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# WATER CURRENT

VOL. 37, No. 2

SPRING 2005

## Gleick Headlines April Water Management and Policy Conference

By Steve Ress

The University of Nebraska-Lincoln's Second Annual Water Law, Policy and Science Conference drew a diverse participation of nearly 200, including many nationally known speakers on the environment, local experts and strong student participation.

"Water Management and Policy in the Great Plains: Implications of Drought and Climate Change" was April 7-8 at UNL's Nebraska Union.

"The most impressive things about the conference were the quality of the presentations across-the-board, and the high level of student interest and participation," said conference co-organizer and UNL Water Center director Kyle Hoagland.

Conference sessions focused on panel presentations and



Pacific Institute president Peter Gleick and UNL Water Center director Kyle Hoagland chat before the start of April's Second Annual Water Law, Policy and Science Conference at UNL's Nebraska Union (photo: Steve Ress).

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## Water and Natural Resources Tour Looks at LB962, Sandhills, Pine Ridge Issues

By Steve Ress

June's water and natural resources tour will focus on local response to LB962 a year after the bill became law, as well as irrigation and natural resources issues in Nebraska's Sandhills and Pine Ridge.

The tour is June 28-30, beginning and ending in Kearney.

"We're planning stops at locations where we believe a good number of those signing-up for the tour will not have been before," said tour co-organizer Michael Jess, associate director of the UNL Water Center.

"The uniqueness and vastness of the Sandhills and Pine Ridge areas should make for a fun and educational tour, as well." He said.

First day stops include the Kearney Canal diversion dam for discussion of over-appropriation of water resources and a moratorium on new surface water/groundwater diversions. Lake McConaughy visitor's center near Kingsley Dam and lunch at the Bayside golf club on the south side of the lake are next before the tour heads toward

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Lincoln  
*Pioneering new frontiers.*

# April Water Conference, June Tour, New Assistant Director, Possible New Faculty Hires

## from the DIRECTOR



**Kyle D. Hoagland**

It has been a very busy and exciting time in the University of Nebraska-Lincoln's "water world" since our last *Water Current* was published. Since then, we've cosponsored a major water conference, conducted several formal searches for new water faculty members and have finalized plans for our annual summer water and natural resources tour that we conduct in cooperation with the Kearney Area Chamber of Commerce and others.

We've also been cultivating several new state and federal research and outreach partnerships, which I hope to tell you more about soon.

So, due to time and space constraints, this piece will only give you a brief rundown on each of these areas, and a few others. If you would like to know more before the next *Water Current* publishes later this summer, feel free to call me at (402) 472-3305, or send an email to [khoagland@unl.edu](mailto:khoagland@unl.edu).

I was extremely pleased with the comments we received about the Second Annual Water Law, Policy and Science Conference, held at UNL's Nebraska Union April 7-8. There were about 175 in attendance, we web-streamed the conference for the first time ever, we had some simply stellar presenters and I think it was an overwhelming success overall.

I particularly want to thank Sheri Fritz in the Department of Geosciences, Carolyn Johnsen in the College of Journalism and Mass Communications, Sandi Zellmer in the College of Law and Don Wilhite, director of the National Drought Mitigation Center for their thoughtful and diligent efforts as members of the conference planning committee, who made this event the rousing success it was.

Thanks also to staff members Jacki Loomis, Steve Ress, Tricia Liedle, Gregg

Hutchison, Duane Mohlman and Tadd Barrow and our shuttle chauffeurs Nate DeWald and Martina Brunetta for their help in seamlessly executing the myriad of details that always accompany events of this magnitude.

Elsewhere in this issue you will find details and registration information for the annual summer water and natural resources tour, which will feature discussions on the still unfolding outcomes of LB 962, one year after the sometimes controversial conjunctive use bill became law. We will also look at some natural resource issues and sights unique to some of the most beautiful country in Nebraska's Sandhills and Pine Ridge. We'll tour Crescent Lake National Wildlife Refuge, look at one of only two operational uranium mines in the United States and offer plenty of good food and fellowship, as always. If that isn't enough to get excited about, we haven't raised the registration fee either.

Elsewhere in this issue is information on what promises to be another season of high algae bloom infestations of lakes and ponds, a new computer program to help farmers make better-informed cropping decisions under limited water supplies, revisions to state water well standards, and an update on new analysis equipment that has fur-

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## WATER CURRENT

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# Meet the Faculty

## Tadd Barrow

Staff Water Resources Specialist,  
UNL School of Natural Resources  
since 1999.

### Selected Past Research/ Extension Programs:

EPA funded statewide lake classifica-



Tadd Barrow

tion project. 1999 to present.  
Statewide stream classification project.  
Began in 2004 and is ongoing.  
CLEAR team: 2000 to present. Disperse  
funding to 13 Nebraska communi-  
ties for city park pond rehabilita-  
tion. Conduct water quality  
analysis to determine the effective-  
ness of individual projects.  
Demonstration of the use of bottom  
barriers to control macrophytes in  
Nebraska lakes. 2001.

### Selected Extension/Outreach Programs:

— **UNL's Lake Volunteer Monitor-  
ing Program:** Allows lake own-  
ers, users and managers to actively  
participate in sample collection on  
their lake of interest, return the  
sample to the Limnology lab where  
water quality measurements are  
conducted, with the results then re-

turned, along with general lake  
management strategies to the  
volunteer. Included under this  
program is an initial screening  
for potentially toxic blue-green  
algae.

— **Public education on general  
water quality issues:** Adults are  
reached through presentations at  
lake association meetings, site  
visits, and monitoring program.  
Jr. and Sr. high students are  
reached through a variety of  
hands on learning experiences  
via "field days", science fairs,  
groundwater festival, etc.

### Teaching Responsibility:

— None. However as professional  
staff, I have been a TA for lim-  
nology at UNL's Cedar Point  
Biological Station. Plus have  
(continued on page 10)

## David Cassada

Organic Separation Chemist, Univer-  
sity of Nebraska-Lincoln Water sci-  
ences Laboratory, since 1990. From  
Aug 1986 to Dec 1989, I was a  
Research Technologist II at the Eppley  
Cancer Institute at the University of  
Nebraska Medical Center in Omaha.  
I operated the mass spectrometer for  
the Institute.

### Education:

M.S., Physical Organic Chemistry,  
University of Nebraska-Lincoln,  
1986.

B.S., Chemistry, Northeast Missouri  
State University, 1981.

### Examples of Current Research/ Extension Programs:

— Supervise development and  
implementation of methods for  
the trace level analysis of environ-

mental contaminants in water, soil,  
and other matrices using gas chro-  
matography/ mass spectrometry  
(GC/MS) and high performance  
liquid chromatography/tandem  
mass spectrometry (HPLC/MS/  
MS). Various methods have been  
developed that are currently in use  
for the analysis of pesticides, antibi-  
otics, explosives and their degrada-  
tion products as well as gasoline  
oxygenates.

— Responsible for the programming  
and implementation of the Labora-  
tory Information Management  
System (LIMS) used by the Water  
Sciences Laboratory to track  
samples as they pass through the  
analysis process. The LIMS  
program also tracks the results  
generated by each analyses for  
further data analysis.

— I have synthesized several non-  
commercially available degradation

products for RDX and some her-  
bicides for use as analytical stan-  
dards in our methods.

### Teaching Responsibilities:

— Instruct and assist faculty and  
students in the use of the  
laboratory's instrumentation and  
interpretation of analytical  
results. I also conduct tours  
which highlight the analytical  
(continued on page 10)



David Cassada

# Holz Named Water Center Assistant Director

John Holz has been named assistant director of the UNL Water Center to assist with water education and curriculum needs and to help identify emerging research and outreach opportunities.

“John (Holz) has long been associated with the Water Center as a faculty researcher and programming specialist in aquatic ecology and hydrologic science. He will bring new energy and ideas to the Water Center at a time when the center’s involvements in a number of research and academic areas are increasing,” said Water Center director Kyle Hoagland.



**Research assistant professor John Holz was recently named assistant director of the UNL Water Center.**

Holz is a research assistant professor in UNL’s School of Natural Resources. As assistant director he will help increase Water Center outreach activities by expanding online resources to include more water quality management extension information.

“He will also help promote UNL water-related research by identifying emerging ideas, organizing groups of qualified

researchers, identifying funding opportunities and promoting proposal development and submission,” Hoagland said. Additional duties include helping to reorganize water science curriculum and planning educational retreats for water-related teaching faculty.

In five years at UNL, Holz’ areas of academic emphasis have centered on fisheries and wildlife, and specifically, aquatic ecology and hydrologic science.

With the U.S. Environmental Protection Agency (EPA) working to establish national standards for assessing lake water quality, much of his research has focused on creating an accurate evaluation mechanism for lakes.

“It is increasingly evident that a single set of national water quality standards that don’t take into account regional hydrogeologic and ecological differences will not be viable, since lakes clearly have different inherent capacities to meet such standards,” he said.

Holz’ team is also examining interactions between agriculture and surface water to develop a model lake and watershed classification system suited to agricultural areas. They’ve sampled more than 300 Nebraska lakes and reservoirs and are developing methods to compare current and historical water quality to develop tools to more accurately determine realistic water quality goals.

Finding ways to remotely monitor water quality instead of sampling water at each lake is another goal of the work since remote sensing of water quality should make monitoring easier and less expensive.

Developing research-based tools to classify and monitor lakes and reservoirs in agricultural areas should help natural resources and environmental agencies protect water quality and determine which are the best candidates for restoration.

Holz is also active in researching phytoplankton ecology and lake restoration ecology.

## Water Resources Research Initiative One of 11 “Programs of Excellence”

The Water Resources Research Initiative (WRRRI) is one of 11 programs that have been identified as priorities and will receive enhanced support from UNL’s “Programs of Excellence” base funding for the current academic year.

The WRRRI is a multi- and interdisciplinary collaborative effort that spans several UNL colleges and departments.

The initiative is completing four interdisciplinary faculty hires during the current academic year.

A new award of \$45,000, split evenly between the 2005-2006 and 2006-2007 academic years, in recurring funds reflects collaboration between the WRRRI and UNL College of Law.

The other 10 program of excellence areas include atomic, molecular, optical and plasma physics; behavioral health/sociology of health; ecology and evolution; enhancing

undergraduate education; honors program; J.D. Edwards; nanoscale science and technology; seed funding for developing collaborative programs; simulation and computing engineering; and survey research and methodology.

The programs were identified from applications reviewed by the Academic Planning Committee; chancellor Harvey Perlman; senior vice chancellor for academic affairs Barbara Couture; vice chancellor for the Institute of Agriculture and Natural Resources John Owens; and vice chancellor for research and dean of graduate studies Prem Paul.

The NU Board of Regents began the process in 2000 to target the highest priority programs on each of the university’s four campuses. The regents established the programs of excellence grant fund two years later.

# Cooperative Extension Ready With Algae Test Kits

By Steve Ress

This summer will likely see more toxic blue-green algae blooms, many of which were reported on Nebraska lakes and ponds last year and can be a serious threat to human health and to animals.

Last spring and summer saw an explosion of toxic blue-green algae blooms on ponds and lakes across Nebraska, particularly in eastern Nebraska where recreational use of these water bodies can be very high.

Skin irritations and gastrointestinal problems are the main risks to people from algal toxins, but in rare cases, extremely high toxin levels can be fatal to people.

Last year's blooms resulted in only a few reported cases of human illness and skin irritation and some livestock and pets died after drinking lake water during an algae bloom, said UNL water quality specialist John Holz.

"There was an unusually high number of complaints about blooms last summer, particularly in May and June, but persisting through the summer months," said UNL water resources specialist Tadd Barrow.

## Blue-green Algae a Known Health Risk

Blue-green algae blooms sometimes smell bad and can look like thick paint spilled in the water. If you visit a lake that looks like it may have a problem, there are several methods of protecting yourself and others from the hazards:

- Avoid contact with the mats of blue-green algae.
- Never allow children or pets to play in or drink scummy water.
- Don't water ski or jet ski over algae mats.
- Don't use scummy water for cleaning or irrigation.
- If you come into contact with the toxic algae, wash thoroughly, paying special attention to the swimsuit area. Thoroughly wash the fur on pets that come into contact with the algae.

If you experience health symptoms, notify your physician, and also report the incident to the Nebraska Health and Human Services System at (402) 471-2937 or the Poison Information Hotline at (888) 232-8635.

(From *Environmental Update*, Nebraska Department of Environmental Quality, Winter 2004/2005).

The normal season for algae bloom complaints is June through September. Last year the toxins and blooms began appearing in May and persisted through September. Some lakes still had blooms and high toxin levels as late as December, Barrow said.

With forecasts calling for similar weather patterns this summer, he predicts "Blooms will be just as prevalent as last year. Higher public awareness of the problem could also result in more of the blooms being reported."



The unmistakable appearance of water taken from a lake with a blue-green algae bloom (Photo: Brett Hampton, IANR News)

"Due to the probability of more toxic algae blooms this summer, Nebraska Cooperative Extension's lake management program is continuing a volunteer monitoring program to check lakes for blue-green algae. Free test kits are again available from Barrow's office so lake owners, users and managers can check their lake for potential toxin-producing algae," Barrow said.

Last year, more than 400 of the free kits were sent to testers all across Nebraska, Barrow said. About 40 percent of those that were returned to the university for testing were positive for the presence of potential toxin producing blue-green algae.

Fifty-five water samples the university received tested positive for blue-green algae, 20 of which were above the two parts per billion limit set by the Nebraska Department of Environmental Quality. All 55 of those samples were sent to the NDEQ, which tests for blue-green algae toxin and tracks blooms across the state, Barrow said.

"The number of kits sent out doesn't include the second, third, fourth or more samples tested for some individual lakes and ponds," he added.

Kits contain instructions on proper sample collection, a sheet for recording measurements, a questionnaire about

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# Revisions to Water Well Construction, Pump Installation and Water Well Decommissioning Standards

**By Sharon Skipton  
UNL Extension Educator**

**R**evisions to Nebraska's Water Well Construction, Pump Installation, and Water Well Decommissioning Standards took effect in February.

There are a few changes to keep in mind as we develop or revise extension publications and programs. While additional changes were made, I thought these were the ones most likely to impact us.

The definition for "irrigation well" has been removed. These wells (and industrial wells) are now defined as "non-potable wells." Section 12-005 addresses "non-potable well" construction, repair, etc. Standards for wells six inches in diameter and smaller are different compared to standards for wells 6 inches or larger in diameter. Standards for test pumping wells producing 50 gallons per minute (gpm) or more are included. Repairing a non-potable well must comply with current standards.

The definition for "domestic water well" has been removed. These wells are now defined as "potable wells." Section 12-004 addressed "potable well" construction, repair, etc. "Reconstructing a domestic well" is redefined as "repairing a potable well" and must comply with current standards for material, design, and construction.

Observation wells are now included with monitoring and recovery wells construction standards.

For water well decommissioning, the upper plug option one "grout seal" changed from four inches to six inches thick on top of the casing. Static water level seal on multiple aquifer wells changed from five feet thick to three feet thick.

A "waiver of disinfection form" allows for waiving the disinfection requirement and documents the contractor has been prohibited by the landowner from disinfecting a well.

New definitions are included for "Natural Resource Groundwater Technician," "Pump Installation Contractor,"

"Pump Installation Supervisor," "Water Well Contractor," "Water Well Drilling Supervisor," and "Water Well Monitoring Technician." The regulations spell out responsibilities for each.

Reporting decommissioning is spelled out. The pump installation contractor or water well contractor must submit written notice of decommissioning of a water well to the Department of Natural Resources within 60 days of the decommissioning. If both a water well contractor and a pump installation contractor are involved in the decommissioning, the pump installation contractor must submit the notice. If a landowner decommissions a sandpoint water well on land owned by him/her and used by him/her for farming, ranching, or agricultural purposes or as his/her place of abode, the landowner must report the decommissioning.

*(Editor's Note: Address questions to: Sharon Skipton, University of Nebraska Cooperative Extension, 105A Mussehl Hall, University of Nebraska, Lincoln, NE 68583-0714 or phone (402) 472-3662)*

## "Optimizer" Computer Tool Helps With Crop Production Under Limited Irrigation

**By Sandi Alswager Karsten  
IANR News Service,**

**A** University of Nebraska computer program is helping farmers make better-informed cropping decisions under limited water supplies.

The Water Optimizer, a decision support tool for producers with limited water, was developed by an Institute of Agriculture and Natural Resources team.

"The computer tool will help farmers decide if they should grow different crops,

irrigate fewer acres or apply less water to existing crops," said Ray Supalla, agricultural economist.



The tool was developed in response to several years of drought across the state and for farmers facing water restrictions in the Central Nebraska Public Power and Irrigation District and Republican River Basin.

Republican River Basin water restrictions stem from the 2002 settlement involving Kansas, Nebraska and Colorado over the 1943 Republican River Compact. This settlement found groundwater pumping

was covered by the compact, which will limit future ground-water irrigation development in the basin.

"It's really an aid that will help the irrigators make decisions on how to use the limited water supplies they will have," said DeLynn Hay, Nebraska Cooperative Extension program leader.

The Upper Republican Natural Resources District has had specific water allocations for a number of years, but this is the first time that they will be applied in a broader area that also includes Middle and Lower Republican NRDs.

The tool evaluates single fields for several crop options. Irrigated crops include corn, soybeans, sorghum, wheat, alfalfa, edible beans and sunflowers. Dryland crops include corn, soybeans, sorghum, sunflowers, alfalfa and wheat in continuous, summer fallow and eco-fallow rotations.

It allows users to input information into a Microsoft Excel spreadsheet, including soil type and irrigation system options. Irrigation options include center pivot or gravity irrigation systems, well or canal delivery, and systems powered by electricity, diesel or natural gas. After entering this basic information, producers enter their production costs, irrigation costs, crop prices, crop type and available water.

After these parameters have been set, the program calculates what crops will be most profitable with the given costs and available water.

"By running the model a couple times, a producer can find out if it would be better to produce one type of crop with so many acres than producing another type of crop."

The program also helps a producer decide when it is time to go to dryland.

Other potential uses of the program include comparing management strategies such as profit maximizing deficit irrigation, fixed crop rotations, single-year and multi-year full irrigation strategies, or Environmental Quality Incentives Program or Conservation Reserve Enhancement Program leasing.

The program does not include insurance and farm programs and a whole-farm model.

Derrel Martin, IANR biological systems engineer, also was part of the program's development team.

The Water Optimizer tool is available online at <http://extension-water.unl.edu/>. A DVD/CD set is available for \$7 by calling (800) 755-7765 or faxing (402) 472-9724. The DVD includes a program tutorial and the CD has the Water Optimizer tool. The tool only is compatible for PC users with Microsoft Office XP or Microsoft Office 2003.

For more information about using the program, contact Steve Melvin, extension educator in Frontier County, at (308) 367-4424, e-mail [smelvin@unl.edu](mailto:smelvin@unl.edu); Chuck Burr, extension educator in Phelps County, at (308) 995-4222, e-mail [cburr@unl.edu](mailto:cburr@unl.edu); Dave Stenberg, extension educator in Dawson County, at (308) 324-5501, e-mail [dstenberg1@unl.edu](mailto:dstenberg1@unl.edu); or Roger Wilson, research analyst at the university's West Central Research and Extension Center at North Platte, at (308) 532-3611, e-mail [rwilson6@unl.edu](mailto:rwilson6@unl.edu).

## **Water and Natural Resources Take Looks at LB962, Sandhills, Pine Ridge Issues** (continued from page 1)

Crescent Lake National Wildlife Refuge, north of Osh Kosh, for presentations on wildlife breeding and habitat restoration projects by the U.S. Fish and Wildlife Service and University of Nebraska.

The remote refuge was established in 1931 and includes nearly 46,000 acres. It is dotted with numerous shallow lakes and has hosted nearly 275 species of birds through the years.

Buses then head to Chadron and a reception at the Museum of Fur Trade before a catered supper at Chadron State Park. Overnight is at the Best Western Lodge in Chadron.

On the second day, University of Nebraska associate forester Doak Nickerson will detail commercial logging operations in the Pine Ridge area, including a timber harvesting demonstration.

Lunch is at nearby Chadron State College. Presentations there include the college's closed-loop heating and cooling systems, fueled by wood chips from the area's logging industry and representatives of the Crow Butte uranium mine near Crawford discuss mine operations. Crow Butte is one of only two operating uranium mines in the United States.

Buses then head to the mine, near Crawford, for tours of the facility and its expansive groundwater well fields that are integral to mining uranium.

Buses then head south to Box Butte Reservoir north of Alliance and then to a minimum tillage demonstration near Hemingford on behalf of the Upper Niobrara White Natural Resources District

Supper will be a steak fry by NRD staff at Alliance's Central Park and overnight is at the Days Inn and Holiday Inn Express in Alliance.

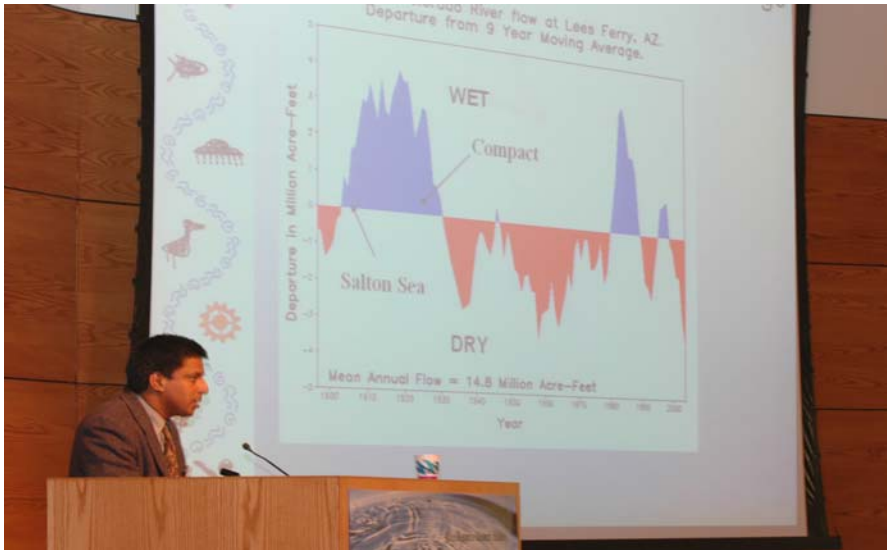
The tour's final day will begin with a panel discussion of Pumpkin Creek litigation issues and municipal water issues for the City of Sidney at the Bridgeport community center before proceeding to Ole's at Paxton for lunch and then to Kearney where the tour ends.

Registration is \$395 per person single occupancy or \$345 per person double occupancy and includes all food, motel and motor coach expenses. To register, contact Kearney Area Chamber of Commerce event coordinator Sara Koperski at (800) 652-9435. Registration deadline is May 20 and participation is limited to the first 85 registrants.

Central Nebraska Public Power and Irrigation District, Gateway Farm Expo, Kearney Area Chamber of Commerce, Nebraska Water Conference Council, Nebraska Association of Resource Districts, Nebraska Public Power District and the University of Nebraska-Lincoln's School of Natural Resources and Water Center cosponsor the tour.



# Second Annual Water Law, Policy and Science Conference, University of Nebraska-Lincoln, Nebraska Union April 7-8, 2005



**Roger Pulwarty, Research Scientist, NOAA Climate Diagnostics Center, University of Colorado** spoke on how ongoing drought has intensified water problems in the Colorado River Basin



**University of Nebraska Chancellor Harvey Perman** opens the two-day conference at the Nebraska Union.



**Pat Mulroy, General Manager of the Southern Nevada Water Authority in Las Vegas, Nev.** Spoke at Thursday night's dinner on the challenges that area has faced in delivering water to a community that is the fastest growing in the United States.

**Thursday evening's dinner and presentation among the elephants at Morrill Hall.**





**Peter H. Gleick, Director, Pacific Institute delivered the conference plenary address on “Water Management and Policy: Increasing Competition for a Scarce Resource.”**



**Donald Wilhite, Director of the University of Nebraska’s National Drought Mitigation Center, helped organize the conference and spoke on reducing societal vulnerability to drought.**

**Prem Paul, Vice Chancellor for Research at the University of Nebraska-Lincoln, talks with Friday morning panelists (from left center) Don Wilhite, W. Don Nelson and Bob Bettger.**



**Conference participants and attendees gather for Thursday night’s dinner and presentation at the University of Nebraska-Lincoln’s Morrill Hall.**



*“Water Management and Policy in the Great Plains: Implications of Drought and Climate Change”*

(Photos by Brett Hampton, IANR News and Steve Ress)

## Meet the Faculty

### Tadd Barrow (continued from page 3)

taught Jr/Sr. high students basic lake ecology, the use of lake sampling equipment, lab techniques, and data interpretation through a combination of classroom instruction and field trips.

#### Selected Publications:

- Dall'Olmo, G. A. A. Gitelson, D.C. Rundquist, B. Leavitt, T. M. Barrow and John C. Holz. 2004. Estimation of chlorophyll concentration in case-2 productive waters using

existing ocean color sensors: calibration, validation and radiometric considerations. In-review. Remote Sensing of Environment.

- Barrow, T.M. and J. C. Holz. 2003. Controlling Pond Plant Growth with Bottom Barriers. NebGuide G03-1529-A. Cooperative Extension, IANR, UNL.
- Barrow, T. M. and J. C. Holz. 2003. Bottom barriers for lakes and ponds: Sources of supply. NebFact

NF03-586. Cooperative Extension, IANR, UNL.

- Barrow, T. M. and E. J. Peters. 2001. Movements of rainbow trout in response to dissolved oxygen and food availability in Lake Ogallala, Nebraska. *Journal of Freshwater Ecology*. 16(3):321-329.

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### David Cassada (continued from page 3)

capabilities of the Water Sciences Laboratory for both on and off-campus groups.

#### Selected Publications:

- Snow, D.D., D.A. Cassada, S.J. Monson, J. Zhu and R.F. Spalding, 2003. Tetracycline and Macrolide Antibiotics: Trace Analysis in Water and Wastewater Using Solid Phase Extraction and Liquid Chromatography-Tandem Mass Spectrometry. In: *Liquid Chromatography/Mass Spectrometry, MS/MS and Time of Flight MS Analysis of Emerging Contaminants. American Chemical Society Symposium Series 850*.
- Snow, D. D., D.A. Cassada, S.J. Monson, J. Zhu and R.F. Spalding, 2002. Trace analysis of tetracycline and macrolide antibiotics using

solid phase extraction and liquid chromatography-tandem mass spectrometry. *Preprints of Extended Abstracts ACS National Meeting, American Chemical Society, Division of Environmental Chemistry*. 42(1), 414-418.

- Zhu, J., D. D. Snow, S. J. Monson, D. A. Cassada and R. F. Spalding, 2001. Analysis of Oxytetracycline, Tetracycline, and Chlortetracycline in Water Using Solid Phase Extraction and Liquid Chromatography-Tandem Mass Spectrometry. *Journal of Chromatography A*, 928, 177-186.
- Cassada, D.A., Y. Zhang, D.D. Snow and R.F. Spalding, 2000. Trace analysis of ethanol, MTBE and related oxygenate compounds by solid phase microextraction and gas

chromatography/mass spectrometry. *Analytical Chemistry*. 72(19) 4654-4658.

- Cassada, D.A., S.J. Monson, D.D. Snow and R.F. Spalding, 1999. Sensitive determination of RDX, nitroso-RDX metabolites and other munitions in groundwater by solid-phase extraction and isotope dilution liquid chromatography-atmospheric pressure electro-spray ionization mass spectrometry. *Journal of Chromatography A*, 844: 87-95.

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## From the Director (continued from page 3)

ther increased the already impressive analytical capabilities our Water Sciences Laboratory.

I also want to extend my thanks to research assistant professor John Holz for agreeing to assume additional responsibilities as the new assistant director for the Water Center. John will be very involved in the near future with honing our outreach and extension

programming and I welcome his energy and involvement.

I want to extend my congratulations, as well, to Xun-Hong Chen, a vital member of our water resources faculty, for his recent promotion to full professor.

Finally, you've probably already noticed some changes on the front page of this issue of the *Water Current*.

These have been made to strengthen our visual identity as part of the University of Nebraska-Lincoln, a process all University publications will be undergoing in the coming months. You'll soon see similar changes to our Water Center and Water Resources Research Initiative web sites, as well.

# Kansas Center for Agricultural Resources and the Environment (KCARE)

(Editor's Note: This is the second in an occasional series of articles on Missouri River basin Water Resources Research Institutes).



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## Director:

W.L. Hargrove, Ph.D., soil science, KCARE director since 1997.

## Faculty / Staff:

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## Areas of Emphasis:

KCARE was established to coordinate and enhance research, extension and teaching activities pertaining to environmental issues related to agriculture. Our Mission is "To develop and deliver knowledge that helps Kansans balance 'utilization' and 'protection' of natural resources today and into the future."

**Water Quality:** Especially watershed planning, management and assessment; livestock waste management; and nutrient management.

**Ogallala Aquifer:** Especially technologies aimed at prolonging the life of the aquifer; irrigation technologies; modeling; and policy and economics.

## Undergraduate / graduate fields of study offered:

Degrees in water science and related disciplines offered through various academic departments at Kansas State University.

## Annual events:

22nd Annual Conference: Water and the Future of Kansas: "The Political Science of Water: Putting Science into Water Policy," March 17, 2005, Topeka, KS.

Call the Conference Registration Office at (785) 532-5569 or 1-800-432-8222 for registration information. For information about the conference, contact the Conference Office at (785) 532-5575 or email [info@dce.ksu.edu](mailto:info@dce.ksu.edu).

## Recent Publications:

K-State Animal Waste Lagoon Report

Animal Waste Management and Utilization, Final Report

## Key Findings

Nutrient Composition of Kansas Swine Lagoons and Hoop Barn Manure — J.D. DeRouchev, Robert D. Goodband, J.L. Nelssen, M.D. Tokach, S.S. Dritz, and J.P. Murphy

Seepage Losses from Animal Waste Lagoons: A Summary of a Four-Year Investigation in Kansas — Jay Ham

Geomembranes and Composite Liners for Anaerobic Lagoons — Lakshmi Reddi, Mohan Bonala, and Hugo Davalos

Drainage Patterns of Water from Animal Waste Lagoons to Saturated Groundwater — David Steward and Md. Raziul H. Mollah

Adsorption and Desorption of Ammonium from Swine Lagoon Waste in Two Kansas Soils — Nishantha Fernando and Kang Xia

Vegetative Reclamation of Abandoned Swine Lagoons — Kyle Mankin, Kimberly Precht, and Mary Beth Kirkham

Crop Growth in Soil from Three Locations Below One Closed Animal Waste Lagoon — Liansheng Zhu and Mary Beth Kirkham

Comparison of Crop Growth in a Soil from a Closed Animal Waste Lagoon and an Agricultural Soil — Liansheng Zhu and Mary Beth Kirkham

Residue-Amended Abandoned Animal Waste Lagoon Soil: Physical Properties and Growth of Barley — S.M. Liphadzi and Mary Beth Kirkham

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# Robots Help with Sample Preparation and Analysis at UNL Water Sciences Lab

By Daniel Snow, Ph.D.  
Laboratory Services Director

Two new automated sample extraction injection systems have been installed at the UNL Water Science Laboratory (WSL) this spring to speed sample analysis and improve sensitivity of our detection methods for volatiles, agrichemicals, algal toxins, and other “emerging” contaminants.

A Agilent 5973 GC/MS has been outfitted with a CTC Analytics Combi PAL sample injection system that combines liquid, large volume, headspace and solid phase microextraction (SPME) injection in a single instrument. The Combi PAL is permits switching from one application to another on the same GC workstation.

SPME is a powerful extraction and injection method for a wide range of volatile organics, but applications using this method have been limited due to labor intensiveness.

The Combi PAL automates this process and permits unattended extraction and analysis of a wide range of contaminants. It can easily switch from SPME to headspace to liquid injection. Paired with the new inert source Agilent 5973,

with both electron impact (EI) and negative/positive chemical ionization (CI), will allow for ultra low (trace) analysis of a wide variety of compounds.

The other robotic system recently installed is a Spark Holland Symbiosys Enviro coupled to the Lab’s Quattro Micro triple quadrupole mass spectrometer.

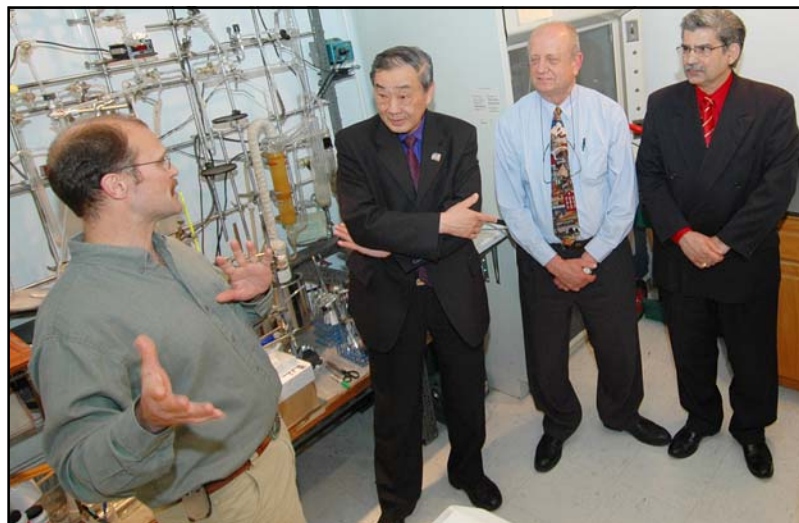
The Symbiosys Enviro is an automated system for simultaneously pre-concentrating and injecting samples for environmental analysis of polar (water soluble) compounds.

This system will be extremely useful for developing methods for analysis of pharmaceuticals and endocrine disruptors in environmental samples.

For example, a paper I published last year in the American Chemical Society journal *Analytical Chemistry* describes a method utilizing this system for determination of parts per trillion concentrations of estrogens like estradiol and estradiol conjugates in lake and river water.

Clearly, the WSL is positioned to provide improved methods for analysis of these compounds and others such as algal toxins that may negatively impact Nebraska’s water quality and environment.

*Two new automated sample extraction injection systems have been installed at the UNL Water Science Laboratory (WSL) this spring to speed sample analysis and improve sensitivity of our detection methods for volatiles, agrichemicals, algal toxins, and other “emerging” contaminants.*



Dan Snow, Director of Laboratory Services for the UNL Water Sciences Laboratory, details lab analytical equipment and methodologies for Joseph J. Jen, Under Secretary for Research, Education and Economics, U.S. Department of Agriculture; Dale Bucks, National Program Leader, Water Quality and Water Management, U.S. Department of Agriculture; and Prem Paul, UNL Vice Chancellor for Research and Dean of Graduate Studies. The three visited the lab in late April as part of a day long overview of UNL water, natural resources and agriculture-related research (photo: Brett Hampton, IANR News).



# Water News Briefs

## EPA's "Thirstin"

U.S. Environmental Protection Agency has introduced "Thirstin" online, a site with educational activities for youth and teachers. The site address is <http://www.epa.gov/ogwdw/kids/index.html>

Take time to try out some of the activities such as the interactive word scramble and the interactive fun facts matching game, both for youth in grades four to eight. Also, the interactive water question and answer game is available for youth in grades nine to 12. There are additional activities as well.

## Heartland Region Water Quality Conference

The DoubleTree Hotel, Overland Park, KS, is the site for the first-ever Heartland Regional Water Quality Conference October 26-28.

This conference will bring together researchers and extension educators from across Missouri, Iowa, Nebraska and Kansas, along with state and federal agency personnel, to learn about and discuss issues affecting water quality in the region. It will provide an opportunity for in-depth inservice experiences and sharing of educational resources/programs on regional water quality issues. A limited number of delegates will be accepted from each state

(about 20). Registration, lodging and meal costs will be covered for attendees.

Jamie Benning, Charles Wortmann, Rick Koelsch, and DeLyn Hay serve as primary University of Nebraska point of contacts to the Heartland Regional Water Quality Project. Jamie Benning is our project manager for UNL's contribution to this project. This project is currently focusing on three issues: community involvement in watershed issues, nutrient and pesticide issues and animal manure management. The project emphasizes sharing research and educational resources within the Heartland region and cooperation with state and federal agencies on educational outreach activities.

For more information on this project, go to <http://www.heartlandwq.iastate.edu>. To attend, contact Jamie Benning a [jboehm2@unlnotes.unl.edu](mailto:jboehm2@unlnotes.unl.edu).

## Law Review Features First Annual Conference

The current edition of the *Nebraska Law Review* features speakers and topics from the First Annual Water Law, Policy and Science Conference, held at the University of Nebraska College of Law last year.

"Finding Solutions to Multi-jurisdictional Water Conflicts," was held Mar. 4 and 5, 2004.

Articles pertaining to the conference in the *Law Review* are diverse, ranging from local and regional examples of specific challenges facing those involved in water management and policy, to broader, nationally applicable law and policy questions.

Authors include Sandra B. Zellmer, John H. Davidson, J.B. Ruhl, Janet C. Neuman, Lawrence J. MacDonnell and J. David Aiken.

Zellmer and Aiken are faculty members at the University of Nebraska-Lincoln, Zellmer in the College of Law and Aiken in the Department of Agricultural Economics.

The issue is *Nebraska Law Review*, University of Nebraska, Vol. 83, No 2. A limited number of copies are available through the UNL Water Center for \$10 each by contacting Tricia Liedle at (402) 47203305 or by emailing [sress1@unl.edu](mailto:sress1@unl.edu).

## New USGS Office

U.S. Geological Survey (USGS) offices in Lincoln moved earlier this year. New contact information for the office is Richard Wilson, PE, U.S. Geological Survey Nebraska Water Science Center, 5231 South 19th Street, Lincoln, NE 68512-1271. Phone (402) 328-4120,

Fax (402) 328-4110, Cell (402) 416-0633 or email [wilson@usgs.gov](mailto:wilson@usgs.gov)

discussions of climate change and drought; drought history and predictability; climate change in a fragile ecosystem: water in the Great Plains; decision making under uncertainty; water management and policy instruments to mitigate drought and climate change; and translating science into policy and to the public.

After University of Nebraska Chancellor Harvey Perlman opened the conference, Peter Gleick, president of the Pacific Institute for Studies in Development, Environment, and Security, said the world stands on the brink of a new era in water management and development.

"A new period of substantial risks and opportunities in the 21st century may help resolve some of the questions left unaddressed in the 20th century," he said.

Globally, we are increasingly making better ecological decisions on water; are making more efficient use of water; have better drought management; and are better integrating climate change into water planning, Gleick said.

Nonetheless, water remains the most critical resource issue worldwide and we continue to live in the midst of a global water crisis.

"Per capita water availability is in decline, as the amount of clean freshwater is relatively fixed but population is not," he noted. Water demands, especially in the developing world, are growing.

"The challenge for water availability is not the total amount of water on the planet but the places where water is scarce," Gleick said.

While saying he could envision a fairly depressing world water scenario in the future, Gleick also said that all kinds of innovations are leading to solutions. These are occurring as people break out of ideological and institutional barriers and other limited ways of thinking about water.

Later, Don Wilhite, director of UNL's National Drought Mitigation Center, said that by planning for drought and adopting mitigation measures aimed at reducing impacts, state and federal governments could reduce post-drought expenditures

in the form of relief programs.

Relief programs are reactive and do little to reduce vulnerability to future episodes of drought, Wilhite said.

"While drought is a natural hazard, there is a very strong, very important social component to it, particularly from the standpoint of improving resource management, by adopting measures that reduce vulnerability and, therefore, risk," he said.

Because drought is the nation's most expensive natural hazard and our vulnerability to it is increasing, the key to good drought policy and efficient use of government funding is developing an integrated early warning system using multiple indicators and better drought mitigation plans at all levels of government.

UNL paleoclimatologist Sheri Fritz said that despite well-defined periods of drought, data collected from tree ring growth and lake bottom sediments suggest the 20th century wasn't as dry as many that preceded it.

Speaking on "Incidence of Drought: What Can We Learn from the Historical and Paleoclimatic Record," Fritz said "Data collected since 1,500 A.D. strongly suggests alternating wet and dry periods in the Western United States, with recurrent periods of extended drought many of which equaled or dwarfed the 20th century's longest and most severe drought in the 1930's.

Historically in the Western United States, droughts can be expected in every century, although the 20th was considerably wetter than many before it.

"From that standpoint, the 20th century alone is not a good indicator of what climate trends may be in the future," she said.

Fritz works in the area of interfacing geological, biological, and atmospheric sciences, and studies lake sediment cores and the remains of microscopic organisms called diatoms to help answer questions about the history and record of environmental change.

Other conference speakers included Philip Mote, a professor in the Depart-

ment of Atmospheric Sciences at the University of Washington speaking on "Preparing for Climate Change in the Pacific Northwest;" Thomas Stewart, a professor in the Center for Policy Research, Rockefeller College of Public Affairs and Policy at the State University of New York speaking on "Uncertainty, Prediction, and Error in Water Management;" and Ed Marston, publisher emeritus and Matt Jenkins, reporter, *High Country News* on the "Role of the Media in Communicating Science."

Others were former Deputy Secretary, U.S. Department of Interior David J. Hayes speaking on "Addressing Water Conflicts: Lessons Learned (or Not Learned);" "*Beauty and the Beast: External Review of Restoration Science*" by Will Graf, Professor of Geography, University of South Carolina and former chair, National Research Council Committee on Endangered and Threatened Species in the Platte River Basin; "*Science, Judgment and Controversy in Natural Resource Regulation*" by Holly Doremus, School of Law, University of California-Davis; "*Drought and critical water problems in the Colorado River Basin: are the Lessons Learned?*" by Roger Pulwarty, Research Scientist, NOAA Climate Diagnostics Center, University of Colorado; and "*Uncertainty, prediction, and error in water management.*" Tom Stewart, Center for Policy Research, SUNY-Albany.

The conference was co-sponsored by UNL's Institute of Agriculture and Natural Resources, School of Natural Resources, Department of Geosciences, College of Law, Water Center, Water Resources Research Initiative, and School of Journalism Public Policy Center.

For more information on the 2004 and 2005 conferences, go to <http://snr.unl.edu/waterconference/>

(Editor's note: This article was compiled with help from UNL School of Natural Resources communicator Charles Flowerday).

## Cooperative Extension Ready With Algae Test Kits (continued from page 5)

the lake, and sample bottles for water and algae. Samples are returned to Barrow for processing and those who submit samples are notified of results.

**For more information or a test kit call Hilary Hansen at (402) 472-8190 or go to the UNL Water Center web site at <http://watercenter.unl.edu/>.**

Knowing what an algae bloom looks like and avoiding water contact during blooms is important, the two School of Natural Resources experts said.

People should avoid swimming, water skiing, riding personal watercraft or similar activities involving physical contact or swallowing water from lakes with blue-green algae blooms, Holz said.

During a bloom, lake water becomes cloudy with a green or blue-

green cast and blue-green streaks may be visible on the water's surface, said Kyle Hoagland, a lake ecologist who heads UNL's Water Center.

"At this stage, the lake looks like pea soup or as if someone dumped a light colored green paint in the water. It often develops a strong musty or fishy odor as the algae accumulates and begins to decompose," he said.

Winds can increase the danger of a toxic bloom by blowing algae to the leeward side of a lake where it concentrates in coves or along shorelines.

"Blue-green algae, which are cyanobacteria, are microscopic organisms commonly found in lakes and ponds worldwide. Special characteristics of blue-green algae often

allow them to multiply faster than other types of algae," Holz said.

"Rapid algal growth is called an algae bloom. Blooms can appear and linger anywhere from days to weeks and can persist until the first hard frost in the fall," Hoagland said.

Some types of blue-green algae produce chemical toxins that harm people and animals. "These colorless and odorless toxins may linger in the water for as long as two weeks after the bloom has disappeared."

"Numerous environmental factors can trigger a bloom, lakes with higher concentrations of nutrients, or fertilizers, especially phosphorus, generally tend to be more susceptible to blue-green blooms," he added.

### We're Updating!!

We are updating our mailing list. If you have a change of address, title and/or name, or would like to have your name added to or removed from the *Water Current* mailing list, please let us know. Also, if you know of anyone who might be interested in receiving our publications, please give us their names and we will be glad to add them to our mailing list.

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# You Get the Last Word

Is the *Water Current* delivering the information you need?

Take a few minutes and tell us by answering the short series of questions below. Your response will give us a better idea of your interests and what kinds of information you want in the *Water Current*.

As a reward for your efforts we'll enter your name in a drawing for one of three Water Center rain gauges. To be eligible, return completed surveys to Steve Ress, UNL Water Center, P.O. Box 830844, University of Nebraska, Lincoln, NE 68583-0844 or FAX it to (402) 472-3574 by Friday, June 3. UNL subscribers may return surveys via campus mail to 103 NRH, EC, 0844.

Please mail or FAX the entire page (so we have your name and address for the drawings). All survey responses are held in confidence and are used only by the newsletter's editorial staff.

**1. Rank in order of importance, the usefulness of the following general areas of the *Water Current* (1 - most important to 6 - least important):**

- News Briefs
- Meet the Faculty
- Previews articles of upcoming events, seminars, conferences, etc.
- Director's Notes
- Articles on NU water and environmental research and outreach activities

**2. What articles or topical areas would you like to see in upcoming issues of the *Water Current*?**

\_\_\_\_\_

**3. What are your primary water and environmental interests?**

\_\_\_\_\_

**4. Do you always read each *Water Current* you receive?**

Yes  No  Usually

**5. Do you circulate your *Water Current* to anyone else?**

Yes (if so, how many others )  No

**6. Should the *Water Current* be distributed**

More often  less often  remain a quarterly

**7. Do you ever access the virtual copy (PDF) of the *Water Current* on the Water Center's web site at <http://watercenter.unl.edu>?**

Yes  No

**8. What can we do to improve the appearance and/or readability the *Water Current*?**

\_\_\_\_\_

**9. Are you more likely to read this newsletter in print, or would your information needs be satisfied by accessing it electronically?**

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