

**Missouri Water Resources Research Center
University of Missouri-Columbia**

**Annual Technical Report
2019**

Products

*Indicates USGS grant-supported student co-author

Submitted Manuscripts

Knott, K., Coleman, E., Cianci-Gaskill*, J., O'Hearn, R., Niswonger, D., Brockman, J.D., Argerich, A., North, R.L., Wenzel, J. Fish condition and fatty acid composition drive annual variability in the concentration of mercury and selenium in largemouth bass. In review at Ecotoxicology.

In Preparation Manuscripts (to be submitted Spring 2021)

Cianci-Gaskill*, J.A., Knott, K., O'Hearn, R., Niswonger, D., Argerich, A., North, R.L. Seasonal differences in microcystin concentrations in fish from an agricultural reservoir. Planned submission to Inland Waters.

Florea*, K.M., Bhattacharya, R., North, R.L. Does allochthonous dissolved organic matter increase during summer algal bloom conditions in an agricultural reservoir? Planned submission to Lake and Reservoir Management.

Knott K, Cianci-Gaskill* J, Morales* V, Williams F, O'Hearn, R., Niswonger, D., Brockman D, Argerich, A., North, R.L., Wenzel J. Do combined exposures to mercury and microcystin pose a health threat for Missouri fish?

Presentations

North, R.L. Missouri reservoirs: are they toxic? Presented at the Big Muddy Speaker Series, Online Webinar, 2020.

North, R.L. What's happening in Missouri reservoirs when no one is looking? Presented at the Upper Mississippi Water Quality Task Force Meeting, Online Webinar, 2020.

Cianci-Gaskill*, J., Knott, K., O'Hearn, R., Niswonger, D., Argerich, A., North, R. Microcystin concentrations in bluegill and largemouth bass. Poster Presentation at: The Great Plains Limnology Conference; 2020 October 12-16, virtual meeting.

North, R.L. Are green water bodies toxic water bodies? Presented at the Population, Education, and Health Seminar Series, University of Missouri-Columbia, Missouri, USA, 2020.

Cianci-Gaskill*, J., Knott, K., O'Hearn, R., Niswonger, D., Argerich, A., North, R. Are there seasonal differences in the relationship between microcystin in water and fish? Poster Presentation at: The Missouri Natural Resources Conference; 2020 February 4-6, Osage Beach, MO.

North, R.L., Obrecht, D., Thorpe, A.P., Florea*, K., Bhattacharya, R., Kinzinger, E., Cianci-Gaskill*, J., Argerich, A. Bizarro cyanotoxins: green reservoirs are not toxic. Presented at the Great Plains Limnology conference, Ames, Iowa, USA, 2019.

Morales*, V., Cianci-Gaskill*, J., Knott, K., O'Hearn, R., Niswonger, D., Argerich, A., North, R. Assessment of Fish Stress in an Agricultural Reservoir. Poster Presentation at: The Undergraduate Research and Creative Achievements Forum; 2019 July 25, Columbia, MO.

Florea*, K., Bhattacharya, R., North, R.L. Dissolved organic matter in Missouri Reservoirs: Implications for cyanobacterial harmful algal blooms. Poster presented at the Great Plains Limnology 2018 Meeting, Lawrence, Kansas, USA.

Clinton*, M., Cianci-Gaskill*, J., Hagerty*, J., Thorpe, A., Obrecht, D., Miller*, C., Knott, K., O'Hearn, R., North, R., Argerich, A. Preliminary water quality of Dairy Farm Lake #1 for fish & cyanotoxins. Poster Presentation at: The School of Natural Resources Research Day; 2018 May 3, Columbia, MO.

Florea*, K., Bhattacharya, R., North, R.L. Carbon dynamics in mid-western reservoirs: implications for harmful algal blooms. Poster presented at the 2018 University of Missouri Undergraduate Research Forum, Columbia, Missouri, USA.

Campbell, C., K. Mazanec, D.K. Niyogi, M. Fitch. 2019. Mitigating urban runoff using floating treatment wetlands. Mid-America Environmental Engineering Conference, Columbia, MO.

Onema, P., M. Fitch, D. Niyogi, A. Onema, A. Alajo. 2019. Nonpoint source pollution mitigation in an urban watershed. The National Association of Black Geoscientists annual meeting, Fayetteville, AR.

Mazanec, K., C. Campbell, D.K. Niyogi, M. Fitch. 2019. Mitigating urban runoff using floating treatment wetlands. St. Louis Ecology, Evolution and Conservation annual meeting, Godfrey, IL.

Undergraduate theses

Florea*, K. Undergraduate thesis. 2019. Does allochthonous dissolved organic matter increase during summer algal bloom conditions in an agricultural reservoir?

<https://hdl.handle.net/10355/73663>

M.S. theses

Mazanec, K.M. 2020. *Aquatic Plants and their Application to Successful Floating Treatment Wetlands*. M.S. thesis, Dept of Biological Sciences, Missouri University of Science and Technology.

Information Transfer Program

The MOWRRC maintained an active information transfer program to address state and regional water and related issues through publications, conferences, seminars, exhibits, newsletters, one-page summaries, and training. We maintained interaction with state and federal water agencies, colleges and universities, as well as private sectors. The Director served on various national and

local water-related boards, organizations and committees, and as Associate Editor/Regional Editor for Environmental Engineering Science, a journal under the Association of Environmental Engineering and Science Professors (AEESP).

Conferences

The MOWRRC hosted The Mid-American Environmental Engineering (MAEEC) Conference. The Conference brings together a network of universities including MU, Missouri S&T, Southern Illinois University Carbondale, Southern Illinois University-Edwardsville, and Washington University in St. Louis, with a goal to increase communication among the major research universities in the region and to provide opportunities for graduate students to present their research advances through oral and poster presentations.

The MOWRRC participated in the following Missouri Water Conferences:

- 1) Held Expo Booth at the **Missouri Rural Water Association Annual Conference** 3/11-3/14/2019.
- 2) Held Expo Booth at the **Missouri American Water Works Association and Missouri Water Environment Association Joint Annual Conference** 3/31-4/3/2019.
- 3) **Northeast Section of the Missouri Water & Wastewater Conference** 4/10/2019 Macon, Missouri

These exhibits were attended by Missouri water operators, vendors, engineering consultants, students, state agencies including the Missouri Department of Natural Resources, researchers and stakeholders.

Seminars, Website, and Newsletter

The MOWRRC hosted a joint University of Missouri-Columbia seminar series with Civil & Environmental Engineering & Chemical Engineering throughout the year. In addition, other special seminars included speakers from out of state and other countries to speak on a variety of topics. The MOWRRC website highlights information regarding the USGS Program including funded projects, Call for New Proposals, yearly newsletters, and publications archives. The website also highlights news articles regarding research and student involvement within the Center and College of Engineering and laboratory facilities available. The Missouri Water Resources Research Center Website URL: <http://water.missouri.edu> .

The MOWRRC newsletter is a yearly publication. The purpose of the Center's newsletter is to inform the scientific community as well as the public, on the activities of the Center, new research projects funded, and upcoming conferences. The Center's primary focus is on its own information transfer activities and the general scope of the projects that were funded. Highlights of the newsletters are attached and can be also found on the Missouri Water Resources Research Center website at <http://water.missouri.edu>.

Training Courses

The Missouri Water Resources Research Center collaborated with the Missouri Department of Health & Senior Services to provide the training opportunity for operators to receive 1 credit hours of Operator Certification. This grant provided training and technical assistance to water system operators, civil engineers, city managers, and other local decision-makers regarding the practice of community water fluoridation. Community water fluoridation is the controlled adjustment of fluoride in a public water supply to the optimal concentration needed to prevent tooth decay in members of a community. *To access the online training simply go to:* <https://canvas.instructure.com/courses/1089951>.

Student Support

Undergraduates: 6

Masters: 1

Ph.D.: 2

Notable Achievements and Awards

Jacob Cianci-Gaskill, PhD Candidate:

2021: The College of Agriculture, Food and Natural Resources Dissertation Research Improvement Grant, \$2,000

2020: Invited panelist to the Kansas Harmful Algal Bloom Meeting, Topeka, KS

2019: Great Plains Limnology Conference Graduate Student Poster Competition, 1st Place (Tied)

2019: University of Missouri Graduate Student Presentation Travel Award, \$400

2019: University of Missouri School of Natural Resources Graduate Student Travel Grant, \$500

2019: GLEON 21 Student Travel Award, \$1,200

2019: University of Missouri Douglas D. Randall Young Scientists Travel Award, \$500

2019: University of Missouri Graduate Professional Council Travel Award, \$300, not accepted

2018: University of Missouri School of Natural Resources Graduate Student Travel Grant, \$500

2017: GLEON 19 Student Travel Award, \$1,350

Nonpoint Source Pollution Mitigation In An Urban Watershed

Project Type: Annual Base Grant

Project ID: 2019MO149B

Project Impact:

Our research project focused on three main topics related to mitigating nutrient pollution from stormwater in urban areas. First, we sampled numerous storms in the Rolla area and characterized the nutrient inputs to two ponds in local parks. Second, we measured the uptake rate of nutrients (phosphorus and nitrogen) by different plants and algae in small microcosms set up under controlled settings in a lab or greenhouse. Third, we used outdoor mesocosms to measure nutrient uptake by floating treatment wetlands (FTWs) under conditions similar to natural ponds.

Stormwater delivered high concentrations of both phosphorus (mostly phosphate) and nitrogen (mostly nitrate) to the two ponds in Rolla. We used these values for our experiments on nutrient uptake by plants in microcosms (in lab) and mesocosms (outside). In the microcosms, most plants took up nutrients effectively and at similar rates. Algae had higher biomass-specific uptake rates in the microcosms. We have used three different plants in our model FTWs in mesocosm studies: pickerelweed, bulrush, and blue-flag iris. Pickerelweed and bulrush systems had the highest removal of both phosphate and nitrate.

We have applied for additional funding from several sources (EPA, USGS) in hopes of continuing this promising approach to mitigating nutrient inputs to urban systems. We have also been in contact with officials in Rolla and other cities about using the FTW approach in ponds as a field-scale test of the system.