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November 2009

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## MEET THE FACULTY

## Sarah Michaels, Ph.D.

Sarah Michaels is a Professor, Department of Political Science, University of Nebraska–Lincoln, and Faculty Fellow, University of Nebraska Public Policy Center. Her general areas of interest include water resources policy and governance, science-policy interface, comparative environmental policy, and regional governance. Her current research interests include potential of expert to decision-maker knowledge brokering to support anticipatory institutional strategies for addressing emerging environment-related concerns, longitudinal changes in how science is considered in decision making about water resources, and transboundary dimensions of source water protection.



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## Water Current

PART OF THE SCHOOL OF NATURAL RESOURCES

## Water Tour to North and South Platte Basins

By Steve Ress

The University of Nebraska–Lincoln's annual Water and Natural Resources Tour will take an in-depth look at North and South Platte River watershed issues effecting Nebraska this summer.

The tour is tentatively planned to leave Kearney on Monday, July 12, 2010 and return there on Thursday, July 15, 2010 with stops all along the North and South branches of the Platte River in Nebraska, Colorado and Wyoming.

An in-depth look at the U.S. Bureau



*Wyoming's Seminole Dam, one of several dams forming the backbone of the U.S. Bureau of Reclamation's North Platte Project.*

of Reclamation's North Platte irrigation and hydropower Project in Wyoming and Nebraska will be featured.

"Nebraska, Wyoming and Colorado are

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## Dvorak Named Interim Director

By Steve Ress

For the first time in nearly 10 years the University of Nebraska–Lincoln Water Center has a new director.

Bruce Dvorak, former associate chair of UNL's Department of Civil Engineering, succeeds Kyle Hoagland, director of the Water Center since 2000, who left the position at the end of August to pursue other water and related programming areas at UNL. On Sept. 1 Dvorak began a yearlong appointment as interim director of the Water Center, as well as continuing his faculty affiliations with UNL's

Departments of Civil Engineering and Biological Systems Engineering.

The interim appointment as Water Center director was announced late this summer by UNL School of Natural Resources director Don Wilhite, who said a comprehensive search for a new permanent



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## From the Interim Director

**Bruce Dvorak**

# Changing of the Guard

Elsewhere in this edition of the Water Current, you can read a good deal more about me and my academic background, but for now let me say that I am very humbled to be stepping into Kyle Hoagland's director shoes after one of the longest, and arguably most productive and successful directorships the UNL Water Center has ever had. Among seven past, permanent directors of the UNL Water Center, since its founding in 1964, only Bob Volk and Bill Powers served in the post anywhere near as long as Kyle.

His tenure in the position came at a time of growing awareness of and interest in Nebraska's abundant, but precious water resources.....and when competition for the wise and productive use of those resources had never been higher.

I'm happy to note that Kyle will remain with UNL's School of Natural Resources as a senior water analyst, using his considerable expertise and experience to mentor water faculty and assist in the challenging task of winning multidisciplinary water research grants that are so critical to our understanding of water and how to use it wisely over a broad range of beneficial uses.

My "contract" with UNL and the School of Natural Resources is that I will be Water Center director until this coming September. During that time it is anticipated that a national search for a new, permanent director will be made, commencing this spring, and that a new director could be named sometime in 2010.

Briefly about me, I have been a UNL faculty member since 1994 and am tenured in the Department of Civil Engineering with a joint appointment in the Department of Biological Systems Engineering. My research focuses on water quality issues (esp., water

treatment) and improving sustainability of Nebraska businesses through resource conservation of water and natural resources.

I have also been active on the section and national level in the American Water Works Association.

At present, it is a pleasure to be serving the Water Center's stakeholders and constituents as interim director. It's also meant a busy Fall Semester for both my family and myself, as I settle into new challenges, rearrange some of my other faculty responsibilities and move my family into a new home.

In the short time I have been in the position I have enjoyed getting to meet many of you and look forward to meeting and interacting with even more of you over the course of the coming year.

As I consider how to approach my responsibilities I know that much of what I do and how I help guide the Water Center will revolve around continuing the many good works that are already in place and continuing strong emphasis will be placed on assisting faculty in developing interdisciplinary research teams and interdisciplinary education efforts, catalyzing linkages between research sponsors and faculty researchers, communicating the results of Nebraska water research to stakeholders, and communicating stakeholder needs to University of Nebraska faculty.

In short, I will be using this year as

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## MEET THE FACULTY

### Ron Yoder, Ph.D.

**R**on Yoder is Professor and Head, Department of Biological Systems Engineering (BSE), and Associate Director of Agricultural Water Management, University of Nebraska–Lincoln and has been a BSE faculty member for the past five years. He was honored with the PEI Professional Engineer of the Year Award, ASABE in 2008. Before coming to UNL Yoder was Professor and Head, Biosystems Engineering and Environmental Science Department, UT, 2000 – 2004; Associate Professor, Agricultural and Biosystems Engineering Department, UT, 1996 – 2000; Coordinator, Tennessee Agricultural Experiment Station Interdisciplinary Water Quality Research Team; and Assistant Professor, Agricultural Engineering Department, University of Tennessee, 1992 – 1996, among other past appointments.

#### Education:

Ph.D. Agricultural Engineering, Colorado State University, 1988  
M.S. Agricultural Engineering, Clemson University, 1978  
B.S. Civil Engineering, Drexel University, 1976

#### Selected Publications:

Tyner, J. S., W. C. Wright, and R. E. Yoder. 2007. Identifying Long-Term Preferential and Matrix Flow Recharge at the Field Scale. *TRANSACTIONS of the ASABE*. 50(6):2001-2006.

Miranda, F. R., R. E. Yoder, and J. B. Wilkerson. 2005. An Autonomous Controller for Site-Specific Management of Fixed Irrigation Sys-

tems. *Computers and Electronics in Agriculture* 48:183-197.

Yoder, R. E., L. O. Odhiambo, and W. C. Wright. 2005. Effects of Vapor Pressure Deficit and Net-Irradiance Calculation Methods on the Accuracy of the Standardized Penman-Monteith Equation in a Humid Climate. *ASCE J. of Irr. and Dr.* 131(3):228-237.

Yoder, R. E., L. O. Odhiambo, and W. C. Wright. 2005. Evaluation of Methods for Estimating Daily Reference Crop Evapotranspiration at a Site in the Humid Southeast of USA. *Applied Engineering in Agriculture* 21(2):197-202.

Li, J., R. E. Yoder, L. O. Odhiambo, and J. Zhang. 2004. Simulation of Nitrate Distribution Under Drip Irrigation Using Artificial Neural Networks. *Irrigation Science* 23:29-37.

Odhiambo, L. O., R. S. Freeland, R. E. Yoder, and J. W. Hines. 2004. Investigation of a Fuzzy-Neural Network Application in Classification of Soils using Ground-Penetrating Radar Imagery. *Applied Engineering in Agriculture*, 20(1):1-9.

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### Sarah Michaels, Ph.D. *continued from page 1*

#### Education:

Ph.D. Geography, University of Colorado  
MRM Natural Resources Management, Simon Fraser University  
BIS (Honours), Stormwater Management, University of Waterloo

#### Example of Current Research:

“Science and sovereignty: Linking environmental sustainability to smart and secure borders” funded by the Canadian Studies Research

Grant Program. Using a case study approach, Michaels is considering two questions vital to Canada-U.S. relations and to environmental security in both countries: (1) What role, if any, does science play in governmental deliberations and intergovernmental processes that may produce ecological consequences of uncertain scale, magnitude and scope in another country? and (2) How within-country decision-making processes that may have cross-border environmental implications influence if and how science is considered?

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## Featured Partner: Nebraska Well Drillers Association

By Duane Mohlman

The Nebraska Well Drillers Association (NWDA) has had a long and profound impact on Nebraska's groundwater resources. Since 1929, NWDA has brought together the state's well drillers, key industry leaders and University of Nebraska scientists for the betterment of all Nebraska.

To quote NWDA's mission statement, "The organization has served the industry by providing technical training, new product exposure, idea sharing and fellowship among its members. The organization represents businesses and industries as well as techni-

cians dealing with water well drilling, pump installation, manufacturing and supplying of equipment and material for water well work. The organization has also become a significant voice in legislative and regulatory matters before the State of Nebraska."

### A Brief History

Ideas for a statewide water well association began forming in the last half of the 1920s. Seidel and Dreeszen, in their 1993 article *NWDA: Leadership for the Water Well*

*Industry*, summarized the growing need for such an organization when they wrote "Timing was right in the late 1920s for a focus on groundwater in Nebraska. A new science – groundwater hydrology – was slowly becoming established at the state and federal levels and desperately needed data. Well drilling as an industry was emerging out of the dark ages of "water witching" and "well digging." The close relationship between certain diseases – notably typhoid fever, cholera and diphtheria – and poorly constructed wells had been established. And early investigations suggested the potential of a vast groundwater resource in the state.

"Dr. George E. Condra, dean and director of the Conservation and Survey Division (CSD) of the University of Nebraska, grasped the opportunity to provide service to the industry and to the people of the state. Condra, a visionary and a dedicated scientist, began two complementary activities. In 1929 he established a cooperative test-drilling and water-level monitoring program with the U.S. Geological Survey, and, with the help of a number of interested drillers, organized a statewide association of well drillers."

In addition, typhoid fever that had earlier claimed the life of Condra's seven-year-old son was believed to have come from drinking contaminated well water while on a trip with his father.

In January 1929, Condra invited a dozen well drillers to campus to organize a professional association. From this initial meeting, the Nebraska Well Drillers Association was formed, with Harry Brown of Blair as their first (interim) president.

Their first convention was held February 28 - March 1, 1929 where Condra informed them that they were just the sixth state to

*continued on page 13*

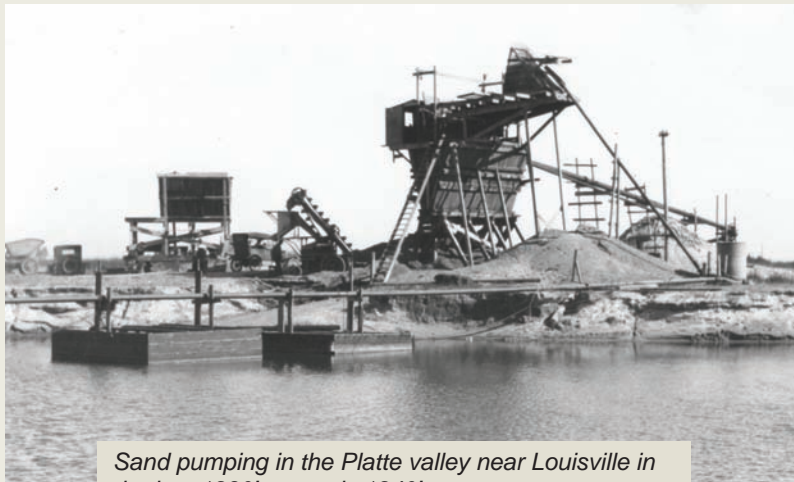


*First convention of the Nebraska Well Drillers Association, 1929. The group was told they were just the sixth state to form such an association and the importance of the well driller, and obtaining a dependable supply of pure and healthy water for the citizens of Nebraska was explained to them.*

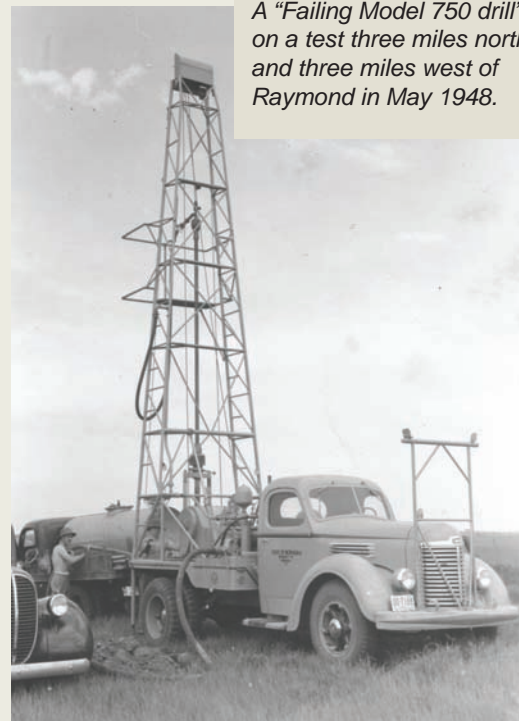


*2008 annual meeting of the Nebraska Well Drillers Association. The group has held annual conventions with the exception of the World War II years, when travel was restricted due to gas rationing.*

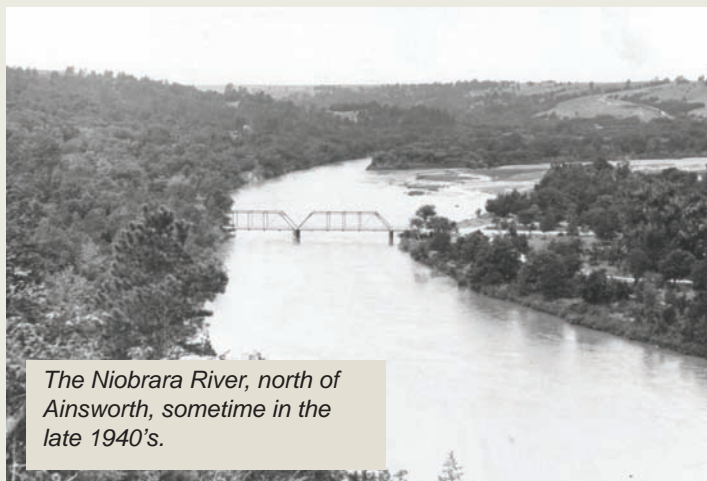
# Irrigation and Water Photos From Nebraska's Past



*Sand pumping in the Platte valley near Louisville in the late 1930's or early 1940's.*



*A "Failing Model 750 drill" on a test three miles north and three miles west of Raymond in May 1948.*



*The Niobrara River, north of Ainsworth, sometime in the late 1940's.*



*A mixed seeding of alfalfa and brome grass east of Steinauer in June 1938. The planting was part of the Soil Conservation Service's Syracuse Project.*



*Shovel irrigation in Scottsbluff County in the 1930's.*



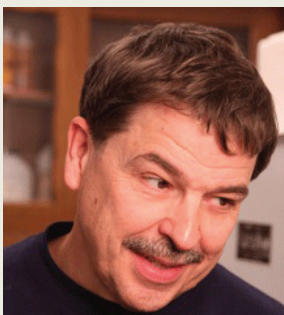
## Emerging Contaminants in a Flat World.

By Alan S. Kolok, Ph.D., Aquatic Toxicologist, Department of Biology, UNO; Department of Environmental, Agricultural and Occupational Health, UNMC

In 2005, Thomas L. Friedman published his seminal book entitled, *The World is Flat: A brief history of the twenty-first century*. The central thesis of the book is that the world has essentially flattened, allowing India, China and other developing countries to become part of the global, electronic supply chain for services and manufacturing.

While Friedman's book primarily focuses on technological business competitiveness, the 'flattened world' applies equally to electronic information related to water quality, environmental stewardship and emerging contaminants.

It is striking to witness how this access to electronic information is influencing non-



UNO environmental toxicologist Alan Kolok.

scientists. I often give lectures to non-scientific audiences, and am continually impressed by the level of

sophistication they already have regarding emerging contaminants.

For many, the Internet is undoubtedly their major information source. In fact, it is just as likely that you are reading this commentary online, as you are to be reading a paper copy of the *Water Current*!

Knowledge is power, and the transfer of high quality information from scientist to non-scientist has truly empowered the public. This information however can cut both ways.

While some information can be educational and empowering, an overflow of unfiltered information can lead to ambivalence and a foreboding sense of helplessness. Why develop a stronger understanding of emerging contaminants if the issue is so pervasive as to be unsolvable?

Clearly, it is incumbent upon us, as environmental scientists, to not only provide information regarding the extent of the issue, but also to engage in the dialog regarding what can be done about it.

One example of how the Internet is currently being used to inform the public of actions they can take to enhance water quality is a website produced by the Nebraska Pharmacists Association ([www.nebraskameds.org](http://www.nebraskameds.org)). It details the proper methods for disposal of unused human pharmaceutical compounds to ensure they do not reach local waterways. Websites, such as this provide information that can change personal behavior, which in turn can directly influence statewide water quality.

But the Internet presents even greater opportunities. It is just as easy to reach data intensive websites, as it is to reach informational websites.

Witness that with just a few keystrokes, you could easily be amassing raw data from U. S. Geological Survey water gauging stations from many watersheds throughout Nebraska or across the nation. Until recently, the only way the non-scientific community could access scientific data was through scientific journals in University libraries.

With the exception of glossy periodicals like *Science* magazine, most of these journals

were obscure and unavailable to general audiences. However, in the electronically interconnected flat world in which we live, the chasm between the scientific community and the public has disappeared, and sophisticated science journals, as well as raw datasets, are available to just about anyone who has a computer and a bit of patience.

Do we acknowledge the empowered public as a potential player in the scientific enterprise, or do we ignore this potential and continue along in a business as usual manner?

We really don't have a choice. If we don't acknowledge the global interconnectedness of information, it will continue to happen nonetheless. How long will it be before a truly meaningful meta-analysis of water quality (and emerging contaminant) data is completed by a lay-scientist, and what will be the scientific community's reaction to this event?

Of course there are problems with the citizen scientist.

Their training may be insufficient, and their underlying motivations may be suspect. Nevertheless, access to information has empowered these individuals, and they are here to stay.

The scientific process has met the electronically interconnected flat world that Friedman so eloquently describes. How scientists deal with this flattened world is destined to be an important issue for many scientific questions, including the impact of emerging contaminants on the environmental health of Nebraska's waterways.

# River City Roundup Features Nebraska Water Issues

By Vernon Waldron, Extension Educator, Douglas-Sarpy Counties

Those attending Omaha's 2009 River City Roundup had an opportunity to learn about Nebraska's water resources through several University of Nebraska–Lincoln Extension displays. A UNL expert staffed each display as an estimated 95,000 toured the event.

UNL educators used a Groundwater flow model to demonstrate groundwater and surface water interactions, with the large format helping people see water movement, potential avenues of contamination, water withdrawal and more. Protection and beneficial use of groundwater and surface water resources are important issues that impact every Nebraskan.

drinking water. Their response to the challenge, as well as their reactions were observed and evaluated.

UNL Extension's involvement with River City Roundup extended beyond educational displays for participants. Extension Educators in Douglas-Sarpy Counties conducted educational school tours, as they have done for more than 20 years. About 2,500 third and fourth graders participated in the tours this year. A visual demonstration and fun lecture at the rain garden display was one of the stops for students. In addition each student received UNL materials on rain gardens, a Nebraska water map poster produced by the UNL Water Center and

water web site promotional items.

UNL Extension is also involved with a 4-H livestock exposition at River City Roundup. As a result, business size cards promoting use of the website were distributed to 1,200 4-H members participating in the livestock show.

River City Roundup celebrates Midwest heritage. Nearly 30 years ago, after a Knights of Ak-Sar-Ben Board meeting, the idea of River City Roundup was born with notes on a paper napkin. Begun in 1982, the event has grown into one of the region's largest. It was held Sept. 24-27 at Omaha's Qwest Center.



*(Editor's Note: Waldren represents UNL Extension on the River City Roundup committee. He can be contacted for additional information on Extension programming at this event by emailing [vwaldren1@unl.edu](mailto:vwaldren1@unl.edu).)*



Bobbi Holm, UNL Extension in Douglas-Sarpy Counties, conducts a school tour demonstration at Omaha's recent River City Roundup which featured a number of UNL Extension water-related displays.

At another display, families learned how to incorporate rain gardens into urban landscapes to help manage urban stormwater run off – the rain that runs off after a storm and anything dissolved in it. Rain gardens can help the environment, and can be a beautiful focal point in a yard.

A UNL web site, [water.unl.edu](http://water.unl.edu), was demonstrated. In addition, UNL website team members conducted in-depth interviews and tests to help determine its effectiveness. Volunteers were asked to find specific information on lawns, landscapes and gardens; lawn and landscape irrigation; property design and management; climate; or



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## Platte River Basin Science and Resource Management Symposium Oct. 14-15, Kearney

Hosted by USGS Nebraska Water Science Center, Platte River Recovery Implementation Program, Headwaters Corporation, and UNL Water Center



About 50 of those attending October's Platte River Basin Science and Resource Management Symposium were able to tour wildlife and threatened and endangered species work being done at Cottonwood Ranch near Elm Creek (photo by Rachael Herpel).

Nebraska Public Power District Environmental Specialist Jim Jenniges of Kearney talks to those attending a tour of Cottonwood Ranch that was part of an Oct. 14-15 symposium on Platte River basin science and management issues. Jenniges is also a technical advisor to the Platte River Recovery Implementation Program's technical advisory committee and adaptive management working group (photo by Rachael Herpel).



Attendance at the Oct. 14-15 Platte River Basin Science and Resource Management Symposium, in Kearney, reached nearly 200. The event kicked-off a planned series of symposiums dealing with issues effecting Nebraska's large river basins. It was jointly hosted by the USGS Nebraska Water Science Center, Platte River Recovery Implementation Program, Headwaters Corporation and UNL Water Center (photo by Steve Ress).

Viewing posters at the Oct. 14-15 Platte River Basin Sciences and Resource Management Symposium in Kearney (photo by Steve Ress).







One of the speakers at the Platte River Basin Science and Resource Management Symposium was Dave Marmorek of the Platte River Recovery Implementation Program's Independent Scientific Advisory Committee (photo by Steve Ress).



A report on where we've come in terms of integrated water management in the Platte River basin was given by James Schneider of the Nebraska Department of Natural Resources (photo by Steve Ress).



Bob Swanson of the USGS talks about designing a model for integrated climate change effects assessment in the greater Platte River basins at October's Platte River Basin Sciences and Resource Management Symposium (photo by Steve Ress).



Michael Stier of the USGS talks about economic and physical influences on changes to land cover in the Platte River basin (photo by Steve Ress).



Tara Anderson from the University of Nebraska-Lincoln talks about the population dynamics of the Shovelnose Sturgeon in the Lower Platte River (photo by Steve Ress).

## New UNL Spreadsheet Helps Irrigators Evaluate Efficiency

By Faith Colburn, UNL West Central Research and Extension Center

A new University of Nebraska–Lincoln Extension online spreadsheet will help irrigators evaluate their pumping plant efficiency.

The new tool will help irrigators calculate the amount of money they could save by improving the efficiency of their system, said Tom Dorn, Lancaster County Extension educator, who developed the tool.

Irrigators need to determine whether the pumping plant uses more energy than the Nebraska pumping plant performance criteria suggest it should, Dorn said.

“To do that, all irrigators need to do is enter data from irrigation records into the online spreadsheet,” Dorn said. The

spreadsheet is available at [http://lancaster.unl.edu/ag/crops/Long\\_Term\\_Pump.xls](http://lancaster.unl.edu/ag/crops/Long_Term_Pump.xls).

Irrigators are asked to select the energy type from the drop down list and input the price per unit of fuel and water meter readings. If they don’t have a water meter, irrigators can enter the acres irrigated and the gross depth of water applied during the period the energy consumption was being recorded, pumping water level, pressure at the discharge head and total energy used during the test period.

Instructions help users navigate the spreadsheet to determine their own plant’s efficiency and the amount of money they could save if the pumping plant were

operating up to Nebraska performance standards.

“With that information, irrigators can calculate how much they can afford to spend, based upon the interest rate available,” he said.

When considering inefficiencies in the system, irrigators should look at the whole system, including the pump, gearhead, PTO shaft and power unit. Inadequacies in any part of that system can increase energy use.

While it’s costly to pull a pump, sometimes the cost of unneeded energy is quite high too.

For more information about the spreadsheet or to access it online, contact a local UNL Extension office.

*Jeff Buettner of Central Nebraska Public Power and Irrigation District, Holdrege walks across the Western Canal near Big Springs. Irrigation will be a focus of this summer’s Water and Natural Resources tour to Colorado and Wyoming (photo by Steve Ress). See story on page one.*





### Sarah Michaels, Ph.D. continued from page 3

#### Example of Past Research:

With funding from the Social Science and Humanities Research Council (SSHRC) Michaels completed a multi-year research project on organizational knowledge creation for watershed management. The organizations best able to address constantly evolving problems related to managing water in its natural state are those capable of organizational knowledge creation. This process involves creating new knowledge, disseminating it throughout the organization and embodying it in what it does and how it does it. The research undertaken determined that five conservation authorities in Ontario, Canada have the competence, to varying degrees, to undertake this process. Ontario conservation authorities are provincially created bodies mandated to manage, protect and restore Ontario's freshwater resources on a watershed basis.

#### Example of Outreach Programs:

Michaels organized a panel session on opportunities for federal leadership in water policy at the 2008 Dupont Summit, "The New Administration Tackles Science and Technology: Priorities for the Road Ahead," The Carnegie Institution, Washington, D.C.

She gave the invited plenary address "Seeing around the bend: Understanding the mismatch between engineering and ecological perspectives on restoring the Missouri" at the 2009 Missouri River Natural Resources Committee Conference and BiOP Forum, Billings, Montana.

#### Teaching:

POLS 831. Core Seminar in Public Policy

POLS 836. Seminar in Policy Analysis

POLS 931. Advanced Seminar in Public Policy: Science and Policy

POLS 931. Advanced Seminar in Public Policy: Water Policy

#### Selected Publications:

Platt, R.H., Beatley, T. **Michaels, S.** Goucher, N. and Fenstermacher, B. 2008. Urban stream restoration: Recovering ecological services in degraded watersheds in Birch, Eugenie L. and Wachter, Susan M. (eds.) *Growing Greener Cities: Urban Sustainability in the Twenty-First Century*. Philadelphia, PA: University of Pennsylvania Press, pp. 127-151.

**Michaels, S.** 2007. Shaping environmental decision making: Incorporating knowledge brokering in different decision making frames. Discussion paper prepared for invitational workshop on brokering knowledge for the environment, September 17 – 20, 2007, L'Auberge du lac à la loutre, Huberdeau, Quebec.

**Michaels, S.,** McCarthy, D. and Goucher, N. 2007. Information management for water resources: Concepts and practice in Hanna, K. and Slocombe, D.S. (eds.) *Integrated Resource and Environmental Management: Concepts and Practice*. Don Mills, ON: Oxford University Press, pp. 220-235.

**Michaels, S.,** Goucher, N. and McCarthy, D. 2006. Policy windows, policy change and organizational learning: Watersheds in the evolution of watershed management. *Environmental Management* 38:6:983-992.

**Michaels, S.,** Goucher, N. and McCarthy, D. 2006. Considering knowledge uptake within a cycle of transforming data, information and knowledge. *Review of Policy Research* 23:1:267-279.

**Michaels, S.** 2005. Implementing and sustaining systematic approaches to improving the science - policy interface in selected science-based organizations. Ottawa, Ontario: Environment Canada.

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## Dvorak Named Interim Director *continued from page 1*

center director will be made during the coming year.

Dvorak has taught at UNL since 1994 in environmental engineering. His teaching spans introduction coursework (freshman Introduction to Civil Engineering), multi-disciplinary coursework (Pollution Prevention: Principles and Practices), to specialized graduate coursework (e.g., Physical and Chemical Treatment Processes).

When named interim director of the Water Center, he was associate chair at Civil Engineering. He also holds a joint appointment in Biological Systems Engineering, as an environmental infrastructure engineer, where he provides extension outreach to Nebraska on drinking water and waste minimization issues.

His research and service focus on water quality issues (esp. physical/chemical treatment of water and adsorption processes),

applied pollution prevention, methods for enhancing the adoption of sustainability practices by industry.

He currently serves as chair of the Nebraska section of the American Water Works Association (AWWA) and also chairs their Small Systems Research Committee. Additionally, he was recently awarded the 2009 Samuel Arnold Greeley Award for a coauthored paper judged by the American Society of Civil Engineers (ASCE) for making the most valuable contribution to the environmental engineering profession. Eligible papers must deal with the design, construction operation or financing of water supply, pollution control, storm drainage or solid waste collection and disposal facilities and be published by ASCE during the preceding year.

Dvorak also holds numerous teaching awards, including the 2005 University of Nebraska Holling Family Master Teacher

Award/University-Wide Teaching Award. He is a registered professional environmental engineer and was recently fully promoted to professor.

He earned his BS in Civil Engineering from UNL in 1987 and Ph.D. in Civil (Environmental) Engineering from the University of Texas at Austin in 1994.

Past directors of the UNL Water Center, and their tenure, are:

Kyle D. Hoagland 2000-2009  
J. Michael Jess (acting) 2001-2003  
Edward F. Vitzthum (interim) 1999-2000  
Bob G. Volk 1990-1999  
Roger E. Gold 1988-1990  
William L. Powers 1980-1988  
Gary L. Lewis and Deon Axthelm (interims) 1978-1980  
Millard W. (Wayne) Hall 1975-1978  
Warren (Bud) Viessman, Jr. 1968-1975  
Eugene C. Reed 1964-1968

## From the Interim Director *continued from page 2*

director to continue refining the Water Center's roles and activities to better meet the needs of you, our stakeholders.

One of these stakeholder activities I was very pleased to step into was the Platte River Basin Science and Resource Management Symposium in Kearney in mid-October. This was, in effect, both a revival of the past Platte symposium series that UNL's Tom Franti and others hosted, as well as what I hope will be the inaugural event in a series of broad-based symposiums on Nebraska's large river basins.

Nearly 200 attended this day-and-a-half event and most seemed captivated by the range of topics related to the river.

Fifty attended a very wet and muddy pre-symposium tour of the Cottonwood Ranch habitat area, as well.

I would especially like to thank our Assistant Director Lori Benson, for coordinating this event and our partners at USGS Nebraska Water Research Center, Platte River Recovery Implementation Program, and Headwaters Corp.

One other topic I would like to address, and that I know many of you are keenly aware of and interested in, is development of the University's Global Water for Food Institute. The University is seeking funding for this Institute, which will focus on research, policy

analysis and education addressing the international issues around growing more food with limited water supplies.

A key part of this work is applying the expertise and experience in water management we have here in Nebraska to this global challenge. It is an exciting and ambitious goal that could lead to new syntheses and understanding of the challenges in water and food production, and have impacts both in Nebraska, nationally and internationally. There would be many opportunities for collaborations.

form such an association. He explained the importance of the well driller and obtaining a dependable supply of pure and healthy water for Nebraskans.

Their annual Lincoln convention has become an NWDA highlight and has been held every year except 1943-45 when war-induced travel restrictions cancelled it. The 2010 convention will be Feb. 17-18, at the Lancaster County Event Center.

"The convention includes a trade show as well as special opportunities for continuing education training. New opportunities for 'hands on' programs because of the larger facility and inside 'dirt' arena will add special interest to the 2010 event", said NWDA executive director Lee Orton.

The annual January Short Course also envisioned by Condra "Was designed to educate members about the geology and groundwater characteristics of the state and techniques of well drilling and construction needed to obtain a safe and adequate water supply" (Seidel and Dreezen: 1993).

"That short course tradition has become the principle technical training event for NWDA and draws record crowds each year," Orton said.

In the late 1970s NWDA retained its first part-time manager. In 1982 Orton was hired to assist in developing a professional licensing and continuing education program, which was adopted that year. With its own professional management, the association separated from CSD, yet CSD (now part of UNL's School of Natural Resources), continues to assist them with a number of continuing education events and cosponsors many of those programs. In addition, SNR houses NWDA archives.

NWDA has an accomplished history of providing leadership in developing water-

well industry standards. Working with NU scientists and state agencies, some of these include:

- Developed and adopted minimum standards for irrigation wells (1957)
- Developed and adopted minimum standards for sanitary domestic wells (1965)
- Water-Well Standards and Contractors' Licensing Act (1986).
- Sponsorship of a majority of the continuing education programs required for industry license renewal (1986).
- Partnership with the "Grout Task Force" investigations of grout materials.
- The 1986 Licensing Act requires that all well drillers and pump installers earn educational credits, and must pass an examination to receive their license. These 1986 requirements caused NWDA to increase the quantity and diversity of its educational offerings.

## Today's NWDA

NWDA has a current contractor membership of 155, and many affiliated individual, company and government agency members. It continues to be involved in a number of important, on-going projects, including:

**Education:** Sponsors the annual convention and cosponsors with UNL an annual technical workshop; Sponsors numerous outdoor workshops, special training events and geology tours in Nebraska and throughout the Great Plains.

**Industry News:** Quarterly magazine *Water Writes*

**Insurance:** Complete insurance protection is available

**Government Liaison:** NWDA monitors state legislative activity and when needed, interacts with lawmakers. Works with state agencies involved with groundwater activities, and other groups.

**Industry Promotion:** Represents the industry on several committees, including state and federal. Provides information and news releases to media and trade publications.

**Public Affairs:** Promotes youth and adult groundwater education.

**Scholarship:** Presents annual George Condra Scholarship to a Nebraska student studying water resources/planning.

Through Condra's visionary work, and many others since then, NWDA has become one of the largest and most successful state water well drillers associations in the U.S.

For more information go online to <http://www.nebraskawelldrillers.org>, phone (402) 476-0162, contact via the Internet at <http://www.nebraskawelldrillers.org/contact.htm>, or write: NWDA, 1223 Lincoln Mall, Suite 201, Lincoln, NE 68508. Annual convention minutes, photographs and programs; short course and banquet programs; and other archival information are online at <http://nwda.unl.edu>.

Any water well contractor, pump installation contractor, repair person, or friend of the water well industry, is welcome to become a member. Current membership fees range from \$40 to \$275 and membership applications are online.

*(Editor's Note: This is the third in a series featuring Nebraska water and environmental non-governmental organizations and/or partners of the UNL Water Center. By featuring these groups we hope to promote their good work. We thank Lee Orton for his contributions to this article).*



## NEWS BRIEFS

### USGS Mercury Study

The USGS recently released a study that assesses mercury contamination in fish, bed sediment, and water from 291 streams across the nation, sampled from 1998 to 2005.

The report, along with a press release, podcast, and summary of major findings can be accessed at <http://water.usgs.gov/nawqa/mercury/>.

Scientists detected mercury contamination in every fish sampled in every stream. <http://water.usgs.gov/nawqa/mercury/>. About a quarter of these fish were found to contain mercury at levels exceeding the criterion for the protection of people who consume average amounts of fish, established by the U.S. Environmental Protection Agency (EPA). More than two-thirds of the fish exceeded the EPA level of concern for fish-eating mammals.

Atmospheric mercury is the main source to most of these streams – coal-fired power plants are the largest source of mercury emissions in the United States – but 59 of the streams also were potentially affected by gold and mercury mining. Since USGS studies targeted specific sites and fish species, the findings may not be representative of mercury levels in all types of freshwater environments across the United States.

For more information, contact Barbara Scudder, [bscudder@usgs.gov](mailto:bscudder@usgs.gov), (608) 821-3832 or Mark Brigham, [mbrigham@usgs.gov](mailto:mbrigham@usgs.gov), (763) 783-3274.

### EPA Expects to Revise Rules for Power Plant Discharges

The U.S. Environmental Protection Agency (EPA) plans to revise existing standards for water discharges from coal-fired power plants to reduce pollution and better protect America's water. Wastewater discharged from coal ash ponds, air pollution control equipment, and other equipment at power plants can contaminate drinking water sources, cause fish and other wildlife to die and create other detrimental environmental effects.

Earlier this year, EPA completed a multi-year study of power plant wastewater discharges and concluded that current regulations, issued in 1982, have not kept pace with changes in the electric power industry over the last three decades. Air pollution controls installed to remove pollution from smokestacks have made great strides in cleaning the air people breathe, saving lives and reducing respiratory and other illnesses. However, some of the equipment used to clean air emissions does so by "scrubbing" the boiler exhaust with water, and when the water is not properly managed it sends the pollution to rivers and other waterbodies. Treatment technologies are available to remove these pollutants before they are discharged to waterways, but these systems have been installed at only a fraction of the power plants.

As part of the multi-year study, EPA measured the pollutants present in the wastewater and reviewed treatment technologies, focusing mostly on coal-fired power plants. Many of the toxic pollutants discharged from these power plants come from coal ash ponds and the flue gas desulfurization systems used to scrub sulfur dioxide from air emissions.

More information about EPA's study is provided in an interim report published in August 2008. A final study will be published later this year. More information on wastewater discharges from power plants: <http://www.epa.gov/waterscience/guide/steam/>.

### Revised Water Quality Standards Approved for Nebraska

The U.S. Environmental Protection Agency (EPA) has approved revised Nebraska water quality standards to support recreational activities and the protection of aquatic life. The approved water quality standards include updated criteria for several pollutants and protection of over 3,200 miles of streams for recreation.

"EPA appreciates Nebraska's ongoing efforts to revise its water quality standards. The work done by the Nebraska Department of Environmental Quality will further protect the waters of the state," said William Rice, Acting Regional Administrator.

The Nebraska Department of Environmental Quality submitted new and revised Nebraska surface water quality standards to EPA for review and approval, as required by the Clean Water Act. EPA's September 30, 2009, decision letter provides a more detailed description of EPA's review and the basis for this action. The decision letter is available at [www.epa.gov/region07/news\\_events/legal](http://www.epa.gov/region07/news_events/legal).

For more information, contact Chris Whitley at (913) 551-7394 or email [whitley.christopher@epa.gov](mailto:whitley.christopher@epa.gov).

## Water Tour to North and South Platte Basins *continued from page 1*

highly dependent on irrigation water and hydropower generated in the North Platte watershed,” said tour director Michael Jess. “The tour last visited this very historic and important federal impoundment project eight years ago and there are many people that have told us they would like to see it either for the first time, or again.”

Project construction began more than 100 years ago under then-President Theodore Roosevelt. The project irrigates a large swath of cropland in western Nebraska, above Lake McConaughy.

“Both operationally and historically the dams and reservoirs in Wyoming are impressive, and as important to irrigated agriculture and power generation in Nebraska as ever,” Jess said.

Other stops and topics tentatively being discussed for the tour include the Platte River Recovery Implementation Program, Colorado’s Tamarack wildlife area and water augmentation



*Pathfinder dam and reservoir are at the heart of the U.S. Bureau of Reclamation’s North Platte Project. The dam celebrated its centennial last year.*



*The North Platte River, as it looks downstream from Wyoming’s Pathfinder Dam.*

program, South Platte River hydrology, surface and groundwater regulation under Colorado law, water supply and use challenges from continuing urbanization of Colorado’s “Front range,” allocation of stream flows among irrigators in Nebraska and Wyoming, and a visit to UNL’s Panhandle Research and Extension Center, Scottsbluff.

Conjunctive water use tensions in the Pumpkin Creek valley in Banner and Morrill Counties will also likely be talked about and the tour will likely stop at Lake McConaughy before returning to Kearney.

Tour costs, itinerary and registration details have not yet been set. The Kearney Area Chamber of Commerce is expected to begin taking tour registrations in April.

Event cosponsors include Central Nebraska Public Power and Irrigation District, Gateway Farm Expo, Kearney Area Chamber of Commerce, Nebraska Public Power District and UNL’s Water Center, School of Natural Resources and Conservation and Survey Division.



## Water Center Events

Kyle Hoagland talks at a reception honoring his nine-years of service as director of the UNL Water Center. Bruce Dvorak was named interim director of the center September. Hoagland will continue as a senior water analyst in UNL's School of Natural Resources (photo by Steve Ress).



UNL Vice Chancellor for Research Prem Paul talks with Kyle Hoagland at an October reception honoring Hoagland's nine-years as director of the UNL Water Center (photo by Duane Mohlman).



UNL Water Center outreach specialist Rachael Herpel talks with U.S. Senator Ben Nelson's staff agricultural representative Dayle Williamson at a reception honoring former director Kyle Hoagland's nine years of service as director of the UNL Water Center (photo by Steve Ress).



Steve Ress from the UNL Water Center (left) plays the water game with those playing in early October's Water Quality Open golf tournament sponsored by the Lower Platte River Corridor Alliance. The tournament was held at Quarry Oaks Golf Club near South Bend (photo by Duane Mohlman).



Explaining basic groundwater concepts and the importance of properly decommissioning abandoned wells at the World O! Water Festival at the Papio-Missouri River NRD's Natural Resources Center, near Omaha, in September. Families and scout troops took advantage of the event, picking up copies of the Nebraska Water poster and taking turns "pumping" a well with help from UNL Water Center outreach specialist Rachael Herpel (Photo courtesy Mary Bamesberger, Sierra Club, Missouri Valley Group).



Next to the Hwy 183 Bridge on the Platte River - Plattetracks Spraying & Mowing demonstrates how this machine is used to shred invasive vegetation after it is killed with herbicides. Vegetation on the west side of the bridge was left standing while the channel on the east or downstream side was shredded to study early removal affects versus leaving treated stands intact for one year before removal (photo by Rachael Herpel).



Tour participants enter a Platte River channel near the Bassway Recreation Area to experience the height and choking effects of Phragmites (photo by Rachael Herpel).



Lincoln-area teachers attended a "Learning beyond the classroom walls" Teacher's Night Out at UNL's Hardin Hall in September. The Informal Educators Network, comprised of museums, nature centers, performing arts venues and organizations, teaching artists, and libraries in the Lincoln area, organized the event. Several educators from the UNL School of Natural Resources participated in the event, including Rachael Herpel from the UNL Water Center (right) (photo by Steve Ress).



Phragmites, or common reed, can grow to 20 feet in thick stands. Their height is apparent when UNL Water Center outreach specialist Rachael Herpel stands next to them (photo by Rachael Herpel).



## Our Water Supply, Down the Drain

By Robert Glennon

In the United States, we constantly fret about running out of oil. But we should be paying more attention to another limited natural resource: water. A water crisis is threatening many parts of the country – not just the arid West.

In 2008, metro Atlanta (home to nearly five million people) came within 90 days of seeing its principal water supply, Lake Lanier, dry up. Rainstorms eased the drought, but last month a federal judge ruled that Georgia may no longer use the lake as a municipal supply. The state is now scrambling to overturn that ruling; but Alabama and Florida will oppose Georgia's efforts.

In Florida, excessive groundwater pumping has dried up scores of lakes. In South Carolina, a paper company recently furloughed hundreds of workers because low river flows prevented the company from discharging its wastewater. That state's battle with North Carolina over the Catawba River has reached the U.S. Supreme Court. Water has become so contentious nationwide that more than 30 states are fighting with their neighbors over water.

Lake Superior, the largest of the Great Lakes, is too shallow to float fully loaded freighters, dramatically increasing shipping costs. North of Boston, the Ipswich River has gone dry in five of the past eight years. In 2007, the hamlet of Orme, Tenn., ran out of water entirely, forcing it to truck in supplies from Alabama.

Droughts make matters worse, but the real problem isn't shrinking water levels. It's population growth. Since California's last major drought ended in 1992, the state's population has surged by a staggering 7 million people. Some 100,000 people move to the Atlanta area every year. Over the next four decades, the country will add 120 million people, the equivalent of one person every 11 seconds.

More people will put a huge strain on our water resources, but another problem comes in something that sounds relatively benign: renewable energy, at least in some forms, such as biofuels. Refining one gallon of ethanol requires

four gallons of water. This turns out to be a drop in the bucket compared with how much water it takes to grow enough corn to refine one gallon of ethanol: as much as 2,500 gallons.

In the United States, we've traditionally engineered our way out of water shortages by diverting more from rivers, building dams or drilling groundwater wells. But many rivers, including the Colorado and the Rio Grande, already dry up each year. The dam-building era from the 1930s to the 1960s tamed so many rivers that only 60 in the country remain free-flowing. Meanwhile, we're pumping so much water from wells that the levels in aquifers are plummeting. We're running out of technological fixes.

Some dreamers gaze upon distant sources of water and imagine that the problem is solved. Plans to divert water from rivers in British Columbia or tow icebergs from Alaska periodically arise. An entrepreneur in Colorado, Aaron Million, recently proposed a \$4 billion, 400-mile pipeline to transport water from the Flaming Gorge Reservoir, located on the Green River in Wyoming and Utah, to Denver and Colorado Springs. But the dreamers tend not to address the immense costs, significant environmental objections or regulatory nightmares associated with such grandiose proposals.

More viable solutions include desalination of ocean water, reuse of municipal waste and aggressive conservation strategies. But none of these is a cure-all. Desalination is expensive, burns energy and generates a thorny waste problem. Nor is reclaiming water – that is, reusing water from the sewage system – a silver-bullet answer to the crisis. Aside from the major “yuck” factor associated with the idea of potable toilet water, it's also quite expensive, requiring a set of pipes that is completely separate from the drinking-water system.

Conservation does work. In places such as San Antonio, Albuquerque, Tucson and Long Beach, Calif., aggressive conservation programs have reduced consumption dramatically. But it's not enough.

We need a new water policy in the United States. Americans do not pay the real cost of

the water that we use. In fact, we don't pay for water at all. The check that citizens write to their municipal water department or private water company covers only the cost of service, plus a small profit for the private company. There is no charge for the water itself.

Last summer, as the price of gas inched up over \$4 a gallon, Toyota dealers couldn't keep fuel-efficient Priuses in stock. We should apply that pricing lesson if we want to conserve water, using increasing block rates to discourage profligate water use. Tucson does that and adds a surcharge for excessive use in the summer, when water mostly goes to fill swimming pools and irrigate landscaping.

The idea of charging for water offends many people who think that would be like charging for air. Is it immoral to extract fees for an essential resource? Precisely because water is a public – and exhaustible – resource, the government has an obligation to manage it wisely.

Think of our water supply as a giant milkshake, and think of each demand for water as a straw in the glass. Most states permit a limitless number of straws – and that has to change.

The West, one of the thirstiest parts of the country, is developing a system that should lead the way: the use of market forces to reallocate water. In eastern Oregon, along the Middle Fork of the John Day River, the Oregon Water Trust persuaded third-generation ranchers Pat and Hedy Voigt to turn off their irrigation system each year from July 20 until the end of the growing season. The 6.5 million gallons per day that would have been diverted to grow alfalfa now augment river flows and improve the habitat of endangered salmon and steelhead trout. The \$700,000 paid to the Voigts allowed them to make substantial on-farm improvements.

Taking their straw out of the glass is one step toward keeping us from getting parched.

*(Editor's Note: The preceding was published in the Washington Post, August 23. Glennon is a professor of law at the University of Arizona and the author of “Unquenchable: America's Water Crisis and What to Do About It”).*

Dean Yonts, Associate Professor at UNL's Panhandle Research and Extension Center, focused on how Nebraska can achieve sustainable irrigation water use. He described how now is the time to use available technology to make it as simple and cost-effective as possible to use as little water as possible.

Yonts proposed implementing a large-scale water conservation project focused on the producer's bottom-line. Existing research and data show that deficit irrigation can be used to stress a crop in a way that is least likely to affect yields; in some cases, irrigation can be reduced by 25 percent while maintaining yields.

The key is looking at producer decision-making and remove barriers that keep them from adopting lower water use practices. WRAP members agreed, noting that stressed plants can revive while drowned plants simply die, and that it is key to reduce the hassle factor, reward producers for reducing both energy and water consumption, and show producers they can reduce costs-per-acre by better managing water use.

WRAP reconvenes in January to continue to provide advice and guidance to the University of Nebraska on state water research needs, education, and outreach programs.

Members are Mark Brohman, Nebraska Environmental Trust; State Senator Tom Carlson; Brian Dunnigan, Nebraska Department of Natural Resources; Eugene Glock, Cedar Bell Farms; Frank Kwapnioski, Nebraska Public Power District; Marian Langan, Audubon Nebraska; State Senator Chris Langemeier; Mike Linder, Nebraska Department of Environmental Quality; John Miyoshi, Lower Platte North NRD; Kirk Nelson, Nebraska Game and Parks Commission; Jerry Obrist, Lincoln Water System; Lee Orton, Nebraska Well Drillers Association; Jay Rempe, Nebraska Farm Bureau; Dennis Strauch, Pathfinder Irrigation District; and

Dayle Williamson, Office of U.S. Senator Ben Nelson.

### Priorities of the Water Resources Advisory Panel:

#### Water Quality Research Priorities

- Developing realistic Nebraska standards for nutrients in flowing waters
- Managing the risk (mitigating) water contamination from livestock manures and land application areas
- Evaluating and measuring the effectiveness of riparian buffer strips
- Managing the risk (mitigating) water contamination from agricultural production
- Evaluating and measuring the effectiveness of wetlands and wetland vegetation on reducing water contamination
- Other drinking water contaminants (of human health concern): nanomaterials, arsenic, uranium, pathogens, hormones, and pharmaceuticals
- Human dimensions of water quality – developing and implementing effective outreach efforts and measuring their impact
- Water quality in urban settings

#### Water Quantity Research Priorities

- Develop methods to monitor and measure the consumptive use of water and develop methods to maintain beneficial use but reduce non-beneficial consumptive use
- Study current water management concepts in Nebraska and research options for improving the relevance, efficiency, and effectiveness of current approaches
- Identify methods to recognize the value of water for uses not easily monetized, such as recreation, aesthetic and wildlife uses
- Identify methods to establish fair and equitable water market systems

- Determine the impacts of climate change on Nebraska's water resources, especially in areas where demand is greater than supply, and increase understanding of these impacts. Develop an approach to identify actions that mitigate the potential impacts of climate change that may also have other supplemental water management benefits.
- Identify effective social systems that achieve sustainable water resource management
- Create and support more comprehensive, ongoing, real-time water monitoring protocols to ensure comparability and QA/QC of data
- Study water and energy production connections – whether energy is produced by conventional steam plants, or by harvesting the sun in biomass, water and energy production are closely linked. A thorough understanding of this linkage, and the interactions and trade-offs to be considered in decision and policy making, is needed to ensure sound management of both energy and water resources.

#### Basin-specific Research Priorities

- Quantify water supply and water demands for each Nebraska basin, beginning in the west
- Identify opportunities for the conjunctive management of water, especially where surface water could be stored as groundwater until needed for compliance with surface water compacts
- Determine the inter-relationship between surface water and groundwater supplies
- Assess the impact of cyclical water supply (i.e., drought and wet weather) and identify better management options to reduce these impacts



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## WRAP Ranks Priorities, Spurs Proposal Development

By Rachael Herpel, UNL Water Center and NU Rural Initiative

The University of Nebraska–Lincoln’s Water Resources Advisory Panel (WRAP) recently ranked their priorities for water quality, water quantity, and basin-specific research (see accompanying sidebar).

WRAP water quality and water quantity work groups were formed and held meetings in August to review the priority ranking lists. WRAP also reviewed reports developed using the “NU Water-Related Research Database” that described how faculty’s current and recently completed research is applicable to each topic.

WRAP members affirmed the research priority ranking lists and discussed an ideal strategy to supplement research funds obtained by faculty with additional support if and where needed.

Faculty working in the priority research areas were informed that their area of research is a WRAP priority. Faculty were asked for their feedback on: 1. Whether their current work was accurately represented on the research database; 2. The degree to which their previous work should be added to the research database (to increase awareness of this work and lay the foundation for future research); 3. Whether they had any research project proposals pending in this topic area; and 4. Their specific interest in and availability for additional research in this topic area.

WRAP members also met in Kearney in October to hear about projects underway and project proposals pending or in development.

Chuck Burr, coordinator of the “Center Pivot Water Conservation Project,” described

how center pivot manufacturers and UNL Extension have joined to deliver a united message that center pivot irrigation can be used to help producers maximize benefits of a constrained water supply.

Burr’s update was preceded by a discussion on Extension’s role in educating producers about how to continue operating during water short years and concluded by describing how extensive evaluation will be used to plan future education programs and approaches.

This project is made possible by support from the Nebraska Environmental Trust, the Nebraska Department of Natural Resources, UNL Extension, Lindsay Corp, Reinke Manufacturing, T-L Irrigation Co., and Valley Irrigation.

*continued on page 19*