Aaron Shultis

Aaron Shultis is an Isotope Scientist at the NU Water Sciences Laboratory, part of the Nebraska Water Center, which is part of the University of Nebraska’s Robert B. Daugherty Water for Food Institute. Shultis, who is a Ph.D. candidate in the UNL Department of Earth and Atmospheric Sciences, has been at the lab for eight years, where his research interests extend to isotope geochemistry, stratigraphy; carbonate Petrology and paleoclimatology as it relates to paleoenvironmental and paleoecological change. Shultis is affiliated with American Geophysical Union, Geological Society of

Aaron Shultis

2014 Water And NR Tour to Head West Along North Platte River

By Steve Ress

The University of Nebraska’s annual water and natural resources tour will examine the state of sharing limited water supplies in the North and South Platte River basins in Nebraska, Colorado and Wyoming this coming July.

The tour will include a visit to the U.S. Bureau of Reclamation’s (USBR) North Platte irrigation project in Wyoming, as well as many points of interest in Colorado and Western Nebraska.

The July 15-18 tour will begin and end in Kearney and is being sponsored and supported by NU’s Nebraska Water Center, Kearney Area Chamber of Commerce, Central Nebraska Public Power and Irrigation District, Osher Lifelong Learning Institute at UNL (OLLI), the Nebraska State Irrigation Association and others.

Advisory Boards Meets in October

By Steve Ress

The Nebraska Water Center (NWC) advisory board listened to presentations on research projects funded by U.S. Geological Survey (USGS) seed grants and heard from NWC’s new director when the group met on Oct. 24.

Chittaranjan Ray, NWC’s new director, outlined some of his impressions from his first few months at the University of Nebraska, as well as areas he is currently working on and reminded those attending of the center’s name change, from UNL Water Center to Nebraska Water Center, and its role as part of the Robert B. Daugherty Water for Food Institute.

Recipients of USGS 104b seed grant

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After my first three months as director of the Nebraska Water Center, I have been overwhelmed with the opportunities and possibilities available to the center as well as the number of wonderful colleagues and new friends I have had the chance to meet and work with since arriving here from the University of Hawaii in August.

One of the first things I wanted to do since my arrival at the University of Nebraska–Lincoln was to meet with as many of our colleagues and cooperators as I could as part of my ongoing education on how the NWC fits into the overall picture of water use and management related to the state’s water quantity and quality concerns.

Among those with whom I have met have been representatives of the Nebraska Association of Resource Districts and many individual NRD managers, the Nebraska Water Balance Alliance, the Nebraska Departments of Natural Resources and Environmental Quality, USDA’s Natural Resources Conservation Service, the Nebraska Water Resources Association, municipal water departments for Lincoln and Omaha and members of the water funding task force.

I have also met with as many faculty colleagues from the UNL, UNK, UNO and UNMC campuses as time has allowed and will continue to do so in the coming months. Together we will be exploring how we can help each other and where our mutual interests lie.

Regular meetings of our NWC advisory board and water resources advisory panel (WRAP) have also been very helpful in getting a handle on where the NWC is and what directions we may be taking in the near term.

The advisory board has been asked about their priority research areas for the coming year, and I have also asked them to work with us to help identify non-federal funds that we may be able to match with our available U.S. Geological Survey grant funds.

Several years ago, WRAP identified and ranked priority water issues for Nebraska, including water research areas, and I am very pleased to see that they will be revisiting these priorities and perhaps honing them a bit in the coming year.

At our associated Water Sciences Laboratory (WSL), I have been very pleased to see the work that lab director Dan Snow and his staff have been doing there, but am keenly aware that the WSL needs more support from faculty researchers to fully function in its roles as an NU core research facility and viable teaching lab. We are working with the lab to improve many areas, from overhauling the web site to asking faculty for their help in explaining how the lab has helped them with their research programs.

Also, as part of our overall research focus, I participated in the Global Food Security meetings at Iowa State University in Ames and will be working with our colleagues there to identify and develop cooperative research proposals.

We have also submitted a few grant proposals through the U.S. Environmental Protection Agency (in conjunction with the University of Massachusetts, University of Texas-Austin, University of Illinois and University of South Florida), the Nebraska Environmental Trust, the U.S. Army Research Office and others.

I had the pleasure of being invited to speak about the mission and activities of our parent Daugherty Water for Food Institute at...
MEET THE FACULTY

Aaron Shultis continued from page 1

America, Geochemical Society, SEPM Society for Sedimentary Geology, International Association of Sedimentologists

Education:
M.S. University of Wisconsin – Madison, Geology, 2006
B.S., University of Wisconsin – Milwaukee, Geology (Cum Laude), 2003

Examples of Current Research:
We are currently installing a Thermo Scientific Helix SFT Mass Spectrometer for the measurement of helium isotopes and other noble gases in groundwater. The highly precise measurement of He isotopes allows for the dating of groundwater.

Examples of Past Research:
We have five isotope ratio mass spectrometers for the measurement of nitrogen, carbon, hydrogen and oxygen isotopes

Publications:
Shultis, AI, Frank TD, and Fielding CR. Evolution of Sea-Surface Temperature and Meltwater Contribution along the Southeastern Margin of Gondwana during the Acme and Demise of the Late Paleozoic Ice Age. P (in review).

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Nebraska Could See More Hot Days, Symposium Speaker Says

By Steve Ress

Nebraska and many parts of the Great Plains can expect more hot days and increased demands for water and energy as a result of ongoing climate change and rising temperatures an environmental ecologist and climatologist told those attending Oct. 15’s University of Nebraska water symposium.

Shannon McNeeley of the North Central Climate Science Center (NCCSC) at Colorado State University, Fort Collins, Colo. said that rising temperatures in the Great Plains will continue to stress natural resources and increase competition for water among communities, agriculture, energy production and ecological needs.

“Nebraska, under current climate change scenarios, will likely be using more water for irrigation of crops and using more energy for production of biofuels,” McNeeley said.

If carbon emissions remain at current levels, she also said it is likely that in coming years, the state could experience as many as 25 to 30 days more per year of temperatures over 90 degrees.

Much of the information McNeeley presented at Tuesday’s symposium will be published in the forthcoming U.S. National Climate Assessment report to be released to Congress. The report will be used as a state of the art tool for assessing how the effects of climate change may affect federal and tribal lands nationwide. McNeeley co-wrote the report’s chapter on adaptation to climate change.

NCCSC is one of eight regional climate science centers contributing to the report, she said.

Along with more hot days, Nebraska could see it’s percentage of crop acres under irrigation increase dramatically as producers begin to feel the effects of changes in crop growth cycles due to warming winters and alterations in the timing and magnitude of rainfall events.

“These trends are already being observed and as they continue, they will require new agriculture and livestock management practices to help mitigate their effects,” McNeeley said.

She also noted that communities already vulnerable to weather and climate extremes will be “Stressed even further by more frequent extreme events occurring within an already highly variable climate system.”

The magnitude of these expected changes will exceed those experienced in the 20th century and while government, organizational and private sector resources are increasing efforts to deal with these predicted changes “Existing adaptation and planning efforts are inadequate

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WRAP Meets in Late September

The University of Nebraska’s Water Resources Advisory Panel (WRAP) met to discuss previously identified water research priorities and new information on possible research funding in late September.

The 15-member panel meets three times annually to discuss and provide feedback on University water-related research, education and outreach programs. The WRAP met at the Whittier Research Center in Lincoln on Sept. 25.

In 2009 the WRAP identified and ranked research priorities in the areas of water quality and management; basin specific priorities; and water-quality related priorities. During the meeting it was decided that revision of these priorities was needed.

Current WRAP members include Frank Albrecht, Nebraska Game and Parks Commission; Brian Barels, Nebraska Public Power District; Mark Brohman, Nebraska Environmental Trust; State Senator Tom Carlson; Eugene Glock, Cedar Bell Farms; Jerry Kenny, Platte River Recovery Implementation Program; Marian Langan, Audubon Nebraska; Mike Linder, Nebraska Department of Environmental Quality; Jerry Obrist, City of Lincoln Water System; Lee Orton, Nebraska Well Drillers Association; Jay Rempe, Nebraska Farm Bureau Federation; State Senator Ken Schilz; Jim Schneider, Nebraska Department of Natural Resources; Lyndon Vogt, Central Platte NRD; and Dayle Williamson.

Rural Nebraskans Rethinking Water Priorities in Wake of 2012 Drought

By Dan Moser, IANR News

Eighty percent of rural Nebraskans with farming interests experienced a loss of business income because of last year’s drought, according to the Nebraska Rural Poll.

Poll responses also indicated rural Nebraskans’ priorities for water uses have shifted since they last were surveyed on the issue, in 2004.

The 18th annual University of Nebraska–Lincoln poll was sent to 6,320 households in Nebraska’s 84 nonmetropolitan counties in March and April. Results are based on 2,317 responses.

Nebraska was wracked in 2012 by what has been described as the worst drought in at least 50 years. Eighty-eight percent of rural Nebraskans with occupations in agriculture reported decreased farm production in 2012, with 42 percent saying they experienced this to a great extent.

Eighty percent of respondents said they lost income. While national reports tended to focus on the near-record farm income levels due to higher prices, the poll shows that for Nebraskans in the middle of the drought, price increases could not overcome production losses.

“It serves as a reminder that agriculture faces unique production and economic risks and points to the critical nature of delayed action in Washington, D.C. over future agricultural policy,” said Brad Lubben, UNL public policy expert.

With memories of that drought in mind, rural Nebraskans also appear to be rethinking priorities for water use. Seventy-three percent rated indoor use in existing homes as a high priority; 56 and 51 percent listed livestock and crop irrigation, respectively, as high priorities. In 2004, only 48 percent of respondents listed livestock as a high water-use priority.

Only 28 percent of respondents listed indoor use in new housing developments as a priority use, and only 10 percent listed outdoor recreation, down from 34 and 18 percent, respectively, in 2004.

Poll respondents seem to be saying “we can’t just build businesses and homes and add new uses without knowing the water will be there,” said Lubben.

Randy Cantrell, rural sociologist with the Rural Futures Institute, added: “There’s a message here for economic developers. They have to be participants in these discussions about water.”

Seventy-three percent of poll respondents said they had voluntarily reduced water use in response to last year’s drought.

“That strikes me as a positive note about rural Nebraska’s willingness to contribute,” Cantrell said.

Also, 75 percent reported loss of wildlife and wildlife habitat.

The Rural Poll is the largest annual poll of rural Nebraskans’ perceptions on quality of life and policy issues. This year’s response rate was about 37 percent. The margin of error is plus or minus 2 percent. Complete results are available online at http://ruralpoll.unl.edu. The university’s Center for Applied Rural Innovation conducts the poll in cooperation with the Nebraska Rural Futures Institute with funding from UNL Extension and the Agricultural Research Division.
The Nebraska Water Balance Alliance (NEWBA) is wrapping up a second year of Water for Generations demonstration projects showing farmers how technology can help them with their water management strategy.

One NEWBA project uses weather stations, evapo-transpiration gauges, flow meters and soil moisture sensors in Nebraska fields from Gering to Loomis. The goal is to provide "real time" daily measurements of water being applied by the irrigation system, used by the crop and available in the soil to help producers make the best use of limited irrigation water.

"Farmers are sometimes skeptical about using technology like water sensors and ET gauges. They hesitate because of initial cost or they aren’t sure if they can trust the data. Our demonstration project shows these tools really do provide valuable information to producers," said NEWBA president Roric Paulman.

"There is no doubt in my mind that if we present what we have learned, it will change the way we look at water management in the future," said Ted Tietjen, project director for the past two years.

"Irrigators are common sense people, innovative and hard-working; many of the innovations in irrigation systems and farm equipment have come from Nebraska growers. As they are faced with ever-increasing regulations, they have an opportunity in NEWBA to put forward different and perhaps better solutions to their common problem," explains Don Kraus, General Manager of Central Nebraska Public Power and Irrigation District. "The alliance’s strength is in their approach, where growers work collaboratively to determine water management strategies to reduce on-farm water use."

The demonstration project is also tracking movement of nitrogen in the soil. Irrigation and precipitation push nitrogen and other nutrients down through the soil. Ideally, nitrogen should be deposited in the plant’s root zone where it can be fully utilized by the crop. It is important to avoid excess watering that could push the nitrogen below the roots and potentially contribute to groundwater contamination.

Another project is using variable rate irrigation technology to help farmers recognize and avoid overwatering. Traditional pivot irrigation systems apply water at a flat rate over the entire field. Farmers naturally set up their irrigation schedule based on the driest, most challenging parts of the field.

In a field with variable soil types and elevations this means some parts will receive more water than needed. New variable rate technology allows producers to slow down the pivot over lighter soils to apply more water and speed up to put on less water in heavier soils. This study is designed to promote adoption of variable rate technology by demonstrating how farmers can reduce total water and energy costs while maintaining yields by better placement of the water in line with what the soil needs.

Bill Marek, a Cropmetrics irrigation specialist, explains, “Growers don’t want to over-irrigate but with only a flat rate solution they have no other alternative. Growers are a bright breed and will make decisions to optimize crop production. With a technology advantage that allows for a different amount of water to meet the soil variability the result is a natural cutting back…not an ‘allocated’ cut back via regulation.”

Results from both projects will be summarized and data shared at upcoming NEWBA Grower Symposia scheduled for January 2014.

**Working together for long term solutions**

Demonstration projects are just one way NEWBA is working to encourage better water management. The organization is becoming a place where people can come together to discuss and explore proactive strategies for a more resilient future water strategy.

NEWBA is a learning organization. Monthly board meetings, which are open to the public, include time for presentations from water experts and leaders. NEWBA also hosts semi-annual water summits that showcase promising strategies and encourage discussion to discover how to partner in new ways.

“NEWBA is a non-profit organization with no vested water interests. We promote solutions that safeguard our economy and quality of life,” said Lorre McKeone, NEWBA communications coordinator. “We know long term solutions can only come through better understanding and cooperation. NEWBA provides a place where constructive conversations can occur and promising strategies can be advanced.”

Conversations at NEWBA meetings encompass different perspectives. There are producers who take a grassroots approach to saving water on their farms and adapting practices to cope with restrictions on water use. Researchers and academics share technical data from statewide studies. NRD staff explain rules they are required to follow and the assistance they can offer landowners. Agricultural technology providers offer tools that provide site-specific data producers need for decision-making. Electric utilities are concerned about rural economies and the customers they serve. With such a diverse group, you might expect...
Modern Toilets Can Be Flush With Water Savings

By Sharon Skipton and Bruce Dvorak

If you want to become more water-efficient in your home, start with the toilet. The Environmental Protection Agency reports that toilet use in the United States accounts for about 9,000 gallons of water used per person per year.

How can we be using that much water for toilets? A study by the American Water Works Association found, on average, each of us flushes the toilet five times per day. Older conventional toilets use 3.5 to 5 gallons or more of water per flush. Five flushes per day at 5 gallons per flush would add up to the 9,000 gallons per year reported by EPA.

Effective Jan. 1, 1994, the Energy Policy Act of 1992 required that all new toilets produced for home use must operate on 1.6 gallons per flush or less. That accounts for a savings of about 2 to 3 gallons per flush. Some of the first water-efficient models on the market did not effectively remove solid waste. In fact, it was often necessary to flush two or more times to effectively remove solid waste. Manufacturers responded, and pressure and vacuum assisted, or jet-action toilets were designed for good waste removal. The most water-efficient toilets carry the EPA WaterSense® label. Products with the label are generally 20 percent more water-efficient than similar products on the market. WaterSense® labeled toilets are required to use 1.28 gallons or less per flush.

Dual-flush toilets have been available in other countries for years, but they are relatively new here in the U.S. These toilets offer a half-flush (0.8 to 1 gallon) and a full-flush (1.6 gallons per flush). Dual-flush toilets use much less water than conventional models, but they are more expensive to purchase.

Dual-flush toilets use about half the water of a conventional toilet, but they are more expensive to purchase. They are available in a variety of styles and prices. Many people choose to install a dual-flush toilet to save water and reduce their utility bills.

New Insight on Vulnerability of Public-Supply Wells to Contamination

Key factors have been identified that help determine vulnerability of public-supply wells to contamination. A new U.S. Geological Survey (USGS) report describes these factors, providing insight into which contaminants in an aquifer might reach a well and when, how and at what concentration they might arrive.

About one-third of the U.S. population gets their drinking water from public-supply wells.

"Improving the understanding of the vulnerability of public-supply wells to contamination is needed to safeguard public health and prevent future contamination," said Suzette Kimball, acting USGS director. "By examining ten different aquifers across the nation, we have a more thorough and robust understanding of the complexities and factors affecting water quality in our public supplies."

The study explored factors affecting public-supply-well vulnerability to contamination in ten study areas across the Nation. The study areas include Modesto, Calif., Woodbury, Conn., near Tampa, Fla., York, Nebr., near Carson City and Sparks, Nev., Glassboro, N. J., Albuquerque, N. Mex., Dayton, Ohio, San Antonio, Tex., and Salt Lake City, Utah.

Measures that are crucial for understanding public-supply-well vulnerability include: 1) the sources of the water and contaminants in the water that infiltrate the ground and are drawn into a well; 2) the geochemical conditions encountered by the groundwater; and 3) the range of ages of the groundwater that enters a well.

The study found that conditions in some aquifers enable contaminants to remain in the groundwater longer or travel more rapidly to wells than conditions in other aquifers. Direct pathways, such as fractures in rock aquifers or wellbores of non-pumping wells, frequently affect groundwater and contaminant movement, making it difficult to identify which areas at land surface are the most important to protect from contamination. An unexpected finding is that human-induced changes in recharge and groundwater flow caused by irrigation and high-volume pumping for public supply changed aquifer geochemical conditions in numerous study areas. Changes in geochemical conditions often release naturally occurring drinking-water contaminants such as arsenic and uranium into the groundwater, increasing concentrations in public-supply wells.

Knowledge of how human activities change aquifer conditions that control which contaminants are released to groundwater and how persistent those contaminants are once in the groundwater can be used by water managers to anticipate future water quality and associated treatment costs.

The quality of drinking water from the nation’s public water systems is regulated by the U.S. Environmental Protection Agency under the Safe Drinking Water Act. USGS studies are intended to complement drinking water monitoring required by federal, state and local programs.

This new report, Factors affecting public-supply-well vulnerability to contamination: understanding observed water quality and anticipating future water quality, was done by the USGS National Water-Quality Assessment Program. NAWQA conducts regional and national assessments of the Nation’s water quality to provide an understanding of water-quality conditions, where conditions are getting better or worse over time, and how natural features and human activities affect those conditions.
the Patterson School for Diplomacy and Global Commerce at the University of Kentucky in October.

I have also been working to finish-up some lingering projects from my tenure at the University of Hawaii, including finishing a draft for a booklet on “Emergency Water Supply Technologies for Elsevier” which, thankfully, is now under review.

On the NWC’s education front, we have reconstituted the membership for the inter-disciplinary water resources planning and management minor program for graduate students and have met with the Nebraska Department of Natural Resources to recruit graduate students for work in their department, which looks very promising.

Our long-standing spring semester lecture series, the water and natural resources seminar, will be changing a bit this coming spring. Rather than the traditional 14 to 16 weekly lectures that have been offered as a free public lecture series or course credit, the series will consist of six to eight lectures that will be taught by UNL’s School of Natural Resources. The NWC will continue to help identify a theme for the series, as well bring in speakers and provide logistical support. These changes are largely a result of staffing changes within the NWC.

The 2014 Water and Natural Resources Tour will be heading to Western Nebraska, Colorado and Wyoming in July to look at a variety of water issues in the North and South Platte River basins as well as to the U.S. Bureau of Reclamation’s North Platte Project in the mountains near Casper, Wyo. We have made this trip before, but it is one that always merits repeating, since so much of our water comes to Nebraska via this project. It is also a good opportunity for those in Nebraska who are interested in water or work in water to see the North Platte Project, since these locations are quite remote.

The tour will be about four days in length, due to the distances we will travel. More details will be on our website and in this newsletter as they become available. This will be one of those tours that fills-up early; so book your seats as soon as you can.

Looking ahead to the next few months, we are planning to hold a daylong brainstorming retreat with water faculty members from across Nebraska during the third week of January. I am hoping this will lead to the formation of some core groups that can focus on specific types of research funding and scholarly activities, as well as be an opportunity for us to hear about what expectations any faculty may have of the NWC that currently aren’t being met, or that can be improved upon.

We will also be looking to continue to broaden our collaborations everywhere, from the local campus, to across the state, to internationally.

Before closing, I want to thank assistant director Lorrie Benson for her years of service to the NWC, including my personal congratulations for the extremely relevant and well-run water symposium and water conference events that were held at the Cornhusker Hotel in mid-October. Lorrie is an unfortunate victim of shifting funding that often plagues public universities. Her efforts and dedication will be sorely missed.

Also thanks to go to our communications coordinator Steve Ress and Daugherty Water for Food Institute outreach coordinator Rachael Herpel for their management and leadership of another very successful Husker Harvest Days exhibit for the Institute of Agriculture and Natural Resources and UNL Extension. This year’s series of exhibits were once again water-themed, while it appears next year will use the coming centennial of the Smith-Lever Act of 1914 (that established the extension service) to help showcase where Extension is heading into the future.

McNeeley continued from page 3

McNeeley is also working on a Drought Risk and Adaptation in the Interior study to help U.S. Department of Interior resource managers, and stakeholders such as the National Park Service, Bureau of Indian Affairs and Bureau of Reclamation among others, deal with drought in their landscapes. One of the partners in this study is the University of Nebraska–Lincoln’s National Drought Mitigation Center.

The symposium, followed the next day by NU’s annual water law conference, was at Lincoln’s Cornhusker Hotel. The twin events were co-sponsored by the Nebraska Water Center, part of the Robert B. Daugherty Water for Food Institute, U.S. Geological Survey’s Nebraska Water Science Center, the University of Nebraska College of Law and the Natural Resources and Environmental Law Section of the Nebraska State Bar Association.

Implementing plans to mitigate effects from climate change have also been slow to come about, she said, noting that there are many political, cultural and institutional barriers to the process of making changes and that adaptation isn’t “One size fits all.”

Barriers to change include lack of resources to begin and sustain adaptation efforts, fragmented decision-making networks, lack of leadership and polarization of the issue politically as well as widely divergent perceptions on the potential risks posed by climate change, she said.

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University of Nebraska Water Symposium (Oct. 15) & Water Law Conference (Oct. 16), Cornhusker Hotel, Lincoln

Sponsored by:
Nebraska Water Center, part of the Robert B. Daugherty Water for Food Institute
USGS Nebraska Water Science Center
University of Nebraska College of Law
Natural Resources & Environmental Law Section, Nebraska State Bar Assoc.

Oct. 15’s water symposium gets underway at the Cornhusker Hotel in Lincoln.

Nebraska Water Center director Chittaranjan Ray greets symposium attendees.

Doug Hallum of UNL’s Conservation and Survey Division, was a breakout session speaker on transforming the Platte River.

David Yates of the National Center for Atmospheric Research and Stockholm Environment Institute.

Mike Hayes, director of the University of Nebraska–Lincoln’s National Drought Mitigation Center.

(Photos by Craig Eiting)
Alan Tomkins, director of the University of Nebraska’s Public Policy Center.

UNL’s Karina Schoengold delivered a breakout session on groundwater trading in the Upper Republican NRD.

Don Blankenau talks on the latest on Republican River legislation.

continued on page 10
Water Symposium continued from page 9

Anthony Schultz of the University of Nebraska opened the conference with a primer on water law 101.

Marty Link of the Nebraska Department of Environmental Quality.

UNL’s Dean Eisenhauer talked on water percolation beneath crop root zones research during a symposium breakout session.

Municipal Legal Options during a Drought was the topic of Lash Chaffin’s water conference presentation.

Richard Dooling of the University of Nebraska was a law conference ethics speaker.

Jon Schroeder of Curtis spoke on the legalities of certifying acres.

Widener University’s John Dernbach was a water law conference presenter.

Conference presenter Kristin Linsley Myles of Munger, Tolles & Olson LLP.
“The tour will take an in-depth look at North and South Platte River basin issues and how they effect Nebraska from a number of perspectives,” said tour co-organizer and host Michael Jess.

Tour stops and agenda are still being planned, but will include stops and topics along both the North and South branches of the Platte River.

“The tour has traveled this route in past years and one of the highlights is always the USBR’s North Platte Project, which is one of the most historic federal impoundment projects in the western United States. It is something anyone interested in or working in Nebraska water issues needs to see at least once to fully appreciate where a great deal of our surface water in Nebraska comes from,” said tour co-organizer and sponsor Steve Ress of the Nebraska Water Center, part of NU’s Robert B. Daugherty Water for Food Institute.

“Nebraska, Wyoming and Colorado are highly dependent on irrigation water and hydropower generated in the North Platte watershed and are legally tied to share its waters.”

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

Though early in the planning process, other likely topics and stops during the four-day event could include the Platte River Recovery Implementation Program, water supply challenges in Colorado’s urbanized “Front range,” and stream flow allocations among irrigators in Nebraska and Wyoming.

Lessons learned and outcomes from this summer’s flooding along the South Platte River will also likely be examined.

There will also be discussions on water for wildlife habitat, effects on the rivers from invasive species, irrigation efficiency measures, and generation of hydroelectric power.

Nebraska tour stops could focus in part on issues facing local irrigation districts and Natural Resource Districts, examination of the Fort Laramie and Interstate canals, and the Whalen and Tri-State diversion dams.

An overview of North Platte River operations is also expected to be part of the agenda.

Organizers will be working on the tour program and route over the coming months and will likely open registration in early to mid-spring of 2014. Updates on the tour will be posted at watercenter.unl.edu and within the pages of this newsletter.
research funding gave brief rundowns on their projects. These included:

David Hage, UNL Department of Chemistry, on “Development of an Affinity-based Concentrator-detection kit for Monitoring Emerging Contaminants in Recycled Water:

David Admiraal, UNL Department of Civil Engineering, on “Direct Monitoring of Knickpoint Progression.”

Yusong Li, UNL Department of Civil Engineering, “An innovative Graphene Oxide Filter for Drinking Water Contaminants Removal.”

Alan Kolok, Department of Biology, University of Nebraska, Omaha, on “Developing a Two-tier Screen to Evaluate the Health of Nebraska’s Wetlands.”

Karina Schoengold, UNL Department of Agricultural Economics and UNL School of Natural Resources, wasn’t able to attend, but copies of her presentation were distributed.

The board was updated on the status of upcoming USGS 104b funding and that USGS anticipates awarding $92,000 to each Water Resources Research Institute nationwide, though that funding is not guaranteed. This funding was ultimately reduced by 60 percent in 2013 and 104g funding was eliminated, so submitted projects were not reviewed.

NWC was hoping to get the call out for abbreviated 104b proposals by the end of October. Projects must be submitted by Jan. 15, 2014.

Also at October’s meeting, Water Sciences Laboratory director Dan Snow said the WSL is completing a five-year review and that an NSF/NRI pre-proposal for the purpose of purchasing new analyzing equipment has been completed.

Snow said that requests for letters of support for the lab have been sent to faculty lab users in nearly a dozen departments. These will be used to help leverage the lab’s position. It was noted that the lab recently received $300,000 in Nebraska Research Initiative (NRI) funding.

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**DROUGHT**

in the Life, Cultures, and Landscapes of the Great Plains

The 40th annual Center for Great Plains Studies symposium is a collaboration with the National Drought Mitigation Center and the Robert B. Daugherty Water for Food Institute.

Drought or the ever-present threat of it has had a pervasive effect on the region and its people. It has molded the region's settlement patterns, agriculture, and commerce, stimulated innovation, aroused conflict between agriculturalists and environmentalists, and fueled litigation between states. Drought has shaped how the people of the Great Plains think of themselves and their region and influenced their culture, literature, and art.

Scientists and scholars from across the full spectrum of disciplines will be invited to share their expertise and perspectives as the symposium explores all aspects, causes, impacts, projections, social and cultural consequences, and ramifications of drought.

Featuring more than 40 distinguished speakers including:

**Ian Frazier** of *The New Yorker*

**Richard Hornbeck**, Harvard University

**Erwin Denys** and **Nathan Engle**, World Bank

NOAA: **Tom Karl**, National Climatic Data Center; **Marty Hoerling**, Earth System Research Laboratory

**Sonny Ramaswamy**, National Institute of Food and Agriculture

**Theib Oweis**, International Center for Agricultural Research in the Dry Areas

**Scott Deitchman**, Centers for Disease Control and Prevention

April 1-4, 2014
Lincoln, Nebraska
www.unl.edu/plains
WATER WISE: Trees and Turf Have Different Water Needs

By Amy Seiler, Nebraska Forest Service

Trees and turf often share space in home landscapes, but they have different water needs. Understanding this can help conserve water and save money, according to Amy Seiler, community forestry specialist with the Nebraska Forest Service.

Bluegrass turf requires about 1 inch of moisture per week during the spring and fall and about 1 1/2 inches in summer, depending on temperatures and winds.

Water should be applied once or twice a week on heavier soils in spring and fall, and potentially two to three times during the heat of the summer. For lighter, sandy soils watering may be needed more often.

This frequent irrigation is good for the turf, but not so for the trees that live within the turf.

“This frequent, shallow watering encourages trees living within the turfgrass to develop shallow roots,” Seiler said. “When periods of drought occur, these trees do not have a deep root system that would allow them to pull water from deeper in the soil profile and that’s when we see them become drought stressed.”

One other problem that trees encounter while living in the over-irrigated turfgrass environment is that daily watering of turf also prevents the soil from drying out, and Seiler says this also is harmful to trees.

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“Raising Our H2O IQ”
IANR/UNL Exhibits focus on the latest in water research and Extension programming at Husker Harvest Days 2013

Crowds find IANR’s exhibit building at Husker Harvest Days.

Governor Dave Heineman takes an interview from Robert Pore of the Grand Island Independent while touring UNL water exhibits.

Show goers crowd the red IANR building at Husker Harvest Days.

Governor Dave Heineman.

It sometimes seems that even the longest of droughts can be temporarily broken once the Husker Harvest Days show is open.

Georgia Gleason from the UNL Office of Admissions was on-hand to help potential students explore their options.

Rachael Herpel, NU Vice President and IANR Vice Chancellor Ronnie Green and Governor Dave Heineman share some conversation.

Jesse Korus (center) talks with show goers.

Kevin Martin, Tina Smith and Paige Wood from the Nebraska College of Technical Agriculture at Curtis.

(Photos by Craig Eiting and Steve Ress)
Dana Divine and Dave Hansen from UNL’s School of Natural Resources and Conservation and Survey Division.

Exhibits co-organizer Rachael Herpel of the Daugherty Water for Food Institute and Nebraska Water Center, fields an interview with NTV reporters.

Nebraska Water Center director Chittaranjan Ray and Daugherty Water for Food director Roberto Lenton (right) chat with Bill Krantz.

On-site testing of corn stalk residue for nitrates.

UNL Extension Educators Jenny Rees and Keith Glewen (center).

Gary Zoubek and Paul Hay exhibit on the Nebraska Agricultural Water Management Network.

Drought monitoring expert Tsegaye Tadesse with the National Drought Mitigation Center’s exhibit.

Harlan County Extension Educator Tony Anderson gets a look at the UNL Water Machine.

Dana Divine and Dave Hansen from UNL’s School of Natural Resources and Conservation and Survey Division.
conflict but instead you see a strong interest in working together for a common goal, McKeone said.

Paulman agrees. “This organization fulfills a vital role. It can be the time and the place to express ideas and concepts that will continue to keep Nebraska in the forefront of sustainability.”

“We invite people with practical ideas and strategies to join in a collaborative effort to find the best solutions for everyone. This positive, proactive, ‘win-win’ approach is attracting many solution-minded leaders with good ideas,” McKeone said.

The solutions NEWBA seeks are comprehensive and practical. They need to meet a variety of needs across Nebraska. This is a challenge because of the diversity in the state. Although precipitation can vary from 14 inches per year in the Panhandle to more than 30 inches in the southeast corner of the state, precipitation provides Nebraska with over 90 million acre-feet (MAF) of average annually renewable water supply. Unfortunately, this supply also varies from about 60 MAF to over 140 MAF annually, on a statewide basis, causing additional water challenges.

Water resources must meet needs for domestic, agricultural, environmental, municipal and industrial use. Plans also need to be in place for dealing with normal years as well as flood and drought years. Solutions also need to be practical to implement and sustainable.

More resilient water strategies pertain not only to agricultural impact and the environment, but also to the local and state economy.

“NEWBA is important to electric utilities because of economics,” said Larry Umberger, general manager of Midwest Electric Cooperative Corporation, Grant. “We need to find ways to keep our rural communities viable. All the businesses in our service area are ag related.”

Umberger believes helping farmers save input costs through better water management will help them maximize profits and preserve resources for future generations.

“Over time, NEWBA has been refined with a better focus on what it believes is important and what the group is likely to accomplish,” said Frank Kwapnioski, an advisor from H2Options Engineering. “NEWBA can’t be all things to all people, so we must focus on the best use of time and resources.”

He says the group’s focus has evolved over time from simply trying to change the dialogue about water management to a more grassroots approach of identifying and encouraging more efficient water management practices.

“This message has generated financial support from forward thinking leaders in banking, co-ops, ag businesses, producers, power districts and concerned citizens. Our Water for Generations projects have been cooperative efforts between growers, vendors, natural resource districts, crop consultants, rural electric utilities, University of Nebraska–Lincoln Extension and USDA Natural Resources Conservation Service. These varied interests provide not only in-kind and financial support but also wide ranging perspectives and expertise that help us move to a new level,” McKeone said.

She emphasizes that the organization’s strength is grounded in broad-based support and involvement. NEWBA supporters can donate to the group’s 501c6 fund, which is dedicated to promoting solutions. A second entity, the Water Balance Foundation, has been established as a 501c3 organization for tax-deductible contributions. Foundation funds are used for research and education. For more information about NEWBA go to www.nebraskawaterbalance.com
Modern Toilets continued from page 6

gallons.) This allows you to use the half-flush for liquid waste removal and the full-flush for solid waste removal. Using only 0.8 gallons for liquid waste can add up to big water savings over time.

When an older toilet remains in use, you can place a plastic container (such as a plastic milk jug) filled with water or pebbles in the toilet tank to reduce the amount of water used per flush. Place the container to avoid interfering with the flushing mechanisms or the flow of water. A container can typically result in a savings of up to 1 gallon of water per flush. Do not use bricks or other objects that can release particles of soil, stone, or corrosive materials into the tank. In addition, a variety of devices are commercially available to either reduce the amount of water flowing into the tank, or hold back a reservoir of water when the toilet is flushed. When used with a standard toilet, the device may result in a savings of 1 to 2 gallons of water per flush. However, about 3 gallons of water per flush should be maintained for adequate flushing in older toilets.

You can save water by disposing of facial tissue, wipes, dead insects, and other waste in a trash can rather than a toilet. Use the toilet only to carry away sanitary waste.

Some water use attributed to toilets may not be from flushing. It is estimated that about 20 percent of toilets leak. Leaking toilets may make a telltale leak sound or the fill valve will open to refill the tank long after use. Any ripples or disturbance of water in the bowl can be a sure sign that the toilet is leaking. The best way to tell if a toilet has a leak is to place a few drops of food coloring in the tank. If the color shows in the toilet bowl after a few minutes without flushing, there is a leak. Leaks should be fixed. This usually involves changing the flapper valve. Toilets that don’t receive much use, such as in a basement, can leak unchecked causing significant waste. Make a habit of checking an unused toilet using the method described above or consider shutting off water to the toilet.

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“Tree roots need oxygen to develop correctly. Soil that is constantly saturated with water will prevent oxygen from being present in the soil. This will prevent proper root growth and this will lead to drought like symptoms.”

Furthermore, trees planted in irrigated turf must try to compete with turf to capture moisture and nutrients within that top 12 inches of soil. Inevitably the turf will win every time, Seiler explained.

Homeowners will find it more practical to meet the differing needs of trees and turf if they group trees within large mulched beds, Seiler said.

Trees would prefer to be watered deeply and less frequently than lawns, according to Seiler. They should be given 1 to 2 inches per application.

“We encourage watering trees deeply and infrequently to encourage them to develop a deeper rooting system, which makes them structurally stronger and more resilient to years of drought because they can capture water deeper in the soil profile.”

A typical tree has most of its water-absorbing roots in the top 12 to 24 inches of soil. Those roots also expand out more than one and a half times further than the drip line of the tree. These massive root systems allow trees to draw moisture from a larger area.

The objective to watering trees should be to irrigate to the depth of the root zone and provide adequate water to the area under the drip line and beyond.

Trees would prefer to receive moisture every seven to 10 days, possibly even 14 days, depending on species, Seiler said. The best way to know if a tree needs to be watered is to insert a soil probe or a 12-inch-long flat-head screwdriver into the ground. If it goes in easily there is no need to water; if it is difficult to insert into the ground, it is time to apply some moisture.

It’s also important not to apply too much water or fertilizer around the trees near the end of the growing season, prior to first frost, according to Seiler. That would stimulate tender new growth that could be damaged by the freeze. However, after the leaves have dropped, if winter is dry, water should be added once a month.

Other factors to consider when trying to figure out a watering routine and amount to apply are:

- **Soil:** Heavy soils require more water less often. Sandy soils require more applications, but in smaller amounts.
- **Time of year:** Trees need to be irrigated less often in the spring and fall, because temperatures are lower and less evaporation is occurring.
- **Location in the landscape:** Trees placed on south and west sides of buildings and homes require more frequent watering than trees on the north and east.
- **Species of tree:** Some species require more water than others.

Knowing trees’ water requirements is more than a good way to conserve water; during a drought, it might be the key to saving valuable trees. If water restrictions are enacted in some cities, as they were in dozens of Nebraska cities and towns in 2012, homeowners should give trees higher priority than turf, Seiler recommended.

“A tree is a 30-year investment,” she said. “Turf can be replaced in a year.”
**Team Gold Award**

The University of Nebraska–Lincoln’s Stormwater Management Education Team received the 2013 Outstanding Team Gold Award from the Association of Natural Resources Extension Professionals (ANREP) for its stormwater management programming.

Team members include Kelly Feehan, extension educator; Tom Franti, surface water management engineer, UNL Department of Biological Systems Engineering; Bobbi Holm, assistant extension educator; Steve Rodie, associate professor, UNL Department of Agronomy and Horticulture; Katie Pekarek, assistant extension educator; and David Shelton, agricultural engineer, UNL Department of Biological Systems Engineering.

The stormwater team began in 2007 to address a shifting paradigm — one that was moving away from the traditional view that treated stormwater in urban areas is a problem and toward the new view that sees it as a resource to be retained.

In 2010, the team received a USDA-NIFA grant, enabling them to expand and build upon their stormwater management and education programs. Although that grant concludes next year, the team shows no signs of slowing down and is in the process of pursuing other funding sources to continue its education efforts.

**Fritz Gets Oeschger Medal**

Sherilyn Fritz, George Holmes University Professor, UNL Department of Earth and Atmospheric Sciences and School of Biological Sciences, received the 2014 Hans Oeschger Medal from the European Geosciences Union.

Her research combines geological, ecological and atmospheric sciences and focuses on reconstructing climate and environmental variation during the Quaternary Period, which is the most recent 2.6 million years of Earth’s history.

Fritz uses the fossil record from lakes to reconstruct environments of the past and currently has major projects in tropical South America, western North America, and Southeast Asia. Her work helps reconstruct the history of climate change and develop a long-term context to evaluate how humans impact their environment.

The Oeschger medal is named after a Swiss scientist who was a pioneer in ice core research. It recognizes scientists who have made “outstanding achievements in ice research and/or short-term climatic changes (past, present, future),” according to the EGU.

More than 130 scientists from around the world were nominated for the awards. Fritz was one of 24 recipients of the organization’s 2014 Division Medals and one of 43 researchers being honored overall.

**Symposium Poster Winners**

Poster competition winners at this year’s joint Nebraska Water Center – U.S. Geological Survey Nebraska Water Science Center Symposium, held at Lincoln’s Cornhusker Hotel on Tuesday, Oct. 15 were:

- **First place**: Jason Nolan/EAS/advisor Karrie Weber
- **Second place**: Nora Greiman/Anthropology/advisor LuAnn Wandsnider
- **Third place**: Ryan Matsuda/Chemistry/advisor David Hage

**Master Gardener**

UNL Extension’s Master Gardener training will again be available throughout the state.

The program is a horticulture-related volunteer training program based in many counties throughout the state. It has been part of UNL Extension since 1976.

Volunteers are trained by UNL Extension faculty and staff. They contribute time as volunteers working through their local Extension office to provide horticulture-related information to their community, particularly on sustainable horticultural practices.

Participants must complete 40 hours of training and 40 hours of volunteer service during their first year in the program. Master Gardener volunteers retain their certification through annual training and volunteering.

Some topics that could be covered are: plant functions and the growing environment; insect identification and management; turfgrass management; plant diseases and management; weed identification and management; trees, shrubs, and herbaceous plant selection and management; wildlife management; landscape design and management; water conservation and management and many more.

Class time, location, and cost vary across the state, but generally classes are offered from February through May.

Check with your local UNL Extension office for complete details on a Master Gardener Program near you.
Several Steps Can Reduce Water Use Inside Home

By Kristen Cope and Bruce Dvorak

Every day people use water not only for drinking and cooking, but for bathing, cleaning and many other purposes. However, the amount used by families in their homes can vary because people have different water use habits and a variety of fixtures and appliances installed in their homes.

Water-using fixtures and appliances (such as faucets, toilets, showers, clothes washers, dishwashers) designed in the past two decades typically use less water than older devices, and water-using devices labeled as “ENERGY STAR” or “Water Sense” are the most water efficient.

The ages, gender and number of occupants in the home also plays a role in how much water is used. The U.S. Environmental Protection Agency and the American Water Works Association collected water use data from over 1,000 homes in different North American cities. They found a wide range of water use rates, depending on whether or not families addressed leaks, how efficient the fixtures and appliances were in the home, and whether or not families applied conservation practices.

Families that used the most water did not fix leaks; used older and less-efficient fixtures and appliances, and did not use water-saving practices. A family of four used about 499 gallons of water per day under these conditions. The largest amount of water use was from bathing, followed by the kitchen faucet and toilet. These were followed by the clothes washing machine, leaks, and other uses. The fixtures in this scenario were over 20 years old and had higher flow rates than newer more efficient fixtures. Leaks were most commonly due to the toilet, followed by faucets.

Alternatively, a family that fixed leaks and used the most efficient fixtures and appliances (meeting the Water Sense/ENERGY STAR standards) but maintained the same water use pattern (e.g., same frequency and length of appliance use) saw significant reductions. The total water consumption for a family of four under these conditions was about 176 gallons of water per day, which is less than half the water use as the first example. Further reductions in water use can be realized as the water use patterns are changed.

What can you do to be more water-efficient in your home?

• Identify and repair water leaks.
• Change water use practices. Take shorter showers, flush the toilet less often, do fewer and fuller loads of laundry or dishes.
• Add aerators to faucets to reduce water flow while maintaining wetting ability.
• Replace older fixtures and appliances (especially toilets and washing machines) with more efficient, up-to-date versions.

Saving water in your home is important. Changing water use practices will cost nothing and may even save money as less water might be heated and used. Other conservation methods like taking care of leaks or adding an aerator to your faucet are fairly inexpensive. Water is a finite resource, and it is important that we work to conserve it, so it will be available for future use.
Connectivity Best for Created Wetlands

New research by the U.S. Geological Survey (USGS) has found many wetlands created for habitat do very little to improve water quality problems in streams and rivers. Collectively, these wetland design practices represent a missed opportunity to improve the general ecological health of watersheds and wetland ecosystems.

“Wetlands provide many significant benefits for ecosystems and for people,” said Jerad Bales, acting USGS associate director for water. “While wetlands provide important and unique habitat for great numbers of plants and animals, they also are valuable to humans for flood protection, water quality improvement, and recreation, to name just a few of their benefits.

“Understanding and improving the contributions of created wetlands to the larger goal of healthy watersheds is a valuable scientific insight.”

Wetlands are often created for mitigating impacts to wetlands elsewhere. “Restored wetland,” “mitigation wetland,” and “replacement wetland” are similar terms for created wetlands. Created wetlands typically range from several acres to tens of acres in size and are usually built with berms to regulate water levels precisely.

These wetland creation practices prevent the exchange of water with adjacent streams and rivers. This lack of hydrologic connectivity to streams then has the consequence of limiting inputs of pollutants (sediment, nitrogen, and phosphorus) to both created and natural wetlands where the detrimental effects of these pollutants could be mitigated.

USGS ecologist Greg Noe observed, “Unless a wetland can intercept the large amounts of pollutants in streams and rivers, it doesn’t have a chance to remove any of the pollution.”

Improving habitat for wildlife is one of many reasons for wetland creation and restoration. In some cases, this specific goal may be best managed by limiting nutrient and sediment inputs through limited stream hydrologic connectivity. However, created wetlands may have poor quality soils which limit the development of these young wetlands and consequently lead to poor habitat.

USGS scientists, working in collaboration with George Mason University, also found that increasing inputs of sediment, nitrogen, and phosphorus by increasing connectivity to streams stimulated nutrient availability. It is through this process that increased hydrologic connectivity can create more mature wetland systems faster.

“If you want to maximize the overall water quality benefits of wetland creation,” said Noe, “then design the wetland so that it exchanges water with a stream or river.”