Latest Research on Water Science, Economics and Law To Be Featured in October

University of Nebraska–Lincoln researchers will present their latest water-related research and programming in the areas of water science, economics, and law Friday, Oct. 12 at Hardin Hall on UNL’s East Campus.

“This will be a fast-paced, day long event with dozens of oral and poster presentations by faculty researchers and students. Many of the presentations focus on Nebraska-based research and programming, said Lorrie Benson, senior program manager for UNL’s Water Resources Research Initiative.

“The water colloquium is a great way to learn about an extensive body of university water-related research and programming in the areas of water science, economics, and law Friday, Oct. 12 at Hardin Hall on UNL’s East Campus."

Fifth Annual Water Law, Policy and Science Conference Examines Water Quality

By Lorrie Benson,
Senior Program Manager,
Water Resources Research Initiative

The University of Nebraska–Lincoln’s fifth annual Water Law, Policy and Science Conference will focus on water quality issues important to Nebraska and the Great Plains.

It will be April 22–23, 2008 in Lincoln and will feature a lecture by William Reilly, former head of the U.S. Environmental Protection Agency.

“Having William Reilly as a conference speaker made water quality a logical choice as the focus of our conference,” said UNL Water Center director and conference organizer Kyle Hoagland

“The ongoing drought has kept people focused on water quantity concerns, but we also face critical quality issues that can affect public health and pocketbooks.”

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It also happens that they are very nice people, so stop by their offices (Michaels is in Room 526 Oldfather Hall on UNL’s City Campus and Irmak is in Room 311 Hardin Hall on UNL’s East Campus), say hello and welcome them to Nebraska’s water world.

Second, our 2007 Water Colloquium & Water Sciences Laboratory Open House is fast approaching. It will be October 12 in Hardin Hall. This represents three great opportunities: (1) To learn about the latest UNL water research directly from the wide range of faculty presentations, (2) To see first hand the outstanding capabilities and equipment in the enhanced Water Sciences Laboratory, and (3) To enjoy a catered lunch while visiting the newly renovated Hardin Hall, and all for $15 (free for students). Register by September 28 for this water resources blue-light special.

Third, and here’s the part where I can use your help, we have spent considerable time over the past several months mulling over what has come to be called the, “Top Ten Water Challenges for Nebraska.” Why, got nothing better to do? Rather than trying to develop material for David Letterman’s home office in Wahoo, our motivation has been to try to identify the most important water resources challenges Nebraska faces now and in the near future. Why, been to one too many workshops?

The point is to focus the Water Center’s and WRRI’s efforts and resources on the most important issues in the state (hence the top 10, not the top 100), and to report to the broader community outside the university what exactly UNL water faculty are doing to address each of these challenges.

So please read the list and e-mail me (khoagland1@unl.edu and be sure to title your message “Top Ten Feedback” so my SpamJam software doesn’t jam your input), call (402) 472-3305, or write to me (Water Center, 915 Hardin Hall, P.O. Box 830979, University of Nebraska, Lincoln, NE 68583-0979) with your comments or suggestions on anything relating to this list, ranging from using a better word to describe the problem to “you missed this issue entirely” to “exclude x because its over-rated!”

Please don’t regard this as a futile exercise, rather your chance to “learnum’ durnum'” and have meaningful input into what we believe are the most important challenges facing Nebraska, issues that also apply to the U.S. and to the world. Thanks in advance for taking the time to respond!

Draft - Top Ten Water Challenges for Nebraska

This listing is unranked, also recognizing that several challenges may fit into more than one of the three sub-categories (e.g., challenge #7 – monitoring system and challenge # 3 – which includes ethanol production, also have immediate water quantity implications); K-gray education and outreach also are inherent needs in all of these challenges.

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Meet the Faculty

Brian Wardlow, Ph.D.

Brian Wardlow is an assistant research professor and remote sensing specialist in the University of Nebraska–Lincoln's National Drought Mitigation Center (NDMC), which is part of UNL's School of Natural Resources. Wardlow has been a UNL faculty member since March 2006.

Education:

Ph.D., Geography (honors), University of Kansas, Lawrence, Kansas, 2005.
M.A. Geography (honors), Kansas State University, Manhattan, Kansas, 1996.
B.S. Geography (Magna Cum Laude), Northwest Missouri State University, Maryville, Missouri, 1994.

Examples of Current Research/Extension Programs:

— Vegetation Drought Index (VegDRI): Research to develop a new national-level drought monitoring tool for the U.S. that integrates climate information, satellite-based observations of vegetation conditions, and other biophysical data. Work also includes the development of web-based tools to disseminate VegDRI information and outreach workshops throughout the nation to introduce VegDRI, train agricultural producers and the general public to use the tool, and gather feedback on the quality and utility of this drought information.
— Vegetation Outlook (VegOut): Research to develop a tool that provides outlooks of future vegetation conditions at several weekly time steps by analyzing current vegetation conditions, climate data, biophysical information, and several oceanic indicators. The outlooks are based on historical interactions between vegetation conditions and ocean-climate teleconnections.
— Development of New Remote Sensing-Based Drought Monitoring Tools: Investigating the use of satellite-based observation of land surface temperature and middle-infrared reflectance, as well as passive microwave sensors for their large-area drought monitoring capabilities.

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Steven R. Tonn

University of Nebraska–Lincoln Extension in Douglas/Sarpy Counties Extension Educator-Omaha Metro Area Lakes. University of Nebraska–Lincoln Extension in Douglas/Sarpy Counties. His office is at 1261 Golden Gate Drive Suite 4E, Papillion, NE 68046-2886 or phone (402) 444-4237. He has been with UNL Extension since 2001, having previously served in a variety of positions and offices with the Kansas Cooperative Extension Service.

Education:

M.S. Agriculture, Kansas State University, 1981
B.S. Agriculture, Kansas State University, 1973

Examples of Current Research/Extension Programs:

— Leading the Community Based Watershed Management Planning Process for the Carter Lake Watershed, Carter Lake, Iowa. The process is a comprehensive problem solving process that integrates social, economic and ecological concerns on a watershed basis. The process is underway and will result in the completion of a watershed management plan.
— Urban Erosion and Sediment Control Seminar – Omaha Metropolitan Area. A coalition of federal, state, district and local agencies responsible for regulating stormwater runoff and the University of Nebraska–Lincoln Extension in Douglas/Sarpy Counties was formed. The coalition working with local and state organizations conducts educational seminars for the construction community. The purpose of the seminar is to reduce stormwater runoff pollution from construction sites and to improve the water quality of Omaha metro lakes and creeks.
— Urban runoff pollution prevention education programming in the Omaha metro lakes watersheds involves providing empowerment to and developing leadership in watershed stakeholders and educating watershed residents on best management practices for preventing runoff pollution from leaving their property and entering Omaha metro lakes and creeks.

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New Thermal Imaging Camera Advances UNL Research

By Steve Ress

An advanced infrared camera that can see thermal contrasts as small as two-tenths of a degree Fahrenheit has the potential to greatly expand water and environmental research being done by the University of Nebraska–Lincoln’s School of Natural Resources.

“With this new camera, we can more closely examine many of Nebraska’s unique hydrologic settings, such as delineating and quantifying groundwater discharges to streams, where very little research has been done before,” said SNR remote sensing and geographic information sensing specialist Sunil Narumalani.

The camera, which looks little different than a handheld digital video recorder, is the latest weapon in an already high-tech arsenal used by UNL’s Center for Advanced Land Management Information Technologies (CALMIT) to produce real-time, remote sensing data used by researchers on a wide variety of projects.

An aerial image of James Arthur Vineyards, north of Lincoln, captured with CALMIT’s new SC 640 thermal imaging camera (CALMIT photo).

Though infrared cameras are anything but new, CALMIT’s ThermaCAM-SC640 has imaging capabilities far advanced of mainstream infrared cameras typically used by law enforcement or the military. It can see differences in thermal images in the 7.5 to 13 micron range, which means it is more useful for most earth science research purposes, said SNR geoscientist Rick Perk, who most often uses the camera in conjunction with other data collection equipment mounted on a single-engine Piper Saratoga aircraft operated by CALMIT researchers and staff.

“It can see very subtle differences in the temperature of the targets we fly it over,” Perk said. Those minute temperature variations the camera can see are as little as two-tenths of a degree Fahrenheit, he said, noting that further work is being done to establish just how precise the camera can be in that respect. “How to generate an absolute temperature from airborne imagery is one of the research questions we are addressing.”

With that level of sensitivity, coupled with the high resolution of the images produced by the camera, it should be possible to identify where groundwater discharges into a stream or other body of surface water, for example.

“Using the camera mounted in the aircraft allows us to maximize the area the camera can cover, rather than having it mounted in a ground-based vehicle of some sort. It’s also non-invasive and should facilitate rapid identification of groundwater discharge into small streams and semi-quantitatively estimate the level of that groundwater discharge,” said CALMIT director Don Rundquist.

Used either by itself, or in conjunction with other sensors the aircraft can carry, the new camera allows for the preparation of high-resolution temperature maps useful in many water and earth science research projects.

“Instruments used on the aircraft have collected image data from the visible and near-infrared portions of the spectrum. The SC640 expands those capabilities into the thermal range, which adds another useful layer of information in many water and earth science research projects,” Perk said.

Currently, the camera is being used to study groundwater flow-through lakes, such as Crescent Lake in Garden County, alkali lakes in Sheridan County, toxic algae blooms in Dodge County, outcrops of the Ogallala aquifer and the canopies of wetlands in Garden County and to study sub-irrigated meadows near Whitman.

“These projects and others are part of a number of different research projects by our faculty here at UNL and they are helping us test the capabilities of this new camera,” Narumalani said.

The camera’s high-tech capabilities are available to researchers at other universities, as well as to federal and state agencies conducting their own research or monitoring programs.

“While we don’t loan the camera, we are more than willing to contract for other researchers to fly data for them as long as they pay the charges for making the system airborne,” Rundquist said. It is common for CALMIT faculty and staff to assist with research being conducted at other colleges and universities and state environmental and natural resources agencies due to the staff and systems capabilities CALMIT possesses.

“Last year we participated in research and information gathering projects in 17 states,” he said.

Many of these projects have centered on water quality, invasive species issues, unique marine environments and landcover mapping.

UNL’s Water Resources Research Initiative, a National Aeronautics and Space Administration EpsCor grant and proceeds from CALMIT data collection conducted for other agencies and clients helped pay for the new camera.

For more about CALMIT go online to http://www.calmit.unl.edu/. For more about UNL water research and the Water Resources Research Initiative, go to http://watercenter.unl.edu/.
Coop Research Unit Tracks Invasive Species

By Brent Atema

The proliferation of non-indigenous wildlife species across Nebraska poses risks to both human enterprise and the ecology.

In December 2006 the Nebraska Cooperative Fish and Wildlife Research Unit began a three-year research project to study invasive species in Nebraska. The program, titled “Monitoring, mapping, risk and management of invasive species,” provides resources about invasive species.

According to the project’s website, “Invasive Species impacts threatened and endangered species, biodiversity, and the economy. Once established, non-indigenous species have the ability of displace or replace native plants and animal species, disrupt nutrient and fire cycles, and cause changes in the pattern of plant succession.”

Craig Allen, a wildlife ecologist in UNL’s School of Natural Resources who leads the coop unit, said the project is really two-fold.

The first component is risk assessment and management of current or potential invasive species in Nebraska, the second is providing public information on invasive species and coordinating efforts by agencies such as the University of Nebraska, The Nature Conservancy, the Nebraska Game and Parks Commission, and the Nebraska Department of Agriculture (NDA).

A website http://calmit.unl.edu/invasives/index.htm was created when the project began to help accomplish this.

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Water Resources Advisory Panel Update

By Jessica Harder

The Water Resources Advisory Panel (WRAP) and University of Nebraska–Lincoln are making progress on the panel’s top water research priorities. In April, WRAP identified potential funding sources for four water research projects UNL water faculty previously proposed to the panel, aimed at specifically addressing WRAP water research priorities.

Since then, UNL, water faculty members and other state water leaders have been working to make progress on these important projects.

“WRAP has made tremendous progress since its inception, toward identifying goals for water quantity research in the state, and helping to move forward together with UNL researchers and administrators to address those top priorities,” said Kyle Hoagland, director of the UNL Water Center.

Aside from significant contributions UNL will make toward salaries and facilities for the top-ranked riparian vegetation modeling project, NU’s Institute of Agriculture and Natural Resources’ (IANR) Agricultural Research Division and the NU Rural Initiative provided funding to help get the research started this summer.

The project aims to develop models that will provide decision makers with the opportunity to weigh the potential benefits with the negative ramifications of tree harvesting, and ultimately will result in a basin-wide understanding and prediction of hydrologic impacts of riparian invasive species removal throughout the state of Nebraska.

Equipment needed for the riparian vegetation project will be purchased through a one-time grant from IANR. The Rural Initiative contributed significant funding for the first year for the remainder of project needs. Funding for the next two years of the three-year research project being sought with the help of the Nebraska Department of Natural Resources (DNR).

The riparian vegetation study, led by new water initiative faculty Erkan Istanbulluoglu, Durelle Scott and John Lenters, piggybacks on another DNR-funded project lead by UNL’s Derrel Martin.

DNR and UNL researchers are also collaborating to apply for competitive grants for additional dollars needed to fund the panel’s other top three projects. One such effort is being undertaken to fund the highly ranked Nebraska Climate Variability project proposed by researchers at UNL’s National Drought Mitigation Center.

If funded, this project will educate farmers, ranchers, recreation and tourism businesses, environmental monitors, municipal water providers, and other community leaders and advocacy groups within each targeted sector. The goal of the project is to raise awareness of projected temperature and precipitation fluctuations and the likely effects of these changes, and to begin assessing economic impacts of climate change.

NDMC’s Mike Hayes, Cody Knutson and Megan Sittler among others, will lead this climate project.

Funding is being sought for another WRAP high-priority project.

Suat Irmak and colleagues, proposed to lead a study on quantification of surface soil evaporation for different soil and crop management practices.

If funded, the project will help farmers “Maximize the value of water per acre inch pumped.” The study will target maximum net return (dollars) rather than maximum yield. Maximizing the effectiveness of precipitation can substantially increase the availability of water and water use efficiency for crop production in agro-ecosystems.

The ten-member WRAP was formed last year at the request of NU Vice President and IANR Harlan Vice Chancellor John Owens, and Vice Chancellor for Research and Dean of Graduate Studies Prem Paul. The group, which includes state water policy leaders, meets to help guide and advise UNL on state water research needs, education and outreach programs. WRAP is coordinated through the UNL Water Center.
Since Fall 2006, the Nebraska Department of Natural Resources (DNR) has hired a hydrogeologist and two groundwater modelers to help address questions of balancing surface and groundwater, extreme water use scenarios, and defining research to help Nebraska balance its water demands and other issues.

The quest for answers to these and other questions were spurred with the passage of LB 962 three years ago, said DNR director Ann Bleed.

“We were fortunate that legislative appropriations allowed DNR to fill these three positions, which collectively are helping us find answers to some difficult questions posed by LB 962,” said Bleed, a former University of Nebraska–Lincoln Conservation and Survey Division faculty member and current courtesy faculty member in UNL’s School of Natural Resources.

Additional questions DNR is tasked with answering, all driven by requirements to determine where Nebraska’s river basins are fully or over appropriated under the terms of LB 962, include alternative pumping scenarios resulting in specific levels of impact to a stream at specific times, and what research and survey work can help DNR better understand what is happening with surface and groundwater balance in a specific area.

Groundwater modelers added to DNR staff include Douglas R. Hallum and James C. Schneider, who join Paul Koester, a DNR groundwater modeler already on staff.

To help meet these burgeoning requirements for information on the state’s river basins, DNR also hired Jesse Bradley to fill the position of interrelated water management analyst, where he helps put together DNR’s annual evaluation of hydrologically connected water supplies, coordinates, tracks and suggests hydrogeologic research, and provides geologic expertise for other DNR activities and management planning. Bradley earned a master’s in hydrogeology from Clemson University and a bachelor’s degree in science environmental geology from the University of Nebraska at Omaha. While at Clemson, is was a teaching assistant and helped coordinate a hydrogeology field camp.

Koester, who has been with DNR nearly four years, is responsible for keeping current the Republican River Compact groundwater flow model, calculating annual crop irrigation requirements and other duties. He formerly worked as a research assistant and research technician in UNL’s Conservation and Survey Division. He has a master’s degree in geosciences/hydrology and a bachelor’s degree in soil science, both from UNL.

Hallum is involved in activities related to the Platte River Cooperative Hydrology Study (COHYST) model. He has a bachelor’s degree in geology/hydrogeology from the University of Wisconsin, Eau Claire and formerly worked as a private consultant and as a geologist for the Texas Geologic Services.

Schneider serves as the department’s senior groundwater modeler and knows the intricacies of models as well as their uses, limitations, and how models can be designed to answer specific questions. He has a doctorate in geology from the University of South Florida, Tampa and master’s and bachelor’s degrees in geology from Northern Illinois University, DeKalb. He previously worked as a senior hydrogeologist and geophysicist for SDII Global Corp.

Groundwater - surface water models and modeling efforts in which DNR currently participates include the following: COHYST and other Platte modeling, Republican River Compact, Elkhorn-Loup groundwater model, Blue River basin groundwater model, Upper Niobrara River/Box Butte County modeling; and Nemaha River groundwater flow model.

For more information, go online to http://dnr.ne.gov
Survey Offers Public Perceptions and Attitudes about Water

By Sandi Alswager Karstens, IANR News Service

While 91 percent of Nebraska residents feel their drinking water is safe, the Heartland Regional Water Coordination Initiative Survey of Public Perceptions and Attitudes about Water revealed Nebraskans still want to learn more about water.

The survey, mailed in February 2006 to 325 randomly selected households in Nebraska, asked respondents 38 questions about their feelings toward water quality concerns to build knowledge of citizen awareness, attitudes and willingness to act on water issues. Results are based on 209 responses.

Charles Wortmann, UNL nutrient management specialist in the university’s Institute of Agriculture and Natural Resources, said the opinions expressed and the high response rate indicate considerable interest and concern about water issues, along with desire for more information.

“Basically, this survey helps us recognize and understand how people see situations, their concerns and where they get and how they prefer to get their information,” said Wortmann, who along with Rick Koelsch, UNL livestock bioenvironmental engineer, was on the initiative’s leadership team.

The Heartland Regional Water Coordination Initiative is a partnership of UNL, Iowa State University, Kansas State University, the University of Missouri, U.S. Department of Agriculture Cooperative State Research, Education, and Extension Service, and the U.S. Environmental Protection Agency Region VII. Similar reports also were prepared for Iowa, Kansas, Missouri and the four-state region.

Nebraska survey results revealed 80 percent of residents were most likely to get water quality information from newspapers, while 69 percent said they got information from television and 52 percent from radio. Almost 40 percent listed UNL Extension as an important source of information.

Seventy-five percent of respondents lived inside a town or city, 16 percent outside a city in a rural area not on a farm and 9 percent lived on farms. Sixty-six percent of respondents had lived in Nebraska all their life.

Nebraska residents who lived on a farm were even more likely than those who lived in cities, towns or rural areas to report using Extension and universities as important sources of information at 87 percent, Wortmann said.

“This really is a credible source for the success of Extension,” said Lois Wright Morton, professor of sociology at ISU who prepared the report.

When it came to learning more about water issues, the survey revealed 57 percent of respondents wanted information presented in a newspaper article or series or TV coverage. In addition, 57 percent wanted information presented in printed fact sheets, bulletins or brochures. Only 27 percent would visit a Web site. However, it should be noted that respondents were older on average than the population of Nebraska. Thus responses were more likely to reflect an older population, Morton said.

Other learning opportunities included: looking at a demonstration or display, 21 percent; watching a video, 14 percent; attending a fair or festival, 12 percent; participating in volunteer or one-time learning activity, 10 percent; asking for a water practices assessment, 7 percent; attending a short course, 8 percent; taking a certification course, 6 percent; and being trained for a regular volunteer position, 3 percent.

Of water issues important to Nebraskans, all respondents felt clean drinking water was extremely or very important, followed by 97 percent saying clean groundwater was extremely or very important. Water for households and the private sector, clean rivers and lakes also were highly valued. Forty-one percent felt water for recreation was either extremely important or very important.

While 91 percent of respondents felt their home drinking water was safe to drink, about 69 percent were satisfied with their drinking water. A quarter have a water filter system and 35 percent have a water treatment system. A little more than 30 percent often used bottled water for drinking, while 13 percent were not satisfied with their current drinking water.

Wortmann said results also revealed Nebraskans perceive most pollution comes from cropland or livestock production facilities.

Fourteen percent of respondents felt fertilizers and nitrates were known to affect water quality in Nebraska, while 42 percent suspected it affected water quality in Nebraska. Other conditions believed by respondents to be a problem were pesticides, 9 percent known problem, 33 percent suspected; minerals, 9 percent known, 25 percent suspected; and animal waste, 5 percent known, 26 percent suspected. For all of these conditions, except fertilizer/nitrates, between one-third and one-half of respondents said they didn’t know whether any of these conditions affected their water quality.

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Eleven faculty members hired through the University of Nebraska–Lincoln’s Water Resources Research Initiative (WRRI) are expanding UNL research, service and teaching expertise in a variety of key water-related disciplines.

“We have been extremely fortunate to add these new faculty, all of whom have extraordinary credentials and come from some of the finest institutions in the country. They will help significantly toward reaching our goal of being a national leader in water education and research,” said UNL Water Center director and WRRI co-leader Kyle Hoagland.

A fundamental goal of the WRRI, Hoagland said, is to better integrate existing water faculty at UNL, beginning with multidisciplinary search committees formed to select a majority of the 11 faculty members.

Five of the 11 have joint appointments across several UNL academic units, including the School of Natural Resources (SNR) and Departments of Geosciences, Biological Systems Engineering, Civil Engineering and Agricultural Economics. All are affiliated with the WRRI.

“The disciplines represented by these faculty members are not only cutting-edge, but are also integrative by nature in that they address, in general, ecosystem or larger scale water resources issues, new areas of inquiry and/or interfaces such as water-land-atmosphere and the human dimensions of water resources management.

“Consequently, they will help knit together our present faculty in new and innovative ways to address both basic and applied water resource challenges,” Hoagland said.

The 11 WRRI faculty hires are (listed alphabetically):

**Susan D. Franck**

Susan Franck is an assistant professor of law in the UNL College of Law where she teaches, writes and conducts research at the intersection of international law and dispute resolution. Franck is particularly interested in the management of conflict and resolution of international investment disputes, such as those related to water concessions and international water rights. She received her LL.M., with merit, in Commercial Law from the University of London, London, England; a J.D., Magna Cum Laude, from the University of Minnesota Law School, Minneapolis, Minn.; and a B.A., Summa Cum Laude, from Macalester College, St. Paul, Minn. She formerly was a visiting associate professor of law at the University of Minnesota Law School and a senior associate at Allen & Overy in London, England.

**Ayse Irmak**

Ayse Irmak is an assistant professor in UNL’s School of Natural Resources and Department of Civil Engineering specializing in water resources engineering with a focus on estimating land surface evapotranspiration with satellite-remote sensing and geospatial methodologies. She formerly was a research assistant professor in UNL’s Department of Biological Systems Engineering. She received Ph.D. and M.E. degrees in Agricultural and Biological Engineering from the University of Florida, Gainesville, Fl.; an M.E. in Agricultural Structures and Irrigation Engineering from Mediterranean University, Antalya, Turkey; and a B.E. in Agricultural Structures and Irrigation Engineering from Cukurova University, Adana, Turkey. Irmak’s long-term research goals are working to improve our understanding of surface energy fluxes, including evapotranspiration, on large scales, noting that estimating evaporative losses from different surfaces, using satellite remote sensing and geospatial approaches, are critical to address existing research gaps on watershed and regional scales.

**Erkan Istanbulluoglu**

Erkan Istanbulluoglu is an assistant professor in the UNL Departments of Geosciences and Biological Systems Engineering. His research interests are in geomorphology, specifically modeling landscape evolution; coupling of erosion and vegetation dynamics; effects of vegetation and watershed disturbances on geomorphic processes; sediment transport; and natural hazard assessment. He received a Ph.D. in Civil and Environmental Engineering, with an emphasis in hydrology and geomorphology, from Utah State University, Logan, Utah and M.S. and B.S. degrees in Agricultural Engineering from Uludag University in Turkey. He worked at MIT as a postdoctoral research associate before joining UNL.

**John D. Lenters**

John Lenters is a seasoned researcher in climate modeling, land surface hydrology, physical limnology, and Great Lakes hydrology and is interested in physical and hydrologic interactions between lakes and the regional climate. He is an associate professor in UNL’s School of Natural Resources and Department of Geosciences. Lenters received Ph.D. and M.S. degrees in Atmospheric Science, with minors in hydrology and geophysics, from Cornell University before joining the faculty at Lake Superior State University. He graduated Magna Cum Laude with a B.S. in Mathematics and Physics from Hope College, Holland, Mich. His long-term research plans are working towards an integrated understanding of the interactions among lakes, watersheds, and the overlying atmosphere on climatically relevant timescales.

**Sarah Michaels**

Sarah Michaels is a professor in UNL’s Department of Political Science where her research focuses on water resources policy and management, knowledge uptake for public policy decision-making, science-policy interface, comparative environmental policy and regional governance. She also teaches
Robert J. Oglesby

Bob Oglesby is a professor of climate modeling in the UNL Department of Geosciences and School of Natural Resources. He came to UNL from the National Aeronautics and Space Administration (NASA) and has worked extensively with global and regional climate models for nearly 20 years. His research keys on the potential for future climate change due to greenhouse gases, understanding controls on very different climate states of the past, and understanding climatic impacts of land surface-atmosphere interactions, with particular applicability to climate prediction on seasonal and longer time scales. Before NASA, he was a faculty member at Purdue University for nearly 10 years. Oglesby earned Ph.D. and M. Phil. degrees in Geology and Geophysics from Yale University and a B.S., Summa Cum Laude, in Physical Geography from the University of California, Davis.

Karina Schoengold

Karina Schoengold is an environmental economist in UNL’s School of Natural Resources and Department of Agricultural Economics. She has a strong background and research interests in applied microeconomics, specifically in environmental and natural resource economics. Her dissertation research was on water pricing and allocation. She received Ph.D. and M.S. degrees in Agricultural and Resource Economics from the University of California at Berkeley and a B.S. in Mathematics and Economics from the University of Wisconsin at Madison.

Anthony B. Schutz

Anthony Schutz is an assistant professor in the UNL College of Law where he teaches courses in agricultural law, agricultural environmental law, environmental and water resources management, land use, and state and local government. He received a J.D., with highest distinction, graduating first in his class from the University of Nebraska College of Law and received a B.S. in Criminal Justice, Summa Cum Laude, from the University of Nebraska at Kearney. He is currently involved in discussions on Nebraska water law in terms of the “fences” used to deal with allocation and administration of water, group dynamics developing between agricultural and urban electorates over regulation of water use, and the state constitutionality of using property tax revenue to fund compliance measures under the Republican River Compact.

Durelle T. Scott

Durelle ("Scotty") Scott is an aquatic chemist in UNL’s Department of Geosciences, having previously been with the U.S. Geological Survey, Reston, Va, where he was researching the influence of hydrologic retention on nutrient fluxes through a stream network. Scott received his Ph.D. in Environmental Engineering and an M.S. in Environmental and Water Resources Engineering from the University of Colorado at Boulder and a B.S. in Environmental and Architectural Engineering, also from the University of Colorado at Boulder. Scott’s research focuses broadly on the importance of water quality and quantity.

Steven A. Thomas

Steve Thomas is an assistant professor of stream ecology in UNL’s School of Natural Resources. His research combines ecology and hydrology to address nutrients in streams, microbiological activity and organic matter production, transport and processing. He is interested in understanding how the properties of one location impact the ecological properties of another and how the flow of water links upstream and downstream habitats, which he feels is a fundamental, but often ignored, aspect of ecology. He received a Ph.D. from Idaho State University, M.S. from the University of Wyoming and B.S. in Botany from the University of New Hampshire. He has taught at the graduate and undergraduate levels in biology, limnology, and use of stable isotopes in ecology, among other topics.

Sandra Zellmer

Sandi Zellmer is a law professor in the UNL College of Law, with a courtesy appointment in the SNR and previously was a member of the faculty at the University of Toledo College of Law and a visiting professor at both Tulane and Drake University Law Schools. Zellmer was the first faculty hire under the WRRI and has been a member of UNL faculty since 2003. She is a co-leader of the WRRI and teaches and writes about natural resources, water conservation and use, environmental law, property, and related topics. She is active in the American Bar Association’s Section on Environment, Energy and Resources, and has served as the section’s Chair of the Committee on Marine Resources. Prior to teaching, Zellmer was a trial attorney for the Environment and Natural Resources Division of the U.S. Department of Justice. She received an LLM in Environmental Law from the George Washington University National Law Center, a J.D. from the University of South Dakota School of Law, and a B.S. from Morningside College, Sioux City, Iowa.
More than 50 attended the 2007 Water and Natural Resources Tour of the Lower Pecos River Basin, “A glimpse into the future of Nebraska’s Republican River basin.”

Despite efforts to eradicate them, Salt Cedar plants grow tall along the Pecos River. New Mexico State University has led efforts to control them, with varying success, since the 1930’s.

Heading down the long, lonesome highway toward Roswell, N.M.

Headgate of the old McMillan Dam. Heavy rains breached the reservoir about 20 years ago, having since been replaced by the adjacent Brantley dam and reservoir.
A partially home-built combine for harvesting chilies, near Hagerman, N.M.

Tricia Liedle and Sara Rector help serve lunch at the Easter New Mexico fair-grounds in Roswell, N.M.

Karst hydrologist Lewis Land talks to the tour about groundwater aquifer formations and karst formations at an outcropping west of Roswell, N.M.

John Pettijohn of the U.S. Park Service explains reconstructed ruins of an 18th Century church constructed by the Spanish at what is now Pecos National Park.

Shawn Dennis, New Mexico State University Chaves County Extension Service agent talks to the tour group over lunch in Roswell, after a long bus ride south from Albuquerque.

Kyle Hoagland and Ron Wulf chat at Pecos National Park, near Santa Fe.

Aaron looks over recently planted, flood irrigated chilies near Hagerman, N.M.

(Photos by Kyle Hoagland and Steve Ress)
When Mohamed Dahab isn’t conducting his own research or chairing a meeting at the University of Nebraska–Lincoln’s Department of Civil Engineering, he’s most likely traveling for the Water Environment Federation (WEF).

“It’s a good marriage since WEF’s goals and many of UNL’s and the Department of Civil Engineering’s goals are the same: Improving water quality and water availability worldwide,” Dahab said.

His participation and leadership in WEF is a natural outgrowth of his work at UNL, where he is widely recognized for his research on removing nitrate from water and wastewater using biological denitrification and managing risk for nitrate-contaminated groundwater supplies. He is also widely published and participates internationally with various university programs in water quality issues in Austria, Brazil, Egypt, Hungary, Korea, and Spain.

The longtime UNL faculty member currently chairs UNL’s Department of Civil Engineering and helps direct UNL’s Environmental Engineering Program. He’s also president of WEF, an international organization of water quality professionals headquartered in Alexandria, Va.

Formed in 1928, WEF is a not-for-profit technical and educational organization with 32,000 individual members and 76 affiliated member associations representing an additional 50,000 water quality professionals throughout the world.

WEF’s mission is to preserve and enhance the global water environment.

“It started largely as a wastewater organization, but that changed with implementation of the Clean Water Act in the 1970’s, when much the emphasis shifted to ecological concerns and management of water resources,” Dahab explained. Currently, WEF has more than 100 staff members and manages a $20 million annual budget. Its annual conference attracts more than 15,000 attendees and over 1,000 commercial exhibitors.

Dahab has been an active WEF member for more than 30 years and served as one of its directors from 2000-2003. He was a member of the 2001-2002 and 2002-2003 WEF executive committees (now board of trustees) and has worked extensively with the organization’s student activities including establishing a WEF student chapter at UNL 10 years ago and serving as vice-chair of WEF’s Students and Young Professionals Committee.

He was the recipient of WEF’s prestigious Arthur Sidney Bedell Award in 1998.

In addition, he is active in the affiliated Nebraska Water Environment Association, having served as chair on numerous committees, as a member of the executive board and as president.

Dahab’s associations and partnerships through WEF carryover to his department head duties and research interests at UNL, where he is active in forming closer ties between the Department of Civil Engineering and the Institute of Agriculture and Natural Resources and it’s Water Center and Water Resources Research Initiative toward a goal of filling key water-related research faculty positions that will keep UNL in the forefront of water research.
Wilhite New Director of UNL’s School of Natural Resources

By Steve Ress

Longtime University of Nebraska–Lincoln faculty member and international drought and climate expert Donald A. Wilhite has been named director of UNL’s School of Natural Resources.

Wilhite, who founded the UNL-based National Drought Mitigation Center, assumed the post on Aug. 1, replacing Mark S. Kuzila, who had been director for four years. Kuzila, a soil scientist, will remain a member of SNR’s faculty.

“Dr. Wilhite is a highly successful UNL faculty member and center director whose contributions to the university, the state and to the nation and beyond are widely recognized and highly valued,” said John Owens, NU vice president and Harlan vice chancellor of the university’s Institute of Agriculture and Natural Resources.

Wilhite's work at UNL has focused on drought monitoring, planning, mitigation, and policy and use of climate information in decision-making. He has collaborated with many countries and with regional and international organizations on drought policy and planning issues. Wilhite has led international efforts to establish regional networks on drought preparedness under several sponsoring agencies of the United Nations.

Wilhite founded the National Drought Mitigation Center and International Drought Information Center, both housed in SNR, more than 10 years ago. These centers have put UNL on the map for drought planning on both national and international levels. The drought mitigation center produces the weekly U.S. Drought Monitor map, widely published nationally, through a partnership with the U.S. Department of Agriculture and the National Oceanic and Atmospheric Administration.

“As director of the SNR, Dr. Wilhite brings impressive leadership qualities, a worldwide vision and a record of high achievement,” Owens said. “He has very strong interests in undergraduate education, research and graduate studies, service to the state and extension education programming and he possesses a proven track record of fostering teamwork that yields success.”

Wilhite received a doctorate in geography/climatology and water resources from UNL in 1975, a master's degree in geography/climatology from Arizona State University-Tempe in 1969 and a bachelor's degree in geography from Central Missouri State University, Warrensburg, Mo. in 1967.

Kuzila also directs UNL's Conservation and Survey Division, which is now part of the SNR, and is Nebraska's state geologist. He has been a research soil scientist at UNL for more than 30 years.

UNL's School of Natural Resources is an international leader in natural resources education, research, and outreach and is the primary provider of natural resources information and service to Nebraskans. It was formed almost 10 years ago by combining UNL's Conservation and Survey Division, Department of Forestry, Fisheries and Wildlife, National Drought Mitigation Center, Water Center and several other academic units and departments.

Fifth Annual Water Law, Policy and Science Conference Examines Water Quality (continued from page 1)

Reilly's lecture will be a conference keynote and part of the E. N. Thompson Forum on World Issues lecture series. Other speakers will include state and national subject matter experts.

Topics to be addressed are expected to include stormwater runoff, watershed management, economic and legal issues related to water quality, and agricultural issues including water quality impacts of expanding biofuels production, Farm Bill provisions, and livestock waste management.

“We spare no effort to invite top experts so that our audience gets the newest, most complete information on every topic. We also build networking time into our schedule so participants can talk one-on-one with these experts,” Hoagland said.

For more information about the conference contact Lorrie Benson, Senior Program Manager for UNL's Water Resources Research Initiative, at (402) 472-7372 or email lbenson2@unl.edu.
Groundwater Foundation to Hold National Conference in Denver

For decades scientists, hydrologists, hydrogeologists, policy makers, and others have worked diligently to find answers to our water related concerns and issues. Much is known about our water resources and policy has been enacted to help protect and manage our water. Yet, how has this information impacted day-to-day groundwater management practices?

The Groundwater Foundation plans to explore this question at its 23rd annual conference by focusing on how current science, technology, and policy can promote groundwater-friendly practices at the local level.

The conference will be held November 28-30, 2007 at the Sheraton Denver West Hotel in the Denver suburb of Lakewood, Colo. Invited speakers include: Assistant Secretary for the Remote Sensing Society recognizes UNL’s Wardlow

University of Nebraska–Lincoln remote sensing specialist Brian Wardlow has been recognized by the American Society of Photogrammetry and Remote Sensing (ASPRS) for a publication that appeared in the November 2006 issue of “Photogrammetric Engineering and Remote Sensing.”

Wardlow is a research professor in UNL’s National Drought Mitigation Center. He coauthored the award-winning article with two colleagues from the University of Kansas, said NDMC founder and former director Don Wilhite, who now directs the University of Nebraska’s School of Natural Resources.

The awards were the 2007 John I. Davidson President’s Award for the Best Practical Paper in Remote Sensing, and the 2007 Leica Geosystems Award for Best Scientific Paper in Remote Sensing.

These awards recognize the top research papers published in the PERS journal, which are selected by a committee of nationally-recognized professors and other professionals in the field of GIS and remote sensing.


Wardlow joined the NDMC last year after completing his doctorate in geography at the University of Kansas and is one of the main researchers on the “VegDRI” tool, which can be found online at: http://drought.unl.edu/vegdri/VegDRI_Main.htm.

The NDMC is part of UNL’s School of Natural Resources.

Testing for Toxic Algae

By Tadd Barrow
UNL Extension Educator, Water Quality

Algae is a microscopic plant that occurs in all water. However, only certain conditions bring algae to the surface, making it toxic to animals, especially humans and dogs.

Toxic algae often are naturally occurring from high phosphorus levels. The older a lake is, the higher its phosphorus levels.

Phosphorus also can enter water through fertilizers that contain phosphorus.

To prevent human contamination through fertilizers, follow good management practices. For example, use buffer strips to prevent sediment from going into the water.

When illness occurs from toxic algae, it’s usually because of consumption. Also, mild rashes can occur if contaminated water touches the skin.

If fishing in contaminated water, fish are edible as filets. However, their internal organs most likely are contaminated, so they should not be eaten.

The Nebraska Department of Environmental Quality monitors the quality of 35 lakes on a weekly basis and every Friday the results are updated on their website at www.deq.state.ne.us.

To test water for toxic algae, call the UNL Water Quality Extension Program at (402) 472-7783 and you will be sent a complete monitoring kit with instructions that can be mailed back for screening.

For more information about toxic algae, go online to http://snr.unl.edu/lakes
Hayes Directs UNL Drought Center

By Steve Ress

Longtime UNL climatologist Mike Hayes moved from associate director to director of UNL’s well-known National Drought Mitigation Center (NDMC) on Aug. 1.

Hayes, who has been with the center since its inception more than 10 years ago, replaces NDMC founding director Don Wilhite, who has moved up to be director of UNL’s School of Natural Resources.

“I am convinced the NDMC will be in good hands under Mike’s leadership,” Wilhite said. The two have worked together building the NDMC’s reputation as a national and international leader in drought mitigation planning since Wilhite founded the center in 1995.

Hayes began at the NDMC as a climate impacts specialist and was promoted to associate director of the center last year. He received doctorate and master’s degrees in atmospheric science from the University of Missouri-Columbia and a bachelor’s degree in meteorology from the University of Wisconsin-Madison.

Hayes said the NDMC would continue focusing on core drought planning elements, such as drought monitoring, reducing vulnerability to its impacts, and drought planning.

“For the future, we want to continue providing better and more relevant information that is useful to the public, policymakers and the scientific community,” Hayes said. “We want to identify successful drought planning and monitoring strategies that can be transferred to other locations worldwide and to continue building networks for improving drought impact collection.”

Strengthening and broadening existing ties with other NU researchers, research entities and extension programs, on all three campuses, will also remain a high priority, he said.

Over the past 12 years, NDMC has been directly and indirectly involved with drought planning efforts at state, tribal and local levels, with a result that overall preparedness level for dealing with droughts seems to have improved.

“When we started in 1995, 29 states had drought response plans. Now 39 have them, with eight more having drought mitigation plans and two more moving in that direction. This illustrates the gradual, but growing awareness of the need for drought planning,” said Hayes.

Mitigation is the process of planning before the onset of drought to reduce vulnerability to it, rather than response, which tends to be more expensive. A response plan is a good beginning.

In addition to working with governments on drought planning, the NDMC was a founding partner in the widely published U.S. Drought Monitor and continues to supply rotating authors for the weekly maps that appear in newspapers and on web sites nationally.

Recent partnering with the U.S. Department of Agriculture’s (USDA) Risk Management Agency has enabled other research expansion, such as the satellite-based Vegetation Drought Response Index (VegDRI) and the related Vegetation Outlook (VegOut), the Drought Impact Reporter, Risk Reduction for Ranchers, developing methods for quantifying economic impacts of drought, and developing the Drought Atlas and Decision Support System.

NDMC also conducts research with sponsors such as the National Aeronautic and Space Administration, National Oceanic and Atmospheric Administration and other agencies within the USDA.

Other projects focus on monitoring groundwater, effects of low levels of water in rivers and streams, modeling, and incorporating various kinds of data into drought monitoring and impacts reporting. In addition to research, NDMC conducts workshops, seminars and conferences related to drought and other educational programming.

NDMC began with a staff of six, which now numbers 18 plus graduate students.
Eldon Terrell of Cozad gets a close look at the Platte River downstream of Seminoe Dam near Casper, Wyo. during August’s Four States Irrigation Council summer tour to U.S. Bureau of Reclamation irrigation and power-generating facilities that form the heart of the North Platte Projects. The projects irrigate nearly 450,000 acres of land in Wyoming and western Nebraska (photo by Steve Ress).

The reservoir side of Pathfinder Dam, on the Platte River north of Casper, Wyo. illustrates how far below normal water storage is at the more than one million acre-foot storage reservoir (water would normally reach the top rows of dark stones on the back of the dam). The historic dam was part of this summer’s Four States Irrigation Council tour of the North Platte River Projects in Wyoming and Nebraska. Pathfinder Dam was completed by the U.S. Bureau of Reclamation in 1909 and remains much the same as it was nearly 100 years ago (photo by Steve Ress).

John Lawson and Brian Werner talk to Four States Irrigation Council tour participants at Seminooe Dam near Casper, Wyo. Lawson manages the U.S. Bureau of Reclamation’s Wyoming Area Office at Mills, Wyo. and led much of the August tour of the North Platte River Projects. Werner, who organized the tour, is with the Northern Colorado Water Conservancy District (photo by: Steve Ress).
From the Director (continued from page 2)

Water Quality
1. Nitrate, uranium, and arsenic contamination of drinking water supplies.
2. Non-point source (NPS) nutrient and sediment inputs in lakes, streams and reservoirs, including toxic algal bloom treatment and prevention.
3. Surface and ground water contamination by hormones, antibiotics and other emerging contaminants from CAFOs, ethanol plants, municipalities, and other sources.

Water Quantity
4. Understanding, quantifying and predictive modeling the effects of water conservation practices on instream-flows and water use, including ethanol production.
5. Invasive species (e.g., purple loosestrife, salt cedar), particularly in vegetated riparian buffer strips and in stream channels.
6. Climate change, especially global warming, increased climate variability and frequency of drought.

Water Institutions
7. Creating and supporting more comprehensive, ongoing, real-time water monitoring networks that are spatially explicit and directly linked to predictive models.
8. Aging water infrastructure, including drinking water distribution systems (especially in small rural communities), wastewater treatment (including storm-water runoff), and irrigation water works (including dams, levees and canals).
9. Water economics, including establishment of water markets, water banking, recognition and development of water resources as a natural resource amenity for recreational use (including greater public access).
10. Creation of viable social systems to influence individual and institutional behavioral change for sustainable management of water resources.

Latest Research on Water Science, Economics and Law
To Be Featured in October (continued from page 1)

programming in a short amount of time,” said UNL Water Center director and WRRI co-leader Kyle Hoagland.

The day concludes with a tour of the newly refurbished UNL Water Sciences Laboratory, which is considered one of the top three water analytical laboratories in the United States.

More information on the colloquium and laboratory tour, including an agenda and registration information, will be available by September and can be found online at www.watercenter.unl.edu. Registration brochures will also be mailed. For more information contact Benson at (402) 472-7372 or email lbenson2@unl.edu.

UNL’s Water Center, WRRI and Institute of Agriculture and Natural Resources are sponsoring the event.

News Briefs (continued from page 14)

grounds can easily carry excess lawn herbicides, pesticides, or fertilizers to the municipal storm drains and can eventually reach our streams and lakes. Therefore, conserving water can help protect our water resources. What can you do to help?

Use lawn and garden, or landscaping chemical products sparingly.

Follow directions for applications. Use fertilizer products low in phosphorous.

Select a slow-release fertilizer product where at least half of the nitrogen is ‘water insoluble’ (check the label).

Sweep excess fertilizer back onto the lawn or garden where it is intended to be applied.

Water landscaped areas or gardens only when they need watered, rather than on a regular schedule.

Plant native grasses and plants, which tend to require less water to thrive and are more resistant to plant diseases.

When possible, consider using a broom to sweep your driveway or paved areas clean, instead of washing them off with a hose.

Direct hoses and sprinklers on the lawns or gardens, and avoid ‘watering’ driveways, parking lots, or sidewalks.

Water News Briefs
Meet the Faculty

Brian Wardlow (continued from page 3)

— Large-Area Crop Mapping and Monitoring: Developing methodologies to map and monitor specific crop types, crop rotation sequences, irrigated lands, and specific phenological events of crops at state to national scales. Research projects are being conducted for the U.S. Great Plains, conterminous U.S., and the Brazilian Amazon.

— Assessment of Soil Moisture/Climate/Vegetation Interactions: Investigating the spatio-temporal relationships between soil moisture, climate, and general vegetation conditions as observed from satellite. Research is ongoing at multiple sites in Nebraska’s Automated Weather Station network.

Examples of Outreach Programs:

— Large-Area Crop Mapping in the U.S. Central Great Plains: Research evaluated the utility of a new remote sensing instrument for classifying specific crop types and crop patterns, monitoring general crop conditions, and identifying and characterizing major phenological events of crops. A repeatable state- to multi-state level crop mapping and monitoring for this region was established through this research.

Examples of Past Research/Extension Programs:

— Development of National-Level Land Use/Land Cover Mapping Strategies: Research developed and tested an operational land use/land cover mapping protocol for the conterminous for the USGS’ National Land Cover Dataset (NLCD) program. This research contributed to the completion of two national-level LULC data sets (circa 1992 and 2002) for the U.S.

Examples of Outreach Programs:

— Conduct workshops annually around the U.S. to introduce agricultural producers, government officials/representatives, and the general public to the various drought monitoring tools and activities associated with the NDMC.

— Participate in the Lincoln Public Schools Teachers’ Summer Training sessions hosted by UNL where various topics related to drought such as technical definitions, impacts, and monitoring methods are introduced and materials to be used by teachers in the classroom are created.

Selected Publications:


E-mail:

bwardlow2@unl.edu

Steven R. Tonn (continued from page 3)

Examples of Outreach Programs:

— Zorinsky Lake Watershed Information and Education Project - Omaha
— Rivers Beneath Our Feet – School Enrichment Program for fourth through sixth grade students in Omaha Metro Lakes Watersheds
— Building for the Future – Erosion and Sediment Control Seminar – Omaha Metro Area
— Nebraska Watersheds Newsletter – published and distributed electronically on a quarterly basis
— Established and maintain Clean Lakes web page
— Provide monthly educational articles on runoff pollution prevention to homeowners associations’ newsletters in the Omaha metro lakes watersheds

Selected Publications:


Web/E-mail addresses:

www.douglas-sarpy.unl.edu/clstonn@unlnotes02.unl.edu
Coop Research Unit Tracks Invasive Species (continued from page 5)

two-part goal. It provides a centralized source of information on management, impact, and potential spread of currently established invasive species.

Allen said the project currently isn’t focused on gathering new data on invasive species, but is trying to combine and coordinate existing information, such as the Online Weed Management System of the Nebraska Weed Control Association at www.neweedmapper.org and the NDA’s “Watch List” for Invasive Plants, into a single source where all information can be accessed and compared.

Currently, the website provides information on monitoring, mapping, and management of invasive species. The project, which just completed its first year, does not have any complete maps or significant findings yet, but Allen said maps and risk analyses are being produced and should be ready later this year.

Eventually, both public and private sectors will be able to use the website to get detailed maps of areas where current invasive species are located and where potential invasive species pose a danger or risk.

“Risk analyses should be very interesting,” Allen said. “It allows us to sift among this large number of potentially impacted communities and potentially impacting invasive species and focus on those that really present the biggest risk.”

On February 7 and 8, 2008, the coop unit will host a conference on invasive species. The conference is designed to coordinate management efforts and information, eventually leading to unification of all efforts.

Other members of the Nebraska coop unit include fisheries biologist Kevin Pope, invasive species project coordinator Christopher Kelly and administrative assistant Valerie Egger.

Before coming to UNL, Allen was unit leader for the South Carolina Cooperative Fish and Wildlife Research Unit, and a faculty member in the Department of Forestry and Natural Resources and Department of Biological Sciences at Clemson University.

Survey Offers Public Perceptions and Attitudes about Water (continued from page 7)

Respondents also were asked to identify the top three sectors or infrastructures they thought were most responsible for the state’s pollution. Two of the top three were agriculturally based -- crop production and livestock and/or poultry operations. The third infrastructure thought to be most responsible for existing pollution problems in rivers and lakes was water from urban areas.

Fifty percent of those who live on farms felt crop production was most responsible, and 56 percent of those who live on farms felt livestock and/or poultry operations were to blame. Fifty-nine percent of those who live inside a town or city and 66 percent of those who live in a rural area not on a farm also felt this way about crop production, while 57 percent of those who live inside a town or city and 63 percent of those who live in a rural area not on a farm felt this way about livestock and/or poultry operations.

However, the survey also found those who lived on farms do more to conserve or protect water quality, such as changing pesticide and fertilizer use, testing drinking water or changing the way their yard was landscaped.

“Another interesting finding was who people saw as being responsible for ensuring we have clean water,” Wortmann said.

With urban dwellers, most thought state or local government should be most responsible for protecting local water quality, while those who lived on farms felt it was an individual responsibility.

“Both urban and rural and rural-non farm people view issues similarly, but there are issues they don’t agree on. Knowing this information will allow groups to find the problem and find a common agreement,” Morton said.

Nebraskans want more information on drinking water and human health, Wortmann said. The farm population also wants more information on agricultural water management, irrigation management, pesticide management and how to better handle manure, while the rural non-farm residents are very interested in private well and septic tank management.

“The biggest finding for the entire population as a whole was that many Nebraskans have given a great deal of thought to water and environmental issues,” Wortmann said.

For complete survey results, visit the Web at http://heartlandwq.iastate.edu.

Extension is in the university’s Institute of Agriculture and Natural Resources.

This survey is part of a national project conducted by Robert Mahler, professor of soil and environmental sciences at the University of Idaho. The project was funded by USDA CSREES.
Estrogens in Wastewater Treatment Plant Effluent

By Daniel D. Snow, Manager of Laboratory Services
UNL Water Sciences Laboratory

University of Nebraska, Omaha environmental toxicologist Alan Kolok and University of Nebraska–Lincoln environmental chemist Daniel Snow, along with their graduate students, are in the second year of a two-year study to determine whether estrogenic compounds are released from wastewater treatment plants in Nebraska and whether these compounds occur at sufficient levels to feminize male fish.

Estrogens and other compounds that mimic female sex steroids control development of female reproductive systems including those of fish. For example, male fish exposed to estrogenic compounds can develop feminine traits such as production of egg proteins. Recent studies worldwide have found that estrogenic compounds may occur in wastewater effluent throughout Western Europe and North America at high enough levels to feminize male fish. The environmental implications of these findings are only just beginning to be understood.

In the first year of this Nebraska Department of Environmental Quality-funded study, specially designed passive samplers and caged fish were exposed to water above and below the effluent discharge from wastewater treatment plants in Hastings, Columbus and Grand Island, Nebraska.

The passive samplers, designed to simulate and measure exposure of aquatic organisms to a variety of contaminants, were extracted and analyzed at the UNL Water Sciences Laboratory for a suite of natural and synthetic steroid hormones.

Elevated levels of several natural estrogens were found in the passive sampler below the Hastings plant effluent. Lower, but still detectable, levels of these compounds were also found in samplers exposed to effluent below the Grand Island treatment plant while none were found in the sampler exposed to the Columbus plant effluent, as well as three control sites not impacted by wastewater.

To better understand the biological effects, caged adult male minnows exposed to the same effluent were analyzed in Kolok’s laboratory for the presence of egg precursor proteins.

These proteins are normally found only in female fish, and would only be evident in males exposed to significant levels of estrogenic compounds. The proteins were found only in male fish exposed to effluent from the Hasting wastewater treatment plant. The development of feminine traits by male fish exposed to effluent paired with the results from the passive samplers compounds suggests that the effect is linked to the presence of estrogenic compounds.

A follow-up study on the presence of estrogenic compounds in the waterways of Nebraska is being conducted this summer to validate these results. Feminization of male minnows observed in this study may be used to understand the potential for reproductive impairment in other species of fish in Nebraska waterways.