

Arkansas Water Resources Center

2023

Annual Summary

2023 HIGHLIGHTS

~200
attendees at
our water
conference



28
publications



10
students
supported



6
research
projects
funded by us



approximately
\$125,000
in external
funding



464
eNewsletter
subscribers



984
Facebook
followers



over
5,300
ScholarWorks
downloads



38,260
analytes
measured



We have helped local, state, and federal agencies address our water challenges for 58 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.



Director:
Brian E Haggard
haggard@uark.edu
479-575-2879

Program Manager:
Erin M. Grantz
egrantz@uark.edu
479-575-7192

<https://awrc.uada.edu/publications/annual-summary>

Photo credit: Kings River at the Grandview bridge, by Brad Austin

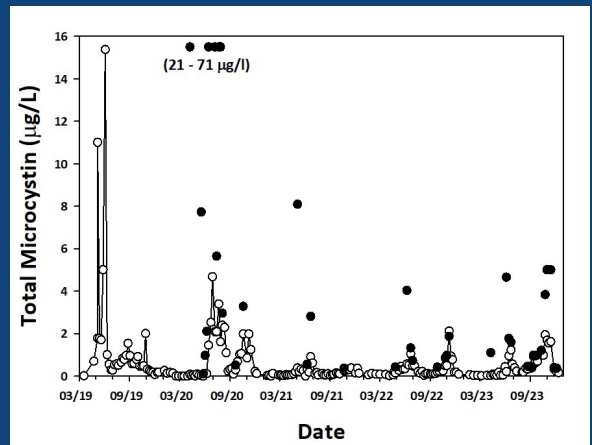
RESEARCH HIGHLIGHTS

Microcystin Occurrence and Predictors at Lake Fayetteville

We completed a fifth year of near weekly water sampling at Lake Fayetteville to understand harmful algal blooms (HABs). We measure microcystin, one of the most common toxins produced by HABs. We also measure nutrients and algal community metrics to understand the conditions and increased production. Findings from the lake have informed lab experiments that help us better understand drivers.

Our research has culminated in decision trees for managing HABs and public advisories at Lake Fayetteville. Findings were published in two open-access journal articles, available at doi.org/10.13031/ja.15273 and doi.org/10.1111/j.1936-704X.2022.3381.x.

We recently submitted another article to *Harmful Algae*, a premier research journal. The article presents lab experiments on lake water that highlight complex nitrogen microcystin links at this small recreational reservoir.



Microcystin concentrations at Lake Fayetteville (2019-2023)



Undergraduate Anna Grace McCarty collects a sample at War Eagle Creek, a tributary to Beaver Lake

Long-Term Water Quality Data for Priority Watersheds

We continued water quality monitoring in two Northwest Arkansas watersheds. When this project concludes, the AWRC will have collected data continuously at some sites for over 16 years! This data is critical to telling the water quality story in these watersheds.

The Upper Illinois River Watershed and Upper White River Basin are both 319(h) program 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. Illinois River phosphorus concentrations have been at the heart of an interstate conflict between Arkansas and Oklahoma for decades.

The judge overseeing the Illinois River case recently ruled that additional mitigation is needed in Arkansas. Our data aligns with the ruling, showing that phosphorus concentrations are trending down at the state line, but decreases have tapered off above Oklahoma's Scenic River criteria.

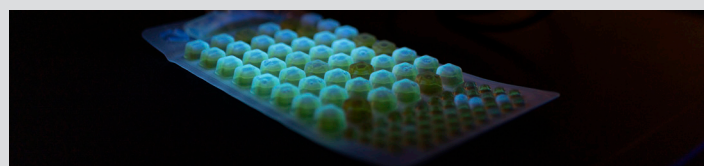
BIOCHAR as a Lake Management Option for Harmful Algal Blooms

Brittany Mc Intyre, a graduate student in environmental dynamics, worked with the AWRC exploring biochar as a water quality solution. She completed her MS in Environmental Dynamics at the University of Arkansas in May 2023, and she is currently pursuing a PhD at the University of Miami.

Her research showed that the biochar used in her experiments did not remove nutrients from lake water but did potentially affect harmful algal blooms (HABs). However, more research is needed to understand how biochar might influence cyanobacterial communities and affect toxin production before it can be used to manage HABs lakes like Lake Fayetteville.



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



Water Quality Lab

We analyzed approximately 38,260 constituents this year in service to researchers, agricultural producers, and others across the State.

2023 104(b) FUNDED PROJECTS

Monitoring Perfluoroalkyl and Polyfluoroalkyl (PFAS) Substances in Central Arkansas Water Systems, Dr. Gunner Boysen, Associate Professor, University of Arkansas for Medical Sciences, Fay W. Boozman College of Public Health

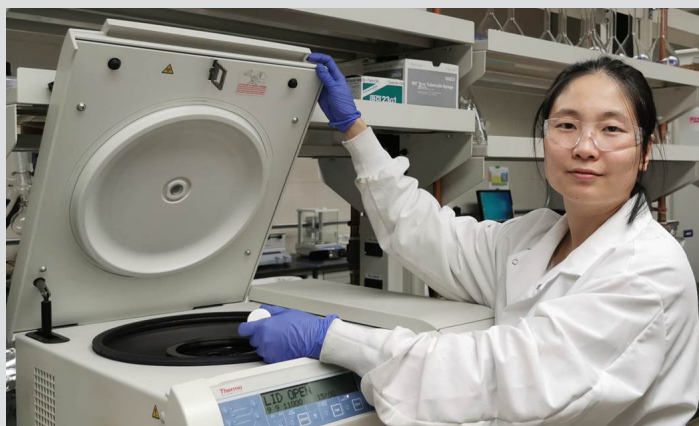
Development of On-Site Fluorescence PFAS Sensors, Dr. Lei Guo, Assistant Professor, University of Arkansas Fayetteville, Dept. of Civil Engineering

Influence of Phytoplankton Stoichiometry on the Production of Secondary Metabolites in a Central Arkansas Reservoir, Drs. Halvor Halvorson and Felicia Osburn, Assistant Professor and Post-doctoral Associate, University of Central Arkansas, Dept. of Biology

Investigating Electrocoagulation as a Pre-treatment for the Nanofiltration of Cyanotoxin-Contaminated Water Sources, Drs. Ranil Wickramasinghe and Wen Zhang, Distinguished Professor, University of Arkansas Fayetteville, Dept. of Civil Engineering

Identifying Genetic Markers for Microcystin-Producing Algal Blooms, Dr. Wen Zhang, Associate Professor, University of Arkansas Fayetteville, Dept. of Civil Engineering

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

Experiential Learning Lab Partnership

The AWRC is working with agricultural communications students at the University of Arkansas to take AWRC's communications and outreach to the next level. The students are currently helping to produce the quarterly newsletter and managing our social media accounts. The Experiential Learning Lab is a program in the Agricultural Education, Communication and Technology Dept. in Bumpers College. The program hires students and works as a small-scale marketing agency.

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 Henry Holtcamp, 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 three 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.



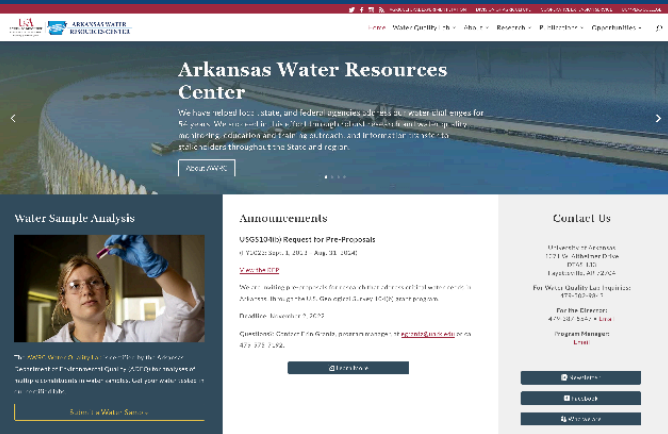
STAKEHOLDER COMMUNICATIONS

Annual Conference

Around 200 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 quarterly 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. Our recent Winter 2024 newsletter announced the launch of new AWRC programs--Water Center Fellows, a student internship opportunity, and the Arkansas Water Webinar Series.

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

LATEST NEWS

The Arkansas Discovery Farm Program: Lessons Learned and Looking to the Future

Arkansas Water Webinars Thursday, March 28, 2024 Noon to 1PM

SPEAKERS: Dr. Shannon Spier Research Lead, Dr. Mike Daniels Extension Lead

ARKANSAS WATER WEBINAR SERIES LAUNCHING MARCH 2024

Jan 19, 2024

LAKE FRANCES ECOLOGICAL DESIGN PROJECT UPDATE

Jan 19, 2024



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