent

sales tax for natural resource programs and projects. These additional funds would be distributed to the following agencies: 1.) Nebraska Dept. of Natural Resources, 2.) Nebraska Dept. of Environmental Quality, 3.) University of Nebraska, 4.) Natural Resource Districts, 5.) Nebraska Game and Parks Commission, and 6.) Nebraska Environmental Trust.

The following programs would be funded under LB 699:

Program	Additional \$ (Est.)	Percentage
Nebraska Resources Development Fund	\$ 8 M	17.4
Soil and Water Conservation Fund	\$ 5 M	10.9
Small Watershed Fund	\$ 2 M	4.3
Urban Stormwater Drainage Planning & TMDLs	\$ 4 M	8.7
Water Quality Research at UNL	\$ 2 M	4.3
NRD Water Quality and Quantity Management	\$15 M	32.6
Wildlife Habitat Programs	\$ 2 M	4.3
Environmental Trust	\$ 8 M	17.4
	\$46 M	99.9%

Examples of incentives or voluntary cost-share programs in areas of water quality/quantity include: 1.) Conversion to efficient center pivot irrigation systems, 2.) cost-share with irrigation districts to improve water use efficiency and delivery, 3.) financing for basin issues such as the Platte River Cooperative Agreement, 4.) cost-share on Best Management Practices (BMPs) for farmers and ranchers, 5.) cost-share on livestock waste management systems, and 6.) cost-share on water meters.

Passage of this bill will be difficult in the current political climate of no new taxes. However, at the minimum, discussion of adequate state funding of Nebraska natural resource programs is needed. Senator Schrock needs to be commended and supported for his leadership on this issue.

For more information, contact Dean E. Edson, NARD Executive Director, 601 South 12th, Suite 201, Lincoln, NE 68508. Phone (402) 471-7674 or email dedson@nrddnet.org

30th Annual Water Conference Will Be Groundwater Quality Monitoring Workshop

The 30th annual Nebraska Water Conference will deviate from its customary format to present a one-day workshop devoted to groundwater quality monitoring on Monday, March 12 at the I-80 Holiday Inn, Grand Island.

"The workshop topic is something people have asked us to address and is intended for management and staff members of Natural Resources Districts, municipalities and irrigation districts," said J. Michael Jess, conference organizer and assistant director of the UNL Water Center.

Workshop sessions are scheduled from 9 a.m. to 3:45 p.m. Morning sessions will be devoted to discussions of monitoring objectives and purposes, by hydrogeologist and hydrochemist Ed Harvey, UNL Conservation and Survey Division; monitoring well siting considerations, by hydrogeologist and geochemist Dave Gosselin, UNL Conservation and Survey Division; and sampling, handling and analysis matters by Ray Ward, president, Ward Laboratories, Kearney.

(continued on page 6)

Meet the Faculty

Dr. James W. Merchant (continued from page 3)

Publications:

- Henebry, G. and J. Merchant, in press. Geospatial Data in Time: Limits and Prospects for Predicting Species Occurrences, chapter in *iPredicting Species Occurrences: Issues of Accuracy and Scale* (J.M. Scott, Ed.). Covelo, CA: Island Press.
- Loveland, T., B. Reed, J. Brown, D. Ohlen, Z. Zhu, L. Yang and J. Merchant, 2000. Development of a Global Land Cover Characteristics Database and IGBP DISCover from 1-km AVHRR Data, *International Journal of Remote Sensing*, 21, 1303-1330.
- Vogelmann, J., M. Choate, D. Helder, J. Merchant and H. Bulley, 1999. Effects of Landsat Thematic Mapper Radiometric and Geometric Calibrations on Selected Land Cover Analyses, *Proceedings of the 14th William T. Pecora Memorial Remote Sensing Symposium*, 143-153 (CD-ROM).
- Yang, W. and J.W. Merchant, 1997. Impacts of upscaling Techniques on Land Cover Representation in Nebraska, USA, *GeoCarto International*, 12(1), 27-39.
- Yang, W., L. Yang and J.W. Merchant, 1997. An Assessment of AVHRRNDVI-Ecological Relationships in Nebraska, USA. *International Journal of Remote Sensing*, 18(10), 2161-2180.
- Loveland, T.R., J.W. Merchant, J.F. Brown, D.O. Ohlen, B. Reed and P. Olsen. 1995. Seasonal Land Cover Regions of the United States, *Annals of the Association of American Geographers*, 85 (2), 339-355. (includes folded map: Seasonal Land Cover Regions of the United States, scale 1:7,500,000).
- Merchant, J.W. 1994. GIS-Based Groundwater Pollution Hazard Assessment: A Critical Review of the DRASTIC Model, *Photogrammetric Engineering and Remote Sensing*, 60 (9), 1117-1127.
- Dillworth, M.E., J. Whistler and J.W. Merchant. 1994. Measuring Landscape Structure Using Geographic and Geometric Windows, *Photogrammetric Engineering and Remote Sensing*, 60 (10), 1215-1224.

Web address:

www.calmit.unl.edu/calmit.html

Dr. Alan S. Kolok (continued from page 3)

depending upon body mass. Another area of research has found that fathead minnows are differentially susceptible to copper. This research has found that whole-body sodium is positively correlated with Cu resistance, as fish that maintain swim performance post-exposure have the highest levels of whole-body sodium.

Teaching:

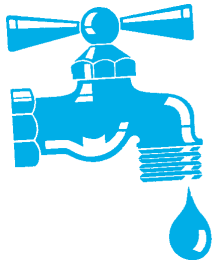
- Undergraduate courses in Animal Physiology and Environmental Biology. Graduate level courses in Environmental Physiology and Toxicology.

Publications:

- Kolok, A.S. (*in press*). Sublethal identification of susceptible individuals: Using swim performance to identify susceptible fish while keeping them alive. *Extotoxicology*.
- Kolok, A.S., 1999. Interindividual variation in the prolonged locomotor performance of ectothermic vertebrates: A comparison of fish and herpetofaunal methodologies and a brief review of the recent fish literature. *Canadian Journal of Fisheries and Aquatic Sciences*. 56: 700-710.
- Kolok, A.S., E.P. Plaisance and A. Abdelghani, 1998. Individual variability in the swimming performance of fish: An overlooked source of variation in toxicity studies. *Environmental Toxicology and Chemistry*. 17: 282-285.
- Kolok, A.S. and D. Sharkey, 1997. The effect of freshwater acclimation on the swimming performance and plasma osmolarity of gulf killifish, *Fundulus grandis*. *Transactions of the American Fisheries Society*. 126: 866-870.
- Kolok, A.S., K. and J.T. Oris, 1996. The relative roles of ventilation and sediment ingestion on hexachloro-benzene uptake in a detritivorous fish, the gizzard shad (*Dorosoma cepedianum*). *Environmental Toxicology and Chemistry*. 15: 1752-1759.
- Kolok, A.S., J.N. Huckins, J.D. Petty and J.T. Oris, 1996. The role of water ventilation and sediment ingestion in the uptake of benzo(a)pyrene in gizzard shad (*Dorosoma cepedianum*). *Environmental Toxicology and Chemistry*. 15: 1760-1762.
- Kolok, A.S. and A.P. Farrell, 1994. The relationship between maximum cardiac output and swimming performance in northern squawfish (*Ptychocheilus oregonensis*) the effect of coronary artery ligation. *Canadian Journal of Zoology*. 72: 1687-1690.

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alan_kolok@unomaha.edu



Water News Briefs

Irrigation History Book

The history of center pivot irrigation will be chronicled in a book being planned by The Groundwater Foundation.

"As a technology, center pivot and linear lateral move irrigation systems have transformed agriculture and made an indelible impression on the earth," said Groundwater Foundation consultant and UNL environmental education coordinator Bob Kuzelka.

The pictorial history book will explain both the evolution and future of this unique technology. It will show the diversity and beauty of the invention in a worldwide setting.

"Using this visual approach will appeal to a diverse public audience so that a broader range of people will become aware of the uses, values and future of this technology," Kuzelka said.

The book will include brief essays on the history, acceptance, growth, use and water supply concerns about

center pivot systems. The book will be extensively illustrated.

In less than 30 years, center pivot technology revolutionized agriculture production and evolved from a methodology considered by some to be a possible risk to water sources to a widely accepted method of water application that promotes highly efficient water use and protection.

For more information on the project, contact Kuzelka or Susan Seacrest at (800)858-4844 or e-mail info@groundwater.org.

Forty Percent Lack Water, Sanitation

Forty percent of the world's six billion people lack sanitation, according to a recent United Nations report. Some 18 percent of the world's population...roughly 1.1 billion people...lack even the most basic fixed water supply, the study said.

Governments have made some improvements over the past decade, but have scarcely kept pace with population growth in the developing world, according to the Global Water Supply and Sanitation Assessment.

(From *U.S. Water News*, January, 2001).

30th Annual Water Conference Will Be Groundwater Quality Monitoring Workshop

(continued from page 4)

"In the afternoon we will consider applications of the issues discussed during the morning sessions," Jess said.

Those discussions will be led in part by Jim Cannia, geologist for the North Platte NRD, Gering addressing a comprehensive monitoring well network and protocols that were recently instituted by that NRD. Brad Routt, program manager at the Nebraska Department of Environmental Quality, will talk about recent clean-up experiences at Scottsbluff.

After the workshop, attendees will be able to preview the annual Children's Groundwater Festival, sponsoring by The Groundwater Foundation, which will be held the following day at Grand Island's College Park.

A reception and banquet following the festival preview will be held at the Holiday Inn beginning at 6:30 p.m. At the banquet, the Nebraska Water Conference Council will present its annual Pioneer and Progress Awards, along with The Groundwater Foundation's annual Maurice Kremer Groundwater Achievement Award.

Workshop registration is \$50, which includes a noon luncheon. Advance registration is encouraged.

To register, or for a registration brochure or information, contact Tricia Liedle at the UNL Water Center, P.O. Box 830844, University of Nebraska, Lincoln, NE 68583-0844, phone (402)472-3305 or e-mail pliedle2@unl.edu.

The conference is sponsored by the Nebraska Water Conference Council, The Groundwater Foundation, Nebraska Department of Environmental Quality, UNL's Water Center, Conservation and Survey Division, School of Natural Resource Sciences, Institute of Agriculture and Natural Resources and the University of Nebraska-Lincoln.

From the Director (continued from page 2)

Sherilyn Fritz in the Department of Geosciences. Fritz co-authored "*The history of South American tropical precipitation for the past 25,000 years.*" Her collaborative research in Lake Titicaca, in Bolivia and Peru, provides a unique, long-term, detailed climatic record during the last glacial age. The findings presented in this paper help clarify climate change from watershed to global scales.

Congratulations to Sherilyn for her second major article in another highly regarded journal within a few months (see the Dec. *Water Current*)!

In the April *Water Current*, I hope to bring you news from the annual NIWR (National Institutes of Water Resources) meeting in Washington, DC. When all of the water center directors

from across the U.S. get together, we may even stay up past ten o'clock ...

A reminder that our 30th annual water conference is fast approaching. This year the conference takes the form of a one-day groundwater quality monitoring workshop, March 12 at the I-80 Holiday Inn in Grand Island. If you have not yet received registration materials in the mail, call our office at (402)472-3305.

Details of the annual summer water tour will be published in the April *Water Current* and a registration mailing will follow from the co-sponsoring Kearney Area Chamber of Commerce. If you are marking your calendar, remember that the tour will be June 18-20 rather than the usual late July timeframe.

5-9: International Erosion Control Association, Las Vegas, NV. Contact Wendy Raeder, NSF International, 789 N. Dixboro Rd, Ann Arbor, MI 48105, phone (970)879-3010 or e-mail raeder@nsf.org.

7: 2:30 p.m. UNL Water Resources Seminar: "Values, Priorities and Agenda-Setting: Surveying Stakeholders and their Construction of Political Possibilities," Lyn Kathlene, Dept. of Political Science, UNL, Room E103 Beadle Center, UNL city campus, Lincoln.

14: UNL Water Resources Seminar: Exercise for registered students only, no public lecture.

17-19: Global Change and Sustainable Development in Southeast Asia, Chiang Mai, Thailand. Contact Louis Lebel, SARCS Science Coordinator, Faculty of Social Sciences, Chiang Mai University, Chiang Mai, Thailand 50000, phone (66)53-263-215 or e-mail llebel@cmnet.co.th>.

21: 2:30 p.m. UNL Water Resources Seminar: "Resolving Environmental Disputes Through Mediation: A Case Study," Jamee K. Wolfe, Ph.D. Candidate in Sociology, UNL, Room E103 Beadle Center, UNL city campus, Lincoln.

27-28: Eleventh Platte River Basin Ecosystem Symposium, Holiday Inn, Kearney. To present, to register, or for information, contact Gary Lingle at (308)236-1235 or e-mail glingle@unl.edu. Also on the internet at www.ianr.unl.edu/ianr/pwp.

28: 2:30 p.m., UNL Water Resources Seminar: Williams Lecture (TBA), John J. Audley, Trade Policy Coordinator, U.S. EPA, Washington, D.C. Room E103 Beadle Center, UNL city campus, Lincoln.

MARCH

7: 2:30 p.m., UNL Water Resources Seminar: "The Human Side of Water Conservation," Gary D. Lynne, Professor of Natural Resource and Environmental Economics, UNL, Room E103 Beadle Center, UNL city campus, Lincoln.

12-14: Riparian Habitat and Floodplains Conference, Sacramento, CA. Contact Lyann Comrack, California Department of Fish and Game at (858)467-4208 or e-mail lcomrack@dfg.ca.gov.

19-22: West Coast Conference on Contaminated Soils, Sediments and Water, San Diego, CA. Contact Heather McCreary, AEHS, 150 Fearing St., Ste. 20, Amherst, MA 01002-1944, phone (413)549-5561 or e-mail heather@aehs.com.

21: 2:30 p.m., UNL Water Resources Seminar: "The Brush Creek Flood Control Project in Kansas City, MO," Tom Kimes, Brush Creek Project Manager, Kansas City Public Works Dept. Room E103 Beadle Center, UNL city campus, Lincoln.

21-23: International Scientific Program on Bases for the Evaluation of Chemical Risks, Bordeaux, France. Contact Catherine Bennetau, Enita de Bordeaux, 1 Cours Du General De Gaulle, B.P. 201, 33 175 Gradignan, France, phone (413)549-5561 or e-mail c-bennetau@unitab.fr.

26-28: Fractured Rock 2001, Toronto, Canada. This meeting will explore contamination that taints bedrock. Sponsored by the U.S. EPA. Contact Cathie Bedard at



(905)957-4077 or e-mail cbedard@niagara.com.

28: 2:30 p.m., UNL Water Resources Seminar: "The Antelope Valley Project in Lincoln, NE," Kent Seacrest, Attorney and Planner for the Antelope Valley Project, Lincoln. Room E103 Beadle Center, UNL city campus, Lincoln.

28-April 1: Making Environmental History Relevant in the 21st Century, Durham, NC. Contact Dale Goble, University of Idaho College of Law at (413)549-5561 or e-mail goble@uidaho.edu.

APRIL

4: 2:30 p.m., UNL Water Resources Seminar: "Kremer Lecture: Water Management in the State of Florida," Warren Viessman, Jr., Associate Dean for Academic Programs and Professor of Environmental Engineering Sciences, University of Florida. Room E103 Beadle Center, UNL city campus, Lincoln.

9-11: International Conference on Marine Invasions, New Orleans, LA. Sponsored by the MIT and Louisiana Sea Grant College Programs. Access UNO Conference Services online at <http://massbay.mit.edu/exoticspecies/conf2>.

11: 2:30 p.m., UNL Water Resources Seminar: "Water Management by Nebraska's Natural Resources Districts,"

Rachael Herpel, The Groundwater Foundation; and Bob Kuzelka, Director of Environmental Studies, UNL, Room E103 Beadle Center, UNL city campus, Lincoln.

18: 2:30 p.m., UNL Water Resources Seminar: "Williams Lecture: Water Marketing: The Good, The Bad and The Ugly," Bonnie Colby, Professor of Natural Resource Economics and Public Policy, University of Arizona. Room E103 Beadle Center, UNL city campus, Lincoln.

18-20: Fourth National Mitigation Banking Conference, Radisson Bahia Mar, Ft. Lauderdale, FL. How to conference on mitigation and conservation banking. For information, contact the Terrene Institute at www.terrene.org or phone (800)726-5253.

22-25: Small Drinking Water and Wastewater Systems: Treatment, Management and Financing, Washington, D.C. Contact Cherrie Bacon, NSF International, 789 N. Bixboro Rd, Ann Arbor, MI 48105, phone (734)827-6865 or e-mail bacon@nsf.org.

25: 2:30 p.m., UNL Water Resources Seminar: Concluding panel: Gene Glock, former staff member of former U.S. Senator Bob Kerrey's office; and Sandy Scofield, J. Michael Jess and Alan Tomkins, UNL faculty. Room E103 Beadle Center, UNL city campus, Lincoln.

Water Tour Still Planning June Dates

Details of the June, 2001 summer water tour to Kansas and southeast Nebraska will be published in the April issue of the *Water Current*.

The tour, scheduled from Monday, June 18 to Wednesday, June 21, will examine increasing demands and challenges to water quantity and quality as Nebraska's population shifts to the eastern third of the state.

A late January trip by tour sponsors to the Omaha, Nebraska City and Kansas City areas to schedule speakers, finalize stops and make lodging arrangements for the June tour was postponed until early March due to winter weather considerations. Details of these arrangements will be published in the April *Water Current*.

For those wanting more information as tour planning progresses, or to be put on the water tour's mailing list, phone the Kearney Area Chamber of Commerce at (800) 652-9435.

Researchers Pool Talents To Protect Nebraska's Premier Trout Fishing Locale (continued from page 1)

Collected samples were checked for temperature, DO, oxygen demand, ammonia and other characteristics.

NU researchers are using this information to construct a scale computer model of Lake Ogallala to study flow patterns and other dynamics. The team includes Hoagland, water quality researchers John Holz and Tadd Barrow of UNL's School of Natural Resource Sciences, and Civil Engineers David Admiraal and John Stansbury.

Admiraal and Stansbury measured the lake's water flow speeds and mapped its bottom using sonar. That information aided construction of a 20- by 40-foot concrete model of the lake at Admiraal's UNL laboratory to help recreate its flow patterns and characteristics.

"Preliminary findings indicate a large stagnant area in the north part of the lake's Keystone Basin," Admiraal said. "It appears Keystone Basin isn't being replenished by normal water flow coming into the lake

which could contribute to the low DO levels at certain times of the day."

Initial findings also indicate that a combination of factors, not just dissolved oxygen, could be stressing the lake's fish.

Ruane said initial indications are that fish in the lake could be "Impacted by a combination of multiple stressors instead of only low DO. This needs more assessment, but tentatively, the fishery may be impacted by elevated levels of ammonia, combined with high pH, sulfide and possibly, total dissolved gases."

It could be several months before researchers make any recommendations on the lake's low

DO, flow patterns, or other factors in the study, however.

The research is being funded by grants from the Nebraska Game and Parks Commission through NU's Institute of Agriculture and Natural Resources and Agricultural Research Division.



Researchers inject a non-toxic, traceable dye into Lake Ogallala. The dye was used to help track water flow patterns in the lake, part of an interdisciplinary study aimed at solving the lake's periodically low levels of dissolved oxygen which may contribute to fish kills in the popular trout fishing lake (photo: Kyle Hoagland).

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