

# Arkansas Water Resources Center

# 2022

## Annual Summary

## 2022 HIGHLIGHTS

**150+**  
attendees at  
our water  
conference



**13**  
publications



**14**  
students  
supported



**6**  
research  
projects  
funded by us



approximately  
**\$440,000**  
in external  
funding



**460**  
eNewsletter  
subscribers



**945**  
Facebook  
followers



over  
**2,900**  
ScholarWorks  
downloads



**30,150**  
analytes  
measured



We have helped local, state, and federal agencies address our water challenges for 57 years.

We succeed in this effort through robust research and water quality monitoring, education and training outreach, and information transfer to stakeholders throughout the State and region.



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Photo credit: Lincoln Lake, November 2021, by Lillie Haddock.

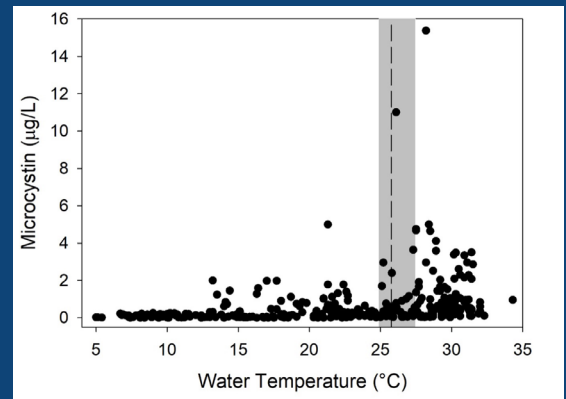
[awrc.uada.edu](http://awrc.uada.edu)  
[watercurrents.uada.edu](http://watercurrents.uada.edu)

## RESEARCH HIGHLIGHTS

### **Microcystin Occurrence and Predictors at Lake Fayetteville**

We completed a fourth year of high-frequency water sampling. We measure microcystin, one of the most common toxins produced by harmful algal blooms. We also measure nutrients and algal community indicators to understand the conditions that lead to toxin production.

Our research will support decision trees for lake managers that will help them understand and communicate toxin risk. Microcystin levels and predictors vary through time at Lake Fayetteville. But, recurring risk factors include warmer water temperatures, large algal blooms dominated by cyanobacteria, and limited bioavailable nitrogen supply.



Microcystin concentration is greater on average at Lake Fayetteville when water temperatures are greater than 25.8 °C.



Graduate student Lillie Haddock collects samples at War Eagle Creek, a tributary to Beaver Lake.

### **Long-Term Water Quality Data for Priority Watersheds**

We continued our water quality monitoring project in two Northwest Arkansas watersheds. The Upper Illinois River Watershed and Upper White River Basin are both priority watersheds for nutrient and sediment reduction. The Upper White and its tributaries form Beaver Lake, the drinking water source for 1 in 6 Arkansans.

This project supports water resource managers and policy makers by providing high-quality, long-term data at 15 stream sites. These data can show the in-stream water quality returns on watershed management investments. When this project concludes, the AWRC will have collected data continuously at some sites for over 16 years!

Our data analysis suggests both point and non-point source management activities have been successful. These results support continued investment in these management strategies and can also guide future directions.

### **BIOCHAR as a Lake Management Option for Harmful Algal Blooms**

Brittany Mc Intyre, a graduate student in environmental dynamics, works with the Arkansas Water Resources Center to find water quality solutions.

Her research explores how biochar can adsorb nutrients from water. Experiments in the lab used biochar and water spiked with dissolved nutrients. Her results showed that biochar did not remove dissolved nutrients from the water.

Biochar still might be an option for water quality and lake management. Lab bioassays on real lake water looked at how biochar affects algae, cyanobacteria, and toxins like microcystin. Biochar might reduce algal and cyanobacterial growth, but microcystin might not be removed.



Graduate Student Brittany Mc Intyre collects water at Lake Fayetteville to use in bioassays.



### **Water Quality Lab**

We analyzed approximately 30,150 constituents this year in service to researchers, agricultural producers, and others across the State.

## 2022 104(b) FUNDED PROJECTS

We funded six research projects, including three faculty proposals, two projects that supplemented graduate student research, and one in-house research study.

### ***Application of functional gene array technology to understanding biogeochemical processes in small reservoirs across a nutrient and land use gradient,***

Drs. Erik Pollock, Michelle Evans-White, Kristen Gibson, & Jizhong Zhou; Facility Director, University of Arkansas, Assoc. Professor, University of Arkansas, Assoc. Professor, University of Arkansas System Div. of Agriculture, & Inst. for Environmental Genomics, University of Oklahoma



### ***Quantifying Watershed-Scale Responses to Conservation in Three Agricultural Watersheds Dominated by Poultry and Pasture-Raised Livestock Production,***

Dr. Shannon L. Speir, Dept. of Crop, Soil and Environmental Sciences, University of Arkansas

### ***Nanofiltration for the removal of harmful algal toxins from Lake Fayetteville,***

Thomas McKean & Dr. Ranil Wickramasinghe, Dept. of Chemical Engineering, University of Arkansas

### ***Antibiotic Resistance Genes in Reuse Water,***

Celestene Sebag & Dr. Wen Zhang, Dept. of Civil Engineering, University of Arkansas



### ***Drought Patterns and Trends in Arkansas, USA, from 1985 to 2021,***

Dr. Hamdi A. Zurqani, University of Arkansas Agricultural Experiment Station, Arkansas Forest Resources Center, University of Arkansas at Monticello

### ***Why and When does Microcystin Exceed Recreational Guidelines at Lake Fayetteville?,***

Dr. Brian E. Haggard, Dr. Bradley J. Austin, & Erin Grantz, Arkansas Water Resources Center, University of Arkansas

## STUDENT TRAINING



### ***Communications Internship***

We mentored Matilda Rydell, an undergraduate student at the University of Arkansas. Matilda is majoring in Communications and Environmental Science and wanted hands-on experience communicating science to many different audiences. Matilda coordinated the production of five Water Currents Newsletters, including writing several 104(b) researcher features for each issue. She also worked on website updates and social media engagement.

### ***Hourly Student Research Assistants***

We supported two undergraduate students from the University of Arkansas as summer research assistants. Anna Grace McCarty, a Crop, Soil and Environmental Sciences major, and Gabriel Cox, a Biological and Agricultural Engineering major, gained valuable experience working in the AWRC's water quality lab and assisting with field work. We also employ and train undergraduate assistants in our lab each semester.

### ***Honors Engineering Research***

AWRC Director Brian Haggard mentored four undergraduate engineering students on their honors thesis research. The students explored research questions around water quality and quantity that are of interest to the citizens of Arkansas and beyond.

# STAKEHOLDER COMMUNICATIONS

## Annual Conference

Over 150 people attended from throughout Arkansas and the region, including researchers, students, consulting firms, utilities, watershed groups, state agencies, and the public. The AWRC partnered with the Beaver Watershed Alliance, the Arkansas Forests and Drinking Water Collaborative, and the Arkansas Department of Agriculture Forestry Division to facilitate conversations about harmful algal blooms, source water protection, and stream restorations and low-head dam removals.

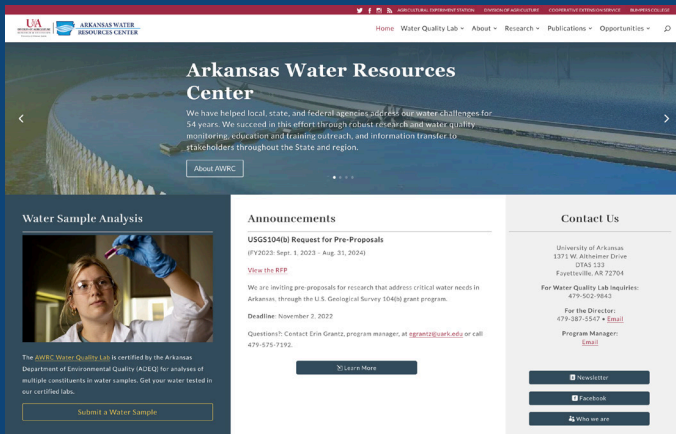


## Website

We continue to improve the usability of our website and stakeholder access to AWRC information. The following are some examples of the valuable information that stakeholders can find on our website:

- Technical reports
- Data reports as raw data excel files
- Conference information
- Laboratory information like how to submit a sample and fact sheets to help clients understand their results
- Grant opportunities

Using ScholarWorks, an open access repository for reports and literature, we have expanded the reach of our publications.



## Electronic Newsletters and "Arkansas Water Currents"

We published monthly email newsletters to the growing AWRC listserv, consisting of several hundred professionals, students, and citizens. We often include articles about USGS 104(b) research, water resources topics in Arkansas, upcoming conferences and events, and more. We also share relevant news stories from other sources and organizations.

We continued publishing newsletter articles on "Arkansas Water Currents." This enhances the Center's information transfer agenda through improved search engine optimization and the ability to more easily share individual articles through various media outlets.

[watercurrents.uada.edu](http://watercurrents.uada.edu)

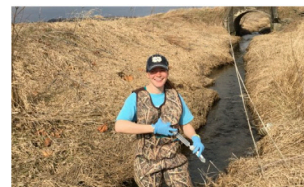
## RECENT ARTICLES



### PH.D. STUDENT MAHMOOD JEBUR SEEKING SOLUTION TO TREATING WATER FROM HYDRAULIC FRACTURING

Sep 28, 2022 | Research, Uncategorized, Water Quality  
University of Arkansas Department of Chemical Engineering Ph.D. student Mahmood Jebur is...

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### DR. SHANNON SPEIR BEGINS 104(B) PROJECT ON COLLABORATIVE CONSERVATION FOR AGRICULTURAL WATERSHEDS

Sep 28, 2022 | Agriculture, Research, Uncategorized  
The Arkansas Water Resources Center is excited to fund a new early-career researcher on the 104(b)...

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