Spring 2022 Workshop Agenda
North Carolina Lake Management Society
Theme: *Applied Science*

On-line, Friday, April 29, 2022

8:45 AM Welcome: Maverick Raber, President, N.C. Lake Management Society
Mechanics of this workshop: Maryann Krisovitch, Executive Director, NC Lake Management Society

Presenters:

9:00 – 11:00 AM Remote and Hands-On Sampling, Craig Hoover, Moderator

Jill Tucker – North Carolina Division of Water Resources Intensive Survey Branch
"Bathymetric Mapping Portions of the Cape Fear River"

Courtney Di Vittorio - Wake Forest University
"Enhancing Perspectives on Lake Impairments using Satellite Observations: A Case Study at High Rock Lake, NC"

A word from our much-appreciated sponsors!

Amy Grogan – University of North Carolina Wilmington
“Wet detention ponds: Their Water Chemistry and Harmful Algal Blooms”

Maverick Raber – Duke Energy
“Surface Water Sampling from Drones”

11:00 – 11:30 AM Coffee Break

11:30 – 1:00 PM, Lake Management Efforts, Matthew Phillips, Moderator

Christine Cailleret – City of Durham
“The Ellerbe Beaver Dam Study

Kevin Dockendorf – NC Wildlife Resources Commission
“Integrated Carp Management Approaches in Lake Mattamuskeet”

Brandon Jones – Catawba Riverkeeper
"The Use of Thrips to Control Alligatorweed"

1:00 PM	General Membership Meeting, Secretary's report, Treasurer's report, old business, new business, other items including fall elections, fall meeting
1:30 PM	Wrap up

NC Lake Management Society Current Leadership

President – Maverick Raber, Duke Energy
Past-President – Dr. Mike Mallin, UNC Wilmington
President-Elect – open
Treasurer – Mark Vander Borgh, NC Division of Water Resources
Secretary – Matthew Phillips, Charlotte-Mecklenburg Storm Water Services
Member-at-Large – Brandon Jones, Catawba Riverkeeper
Member-at-Large – Craig A. Hoover, Water Sciences Section, NCDEQ
Student Representative – Cheyenne Lewis

Executive Director – Maryann Krisovitch

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Spring 2022 Workshop

On-line; April 29, 2022

Abstracts

Cape Fear River Bathymetry Studies by the North Carolina Department of Environmental Quality

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The NC Department of Water Resources (DWR) began collecting bathymetric data in 2015 to support model development for the middle Cape Fear River. Limited resources and poor boat accessibility prevented bathymetric information from being collected on the reach below the Buckhorn Dam downriver to Fayetteville. The Intensive Survey Branch was tasked with collecting this data on the 52-mile shallow and rocky stretch of the Cape Fear River by utilizing Lowrance GPS and transducer systems mounted to canoes. The data was processed by Biobase, and submitted to DWR Planning Section's Modeling and Assessment Branch (MAB). MAB may now use this data to increase accuracy in their models of water quality and hydrodynamics on the middle Cape Fear River. This increased model confidence may be directly applied to supporting NPDES permitting decisions, provide additional information to public water supplies and existing impaired waters, and to support numeric nutrient criteria and conditions associated with algal bloom frequency and duration

Bio: Jillian Tucker has a B.S. Marine Science: Biological Oceanography and a B.S. in Plant Biology from North Carolina State University. She works for NC DEQ's Division of Water Resources in the Intensive Survey Branch. Our group focuses mainly on maintaining a long term water quality database for NC's lakes and reservoirs. We also have the opportunity to undertake special studies, such as our project to provide detailed bathymetry mapping for the mid Cape Fear River to assist DEQ's Modeling Branch.
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Enhancing Perspectives on Lake Impairments using Satellite Observations: A Case Study at High Rock Lake, NC

Courtney Di Vittorio
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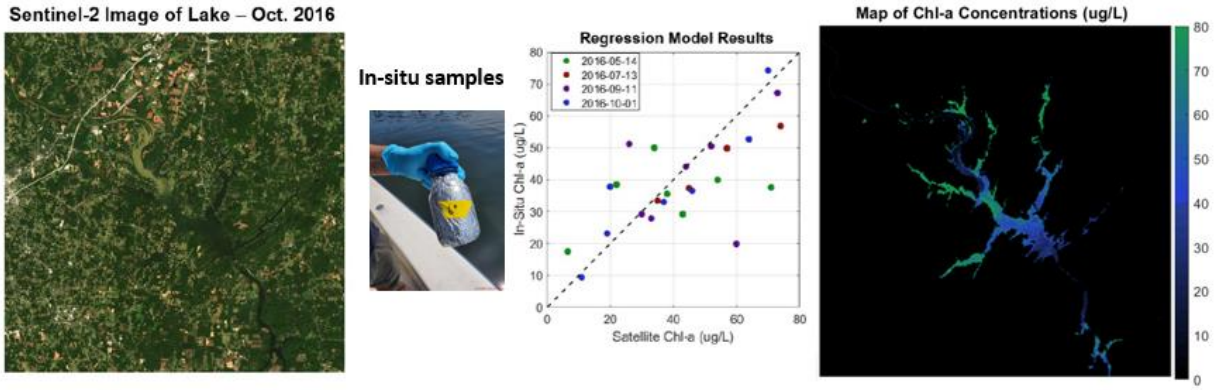
Lakes and reservoirs that are on the 303(d) list require water quality improvement plans that limit pollutant loads and establish effective monitoring plans. These plans are ideally developed by a diverse stakeholder group that collectively supports the proposed management interventions. However, this planning process is often limited by the accuracy and consistency of in-situ water quality databases that can be extremely expensive to maintain. Satellite-derived water quality estimates can augment in-situ databases and fill spatial and temporal gaps, providing a cost-effective approach toward more holistic and comprehensive planning and monitoring. Despite the potential cost savings and improved understanding of lake conditions, stakeholders have been reluctant to integrate satellite estimates into their decision-making process, in part due to limited demonstrations on how this information can be used to complement existing decision-making tools, as opposed to replacing them entirely. This research illustrates how satellite-derived water quality estimates of turbidity and total suspended sediment can be applied to enhance perspectives on lake impairments, with a focus on High Rock Lake, NC. The satellite-based estimates are compared to in-situ measurements and simulations from a physical model using multiple summary statistics and decision-making metrics, illustrating how this information can used to answer stakeholder-driven questions. This analysis serves as a foundation for future research on satellite-derived Chlorophyll-a estimates, an important parameter considering High Rock Lake is serving as a pilot for site-specific Chlorophyll-*a* standards in North Carolina (NC Nutrient Criteria SAC, 2020).

Bio: Courtney Di Vittorio is a Professional Engineer (PE) and an Assistant Professor at Wake Forest University in the Engineering Department. She worked in heavy civil construction prior to earning a Ph.D. in Civil Engineering from the Georgia Institute of Technology. Her research broadly focuses on developing new datasets and models that can support stakeholders who are managing complex and uncertain hydrologic systems.



Wet Detention Ponds: Their Water Chemistry and Harmful Algal Blooms

Amy E. Grogan, *UNC Wilmington Department of Biology and Marine Biology*
Michael A. Mallin, *UNC Wilmington Center for Marine Sciences*
Catharina Alves de Souza, *UNC Wilmington Center for Marine Sciences*
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Blooms of cyanobacteria are becomingly increasingly common and problematic in freshwater environments. Eutrophication and increased climate warming have been identified as two of the most influential factors driving harmful algae blooms (HAB). One of the largest sources of nutrients to freshwater bodies is stormwater runoff. As such, stormwater detention ponds in urban areas have become a hot spot for cyanobacterial HABs. Over the course of the last three years (2019 – present) forty blooms have been collected in the New Hanover County area and thirty-seven algal taxa have been identified. Cyanobacteria was found to be the dominant taxa in roughly 64% of all sampled blooms with 17 unique genera identified. Both temperature and nutrient concentrations were found to be significant factors influencing bloom type and intensity. The presence of microcystin congeners was noted in several blooms (as identified with Abraxis test strips), and a successfully isolated strain of *Cuspidothrix issatschenkoi* was found to produce saxitoxin. As twelve of the seventeen different genera of cyanobacteria identified are capable of toxin synthesis it is very likely that the toxic profile of many sampled blooms includes more than microcystin. The large majority of samples were collected in neighborhood ponds or recreational areas demonstrating the need for additional efforts in the surveillance of cyano-HABs to ensure environmental health and public safety.

Bio: Amy Grogan is a Ph.D. student in the UNC Wilmington Department of Biology and Marine Biology, with affiliation with the Center for Marine Sciences. She holds an M.S. from Coastal Carolina University and a B.S. from Richard Stockton University. Her dissertation research examines several facets of water pollution with a strong emphasis on algal bloom ecology, especially factors influencing occurrence, frequency, dominant taxa, and toxicity of algal blooms in freshwater systems. She also has a strong passion for education and teaches biology and marine biology lab courses.

Surface Water Sampling from Drones

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Surface water sampling is used to assess environmental conditions of streams, rivers, ponds, lakes, and other surface water bodies over time. Conventional methods of surface water sampling involve dipping a container into the water by hand or pumping water into a container using tubing. These methods have traditionally relied on the use of on-site personnel that must travel to and from the designated sample location. However, access to these locations may be logistically prohibitive due to restricted access, high flows, steep terrain, and other considerations. Further, desired or program-required sampling locations may present significant safety risks. Recent advancements using remote platforms (i.e. drones) can help mitigate these logistical factors and safety risks. Duke Energy has developed two patent-pending sampling devices that can be tethered to aerial drones. These devices address sample method and sample volume requirements to satisfy monitoring program needs while ensuring the safety of field staff.

Bio: Maverick is the Manager of the Surface Water Science & Environmental Instrumentation team for Duke Energy and is based out of McGuire Nuclear Station on Lake Norman. His team supports surface water monitoring on lake and rivers associated with Duke Energy's power plants in the western service territory of the Carolinas. He grew up near Asheville and attended UNCW, where he obtained a B.S. in Environmental Science and an M.S. in Geology. He has 20 years of diverse experience on waterbodies throughout the southeast during his tenures working for the USGS, NCDEQ, City of Durham, multiple consulting firms, and Duke Energy, and he is passionate about the outdoors.

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Ellerbe Creek Beaver Dam Study – City of Durham 2018

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The Ellerbe Beaver Dam Study analyzed the use of a beaver pond leveler as a method to increase dissolved oxygen (DO) downstream of a beaver pond as an alternative to relocating the beavers. A beaver pond leveler was installed in Ellerbe Creek and dissolved oxygen data were collected using a DO logger while the pond leveler was both active and inactive. Data was collected between 1/12/2018 – 9/20/2018. During this project, many unforeseen issues arose and multiple project adjustments were required. Data from this project showed the pond leveler did minimally increase downstream DO, however, these effects were small and were only maintained for periods of time directly following rain events. Based on the results of this project, the beaver pond leveler appears to be more suited for managing water levels and remediating potential flooding issues caused by beaver dams than for increasing downstream DO concentrations.

Bio: Christine Cailleret has been with the City of Durham Stormwater and GIS Services Division in the Water Quality Group since 2015 and currently holds the position of Environmental Planning and Compliance Coordinator. As part of the Water Quality Group, Christine is the project manager for the City's Ambient Monitoring Program and has been involved with IDDE work, and multiple City special projects including Falls Lake sampling, and various watershed studies. Christine has a B.S. in Biology from Allegheny College in Meadville, PA, and an M.S. in Environmental Science from Trinity College Dublin.

Advanced Bluegill Stockings at Lake Mattamuskeet to Control Common Carp Overabundance

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Advanced bluegill stocking has been found in whole-lake experiments to be an effective biocontrol mechanism during early life stages of common carp where the common carp eggs and larvae are a preferred food for bluegill. At Lake Mattamuskeet (16,187 ha), the overpopulation of Common Carp *Cyprinus carpio* (2018 estimate of 900,000 common carp weighing 4 million pounds) has devasted the submerged aquatic vegetation (SAV) that is integral to migratory waterfowl of the Atlantic Flyway and fish and wildlife resources present. Common Carp may be considered the “feral hog of shallow water ecosystems” through their behavior to feed upon aquatic bugs in the sediment that uproots the existing vegetation (USFWS reports 0% SAV coverage in last 5 years). This overabundance of common carp increases the turbidity and exceeds the capability of the existing population of bluegills and other predators to limit common carp abundance. In March 2022, NCWRC staff and local volunteers stocked 175,808 advanced sized bluegills (2-4 inches) prior to common carp spawning and with the intent for these bluegills to prey on carp eggs. Coupled with preventative barriers to keep adult carp out and upcoming biomass removal of adult common carp in October 2022, these advanced bluegill stockings are intended to limit the recruitment of common carp by eating the common carp eggs and larvae. These integrated pest management approaches are intended to contribute to the overall goal to significantly reduce the Common Carp biomass at Lake Mattamuskeet and improve the SAV abundance to benefit the lake ecosystem.

Bio: Kevin is a fisheries research coordinator with the NCWRC Inland Fisheries Division. Kevin has conducted fisheries research and angler surveys in coastal North Carolina since 2003. Kevin received his M.S. degree from University of Florida and B.S. degree from Iowa State University. He is currently NCAFS Mentoring Committee - Chair NCWRC Leadership Development Program – Cohort I, American Fisheries Society (AFS) Certified Fisheries Professional #3366 and Candidate for AFS Second Vice-President

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The Use of Thrips to Control Alligatorweed

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Alligatorweed is an aquatic invasive plant native to South America that began threatening the Catawba-Wateree ecosystem in the 1980s. This rooted perennial herb can create navigational hazards, increase sedimentation, reduce sunlight penetration, impact recreational uses, and reduce species diversity. The most utilized biological control, alligatorweed flea beetles (*Agasicles hygrophila*), will only overwinter where the average January temperature is 11°C (51.8°F) or warmer putting areas in North Carolina and upper South Carolina out of the species tolerance range. With few options for eradication or management, it has spread throughout the system with population estimates over 100 acres on Lake Wylie alone. Another biological control, alligatorweed thrips, have been identified and successfully established in eastern NC by the Onslow Cooperative Extension. They appear to be cold tolerant but have not traditionally been used due to their lack of self-dispersal. Our organization partnered with Duke Energy's Aquatic Plant Management staff, NCWRC, and other partners to design a volunteer driven propagation and dispersal plan. This pilot program is now in it's second year with the first 2022 survey and restocking scheduled for May.

Bio: Brandon is the lead scientist and advocate at the Catawba Riverkeeper Foundation. He received a B.A. in Economics from UNC-Chapel Hill and an M.S. in Earth Science from UNC-Charlotte. His team focuses on reducing stormwater and permitted pollution while encouraging restoration to ensure that surface waters are swimmable, fishable, and drinkable.