

THE AQUAHOMAN

Volume XII, Issue II, June 2016

The newsletter of the

**OKLAHOMA
WATER RESOURCES CENTER**

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Oklahoma Water
Resources Center

From the Director's Desk (by Garey Fox)

Do you have a great water research idea that will benefit the state of Oklahoma? The Water Center has a call for pre-proposals for the USGS 104b state funding program open through June 9th ([page 4](#)).

Over the past 50 years, the Water Center has funded 80 projects focused specifically on Oklahoma water issues. The Water Center has funded water quantity and quality projects related to both urban and agricultural water use and demand. Learn more about projects funded through our program at <http://water.okstate.edu/funded-projects>. **The grant program funds projects from any institute of higher education in Oklahoma!** As in the past, we anticipate competition for these funds will be high.

The Water Center is committed to "aiding entry of new research scientists into the water resources fields" and "helping train future water scientists and engineers". To this end, we have modified the funding structure of the USGS 104b program to include students this year.

We believe that such support is critical for fostering student professional development and opening opportunities for expanding their current research projects. Please do not hesitate to contact us with questions, but hurry, as **the deadline for one-page pre-proposals is June 9th**.

Along the line of aiding new research scientists and educating future water scientists and engineers, the Water Center is leading numerous endeavors this summer and fall.

First, the Water Center continues in a leadership role on the NSF EPSCoR project on climate variability focused on research infrastructure and workforce development in Oklahoma. Students, post-doctorate researchers, and faculty at Oklahoma State University, the University of Oklahoma, the University of Tulsa, and the Noble Foundation are supported by this project ([page 7](#)).

This summer the Water Center is hosting its second cohort of National Science Foundation Research Experiences for Undergraduates (REU) program on stream



Dr. Garey Fox carrying water during an OkState Water Week challenge. (It was touch & go.)

restoration/rehabilitation. Read about the projects, students, and faculty at water.okstate.edu/students/nsf-reu.

Finally, the Water Center is leading a special publication in the *Journal of Contemporary Water Research and Education* on undergraduate research in water across the US. We are soliciting undergraduate researchers in water to write peer-reviewed manuscripts for inclusion in the journal. Please let us know of any undergraduate student conducting research that should be included.

Lastly, we have a new Student Affiliate (StAff) program offering a formalized opportunity for **OSU** students to become engaged in the activities of the Water Center.

DDOT and the McClellan-Kerr Arkansas River Navigation System (by Deidre Smith, DDOT Waterways Manager)



As Waterways Manager for the Oklahoma Department of Transportation, I advocate, educate and market the McClellan-Kerr Arkansas River Navigation System (MKARNS). I have worked for the State of Oklahoma 31 years, 4 of which have been in Waterways. I serve on the Executive Committee of the National Waterways Conference, the Standing Committee on Water Transportation with the American Association of State Highway Transportation Officials, the Board of Directors for the Arkansas River Historical Society as Secretary, and the [Water Research Advisory Board for the Oklahoma Water Resources Center](#). In my free time, I enjoy playing golf, gardening, and fishing.

The MKARNS is a federally funded system maintained by the U.S. Army Corps of Engineers (USACE). Besides navigation, the MKARNS is a multi-beneficiary system supplying water to farmers and industries, providing hydropower generation, fish and wildlife habitat, recreation and flood control. In a recent Regional Economic Impact Study conducted for the Oklahoma segment of the MKARNS, it was determined that [\\$1.29 billion in business sales were provided annually and 8,743 full/part-time jobs were created by the 80+ industries located along the MKARNS in Oklahoma](#).

While the western part of the state has been plagued with drought, in 2015 the MKARNS was inundated with a deluge of heavy rainfall. Close to 43 million acre feet of water, which is 5.5 times what it would take to fill the MKARNS, hit the system during June and July. The navigation system was shut down for 60 days due to shoaling and high flows too dangerous to traverse for tows. Damages totaled over \$7 million, which is in addition to the \$123 million needed in backlog maintenance.

Currently, a Three Rivers feasibility study is being conducted by the Little Rock District USACE to determine a permanent fix at the base of the navigation system where the Arkansas, White and Mississippi Rivers converge. A post canal was dredged when the system was developed to shorten the distance of navigation reaching the Mississippi River. Since that time, the structures separating the White and Arkansas Rivers require repairs averaging \$1 million annually. If the staging of the White is ever higher than the Arkansas, the navigation channel could be drained. There are two wildlife refuges, bottomland hardwoods, endangered species and two prestigious hunt clubs in the affected area. The USACE

is working closely with hydrologists, environmentalists and engineers to find the best way to permanently fix this area without negatively impacting the ecosystem. Once a permanent fix is determined, the challenge of funding the project will be a huge undertaking.

It is vital to the region that the MKARNS remain navigable. Nearly 66% of the 12 million tons of commodities shipped annually are agricultural products. Shipping rates of all modes are reduced by 15% due to the competition the system provides. Fuel use and CO₂ emissions are reduced by 40% compared to rail and 270% by truck. A 12-barge tow holds the equivalent of 720 semis and 180 railcars. All 445 miles of the navigation system are maintained to 9 feet and the system is ice free allowing the MKARNS to serve a 12-state region. [Over 468,000 semis would have driven through the I-40 corridor between Oklahoma and Arkansas if the MKARNS were not available for transporting freight last year.](#)

The 2,500-acre Port of Catoosa is located at the head of the navigation system. It hosts 72 industries employing over 3,900 workers. It is one of the largest, most inland public ports in the nation. It is a multi-modal facility providing cargo movements and/or transfers between barge, truck and rail and is the only port on the system with a roll-on/roll-off dock serving project cargo too heavy to transport over roads and bridges. It is the premier port on the MKARNS and serves as a Foreign Trade Zone as well.



Aerial view of the Port of Catoosa

Nature's Wetland Engineer

(by Dwayne Elmore, Associate Professor and Wildlife Extension Specialist)

The American beaver (*Castor canadensis*) is a remarkable animal that is often underappreciated. This large rodent is considered a keystone species because it provides habitat for many other organisms through its extensive dam-building and tree-felling activity. By using sediment and plant material, the beaver creates dams, impounding water. Though most dams are only a few feet in height, they can reach much larger sizes over many years of continued beaver activity. Beaver dam length varies depending on the topography of the watershed, but the dams can be hundreds of feet in length. By impounding water, beaver dams provide habitat for many kinds of fish and amphibians. As **beaver ponds are often deeper, calmer, warmer, and more nutrient-rich than the surrounding stream** water, the species found in beaver ponds can be different than those in the stream itself. Further, many wading birds such as herons and egrets take advantage of the increased fish and amphibians and feed in beaver ponds. Waterfowl (particularly wood ducks, hooded mergansers, and American black ducks) use beaver ponds for feeding, nesting, and roosting. Additionally, dead trees (from flooding, girdling, or felling) allow sunlight to reach the forest floor and the wetland surface. This favors many herbaceous plants and wildlife species. In fact, in some forested ecosystems, beavers provide one of the few disturbances that allows early successional species to persist.

The value of beaver activity is not limited to plants and animals. The wetlands that beavers form provide ecological services as well. By creating series of low water dams, flood waters are retained during high rain events, limiting downstream flooding. The dams also slow stream velocity which can prevent stream bank erosion. Further, as the water velocity slows, suspended sediments fall out of the water column and are deposited within the wetland helping to filter water as it moves through the beaver wetlands. Due to the sediment deposits, trees felled into the wetland, and increased aquatic growth associated with beaver ponds, nu-

trient cycling is often vastly different than the associated stream and adjacent upland sites.

The beaver provides ecological services and habitat for other species not by design, but rather as a byproduct of its specific needs. Feeding primarily on herbaceous vegetation and woody plants, beavers use dams to flood areas of vegetation allowing protected feeding opportunities. While the beaver is slow and cumbersome on land, it is quick and agile in the water and few predators can capture it in its aquatic environs. When not foraging, beavers seek cover in either a domed wooden den or within holes in the ground at the edge of the beaver pond. In both cases, the entrance is typically below the water level with a cavity that is above the water level.

Despite all the benefits of having beavers on the landscape, they can certainly be problematic. Substantial tree damage often results from flooding and feeding activities. In areas where trees have economic value, this can be costly. Further, as they tend to plug any moving water, beavers often

create dams within culverts and pipes causing road flooding. If they are in a manmade pond, they sometimes tunnel within earthen dams and can compromise the integrity of these dams. For these reasons, control is sometimes warranted for specific trouble areas. Trapping is typically the most effective method of control. Because beaver can be diffi-



Beaver dams can impound substantial areas of water, providing habitat for many species of wildlife while providing ecological services such as flood control. (photo credit: Dwayne Elmore)

cult to capture, especially once harassed, it is advisable to have a trained trapper remove the beaver. For more information on controlling beaver damage, view this video (<https://www.youtube.com/watch?v=KLjPg8o6B04>).

Despite the problems sometimes caused by beaver, this industrious engineer plays an important role in maintaining healthy wetland systems.

Please also visit our Wetlands page at <http://water.okstate.edu/strengths/ecosystems/wetlands>.

2017 Request for Pre-Proposals in Water Research: USGS 104(b) Competitive Research Grants Program

The application process begins with one-page pre-proposals due by 5:00 p.m. on June 9. Multiple pre-proposals representing distinct research projects from the same researcher are welcome.

Eligibility

The Oklahoma Water Resources Center invites pre-proposals for water research projects from any faculty member or student at **any institute of higher education in Oklahoma** through the USGS 104(b) grants program. We are soliciting two types of project pre-proposals.

1. We anticipate funding two faculty projects, for up to \$25,000 each.
2. We anticipate funding at least three student projects, for up to \$5,000 each.

Funding

Applicants must provide a 2:1 match in non-federal funds. All indirect costs (F&A) must be waived, but may be counted as match. Matching funds for student researcher projects can be provided by the faculty sponsor.

Process

The application process begins with one-page pre-proposals. Multiple pre-proposals representing distinct research projects from the same researcher are welcome.

Timing

Grants will support one-year projects (March 1, 2017 - February 28, 2018). Longer projects must be divided into discrete, one-year proposals with distinct deliverables. Send pre-proposals to water@okstate.edu **by 5:00 p.m. on June 9, 2016**.

Format

Pre-proposals must be submitted in Word format, be single-spaced in 10-pt Arial font, and cannot exceed one page. The pre-proposal should briefly explain the project objectives, methods, and expected outcomes, and list project personnel.

Find the full announcement and guidelines at <http://water.okstate.edu/researchers/funding/104b-state>.



Request for Pre-Proposals in Water Research

The Oklahoma Water Resources Center invites pre-proposals for water research projects from any Oklahoma research university through the USGS 104(b) grants program.

STUDENT SECTION:

STUDENT AFFILIATE PROGRAM

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We are excited to announce a new opportunity for OSU students: the Student Affiliate (StAff) Program.

StAff will partner with the Center to promote its activities and generate products for the Center's faculty and stakeholders while highlighting their talents.



Students, sign up at [water.okstate.edu/students/affiliate](http://water.okstate.edu/students/affiliate)



## NSF-REU selections have been announced!



We can't wait to host the following students for our second National Science Foundation Research Experiences for Undergraduates (NSF-REU) Program focused on Stream Restoration/Rehabilitation this summer in Stillwater, Oklahoma:

- ◇ Kayla Kassa (Gonzaga)
- ◇ Alexandra Shipman (Rochester Institute of Technology)
- ◇ Laura Mackey (McGill University)
- ◇ Stephanie Estell (Ohio Northern University)
- ◇ Ashley Kinsey (Auburn)
- ◇ Paige Kleindl (Ohio Northern University)
- ◇ Kori Groenveld (Lewis and Clark University)

Meet these students and their faculty mentors, and learn about their projects at <http://water.okstate.edu/students/nsf-reu/2016-reu>.



Job openings are listed on page 8. Visit our Job Board at [water.okstate.edu](http://water.okstate.edu) for the most current listings.

### Student Listserv

Sign up for our *Student News* listserv and stay informed about opportunities coming through the Water Center.

<http://water.okstate.edu/join-mailing-list>

## Faculty Spotlight: Qing Lana Luo

(by Qing Lana Luo, Assistant Professor of Landscape Architecture, Horticulture and Landscape Architecture)

I joined Oklahoma State University as a faculty member in 2015 with a joint appointment of teaching and extension in the Department of Horticulture and Landscape Architecture. I received a Master of Landscape Architecture degree from the University of Minnesota, Twin Cities. Currently I am teaching six courses in the Landscape Architecture Program, including Site Design, Sustainable Landscapes, Hand Graphics, etc. Besides devoting myself to the excellence of academic teaching in the classroom, I also enjoy educating my constituents outside of the classroom. One of my primary Extension roles is conducting programs to educate homeowners and designers on what sustainable landscapes are and how to create an environmentally responsible design for outdoor spaces.



Dr. Qing Lana Luo

Before my academic career at OSU, I was a professional landscape architect for 17 years, practicing in several internationally renowned firms, including Carol R. Johnson Associates in Boston, EDSA, and Turenscape in Beijing. I have been in design leadership roles for a wide range of projects, including urban parks, public open spaces, mixed-use development, and green roofs. Many of my design works (during my practice and study) have been recognized and won international, national, and regional awards, including ASLA (American Society of Landscape Architects) national and regional awards. My projects include Rose Kennedy Greenway series in Boston (Chinatown Park, Wharf District Parks, and Post Mainline Park); the Central Park in Shams, Abu Dhabi, UAE; John Marshall Memorial Park in Washington DC; Beijing Railway Station Front Street Landscapes; and many others.

My academic interests are urban stormwater design, sustainable materials, and urban site design technology. I have been invited to give 16 presentations and talks at national and regional conferences, workshops and international universities covering sustainable landscapes, urban stormwater design, and teaching methods.

My personal interest is traveling to different parts of the world and enjoying local culture and delicacies. I also enjoy gardening and exploring different watering techniques, such as DIY self-watering systems for okra and strawberries in my garden.

## VP for Research Names Faculty Council to Promote, Foster OSU Research

(OSU News)

Vice President for Research Kenneth Sewell, Ph.D., has announced the appointment of a Food-Energy-Water Nexus Council to explore and foster research efforts in this area identified as an Oklahoma State University interdisciplinary research strength.

The Food-Energy Water (FEW) Nexus is a strength area that embraces the interdependence of these three resources that are vital to human existence and that also are key industries in Oklahoma.

“OSU has broad and deep expertise in food, energy, and water research, as well as in the sociocultural aspects of the nexus points,” Sewell said. “By helping to organize our efforts, the council will play a vital role in ensuring that OSU’s research can create the maximum benefit to Oklahoma and the nation.”

[The full article is linked on our homepage at [water.okstate.edu](http://water.okstate.edu).]



## The Oklahoma NSF EPSCoR Research Infrastructure Improvement Award (by Emma Kuster, EPSCoR Program Coordinator)

Oklahoma State University is part of a multi-institutional collaborative research project titled “Adapting Socio-Ecological Systems to Increased Climate Variability.” Researchers involved in this 5-year (2013-2018) project are advancing the scientific community’s understanding of how social and ecological systems can adapt and sustain quality of life in light of climate variability, especially as it relates to more frequent and intense drought. Our researchers will use the knowledge gained from this project to educate Oklahomans about the expected consequences of a changing environment (drier conditions, stressed resources, etc.), empower resource and land managers to effectively adapt social and ecological systems to increased climate variability, and serve as a foundation for future research.

Much of the research efforts are focused in five study areas:

1. Oklahoma City Metropolitan Area
2. Kiamichi River Watershed
3. Lower Cimarron River Watershed
4. Washita River Watershed near Ft. Cobb
5. North Canadian River Watershed



**The Lower Cimarron River Watershed is one of five of the Oklahoma EPSCoR special study areas. Changes in water resources are the driving factor for several of our team’s research questions.**

Because no one socio-ecological question fits all of the study areas, our researchers are focusing on the most pressing issues in each of the study areas. The Oklahoma City group, for example, wants to explore urban water demand and the effects a changing water demand has on ecosystems and land use. Meanwhile researchers in the Lower Cimarron River Watershed wonder how extreme climate events, such as drought, decrease the stability of human and ecological systems in the Cimarron River Watershed.



As our five teams continue to progress, they will be engaging stakeholders to help guide the research efforts and develop decision tools. Stakeholder engagement is being achieved in a variety of ways. Anthropologists are talking to local residents and sociologists are interviewing local stakeholder groups, such as water resource managers. With these connections, we can identify key stakeholders for scenario- and policy-building. By building these potential future scenarios, our researchers can predict how impacts from climate variability change over time.

Additionally, our researchers are creating new datasets that can be used by other scientists working in Oklahoma. Some examples include:

1. The new Cosmic Ray Neutron Rover, which measures soil moisture at a field scale and is used to generate daily statewide soil moisture maps at a high spatial resolution.
2. The first-of-its-kind statewide multi-year quarterly survey to understand people’s perceptions of extreme weather and climate events.
3. Statewide remote sensing datasets, such as surface water maps and forest coverage maps.

### Want to know more?

Oklahoma NSF EPSCoR, in partnership with the Oklahoma Water Resources Center, will be hosting the Kiamichi River Watershed Research and Extension Symposium on June 15, 2016 in McAlester, OK. This symposium will bring together researchers, state and federal agency representatives, and Tribal representatives to discuss current research and extension efforts, identify needs, and develop a plan for future research efforts. For more information about the Kiamichi watershed and symposium, visit <http://water.okstate.edu/watersheds/kimaichi>. **Please register by June 1. We would love to have you join us!**

*This material is based on work supported by the National Science Foundation under Grant No. OIA-1301789.*

# New & Noteworthy

## Funding (<http://water.okstate.edu/researchers/funding>)

- USDA RREA (due 6/3)
- Oklahoma Competitive Research Grants -- USGS 104(b) (due 6/9)
- USDA: AFRI Water for Agriculture Challenge Area (due 8/4)

## Employment (<http://water.okstate.edu/job-board>)

- Assistant Professor: Extension Soil Water Quality Scientist (Oregon State University)
- Assistant Professor of Water Quality (Job ID: 19473; University of Missouri, Columbia)
- University of Oklahoma: Multiple Positions (Water, Environment and Sustainability)
- USDA-ARS Postdoctoral Research Associate
- Assistant Professor in Groundwater Hydrology (University of California, Riverside; open thru June 30)

## Events ([water.okstate.edu](http://water.okstate.edu))

- Kiamichi River Watershed Research & Extension Symposium (McAlester; 6/15; register by 6/1)
- S. Central Climate Science Center Early Career Professional Dev't Training (Lubbock, TX; 6/19-24)
- 2016 UCOWR/NIWR Conference (Pensacola Beach, FL; 6/21-23)
- Water Research Advisory Board Meeting (Catoosa, OK; 7/14)
- Managing Great River Landscapes (Louisville, KY; 7/24-27)
- AR Water Center Annual Water Conference (Fayetteville, AR; 7/26-27)
- GIS Tools for Watershed Education (Hinton, OK; 9/23)
- American Water Resources Association Annual Meeting (Orlando, FL; 11/13-17)
- *More on our homepage.*

## WWWeb Updates

- ◇ We have developed a new page that provides information about the importance of wetlands. This page is linked [here](#).
- ◇ Final reports for 2014 and 2015 USGS 104(b) projects are posted in our [library](#).
- ◇ Be the first to know about the latest additions! [Subscribe to the RSS feed](#) or connect with us on social media.

## Connect



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Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Director of Oklahoma Cooperative Extension Service, Oklahoma State University, Stillwater, Oklahoma. This publication is printed and issued by Oklahoma State University as authorized by the Vice President, Dean, and Director of the Division of Agricultural Sciences and Natural Resources and has been prepared and distributed at a cost of 000 cents per copy.