

THE AQUAHOMAN

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The newsletter of the

**OKLAHOMA
WATER RESOURCES CENTER**

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It's our **50th**

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From the Director's Desk (by Garey Fox)

"After the drought comes the flood." "Now is the time to prepare for the next drought because we may already be entering one." These are phrases I have heard during the extreme hydrologic events Oklahoma has experienced over the last few months.

The impact of the drought and floods has no doubt been significant; however, can you imagine the consequences without our existing infrastructure and knowledge of water systems? Rather than simply noting that drought and floods will come again, we can prepare now to ensure infrastructure is in place, upgraded, and optimized to manage flood waters and provide a secure water supply during drought.

This cycle of drought and flooding opens our eyes to key water issues and questions that must

be addressed.

1. Many of our flood control structures need rehabilitation. Reservoir sedimentation continues to reduce the life-span of these flood control structures, necessitating expensive techniques such as dredging.

2. In drought we risk losing the ability to water livestock, irrigate crops, and even provide water for communities.

3. When we pump groundwater, much of it is treated after use and then discharged to rivers flowing to the oceans. *Are current Oklahoma water policies for groundwater management sustainable?* If not, what actions could be taken to alleviate the consumption?

4. In the past decades, smart irrigation systems for both urban and agricultural irrigation have advanced, but adoption of irrigation technology lags behind. *Why has*



Dr. Garey Fox, Director

artificial groundwater recharge not been more widely adopted and how can we develop strategies for economically supporting such practices?

5. *How did the latest drought change our landscape and impact water use in our ecosystems?*

6. *Are we adequately educating younger generations about water issues and conservation techniques?*

In this issue we cover several of the steps we are taking to address these questions.

New OSU Berry Fellows would make namesake 'pleased'

(by Donald Stotts, Agricultural Communications Services)

Four members of Oklahoma State University's Division of Agricultural Sciences and Natural Resources have been selected as 2015-2017 Berry Fellows by the Oklahoma Water Resources Center.

The OSU Thomas E. Berry Faculty Fellows Program in Integrated Water Research and Management recognizes and supports DASNR educators, scientists and specialists who are making outstanding contributions relative to building awareness about and promoting wise use of Oklahoma's water resources.

"We feel the projects being undertaken by Cheryl Newberry, Francisco Ochoa-Corona, Jason Warren and Glenn Brown have the potential to be extremely important to the state and region, and are representative of OSU's land-grant mission to help individuals, organizations and communities solve local issues and concerns," said Garey Fox, center director.

Cheryl Newberry, an OSU Cooperative Extension district 4-H program specialist, will be developing and putting into place youth-focused water education programs for schools and communities.



Jason Warren, an associate professor in the department of plant and soil sciences, will be focusing on subsurface drip irrigation systems, concentrating on how soil types affect efficiency and management.

"Dr. Warren's work continues and expands DASNR's and the center's investments relative to subsurface drip irrigation in Oklahoma, and focuses on providing new insights and enhanced science-proven recommendations for producers who have installed these irrigation systems," Fox said.

Francisco Ochoa-Corona, an associate professor in the department of entomology and plant pathology, will be studying a field deployable water-filtration system that can effectively monitor and survey water-borne viruses.



Glenn Brown, an OSU Regent's professor with DASNR's department of biosystems and agricultural engineering, will be studying the application of fly ash to treat stormwater around poultry houses.

"Dr. Brown's research emphasizes the protection of water quality in eastern Oklahoma for some of the state's most scenic rivers," Fox said.

Program donor Malinda Berry Fischer lauds the four research and education programs selected as "great examples of OSU's land-grant mission in action, showcasing how such efforts can directly or indirectly affect Oklahomans across the state."

"My husband Dick and I agree with Dr. Fox that it is vitally important to perpetuate and extend support for water research in the state, especially as an outgrowth of the OSU Thomas E. Berry Endowed Professorship," said Fischer, daughter of the Oklahoma "wildcatter" in whose name the OSU endowment was created.

Her father, a native of Ripley, made his living in the oil and gas industry but one of his great passions was water conservation, especially in terms of wastewater use and water reclamation.

"No matter where we live or what we do, we all need access to fresh, clean water," Fischer said. "Long before conservation efforts became trendy my father was working with OSU scientists to develop and disseminate research-based information about water conservation practices."

In a notable experiment called the "Honey Hole," Berry collected, transported and stored municipal wastewater treatment effluent in three ponds before irrigating crops with it.

"We had some of the thickest grass and most prolific vegetable gardens in Payne County," Fischer said. "He would be very pleased with and excited about the four programs being undertaken in his name through the Berry Fellows program."



Malinda Berry Fischer and Richard Fischer, program donors

BRACE FOR IMPACTS: Improving Soil Moisture Monitoring by the Oklahoma Mesonet

(by Jonathan Anthony, OWRC staff writer)

Since 1994, Oklahoma has operated a world-class network of weather monitoring stations, collectively called the Oklahoma Mesonet. Recently, one research team has been working to increase the functionality of this network with soil moisture monitoring.

Through the Water Resources Research Act, faculty can apply for a USGS 104(b) grant. This program provides seed money to three projects each year, encouraging collaboration and research to support Oklahoma's future water needs. **Tyson Ochsner**, Sarkeys Distinguished Professor in the Plant and Soil Sciences Department at Oklahoma State University, received this grant in both 2010 and 2011. He describes his experience with the program as a "catalyst" for development. **"It really helps create an environment where water research can flourish," Ochsner said, "There is an interaction, a synergy kind of effect from having that community activity."**

Under the USGS 104(b) grant, Ochsner conducted a study titled "Drought Monitoring: A System for Tracking Plant Available Water Based on the Oklahoma Mesonet" to develop a Mesonet system that tracks the amount of water stored in the soil and available for plant uptake. "The Mesonet is Oklahoma's world-class environmental monitoring network, so the instruments for this study were all in place, but we needed a better understanding of the soil characteristics," Ochsner said.



To produce an impact on Oklahoma, Ochsner's team is currently researching ways to use the soil moisture data to predict wildfire risk, estimate soil moisture in Oklahoma croplands, monitor drought across the south-central region of the US, track groundwater recharge, and understand factors that impact the Lugert-Altus irrigation district .

Ochsner met colleagues with similar goals while conducting this research, including his collaborator Dr. Michael Cosh from the USDA Agricultural Research Service in Beltsville, MD. Together Ochsner and Cosh now head the research team at the Marena Oklahoma *In Situ* Sensor Testbed (MOISST), an international research site where investigators collaborate to refine existing and emerging soil moisture monitoring technologies.

Through MOISST, Ochsner also began to collaborate with Dr. Marek Zreda from the University of Arizona, the developer of the COsmic Ray Soil Moisture Observing System (COSMOS). Through the National Science Foundation's Experimental Program to Stimulate Competitive Research (NSF EPSCoR) grant, Ochsner's team has acquired a COSMOS rover and continues to pursue more accurate soil moisture maps.

Ochsner attributes much of this progress to his assistants. **"At the end of the day, our students really make the difference on whether a project is successful," Ochsner said, "and my group has benefitted tremendously from some really outstanding assistants working on these projects."** For example, Bethany Scott and Briana Sallee pursued their graduate degrees, and Samuel Wallace and Jordan Beehler completed undergraduate research projects under the guidance of Ochsner.

Ochsner also gives credit to the initial grant and the communities it encouraged. "The USGS 104(b) grant system has been very important to my program in terms of getting some research started and establishing connections with other researchers and Oklahoma stakeholders," Ochsner said, "Thanks in large part to the people that run the program, the grant has played a catalyst role."

For more information about other USGS 104(b) grant studies, please visit the Oklahoma Water Resources Center's website at <http://water.okstate.edu/library/reports/project-reports>. You can find more information about the Oklahoma Mesonet at <https://www.mesonet.org/>.

Excerpted from full article at <http://water.okstate.edu/library/impacts>.

Extension Highlights: Syntheses of Extension fact sheets
Read them all at water.okstate.edu/library/extension-highlights.



Improving Irrigation Efficiencies through New Technologies

This highlight reviews three of the most common irrigation systems... and gives you the resources to maximize the return on your investment.

[\[Read more\]](#)



Protect Our Rivers from Trash

Each year, the Oklahoma Department of Transportation spends over \$4 million cleaning up litter along state roads, but even more of this trash finds its way into our waters.

[\[Read more\]](#)



Got Questions about Stormwater Runoff and LID? OSU Has Answers!

Stormwater runoff and its pollutants flow directly into our creeks, streams, rivers, and lakes. Stormwater runoff increases flooding, water contamination, and erosion in stream channels.

[\[Read more\]](#)



Managing Ponds for Good Fishing

Many ponds in Oklahoma can be managed successfully for recreational fishing, but differences between ponds must be considered.

[\[Read more\]](#)



Is Your Investment in Fertilizer Being Washed Away?

Fertilizing can result in a lush, beautiful lawn, but over-fertilizing can lead to unhealthy, polluted water. Surveys indicate well over half of lawns are over-fertilized.

[\[Read more\]](#)

*Many of these were written by **Joshua Cross**, who joined us as a staff writer in mid-May. We are thrilled that he has joined us!*

New Publications

Extension Fact Sheets:

Listed and linked at water.okstate.edu/library/extension-fact-sheets.

Journal Articles:

Waiting for you at water.okstate.edu/library/journal-publications.

STUDENT SECTION:

Professional
development
opportunities

@

water.okstate.edu/students

Briana Wyatt is a doctoral candidate in the Plant and Soil Science department at Oklahoma State University. Briana's research has focused on estimating groundwater recharge throughout Oklahoma using soil moisture data collected by the Oklahoma Mesonet system.

"I would very much like to be able to provide information and tools for people in Oklahoma – farmers, politicians and others to be able to use the water resources we have to make sure they're sustainable for the future and that people for generations to come will have the same water resources."



This summer, we hosted a group of exceptional undergraduate students as part of the NSF's Research Experience for Undergraduates (REU) program. These seven students came from diverse backgrounds, represented various universities across the nation, and brought unique interests to the ten-week research experience.

These REU students, who dubbed themselves the #REUStreamTeam, worked in the field of stream restoration with a faculty mentor to conduct studies at Oklahoma State University's Cow Creek Stream Rehabilitation Site.

They prepared publications and presentations to share the results of their research; they also received professional development training in ethics, responsible research, research writing, state-of-the-art equipment, and career and graduate school opportunities that will serve them well in their future academic and professional careers.

Meet the #REUStreamTeam and learn about the research projects at <http://water.okstate.edu/students/nsf-reu>.

Faculty Spotlight: Wyatt Hoback

(by W. Wyatt Hoback, Entomology and Plant Pathology Assistant Professor)

Hello everyone. I came to OSU in July 2014, when I joined the Department of Entomology and Plant Pathology. Prior to coming to OSU, I spent 15 years at the University of Nebraska at Kearney after earning a PhD in Entomology from the University of Nebraska and a MS in Biology at Missouri State in Springfield, MO.

My research focuses on how multiple closely-related organisms co-exist in an ecosystem. I have examined physiology, behavior and ecology for both terrestrial insects and aquatic communities. For water research, I have investigated zooplankton communities and assemblages of larval walleye and gizzard shad in Harlan County Reservoir in south-central Nebraska. I have also examined walleye spawning, crappie production, and loss of fish to irrigation releases from Sherman Reservoir in central Nebraska.

I also am strongly interested in conservation and have worked on issues relating to the conservation of small non-game fish, including monitoring populations of the plains topminnow and examining the effects of culverts on aquatic organism passage in perennial streams in the Great Plains. I have also worked with aquatic insects monitoring factors that may influence populations of the Platte River caddisfly, which was proposed for federal protection, and assemblages of macroinvertebrates in the streams and playa wetlands of Nebraska.

At OSU, I teach entomology courses including a non-majors introduction to insects, majors insect classification, and aquatic entomology courses. I am interested in developing collaborations and projects that inform citizens about biodiversity and ecosystem health.



Dr. Wyatt Hoback and his wife, Kerri, in Mexico on an ecoadventure.

Blue-Green Algae Can Threaten Livestock (by Josh Payne, State Poultry Specialist)

Cyanobacteria (blue-green algae) are microscopic organisms that can be found in all types of water including farm ponds. Some cyanobacteria can produce toxins that can be harmful to livestock affecting the nervous system and liver. Toxins affecting the nervous system can cause muscle tremors, difficulty breathing, convulsions and death while toxins affecting the liver can cause weakness, pale mucous membranes, bloody diarrhea and death. The wind can blow the algae bloom to one side of the water source, thus concentrating it. Dead animals may be observed near these concentrated areas.



The Oklahoma Animal Disease Diagnostic Laboratory can help identify the algae by sending them a pint container of the suspect water. The sample should be submitted in an unbreakable container such as a plastic water bottle. It should not be frozen but if it is shipped, provisions should be taken to keep it cool and out of sunlight. Since the blooms will deteriorate, a fresh sample is best. The fee for this test is \$12.00. The lab can be contacted at 405-744-6623.

Prevention and monitoring are key to reduce livestock exposure to blue-green algae.

Read the full article, including tips to consider in the “blue-green algae” section of [our Ponds page](#).



36th Annual Oklahoma Governor's Water Conference and Research Symposium

Tuesday & Wednesday, December 1st & 2nd
at the Embassy Suites in Norman, Oklahoma



The Oklahoma Water Resources Board and Oklahoma Water Resources Center will co-host the **Governor's Water Conference and Research Symposium** December 1-2 at the Embassy Suites Norman Hotel and Conference Center.

The call for presentations is now open.


Professionals, researchers, and students are invited to present on any research or Extension/outreach topic related to water resources in Oklahoma. To be considered for the program, submit an abstract to present (oral or poster) online by 5:00 p.m. October 15, 2015.

Learn more at <http://water.okstate.edu/activities/symposium/2015-symposium>.


An NSF EPSCoR meeting will immediately follow on December 3-4 in Norman. Join us for both, won't you?



PLUS:



Inaugural Oklahoma Onsite Wastewater Conference



October 9, 2015
Wes Watkins Center, Stillwater, OK
8:30 AM to 3:30 PM

More events are on the back page and @ water.okstate.edu.

New & Noteworthy

Funding (water.okstate.edu/faculty/funding)

- **USDA-NIFA:** Foundational Program Grant (closes 9/30/15)
- **Army COE:** Engineer Research and Development Center (1/31/2016)

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

- Research Ag Engineer/Ecologist/Hydrologist/Soil Scientist (Indiana, closes 9/16/2015)
- 4 positions at Penn State (due 9/1, 10/1)
- Research Hydrologist position (National Sedimentation Laboratory, Mississippi)

Events (water.okstate.edu)

- **Agricultural, Food, Environmental & Natural Sciences Career Fair** (OSU, 9/10)
- **International Workshop on Evapotranspiration Mapping for Water Security** (DC; 9/15-17)
- **Ground Water Protection Council Annual Forum** (OSU, 9/27-30)
- **Animal Mortality Management Symposium** (OKC, 9/28-10/1)
- **On-site Wastewater Conference** (Wes Watkins Center, OSU; 10/9)
- **Midwest Groundwater Conference** (Bentonville, AR; 10/14-15)
- **Environmental Federation of Oklahoma annual meeting** (Oklahoma City, OK; 10/14-16)
- **Water Center Seminar: Brent Kisling** (Stillwater; 10/19)
- **Governor's Water Conference and Research Symposium** (Norman, OK; 12/1-2)
- **NSF EPSCoR** (Norman, OK; 12/3-4)

WWWeb Updates

- ◇ The homepage has a completely new look! If you haven't visited lately, we hope you will take a moment to click on water.okstate.edu and let us know what you think of the changes.
- ◇ New pages are set up to direct [researchers](#), [students](#), [gardeners](#), and [landowners](#) to the pages most relevant to them.
- ◇ We have an updated [expertise booklet](#) with information and publications by our faculty.
- ◇ [Extension Highlights](#) is the new home for articles that give quick overviews of Extension fact sheets and topics.
- ◇ Be the first to know about the latest additions! [Subscribe to the RSS feed](#).

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