Conference Booklet

2025
POTOMAC RIVER CONFERENCE:
INTEGRATING SCIENCE, POLICY, AND COMMUNICATIONS TO COMBAT HARMFUL ALGAL BLOOMS

October 22, 2025
George Mason University's
Potomac Environmental Research and Education Center
Woodbridge, VA

Interstate Commission on the Potomac River Basin

The mission of the Interstate Commission on the Potomac River Basin (ICPRB) is to protect and enhance the waters and related resources of the Potomac River basin through science, regional cooperation, and education. Considered the "Nation's River," for more than six million basin residents, the river plays an important role in the lives of all. Through regional cooperation and partnerships, ICPRB is protecting the river and improving the quality of life in the watershed.

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2025 POTOMAC RIVER CONFERENCE:

INTEGRATING SCIENCE, POLICY & MANAGEMENT TO COMBAT HARMFUL ALGAL BLOOMS

Agenda

Coffee and Registration (8:30 am)

Opening (9:00 am)

Moderator: Michael Nardolilli, ICPRB

- **Welcome -**
  - Michael Nardolilli, Executive Director, ICPRB
  - Willem Brakel, Chair, ICPRB Commissioner (DC)
  - Amy Fowler, Interim Director, PEREC GMU

Session 1 - Research (9:40 am)

Moderator: Mike Selckmann, ICPRB

- **HABs in the upper Shenandoah River Basin** - Brendan Foster, USGS
- **Overview of benthic algal communities, including harmful cyanobacteria, in Shenandoah River, Virginia** - Rosalina Stancheva Christova, GMU
- **George Mason University Research Highlights**
  - **Does temperature impact anatoxin-a-production of the riverine cyanobacterium *Microcoleus*?** - Jacob Mormando, GMU
  - **Effects of nitrogen on *Microcoleus* (Cyanobacteria) growth in laboratory conditions** - Sydney Brown, GMU
  - **Algal Responses to Hydrologic Variability in the North Fork Shenandoah River, VA, USA** - Rwan Alsaadi, GMU
- **Integrative characterization of the anatoxin-a-producing benthic cyanobacterial genus *Microcoleus* in the Shenandoah River** - Bruce Cahoon, University of Virginia

Break (11:00)

Session 2 - Local Level Response (11:15 am)

Moderator: Benjamin Rhoades, Reston Association

- **Predicting HABs and other Water Quality Parameters using Remote Sensing Data** - Josh Weiss, Hazen and Sawyer
- **Fairfax County Park Authority Blue-Green Algae Bloom Response** - John Burke, Fairfax County
- **Increasing Harmful Algal Blooms with Increased Drought in Prince William, Virginia** - Veronica Tangiri and Tom Ligon, Prince William Soil & Water Conservation District
- **Societal Benefits of Cyanobacteria Harmful Algal Bloom Management** - Benjamin Simon, George Washington University
- **Poster Lightning Round** - Poster Presenters

Agenda continues on the following page

Agenda (Cont.)

Lunch & Posters (12:30 pm)

Session 3 - Government Response (1:15pm)

Moderator: Anne Spiesman, Fairfax Water

- **Detection of neurotoxins in benthic cyanobacteria mats in the Potomac River -** Cathy Wazniak, MD DNR
- **Government Panel on HAB Response**
  - Jayne Brown, Associate Director, Inspection and Enforcement, DOEE
  - Amy Hamilton, Harmful Algal Bloom Biologist, MD DNR
  - Heidi Biggs, Water Program Specialist, Clean Water Bureau, Water Quality Division, PA DEP
  - Sarah Sivers, Water Permits and Planning Manager, and Justin Loyd, Water Monitoring Supervisor, Northern Regional Office, VA DEQ
  - Mindy Neil, Assistant Director, Division of Water and Waste Management, WV DEP

Closing (2:40)

Gordon "Mike" Selckmann, ICPRB

Poster Session (2:45)

- **Do native river snails consume toxic and non-toxic *Microcoleus* strains (Cyanobacteria) from Shenandoah River, Virginia, USA?** - Mackenzie Allen, GMU
- **National Costs and Benefits of Freshwater Harmful Algal Bloom Management** - Eva Bailey, UMCES
- **A Novel Lateral Flow Assay that Detects Acetylcholine Receptor Ligand Toxin Anatoxin-a (ATX-a)** - Lance Ford, Attogene
- **Distribution and abundance of benthic mat-forming cyanobacterium *Microcoleus* in Shenandoah River, Virginia, USA** - Armon Ghaffari, GMU
- **Field guide to common macroalgae in the Shenandoah River** - Katia Holguin, GMU
- **Structural Complexity and Environmental Adaptation in Cyanobacterial Hsp90-Hsp70 Chaperone Systems** - Liqun Jiang, University of Maryland
- **North American Lake Management Society's Clean Lakes Advocacy** - Benjamin Rhoades, Reston Association/North American Lakes Management Society
- **Photosynthetic Rate and Pigment Composition of *Microseira wollei*, a toxin-producing cyanobacterium, over an annual cycle in the tidal freshwater Potomac River, VA, USA** - Hannah Toney, GMU

Continue the Conversation (optional) - Join other conference attendees for an optional happy hour at Brickmakers Cafe (9751 Ox Rd, Lorton, VA) to continue the discussion!

Abstracts and Speaker Biographies

(In order of appearance)

Opening Session

Welcome

Michael Nardolilli, ICPRB (*moderator*)

Michael Nardolilli joined the Interstate Commission on the Potomac River Basin (ICPRB) as its Executive Director in 2019. Previously, Mr. Nardolilli served as the Chairman of the Board of Directors of the Northern Virginia Regional Park Authority (operators of 33 parks in Northern Virginia), President of the Arlington Outdoor Lab (a 225-acre nature educational facility in Virginia), Executive Director of the Montgomery Parks Foundation (the fundraising arm of Montgomery Parks), President of the C&O Canal Trust (the official non-profit partner of the C&O Canal National Historical Park), and President of the Northern Virginia Conservation Trust (a regional land trust). Prior to his work in the non-profit field, Mr. Nardolilli had a successful 18-year legal career representing Fortune 500 companies suing their insurance carriers for delayed manifestation claims. In 2011, Mr. Nardolilli was selected as a "Green City Leader" by Washington Life Magazine and was named a WETA-TV "Hometown Hero" in 2007. Mr. Nardolilli received a Certificate of Executive Non-Profit Management from Georgetown University, a JD from the College of William & Mary and a BSFS from Georgetown University.

Willem Brakel, Chair, ICPRB Commissioner for Washington, D.C.

Willem Brakel is an environmental scientist, teacher and career diplomat with broad experience conducting research in marine and freshwater ecosystems, managing government programs, and advocating/negotiating environmental policy solutions internationally. He received his Ph.D. from Yale University for research on Jamaican reef corals, and continued with ecological research and teaching while on the faculty at the University of Nairobi (Kenya) and Loyola University (Maryland). He then embarked on a 24-year career in the U.S. Foreign Service, focusing on environment, science, technology and economic development, with assignments in Africa, Europe and Latin America. He was promoted into the Senior Foreign Service with the rank of Counselor, and served most recently in the Department of State as Director of the Office of Environmental Policy. He currently serves at the Chairperson for the Interstate Commission on the Potomac River Basin.

Amy Fowler, Interim Director, PEREC GMU

Amy E. Fowler is a tenured Associate Professor of Aquatic Invertebrate Ecology in the Department of Environmental Science and Policy at George Mason University and a Resident Faculty Fellow at the Potomac Environmental Research and Education Center. She joined Mason in Fall 2016.

Her research focuses on global aquatic invertebrate species patterns, biodiversity, phenotypic plasticity, parasitology, and community and population level interactions of aquatic invertebrates, especially those concerning invasive species. She has experience working in freshwater, estuarine, and marine systems both in the United States and globally and recently returned from a six month Fulbright Fellowship to Finland. Fowler has published 54 peer-reviewed articles addressing broader questions about species interactions within aquatic ecosystems and organismal responses to human-driven environmental change.

At Mason, she has taught nine different courses, including *Freshwater Ecosystems* (EVPP/BIOL 350), *Aquatic Invertebrate Ecology* (EVPP/BIOL 456/556), *Applied Ecology* (EVPP/BIOL 377), and *Experimental Design* (EVPP 991). Over the course of her career, Fowler has mentored two postdoctoral researchers, four PhD students, seven Masters students, and more than 50 undergraduate students across several institutions. Currently, she is the Deputy Editor in Chief of three international journals – *Aquatic Invasions, BioInvasions Records, and Management of Biological Invasions*.

Session 1 - Research

Moderator: Gordon "Mike" Selckmann, ICPRB

Gordon "Mike" Selckmann is the Associate Director of Aquatic Habitats at the Interstate Commission on the Potomac River Basin (ICPRB). He is responsible for evaluating and assessing the habitat quality and biological health of communities within Potomac waters. His work coordinates the cooperation of federal, state, academic, and local partners to find and implement solutions to environmental issues. Prior to joining ICPRB, Mr. Selckmann worked for the University of Maryland Chesapeake Biological Lab, Round River Conservation, and the Okavango Research Institute. He is currently the primary investigator and project coordinator for the ICPRB's Large River Assessment, Harmful Algae Bloom Program, North Branch Potomac Tailwater optimization, and ground water biological studies. Mr. Selckmann holds a M.S. in Environmental Biology from Hood College – a BA in Biology from St. Mary's College of Maryland.

HABs in the upper Shenandoah River Basin

Brendan Foster, USGS

Brendan Foster is a hydrologist at the USGS Virginia and West Virginia Water Science Center. Since joining the USGS in 2019, he has been involved in many interdisciplinary studies, primarily of freshwater ecosystems, to better understand how they function and change over time. His current investigations focus on topics such as harmful algal blooms, mussel reintroductions as a potential BMP, sediment and nutrient transport, and changes in benthic macroinvertebrate and fish communities and potential stressors.

Overview of benthic algal communities, including harmful cyanobacteria, in Shenandoah River, Virginia

Rosalina Stancheva Christova, GMU

Abstract: The PEREC Algal Ecology Lab identified and quantified benthic macroalgae as part of the project "Investigation of drivers of harmful algal blooms on the Shenandoah River, Virginia", initiated by the VADEQ/ICPRB. We received 104 quantitative benthic algal samples from six stations along the North Fork and four stations along the South Fork of Shenandoah River, collected from June to October 2023 and 2024. We identified 160 species of macroalgae and epiphytes, which belonged to Cyanobacteria (43 genera), green algae (11 genera), green charophyte algae (5 genera), yellow-green and red algae (2 genera each). The most common and abundant mat-forming cyanobacteria were Microseira wollei, and species belonging to Microcoleus, Oscillatoria, Phormidium, Potamolinea, and the family Coleofasciculaceae. We identified five filamentous heterocytous cyanobacteria, which, along with M. wollei, can fix atmospheric nitrogen. Distributional and toxin data for common cyanobacteria and green algae will be discussed.

Rosalina Stancheva Christova is a tenure-track assistant professor of aquatic ecology in the Department of Environmental Science and Policy at George Mason University and a Resident Faculty Fellow at the Potomac Environmental Research and Education Center. She joined Mason in Fall 2023. Before coming to Mason, Christova served as project director of the Primary Algae Laboratory at California State University San Marcos, a program funded by the California Water Resources Control Board. Her research focuses on algal taxonomy and ecology, with particular attention to emerging environmental challenges such as benthic toxic cyanobacterial proliferations in streams, water quality bioassessment and algal adaptations to global change. Christova has published 66 peer-reviewed articles, including descriptions of more than 20 new freshwater and marine algal species. Her work addresses broader questions about species interactions within aquatic ecosystems and algal responses to human-driven environmental change. At Mason, she teaches Freshwater Ecosystems (EVPP/BIOL 350) and Protist Diversity and Ecology (EVPP 441/505). She previously taught similar courses at Cal State and Sofia University in Bulgaria. Over the course of her career, Christova has mentored more than 30 undergraduate and graduate students across these three institutions. Currently she is a member of the National HAB Committee.

Does temperature impact anatoxin-a-production of the riverine cyanobacterium *Microcoleus*?

Jacob Mormando, GMU

Abstract: Harmful benthic cyanobacterial blooms have become increasingly documented in recent years, with *Microcoleus* being the main genus responsible for producing a neurotoxin known as anatoxin-a. The impact of climate and temperature changes on *Microcoleus* growth and toxicity has not been investigated. We used three toxic strains of *Microcoleus*, isolated from geographically distant Eel River in California, Virgin River in Utah, and Shenandoah River in Virginia. The strains were grown in BG11 medium at 10°C, 20°C, and 30°C. We measured cell-density and biovolume after 7, 14, 21, 28, and 35 days, and anatoxins and chlorophyll a on days 7, 21, and 35. All strains achieved the highest growth rates and lowest anatoxin-a cellular quotas at 20°C, except for the last harvest for the strains from the Virgin and Shenandoah Rivers, which produced less toxins at 10°C. The maximum anatoxin-a quotas were consistently recorded at 30°C in all strains and harvests.

Jake Mormando is a Master's student at George Mason University majoring in Environmental Science and Policy, currently having a Bachelor's degree in Biology. Jake's main research for his thesis is on benthic cyanobacteria, and more specifically, how temperature impacts the growth and toxin production of a particular cyanobacteria called *Microcoleus*. Jake has been doing research on cyanobacteria in Virginia, including the Shenandoah River, for 2 years and has assisted freshwater projects done by ICPRB, the University of Nevada, Reno, and multiple others.

Effects of nitrogen on Microcoleus (Cyanobacteria) growth in laboratory conditions

Sydney Brown, GMU

Abstract: Microcoleus is a common benthic cyanobacterium that proliferates globally in various nutrient conditions, including oligotrophic habitats. It is a growing concern due to its ability to produce the neurotoxin anatoxin-a. In the field, Microcoleus is reported in abundance when dissolved inorganic nitrogen concentrations are above 0.2 mg/L and total dissolved nitrogen exceeds 0.07 mg/L. We cultured three Microcoleus strains from streams in California (one non-toxic and two producing anatoxin-a and dihydroanatoxin-a) in BG11 growth medium with four increasing concentrations of nitrogen ($NaNO_3$) and measured cell density and chlorophyll a at days 3, 7, 10, 14, 17, 21, 28, and 31. Additionally, medium nutrient concentrations were measured every other harvest to estimate nitrate consumption by Microcoleus. In all cyanobacterial strains, the growth rates increased with increasing nitrate concentrations. Different levels of nitrogen limitation triggered specific physiological responses expressed in cell morphology modifications, indicating the wide nutrient tolerance of Microcoleus.

Sydney Brown is a PhD student in Environmental Science & Public Policy at George Mason University. She has a B.S. in Biology and M.S. in Biology from Georgia College & State University and has been conducting research in the field of algal ecology since 2019. Her PhD dissertation focuses on environmental drivers of the benthic cyanobacterium, Microcoleus, proliferations manipulated under laboratory conditions. Dr. Rosalina Stancheva Christova serves as her major advisor for her PhD.

Algal Responses to Hydrologic Variability in the North Fork Shenandoah River, VA, USA

Rwan Alsaadi, GMU

Abstract: Suspended algae in rivers are highly responsive to hydrological variability, making them useful indicators of ecosystem disturbance. In the North Fork of the Shenandoah River, benthic algal proliferations have increased in recent years, but the contribution of suspended algae to this environmental issue has not been studied. We analyzed algae from water column samples collected from two USGS gaging stations monthly and after storms in 2024. We identified 217 algal species represented with low cell density (64 to 6,501 cells/mL). During the storm events, the cell density increased 2 to 35 times compared to the following sampling date, with almost equal contributions of diatoms and cyanobacteria. The suspended river algae consist of a mixture of scoured benthic cells and typical planktonic inhabitants influenced by frequent storm events, which increase the prevalence of drift cells. Our findings suggest that streamflow variability is central in structuring algal communities in this river system.

Rwan Alsaadi is a 2nd year Master's student in Environmental Science & Public Policy at George Mason University. She also earned her B.S. in Environmental Science & Public Policy with a concentration in aquatic ecology from George Mason. Under the mentorship of Dr. Rosalina Stancheva Christova, her master's research focuses on the suspended algal community in the North Fork Shenandoah River. Her study contributes to understanding how algal communities in mid-sized rivers respond to seasonal changes, and the conditions that may lead to harmful algal blooms.

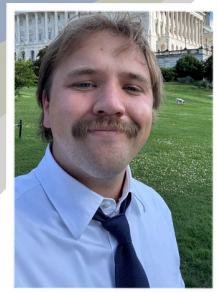
Integrative characterization of the anatoxin-a-producing benthic cyanobacterial genus *Microcoleus* in the Shenandoah River

Bruce Cahoon, University of Virginia

Abstract: *Cyanobacterium Microcoleus* (Order Oscillatoriales, Family Microcoleaceae) produces large benthic mats in rivers, which often contain the neurotoxin anatoxin-a. This genus is common, abundant, and diverse in both forks of the Shenandoah River, but its taxonomy and toxicity are unknown. In 2023 and 2024, we collected fresh field *Microcoleus* mats growing in the Shenandoah River and conducted integrative molecular, morphological, and toxin characterization of the strains. Using field samples and two isolated unialgal strains, whole genome sequencing was performed using either the IonTorrent S5 system or Illumina MiSeq systems, with short reads were de novo assembled into contigs using Megahit or assembled to a representative *Microcoleus* 16S template sequence using a Map-to-Reference approach. The 16S rRNA phylogenetic analysis distinguished two species of *Microcoleus*, one non-toxic and another producing anatoxin-a and dihydroanatoxin-a. The most abundant species in Shenandoah River, which fits the description of *Microcoleus lacustris* Farlow ex Gomont, was phylogenetically placed within the Family *Coleofasciculaceae*. Similarly, the morphological traits of this cyanobacterium do not correspond to the current taxonomic concept of *Microcoleus*.

Bruce Cahoon is a phycologist and molecular geneticist at the University of Virginia's College at Wise where he is the John C. Buchanan Professor of Biology. His primary interests are freshwater microalgal biodiversity and algal organelle mRNA processing.

Session 2 - Local Level Response



Moderator: Benjamin Rhoades, Reston Association

Ben Rhoades has been managing Reston Association's four lakes for the last five years in varying capacities— he is currently the Watershed Manager for the Association. He serves on the board of the North American Lakes Management Society, where he co-leads the Section 314 Working Group advocating for improved federal lakes funding. Ben lives in the City of Fairfax, where he's resided since his graduation from George Mason University's Environmental and Sustainability Studies bachelors program in 2020.

Predicting HABs and other Water Quality Parameters using Remote Sensing Data

Josh Weiss, Hazen and Sawyer

Abstract: This presentation will highlight recent advances in predicting harmful algal blooms and other water quality parameters using satellite-based remote sensing data. The authors will describe the development of fused data product with an effective 10-m spatial resolution to enable early identification of HABs for rivers and small lakes and reservoirs.

Dr. Weiss is a Board-Certified Water Resources Engineer with more than 25 years of experience in water resources planning; system and water quality modeling; watershed and source water evaluation; remote sensing; data analytics; and decision support systems. As the firm's Director of Water Resources Innovations, he leads applied research projects that integrate new data sets and analytical tools to enhance utility decision-making.

Fairfax County Park Authority Blue-Green Algae Bloom Response

John Burke, Fairfax County

Abstract: FCPA staff will discuss the recent harmful algal bloom at Burke Lake Park and FCPA's response. We will discuss the communication process, investigation, signage, and proposed follow-up actions and lessons learned. Co-authors are Christopher Goldbecker and Keith Cline.

John Burke joined Fairfax County Stormwater Management as an Ecologist in 2013 and has served as the Natural Resources Branch Manager for the Fairfax County Park Authority since 2020. His background includes work as an aquatic taxonomist and the management of enhanced extended detention ponds, where he focused on bringing stormwater facilities into alignment with environmental standards. For over a decade, John has promoted environmental stewardship across Virginia through public outreach, education, and industrial environmental compliance. His previous experience includes roles with the City of Alexandria and the Wildlife Ecotoxicology and Physiological Ecology Lab at Virginia Tech.

Increasing Harmful Algal Blooms with Increased Drought in Prince William, Virginia

Veronica Tangiri and Tom Ligon, Prince William Soil & Water Conservation District

Abstract: The rapid loss of trees in the Chesapeake Bay Watershed, resulting from increasing human development and land-use changes, is degrading water quality. Trees act as natural sponges for clean water, protecting the water tables and riparian ecosystems. The loss of trees increases evapotranspiration, runoff, erosion, and water temperature, altering the overall water chemistry. The increase in impervious surfaces is promoting the growth of harmful algal blooms in Prince William. This is a growing health and environmental concern, particularly around stormwater ponds and lakes. The Washington, D.C. metropolitan area has been under a drought Watch since July 29, 2024, leaving lakes and ponds with stagnant and low dissolved oxygen levels. The drop in water flow creates cradles for Harmful Algal Blooms (HABs). HABs have an impact on human health, the environment, and local economies. HABs cause illnesses in both humans and animals, disrupt marine ecosystems, and impact swimming and fishing activities.

Veronica manages the Water Quality Program and is a Certified Trainer of Monitors for the Virginia Save Our Streams Program. Veronica has a M.S. in Environmental Science/Eco-Technology from Mid-Sweden University. Her second master's degree at Lund University focused on land-use changes in riparian ecosystems and the impact on water quality in a changing climate.

Veronica contributed enormously to establishing the Prince William Soil and Water Conservation District's Water Quality Program. Her Program was the 2022 National Earth Team Winner, an award from the Natural Resources and Conservation Services (NRCS) under the United States Department of Agriculture. Veronica has a certificate in disasters and ecosystem resilience in a changing climate from the United Nations Environmental Program and the Cologne University of Applied Sciences. She holds a B.S. in geology with a minor in biology from the University of Buea, Cameroon. She is a recipient of the Ecological Society of America's (ESA's) Katherine S. McCarter Graduate Student Policy Award (GSPA) 2023 cohort. Veronica is a member of the National Water Monitoring Council Working Group.

Tom Ligon earned his BS in Biology from Virginia Tech with an emphasis on microbiology in 1975, but then took a different career path in general science, physics, instrumentation, and physical testing. Half a century later he is retired and a Virginia Master Naturalist active in stream and stormwater monitoring, including both benthic macroinvertebrates and chemical water quality monitoring. This now includes keeping an eye out for cyanobacteria and invasive water plants, so his microbiology training is finally paying off. Tom's instrumentation experience includes spectrophotometry, and modern digital cameras have enabled simple spectrometers to be built for around a hundred dollars, so Tom is working on adapting one of these for analysis of cyanobacteria blooms.

Societal Benefits of Cyanobacteria Harmful Algal Bloom Management

Benjamin Simon, George Washington University

Abstract: HABs have emerged as a global environmental problem. Their negative impact on aquatic ecosystems affects the stock and flow of ecosystem services (benefits nature provides to humans) by reducing water quality; inhibiting aquatic recreation; killing fish, wildlife, and pets; and posing a risk to human health. The societal impacts of eutrophication (which contributes to cyanoHABs) have been estimated to cost the US nearly $2.2B/year. Management actions that prevent, mitigate, manage, treat, or otherwise reduce the incidence, extent, or duration of cyanoHABs will reduce the magnitude of societal impacts. To estimate changes in benefits to humans, consideration must be given to HABs ecological effects, the resulting ecosystem service degradation, and the associated loss of value to people. This presentation will discuss research that estimated the societal benefits associated with reducing HABs for a particular outbreak in Florida. The techniques and analytical approach are directly transferrable to other situations.

Dr. Benjamin Simon is currently an adjunct professor of economics and public policy at the George Washington University. Dr. Simon was Chief Economist at the Department of the Interior and director of the economics staff in the Office of Policy Analysis until December 2021. Dr. Simon has also worked as an economist at the New Zealand Ministry of Finance. At the Department of the Interior, over the course of a 30 year career, he worked on a wide variety of water and land management issues.

Session 3 - Government Response

Moderator: Anne Spiesman, Fairfax Water

Anne Spiesman is the Chief of Source Water Planning and Protection, Fairfax Water. Her background in drinking water quality, treatment operations, water supply, and source water protection come from her prior experience in this region at the Washington Aqueduct and with engineering consulting firms. She is a licensed Professional Engineer in Virginia and a Board Certified Environmental Engineer (Water/Wastewater).

Detection of neurotoxins in benthic cyanobacteria mats in the Potomac River

Cathy Wazniak, MD DNR

Abstract: Toxic cyanobacteria blooms are an environmental issue the state of Maryland has been monitoring for 25 years. Historically microcystin has been the dominant cyanotoxin in the Potomac River; however, no planktonic blooms have occurred since 2006 likely a result of nutrient reduction efforts. Monitoring efforts focus on water column blooms, but in recent years, neurotoxins have been newly detected in benthic cyanobacterial mats from both the Potomac's non-tidal and tidal fresh portions. *Oscillatoria*, *Planktothrix*, and *Microcoleus/Phormidium* mats have been observed in the non-tidal area above Washington D.C. Cyanotoxins including microcystin and a potent neurotoxin, anatoxin, have been detected in mats which led to Pet Health Cautions in 2023 and 2024. In the tidal fresh Potomac, the dominant (bluegreen) mat species *Microseira wollei*, has been shown to produce the neurotoxin, saxitoxin. Benthic mats can detach and float downstream or accumulate along the shoreline where animals and people may come in contact. Authors: Cathy Wazniak, Chris Luckett, Amy Hamilton, and Allison Samuel.

Government Panel on HAB Response

Jayne Brown, Associate Director, Inspection and Enforcement, DOEE

Jayne Brown is the Associate Director for Inspection and Enforcement at the District of Columbia, Department of Energy and Environment (DOEE). Her Division regulates industrial, municipal, and construction stormwater and wastewater compliance. She also serves on several boards, including Board of Directors for the Northeast Environmental Enforcement Project (NEEP). Jayne started working for DOEE in 2013, as an air and water quality inspector. In 2019, she became DOEE's Chief of Emergency Response. Jayne holds a Bachelor and a Master of Environmental Studies from Virginia Commonwealth University and a Master of Geospatial Information Science from the University of Maryland. She is published in the Journal of Vector Ecology. She lives in the Capitol Hill neighborhood of DC with her daughter, husband, and very bad dog.

Heidi Biggs, Water Program Specialist, Clean Water Bureau, Water Quality Division, PA DEP

Heidi Biggs has been with the Pennsylvania Department of Environmental Protection (PADEP) since 2006. She currently works as a Water Program Specialist coordinating water quality monitoring and assessments of lakes statewide. She serves on the Pennsylvania HABs Task Force where she assists in responding to HABs reports, coordinates routine and bloom response sampling, trains collectors and manages HABs data. She has held a variety of roles at PADEP in her career including developing water quality standards, working on the Integrated Water Quality Report and coordinating implementation of Clean Water Act Sections 316(a) and (b) in NPDES permits.

Sarah Sivers, Water Permits and Planning Manager

Sarah Sivers is the Water Permits and Planning Manager for the Virginia Department of Environmental Quality (DEQ), Northern Regional Office. During her 20 years with DEQ, she has worked in the Virginia Water Protection Permit Program as a permit writer, in the Office of Water Supply working on surface water withdrawal projects, and in the Water Quality Planning Program as a team lead overseeing the regional development and implementation of Total Maximum Daily Loads (TMDLs) and assessment of the region's water quality data. In Ms. Sivers' current position, she manages the regional Water Permits and Planning Department, which is responsible for the following programs: Wastewater permits, Pretreatment, Toxics Management, Water Quality Assessments, and TMDLs. Ms. Sivers has a Bachelor's of Science in Biology from the College of William and Mary and a Master's of Natural Resources from Virginia Tech.

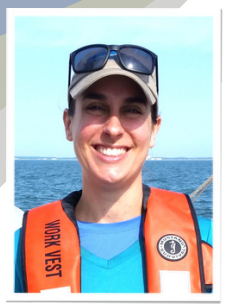
Justin Loyd, Water Monitoring Supervisor, Northern Regional Office, VA DEQ

Justin Loyd is the Water Quality Monitoring Supervisor for the Virginia Department of Environmental Quality (DEQ), Northern Regional Office. During his 11 years with DEQ, he has worked as a water quality monitoring specialist for five years and an aquatic biologist and certified taxonomist for six years. In Mr. Loyd's current position, he manages the regional Water Quality Monitoring Department, which is responsible for the following programs: Regional Trends, Chesapeake Bay, Potomac Embayment's, PCBs, Metals, PFAS/PFOA, HABs, Biological, and Probabilistic monitoring. Mr. Loyd has a Bachelor of Science in Biology, with a focus on organismal biology, from the University of Mary Washington.

Mindy Neil, Assistant Director, Division of Water and Waste Management, WV DEP

Mindy Neil is an Assistant Director for the Division of Water and Waste Management of the West Virginia Department of Environmental Protection. In this role she oversees the Water Quality Standards and Assessment Section (WQSAS), which is responsible for monitoring the State's waters; assessing and reporting on the attainment of water quality standards; preparing restoration plans referred to as Total Maximum Daily Loads; setting water quality standards; tracking and studying water use; and issuing 401 certifications. In addition, Mindy and staff participate in the WV Harmful Algal Bloom Response, including collecting and analyzing samples for toxins; identifying algae; making recommendations for warnings; and coordinating with other agencies.

Prior to joining the WVDEP in 2017, Mindy worked in private industry and for the WV Department of Health Source Water Assessment and Protection Program. In 2002, Mindy received a MS degree in Biological Sciences from Marshall University in Huntington, WV.



Amy Hamilton, Harmful Algal Bloom Biologist, MD DNR

Amy Hamilton is a Harmful Algal Bloom (HAB) Biologist with Maryland Department of Natural Resources and the manager of the agency's Phytoplankton Lab located in Annapolis, MD. A graduate of Duke University, she studies phytoplankton communities and HABs in Maryland's fresh, estuarine, and marine waters. Amy began her career in HABs while working at Maine Department of Marine Resources and Bigelow Laboratory. While there she attended the 2nd annual U.S. Marine Harmful Algae Taxonomy Training Course. She is equally at home hunting through the intertidal for mussels to test and seated at a microscope examining her

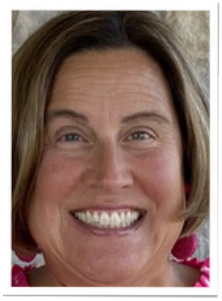
Poster Session

Do native river snails consume toxic and non-toxic *Microcoleus* strains (Cyanobacteria) from Shenandoah River, Virginia, USA?

Mackenzie Allen, GMU

Abstract: Benthic harmful cyanobacterial mat proliferations in rivers are a recent environmental problem due to the production of cyanotoxins, but their effect on algivorous aquatic snails, which coexist with the mats, is little known. We conducted a lab experiment with native aquatic snails, *Leptoxis carinata*, and non-toxic and anatoxin-a-producing cyanobacteria *Microcoleus* strains isolated from Shenandoah River. We exposed a starved single snail to toxic and non-toxic unialgal strains of *Microcoleus* in triplicate to observe the movement behavior and trajectories of the snails for two hours. We also analyzed the snail feces for the presence of *Microcoleus* fragments. Preliminary data showed that snails were attracted by the toxic and non-toxic *Microcoleus* filament and moved to the clumps. The toxic filaments were consumed occasionally, but were excreted quickly.

Hi, I'm Mackenzie! I'm currently an undergraduate at George Mason University majoring in Environmental Science, with a concentration in marine, estuarine, and freshwater ecology. I am currently researching freshwater algae and cyanobacteria with Dr. Christova at the Potomac Science Center. I hope to further my education and pursue researching red tide in the Gulf of Mexico. When I am not in the lab or class, I enjoy reading, hiking, and boating.



National Costs and Benefits of Freshwater Harmful Algal Bloom Management

Eva Bailey, UMCES

Authors: Eva Bailey, Lisa Wainger, Matt Weber, Kehinde Ojo and Scott Knoche

Abstract: Cyanobacterial harmful algal blooms (cHABs) are prevalent in freshwaters across the United States, generating extensive economic and ecological costs. Effective management requires a comprehensive understanding of the costs of alternative management responses and the public benefits of cHAB mitigation. Such values remain obscure and difficult to ascertain due to the many agencies and groups involved.

Funded by the US Army Corps of Engineers, our in-process study is analyzing the costs and benefits of lake cHAB management nationally. Targeted structured interviews are being used to quantify current spending and develop a cost estimation model scaled to cHAB intensity. An economic choice experiment (national survey) is being developed to quantify public willingness to pay for changes in recreational access and ecological quality resulting from cHAB mitigation and prevention. Cost and benefit data we develop will be applied to estimate net social benefits of alternative treatment scenarios, relative to baseline cHAB conditions.

Eva Bailey is a Faculty Research Assistant at the University of Maryland Center for Environmental Science Chesapeake Biological Laboratory in Solomons, MD working for Dr. Lisa Wainger. She has over 20 years of experience in marine and estuarine biogeochemistry with expertise in sediment oxygen nutrient exchange methodology, high speed spatial mapping and water quality. She has worked on sediment phosphorus/pH interactions with freshwater harmful algal blooms locally in the Potomac River and in her current role is leading the structured interview portion of a project on national costs and benefits of freshwater HAB management. Eva has a BA in Biology from Boston University and an MS in Marine Science from the Virginia Institute of Marine Science, College of William and Mary.

A Novel Lateral Flow Assay that Detects Acetylcholine Receptor Ligand Toxin Anatoxin-a (ATX-a)

Lance Ford, Attogene

New Method for detection of an important cyanotoxin.

Dr. Ford, the CEO and President of Attogene Corporation, graduated in 1994 with his Bachelor of Science Degree from Montclair State University with a major in Molecular Biology. Dr. Ford subsequently attended Rutgers Robert Wood Johnson Medical School and graduated from the department of Microbiology and Molecular Genetics with his PhD in 1998. After completing his PhD, he obtained his postdoctoral fellowship at University of Texas Southwestern Medical Center in Dallas Texas in the Department of Cell Biology. Dr. Ford was an experienced officer of a successful biotechnology company, Bioo Scientific, where he was involved in many high-level corporate decisions including the ultimate sale of the company to Perkin Elmer and integration of Bioo Scientific into the larger organization. In 2018 after which he began operations of Attogene to focus on developing and commercializing revolutionary scientific technology and to grow a sustainable, thriving, cutting edge business in Austin Texas.

Distribution and abundance of benthic mat-forming cyanobacterium *Microcoleus* in Shenandoah River, Virginia, USA

Armon Ghaffari, GMU

Microcoleus is a benthic filamentous mat-forming cyanobacterium with increasing global distribution in recent decades, but its diversity and distribution in the Shenandoah River have not been previously studied. Many Microcoleus strains produce neurotoxic anatoxins, and ingesting toxic mats can cause dog fatalities and serious human health concerns. We present data on species diversity, distribution, abundance, and toxicity of Microcoleus morphospecies identified in 104 quantitative benthic algal samples from six stations along the North Fork and four stations along the South Fork of Shenandoah River, collected from June to October 2023 and 2024. This study improves our knowledge about Microcoleus proliferations in Shenandoah River and informs harmful algal blooms control and mitigation efforts.

Armon Ghaffari is an undergraduate student at George Mason University majoring in Biology. Over the summer, he worked under Dr. Christova's mentorship analyzing algal samples from the Shenandoah River as part of a projects for the RISE program and GMU 4-VA, a collaborative partnership for advancing the Commonwealth of Virginia. Although the world of algae is new to him, he very much enjoys learning about it and how it affects aquatic ecosystems.

Field guide to common macroalgae in the Shenandoah River

Katia Holguin, GMU

Recently, Shenandoah River has experienced prolific growths of benthic filamentous green algae and cyanobacteria during the summer and fall months, which are a public health concern. In 2023 and 2024, VADEQ/ICPRB researchers, as part of the project "Investigation of drivers of harmful algal blooms on the Shenandoah River, Virginia," collected field and underwater images of the main macroalgae forming extensive visible proliferations in the river. We compiled the field images and corresponding light microscopy photomicrographs of the algae in an illustrated field guide. This guide will help environmental and citizen scientists identify and distinguish the most common and abundant non-toxic green algae and diatoms from potentially toxic cyanobacterial mats. We included the top 13 most common genera of green macroalgae, diatoms, and cyanobacteria, as well as descriptions of their field appearance, morphology, toxicity, and key distinguishing features.

Katia Holguin is an undergraduate at George Mason University majoring in Environmental Science with a concentration in marine, estuarine, and freshwater ecology. Katia is working with Dr. Rosalina Stancheva Christova and the Interstate Commission on the Potomac River Basin to create a field guide for benthic macroalgae in the Shenandoah. She hopes to continue working with algae post-grad.

Structural Complexity and Environmental Adaptation in Cyanobacterial Hsp90-Hsp70 Chaperone Systems

Liqun Jiang, University of Maryland

Heat shock proteins (HSPs) are essential, highly conserved molecular chaperones responsible for facilitating the proper folding and maturation of diverse client proteins in both prokaryotes and eukaryotes. In bacteria, HSP70 (DnaK) and HSP90 (HtpG) play critical roles in stress response and protein homeostasis, especially under elevated temperature and other environmental stresses. Although extensively studied in Escherichia coli, the molecular structures and biochemical properties of cyanobacterial chaperones remain relatively unexplored. In this study, we characterize DnaK and HtpG from the cyanobacterium Synechococcus elongatus PCC 7942 (seDnaK and seHtpG), a model organism widely used for research in photosynthesis and circadian rhythms. Our findings demonstrate that seDnaK exists in a dynamic equilibrium between monomeric and dimeric forms, regulated by temperature and nucleotide binding. Additionally, seHtpG forms an extended dimeric conformation in the absence of ATP and exhibits an ATP hydrolysis rate of approximately 1.8 ATP/min upon conformational closure, significantly faster than its E. coli homolog (ecHtpG). We also observe that seHtpG possesses unique structural adaptations to environmental variables, including temperature, pH, and salt concentration. Employing cryo-electron microscopy and molecular dynamics simulations, we have determined the atomic-resolution structure of seHtpG, revealing distinctive structural elements absent in ecHtpG. Collectively, our results establish seDnaK and seHtpG as key models for understanding cyanobacterial chaperone functions related to protein homeostasis and photosynthetic activity. These insights lay a foundation for further exploration of chaperone roles in environmental stress adaptation and their potential biotechnological applications.

Dr Liqun Jiang is a postdoctoral associate in the Department of Chemistry and Biochemistry at University of Maryland College Park. Her research focuses on the role of chaperone systems in cyanobacterial response to environmental change and stresses. She earned her Ph.D. in Environmental Engineering from Shandong University, China, where she revealed the environmental adaptation mechanisms of lipid-rich microalgae and developed algae-based approaches to remove nitrogen and phosphorus from wastewater. Her current project, which she will present in her poster, investigates the biochemical activities and structure of cyanobacterial Hsp70-Hsp90 under changed conditions.

North American Lake Management Society's Clean Lakes Advocacy

Benjamin Rhoades, Reston Association/North American Lakes Management Society

NALMS continues to take on a mission of continued protection of our lakes and reservoirs with the 314 Working Group. As you may/may not know, The Clean Lakes Program was established in 1972 as section 314 of the Federal Water Pollution Control Act, to provide financial and technical assistance to States in restoring publicly owned lakes. The program has funded a total of approximately $145 million of grant activities since 1976 to address lake problems but there have been no appropriations for the program since 1994. The section 314 Clean Lakes Program was reauthorized in September 2000 as part of the Estuaries and Clean Water Act of 2000, but no funds have been appropriated. The 314 Working Group, now led by Chris Mikolajczyk and myself, is seeking the restoration of funding specifically to section 314 of the program, along with the current section 319 funding, which addresses nonpoint source watershed management.

Ben Rhoades has been managing Reston Association's four lakes for the last five years in varying capacities— he is currently the Watershed Manager for the Association. He serves on the board of the North American Lakes Management Society, where he co-leads the Section 314 Working Group advocating for improved federal lakes funding. Ben lives in the City of Fairfax, where he's resided since his graduation from George Mason University's Environmental and Sustainability Studies bachelors program in 2020.

Photosynthetic Rate and Pigment Composition of Microseira wollei, a toxin-producing cyanobacterium, over an annual cycle in the tidal freshwater Potomac River, VA, USA

Hannah Toney, GMU

Microseira wollei, a toxin-producing cyanobacterium described in 1870's, has emerged as a significant public health hazard in various freshwater habitats in the eastern U.S. The taxon has been observed in the freshwater Potomac River for at least a decade. In 2024, drifting balls and mats were collected monthly on the Potomac River near a large Vallisneria bed in the Potomac River for analysis. Growth potential as measured by C-14 uptake was combined with pigment, organic weight, and morphological viable cells data to determine how these population characteristics varied seasonally. We hypothesized that this organism would be healthiest in the summer than the cooler months of the year based on temperature. C-14 uptake showed a significant increase with increasing temperature from summer through winter. The ratios between Chlorophyll a to Phycocyanin and Chlorophyll a to Organic Weight had a positive correlation. The study will continue through an annual cycle.

Continue the Conversation

Join other conference attendees for an optional happy hour after the conference to continue the discussion!

Location:

Brickmakers Cafe

9751 Ox Rd, Lorton, VA