

# Water Quality Extension Newsletter

## WHAT'S NEW

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Photo by M. P. Hayes

## UPCOMING EVENTS

### JANUARY

The team is growing! Welcoming new  
graduate student Enamul Moni

Louisiana Turf Association Water  
Quality Lecture

### FEBRUARY

Crawfish pond dissolved oxygen project  
will be in full swing!

### MARCH

Fifth Wastewater Installers Workshop  
will be offered and Louisiana Sea Grant  
Fisheries Summit!

## Let the water flow, and BlueBoat go!

The team is starting the 2025 year off with exciting strides in getting our BlueBoat or "water drone" operational for surveys of waterways across the state. The immediate focus will be on crawfish ponds to understand dissolved oxygen dispersion, but the applications are being leveraged for wastewater treatment ponds and impaired tributaries across the state. Our students have been hard at work making sure the sensors are calibrated and ready to collect impactful data. Check out the research page for more on the validation strategy and future plan.



## Louisiana Student Engagement

This quarter yielded many opportunities to engage students across the southeast on water quality issues and career pathways. Dr. Hayes was able to give three separate lectures to Nicholls State University's Chemistry Department, Southern University's Environmental Toxicology, and LSU's Ag Residents College to showcase some of the lab's interesting research and how it applies to the communities these students live in. It is imperative that future scientists see the value in protecting the natural systems around them. The diverse research pathways the Water Quality Extension Lab has are applicable to students with a wide range of academic backgrounds. This student lecture series promotes science from non-traditional backgrounds similar to Dr. Hayes's liberal arts undergraduate education. The goal is to increase awareness of the Water Quality Extension Lab's mission and spark potential interest in graduate positions for students to explore innovative water-based science.

## New Graduate Student

The Water Quality Extension Lab is excited to have a new graduate student joining the team! Md Enamul Haque Moni will be a Ph.D. candidate with a research focus on fluorescent dissolved organic matter in various environmental systems. He joins the team with a Master's in Soil Science from the LSU School for Plant, Environment and Soil Science (based at the Macon Ridge Research Station). His research focused on spatial and temporal variation of soil sampling for phosphorus and potassium recommendations to benefit crop production and the response of corn/soy crops to nutrient application rates. Prior to LSU, Enamul received his Bachelor's from Bangladesh Agricultural University with a focus on soil science and agricultural chemistry. His research background builds a foundation for advanced instrumental analysis of DOM in agricultural systems. Working with the new Horiba Aqualog, his research is anticipated to start as soon as the instrument is unpacked with a variety of samples and validation tests eagerly waiting for him. The lab is excited to continue growing and looks forward to the great research our students continue to produce.



Photo by Maud Walsh

## Waste Characterization Profile for Research

Dr. Hayes' USDA Hatch Project has yielded many different waste characterizations from readily available resources across the state. The lab is happy to collaborate with any faculty that has a research need for waste materials. For instance, waste with high calcium content may be used for coastal restoration projects to mimic oyster shells. The thorough chemical analysis (conducted by LSU AgChemistry) can be used to match matrices of current research products with readily available waste streams. If interested in collaborating, please email [mhayes@agcenter.lsu.edu](mailto:mhayes@agcenter.lsu.edu) for more information on waste products that have been analyzed.




## Be on the Team to Think Downstream Series

**LSU AgCenter**  
Research Extension Teaching

BE ON THE TEAM TO THINK DOWNSTREAM:  
**DISSOLVED OXYGEN**

**WHAT IS DISSOLVED OXYGEN?**

Dissolved oxygen, often referred to as DO, is the oxygen in water that is available to support aquatic organisms like fish and algae. The oxygen in the water can be directly dissolved from the air or produced by aquatic plants during photosynthesis. Many different environmental conditions can affect the amount of DO in the water, which is why DO indicates other pollution and environmental issues.




Shallow, stagnant water increases the risk of dissolved oxygen depletion. Photo by M.P. Hayes

**LSU AgCenter**  
Research Extension Teaching

BE ON THE TEAM TO THINK DOWNSTREAM:  
**NITROGEN**

**WHAT IS THE PARAMETER?**

Nitrogen is a key nutrient in water systems and is essential for plant and animal life. Though nitrogen is needed for an ecosystem to thrive, anything in excess can cause impairments. The common forms of nitrogen are nitrate ( $\text{NO}_3^-$ ), nitrite ( $\text{NO}_2^-$ ) and ammonium ( $\text{NH}_4^+$ ). These different forms are present in many types of fertilizers or natural organic matter.



Marsh landscapes inundate water with natural sources of nutrients from runoff and plant decomposition. Photo by M.P. Hayes

The Water Quality Extension Lab recently worked with Dr. Ed Bush to create an extension series around water quality parameters. This factsheet series is meant to provide educational materials for communities on impactful water quality metrics while also identifying additional resources to learn about the immediate impact in the local area. Specifically citing the Louisiana Department of Environmental Quality (DEQ) Water Quality Integrated Report, the factsheets outline the sources where these frequent impairments come from and the traditional management practices. For stakeholders, it is important to have readily available information to better understand the impact parameters may have on the surrounding environment. This can help make connections between current practices and established best management practices to reduce the potential risk of downstream issues. The publication series has dissolved oxygen, *Fecal Coliform*, nitrogen, pesticides, pH, salinity, and temperature. In the future, the goal will be to put additional factsheets together for metals, phosphorus, algae, turbidity, sulfates, and total suspended solids (TSS). All the extension publications produced by the lab can be found on the [LSU AgCenter website](#) or the [Water Quality Extension Lab](#)'s homepage.

## Hayes Takes Leadership Position with SERA-46 Multi-State Group

The [Southern Extension and Research Activities Committee Number 46 \(SERA-46\)](#) is made up of land grant universities throughout the Mississippi River basin. This group brings together researchers and extension specialists who share a common interest and expertise related to the environmental, social and economic factors that contribute to nutrient loss from agricultural lands and hypoxia in the Gulf of Mexico. This USDA National Institute of Food and Agriculture (NIFA) and land-grant university-funded committees are designed to promote multi-state research and extension activities, communicate strategies for conversation and inform stakeholders on nutrient reduction strategies. In the Fall of 2024, Dr. Hayes was appointed secretary of the multi-state group and works directly with Dr. Matt Helmers (Agricultural and Biosystems Engineering Iowa State University) and Dr. Noel Aloysius (Biological Engineering University of Missouri) to coordinate the group's future direction. Additionally, Dr. Hayes has a seat on the Communication Strategy Subgroup where he works with a team of faculty from Wisconsin, Kentucky and Illinois to develop a plan for the next four years to disseminate information to the stakeholder networks which includes federal agencies, local governments, associations and farming stakeholders. SERA-46 is currently in the process of building a database for collaborative research opportunities in the Mississippi River basin's land grant network. In future newsletters, be on the lookout for opportunities to engage with other university faculty or extension specialists on programs in their respective areas.

## Seed Grant for Seafood Waste Project

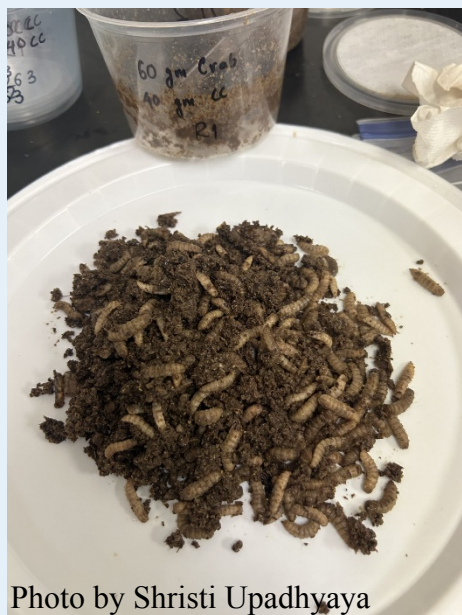


Photo by Shristi Upadhyaya

In collaboration with Dr. Damon Abdi and Dr. Jeff Plumlee, the lab has secured seed grant funding from LSU AgCenter's Center of Excellence in Crop Development. The proposal titled, "Developing the Framework for Louisiana Waste Valorization Network from Seafood Processors to Agricultural Farms" sets to establish preliminary datasets for the chemical characterization of seafood waste to larvae feedstock and organic frass fertilizer. Late last semester, the first round of cup trials was expanded to encompass a variety of waste blends to compare to standard diet controls. Once the characterization is returned from the LSU AgChemistry labs, the next round will scale the selected waste blends to macro trials for larvae and frass to be tested for food web dynamics. The bulk density and survival rate results from the expanded cup trials showed favorable results for blends up to 60% seafood waste to 40% standard diet. The team eagerly awaits the next round of testing to explore the nutrient content of the frass and anticipates moving into the small-scale plant trials at the Hammond Research Station during the summer.

## Research Development and Validation for "Water Drone"

Over the last few months, the team has done extensive design and validations for water quality parameters collected by the BlueBoat and YSI EXO2 sensors. Before starting any research with crawfish ponds, the lab took great care to ensure the data was accurate and the methodology repeatable. Mason Marcantel (graduate students) and Nick Wagner (undergraduate student) have been doing trials on LSU Lake that incorporate stationary sensors to monitor BlueBoat sensor readings at the same location. These data points will be used to determine the optimal speed and equilibration time for the boat to establish valid datasets. For instance, even though at low speeds the sensors can collect the nitrate and temperature data, the dissolved oxygen (DO) may vary due to water disturbance by the vessel's forward momentum. In this case, the sensor may need to be stationary for 10 seconds to accurately measure the DO and will be programmed into the BlueBoat's automated mission. Dr. Hayes is currently in the process of securing a second BlueBoat and sensor set up to have two separate units for environmental monitoring and wastewater treatment surveys. The team is planning to leverage the vessel and sensors for an upcoming proposal that optimizes water quality and energy at wastewater treatment ponds. Associating DO profiles to nutrient intake can give facilities a more targeted approach to DO generation to scale back energy use in rural areas. Additionally, this technology is a great opportunity to expand water quality resources throughout the state. The lab will be building a program to train students from other universities on "Water Drone" sensing to promote the future of water quality research.





## Yearly Review for Onsite Wastewater Installers Workshop

After a year of collaborating with the Louisiana Department of Health (LDH), we successfully host the Onsite Wastewater Installers workshop in four locations (Hammond, Alexandria, Baton Rouge and Crowley). The course is designed to educate installers, haulers, sub-manufacturers and manufacturers of wastewater systems on proper treatment techniques for sewage to prevent untreated or improperly treated sewage from being discharged into the environment. We were able to certify 83 installers (~92% of the course participants) this year with 49 professionals seeking the licenses for the first time. The dates for the 2025 workshops have officially been released to continue working with new and renewal license applicants. Along with the workshop, the lab is working with LDH to produce an extension publication series for septic systems including sanitary code, regulation and homeowners guides to better understand preventative maintenance, navigate floods and general details on how the different configurations work. The goal of this series is to have a platform through local installers, academics and state agencies to promote healthier septic systems that will lead to safe watersheds across the state. Be on the lookout for the series to go live in early Spring 2025. If you are an ANR agent or faculty interested in more information about tailoring a workshop for your area or community, feel free to email [mahyes@agcenter.lsu.edu](mailto:mahyes@agcenter.lsu.edu) to start planning.

## ANR Training

The Hammond Research Station hosted the southwest ANR Agent Training in November with a focus on pond health. Dr. Hayes was invited to give a lecture on "Understanding Pond Health through Water Quality Parameters". The presentation highlighted available state and university resources to help mitigate persistent water quality issues in pond settings. An emphasis on the use of handheld field sensors for immediate results to provide recommendations was coupled with a short demonstration of new technology for water quality solutions. The demonstration included the team's BlueBoat with YSI EXO2 sensor and a look at the floating photovoltaic systems for energy production and pond stability. Agents are always encouraged to reach out with persistent water quality issues to come up with extension publications tailored toward common issues seen in the field. These publications can be easily disseminated to stakeholders for accessible and practical recommendations to mitigate water quality issues.

## Content Created

### Presentations

Hayes, M., Experimental Analysis of Floating Photovoltaic (FPV) Systems for Louisiana Community Resiliency. Industry-LSU Energy Innovation Workshop. Baton Rouge, LA. November 11, 2024

Hayes, M., Understanding Pond Health through Water Quality Parameters. Southeast ANR Agent Training. Hammond, LA. November 5, 2024

Hayes, M., Agricultural Water Quality in Louisiana. Agricultural Residential College Seminar. Baton Rouge, LA. November 4, 2024

## **Content Created (cont.)**

### **Presentations**

202414. Hayes, M. Water Quality and Irrigation: Sources and Solutions. Louisiana Irrigation Association (LIA) Recertification Meeting. Baton Rouge, LA. October 17, 2024

### **Extension Publications**

Hayes, M, Bush, E., and Nolan, R., Be on the Team to Think Downstream: Salinity. Fact Sheets. Lead Author. December 2024. Pub. # P3975-G.

Hayes, M, Bush, E., and Nolan, R., Be on the Team to Think Downstream: pH. Fact Sheets. Lead Author. December 2024. Pub. # P3975-F.

Hayes, M, Bush, E., and Nolan, R., Be on the Team to Think Downstream: Nitrogen. Fact Sheets. Lead Author. December 2024. Pub. # P3975-E.

Hayes, M, Bush, E., and Nolan, R., Be on the Team to Think Downstream: Pesticides. Fact Sheets. Lead Author. December 2024. Pub. # P3975-D.

Hayes, M, Bush, E., and Nolan, R., Be on the Team to Think Downstream: Fecal Coliform/Enterococcus. Fact Sheets. Lead Author. December 2024. Pub. # P3975-C.

Hayes, M, Bush, E., and Nolan, R., Be on the Team to Think Downstream: Temperature. Fact Sheets. Lead Author. December 2024. Pub. # P3975-B.

Hayes, M, Bush, E., and Nolan, R., Be on the Team to Think Downstream: Dissolved Oxygen. Fact Sheets. Lead Author. December 2024. Pub. # P3975-A.

Hayes, M and Bui, T., Better Water Practices: Water Conservation Tips. Fact Sheets. Lead Author. December 2024. Pub. # P3974.

Hayes, M., Conger, S., DeBoer, E., Louisiana Salinity Field Reference for Agriculture. Fact Sheet. Lead Author. October 2024. Pub. #3969.

Hayes, M., 2024. Using Technology to Create Pond Health Profile. Louisiana Nursery and Landscape. Winter 2024. Volume 89

Hayes, M. Agricultural Water and Energy Conservation Using Floating Solar Panels. Louisiana Agriculture. Fall 2024. Volume 67 Number 4 Page 24-25.

### **Other Mass Media**

Using Pond for Energy Production. LSU AgCenter: Matt Faust. December 2024. Content Expert.

Using Wastewater as Fertilizer by Karen Henderson. Louisiana Considered on WWNO/WRKF Radio Pod Cast. November 25, 2024. Interviewed.