APRIL 2026: YEAR 3, ISSUE 10

Water Quality Extension Newsletter

WHAT'S NEW

Photo by M.P. Hayes

UPCOMING EVENTS

APRIL

P2 FARM site visits scheduled for multiple locations and book chapter submission due!

MAY

Onsite Wastewater Installers Course in Alexandria and 3rd year tenure committee meeting.

JUNE

Invited talk at the IEEE Photovoltaic Specialists Conference (PVSC) for Floating Solar Project

Let the Water Flow and Community Know!

With the lab's stakeholder and community networks, the growing initiative for research and extension has been to Think Downstream. Many of our talks and workshops have a key philosophical principle derived from the definition of stewardship - the act of managing something with care and responsibility. We encourage people to focus on water stewardship, which is the responsible use of water that is sustainable and beneficial to the economy. But it is more than that for people in our state... It's the responsible use of water for your community and the people downstream. Educating people that the water they put into the streams, bayous and tributaries is the same water that others use for agricultural irrigation or drinking water has been an eye-opening endeavor and the focus for many of our current grant opportunities.

LSU AgCenter
Research · Extension · Teaching

Sea Grant
LOUISIANA

ACS Review Publication

This journal article titled, "Unlocking Soil Health and Surface Water Quality Management: A Review on Fluorescent Dissolved Organic Matter (fDOM) in Agricultural Systems," was published in the American Chemical Society's Journal of Agricultural and Food Chemistry. It outlines the impact of various best management practices (BMPs) on soil organic matter and provides the framework for analysis using fluorescence. This methodology is an innovative approach to understanding parent source materials and carbon signatures from runoff. The calculated indices can distinguish intensities of the carbon molecular weight, biological activity and humification to trace the availability of carbon sources, while comprehensive data sets use parallel factor analysis (PARAFAC) to determine parent source components. This publication has led to an invited book chapter that the team is currently working to complete.

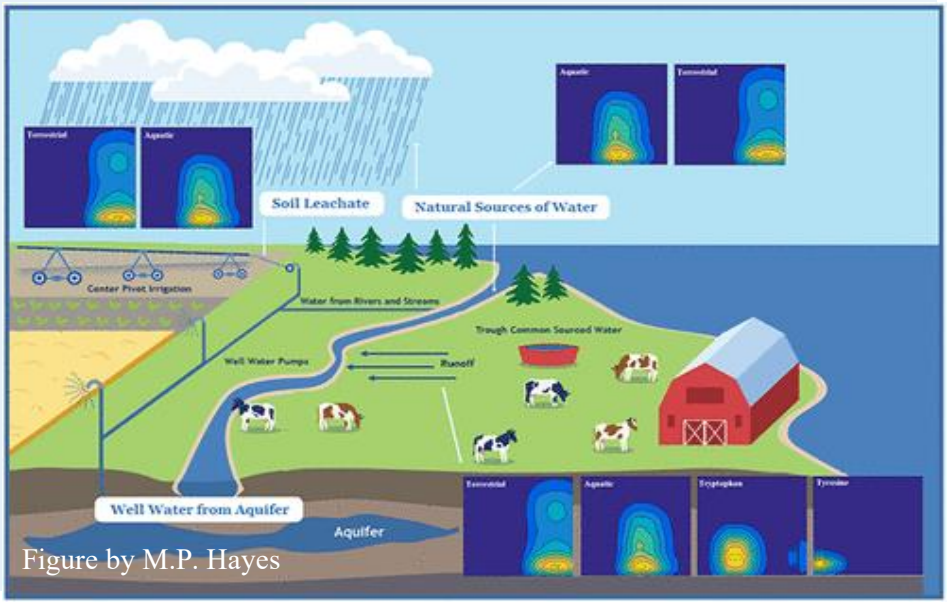


Figure by M.P. Hayes

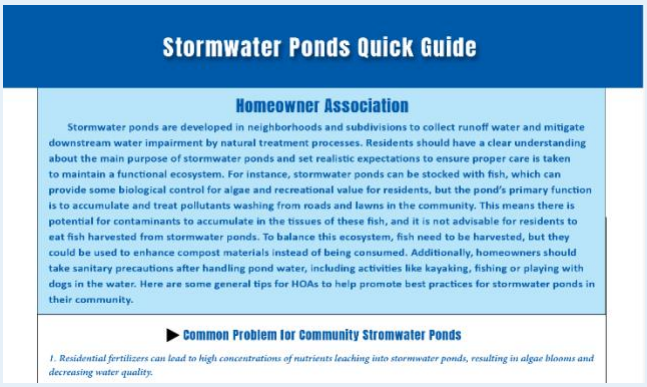
Gulf Scholar Students

The lab is excited to host two Gulf Scholars undergraduate researchers this summer from the LSU Discover Program. Nevaeh Barriere is a rising junior in Coastal Environmental Science at LSU. Her career focus is on addressing the impacts of water quality on drinking water security. She looks to couple the field and data-based research to expand her skills and scientific background. Chelsea Kasuli is a junior majoring in Kinesiology at LSU. Her interest in the lab was focused around gain an understanding of how environmental factors lead to impacts on human health. The water quality emphasis will help connect scientific data collection of identified impairments, sustainable solutions and community education. Their projects will focus on different areas of the state to develop water quality indexing for drinking water and septic system impairments. Each student has selected a region based on impacted areas and contaminants to develop the single water parameter metrics. They will have the opportunity to work with both advanced datasets, train on field sampling instrumentation and learn from graduate students on benchtop instrumentation to create a well-rounded summer research experience.

Lab's New Total Carbon Analyzer!

Our lab has officially installed a Shimadzu TOC-L Analyzer! This instrument provides the capability to determine concentrations of total carbon (TC), total inorganic carbon (TIC) and calculated total organic carbon (TOC) through a combustion catalytic oxidation method. The combustion catalytic oxidation method efficiently oxidizes not only easily-decomposed, low-molecular-weight organic compounds, but also insoluble, macromolecular organic compounds. The TOC analysis can be coupled with fDOM to provide valuable SUVA ratios as reference points for various environmental systems. If you are interested in having aqueous samples analyzed, please email mhayes@agcenter.lsu.edu for more information.

Stormwater Pond Factsheet Series



In a collaborative effort by the Louisiana Sea Grant team, our lab worked with Dr. Greg Lutz and Carol Franze to produce a 10-part factsheet series on Stormwater Ponds in proactive anticipation of the spring season. This factsheet series is meant to provide educational materials for communities on impactful water quality metrics while also emphasizing best management practices and preventative action for pond health. The series has two parts: Community and Commercial Stormwater Ponds Factsheets, and Quick Guides for Target Audiences. The first set of factsheets are dedicated to various challenges that impact ponds, while providing maintenance strategies and connections to potential causes. In addition, these fact sheets show optimal design and optimization of space to maximize the value of stormwater ponds. The second Quick Guide series focuses on specific groups that may have questions about stormwater ponds. For example, the Homeowner Association provides tips for neighborhoods to manage ponds for day-to-day recreation activities. A big thank you to the entire Sea Grant team (Robert, Roy and Kelli) for creating the formatting and supporting the review process! Check out the series at the Water Quality Extension Lab website.

Introducing the EPA-Funded P2 FARM Program

A new extension grant has been awarded to Dr. Hayes and the Water Quality Extension Lab for experiential learning programs that engage stakeholders with students and faculty for water-related recommendations. The EPA Pollution Prevention for Food and Agricultural Rural Manufacturers (P2 FARM) program is a two-year grant to establish technical assistance for sustainability recommendations (water, waste and energy) for many of the LSU AgCenter stakeholders' networks. Dr. Hayes led the grant in collaboration with LSU Engineering to engage students in field assessments to broaden the reach of their classroom learning in both environmental management systems and engineering disciplines. This year, the team will travel to eight different facilities to help manufacturers and processors understand their resource footprint and find practical solutions to persistent issues. The lab will be providing characterization for water and non-hazardous waste samples to provide alternative uses and value-added opportunities. In the final report to the facility, federal opportunities are outlined for potential implementation of projects to promote adoption of the recommendations. Another grant product is working with facilities to build case studies and success stories around recommendations. Additionally, the team is working with the Louisiana Department of Agriculture and Forestry to present at events centric to their Certified Louisiana program to provide resources to Louisiana-based food manufacturers. For facilities interested in having our team at the site, please email mhayes@agcenter.lsu.edu for more information or to set up a call.

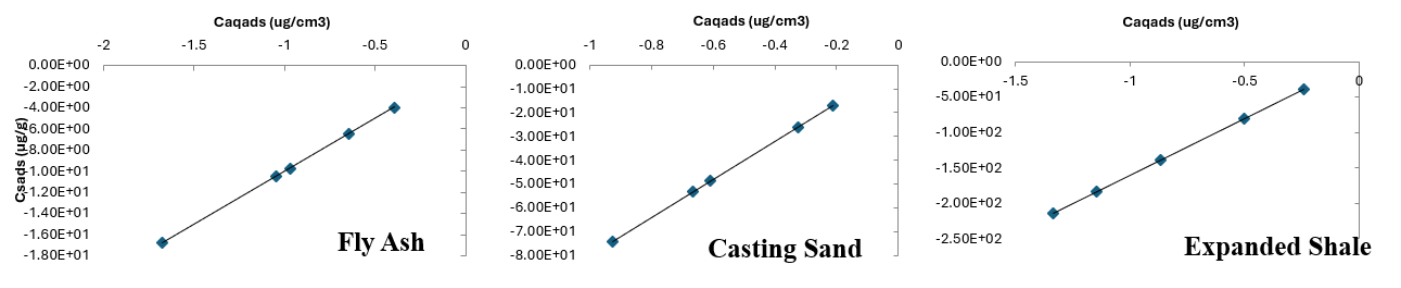
Agricultural Wastewater Effluent Tracing Project


Photo by M.P. Hayes

With the new funding for P2 FARM, the Water Quality Extension Lab will begin incorporating sample analysis into site visits to provide more accurate recommendations while working with facilities on potential waste valorization research. One area of emphasis is evaluating agricultural processors' wastewater effluent as a value-added fertilizer, using fluorescent dissolved organic matter (fDOM) tracing and nutrient analyzers to determine fertilizer potential. Many processing facilities generate wastewater rich in valuable nutrients, particularly nitrogen, phosphorus and carbon sources that, if at high concentrations, can contribute to water quality impairments. With the lab's analytical capabilities, the team will generate research data on various wastewater streams to demonstrate their potential for valorization or to estimate chemical dosing requirements for dissolved air flotation (DAF) treatment systems. For example, high protein levels from seafood processors can be quantified using fDOM microbial indicators and HPLC amino acid profiles to determine concentration patterns throughout the year based on production cycles. This information will give facilities a more accurate understanding of long-term chemical dosing costs if they choose to implement DAF systems.

Non-Hazardous Industrial Waste Adsorption of Phosphate

Mysha recently completed her project on the adsorption of phosphorus using industrial waste by-products compared with commercially available biosorbent materials. The research examined two unmodified industrial by-products: domestic wastewater treatment fly ash (FA) and spent foundry casting sand (CS)—alongside commercial expanded shale (Sh) as phosphorus adsorbents under standardized batch conditions simulating mildly acidic agricultural soil pore water. The goal was to evaluate the scalability of waste valorization strategies that could help reduce edge-of-field nutrient runoff. Excess phosphorus released into waterways from various sources can cause eutrophication and other harmful water quality impairments. Passive, low-cost sorption technologies capable of capturing dissolved orthophosphate and later returning the bound phosphorus to farmland are essential for addressing these global challenges. The Organization for Economic Co-operation and Development (OECD) Method 106 was used to establish a uniform and consistent procedure for describing sorption–desorption behavior between sorbates and sorbents. In addition to washing, waste-to-solution, adsorption and desorption trials, Freundlich isotherms were developed to calculate sorption–desorption hysteresis indices, which indicate the mobility of adsorbed phosphorus. Results showed that commercial expanded shale was the most effective biosorbent for irreversible phosphorus adsorption, while fly ash demonstrated comparable adsorption capacity with moderate irreversibility. Continued research will focus on understanding waste leaching behavior of persistent metal/contaminants to ensure safe environmental usage and identifying the range of compounds compatible with the sorption capacity of these waste materials.



Diverse Stakeholder Engagement

The first quarter of 2026 has started off with presentations for a diverse range of stakeholders that provide unique perspectives on water quality. The LSU AgCenter Pesticides Recertification Course was the first talk of the year, where professionals were educated on the degradation pathways from common pesticides as they break down and enter waterways. The chemistry behind pesticide transport is not only a valuable tool for professionals for compound selection, but also for residential homeowners to understand the importance of application rates. The next extension event was the ninth Onsite Wastewater Installers Course hosted at Hammond Research Station. There was a great turnout with 36 installers taking the workshop. This group was extremely engaged and had great questions, which focused on how septic installations can impact downstream public health. Additionally, they are the first class to have access to the new Septic Series publications that help provide both installers and residential homeowners with information preventative maintenance. Continuing the focus of the "Think Downstream" initiative of the Water Quality Extension Lab, the Air and Waste Management Association requested a presentation on the Connectivity of Science through Water and Waste. This was a joint event for students and industry professionals to learn about waste-centric projects at LSU and opportunities to get involved with research. Finally, the month concluded with a talk for the American Shrimp Processors Association about available federal resources for implementing sustainability recommendations at their facilities. They were also provided with an update on the insect rearing project for waste valorization of seafood shells and horticulture trials.

LSU Guest Lectures

This semester has been full of opportunities to provide expertise in water quality through various guest lectures around campus. The two courses this semester have targeted the environmental sensors as a focus point for student lectures. For the Renewable Natural Resources 4022: Principles of Aquaculture class, the two-day lecture focused on pond fertilization and management. This provided students with key chemical parameters that drive health in ponds for aquaculture stock. The lecture concluded with students getting to see the Water Analysis Vessel (WAV) and sensors for real-time data collection. The same technology made an appearance in the Biological and Agricultural Engineering 2350: Experimental Methods for Engineers course, where the lecture topic focused on the integration of technology to investigate Louisiana's water quality dynamics. Both lectures presented a great recruiting opportunity for EMS 4040: Environmental Instrumental Analysis, which will be taught in Spring 2027.

Content Created

Peer Review Publication

Moni, E., and **Hayes, M**. Unlocking Soil Health and Surface Water Quality Management: A Review on Fluorescence Dissolved Organic Matter (fDOM) in Agricultural Systems. Journal of Agricultural and Food Chemistry. 2026. **Journal Link**

Martinez, J., Islam, M., **Hayes, M**., and Bappy, M, AI-Enabled Modeling for Smart Rural Wastewater Treatment Systems: Current Practices and Remaining Gaps. Applied Water Science. 2026. **Journal Link**

Content Created (cont.)

Presentations and Demonstrations

Hayes, M. Projects and Resources for Processors. American Shrimp Processors Association Annual Meeting. Biloxi, MS. March 20, 2026

Wagner, N. and **Hayes, M.** BlueBoat Demonstration at Sea Grant Middle School Wastewater Treatment Program. Mary Ann Brown Nature Preserve for Scotlandville Middle School. St. Francisville, Louisiana. March 19, 2026

Hayes, M. Connectivity of Science through Water and Waste. Louisiana Section of the Air and Water Management Association. Baton Rouge, LA. March 19, 2026

Onsite Wastewater Installers Certification Workshop. Lead Chair. Louisiana Department of Health Sanitarian Program. Hammond, LA. March 19, 2026.

Hayes, M., Pesticides and Waterways: Identifying Chemical Fate and Transport. Hammond Research Station Pesticide Recertification Course. Hammond, LA. February 19, 2026

Extension Publications

Hayes, M., Franze, C., and Lutz, G., Stormwater Ponds Quick Guide: Maintenance and Operational Planning. Factsheet. *Lead Author.* February 2026. **Article Link**

Hayes, M., Franze, C., and Lutz, G., Stormwater Ponds Quick Guide: Landscape Professionals. Factsheet. *Lead Author.* February 2026. **Article Link**

Hayes, M., Franze, C., and Lutz, G., Stormwater Ponds Quick Guide: Homeowners Associations. Factsheet. *Lead Author.* February 2026. **Article Link**

Hayes, M., Franze, C., and Lutz, G., Stormwater Ponds Quick Guide: Developers and Commercial Industries. Factsheet. *Lead Author.* February 2026. **Article Link**

Hayes, M., Franze, C., and Lutz, G., Community and Commercial Stormwater Ponds: Water Movement. Factsheet. *Lead Author.* February 2026. **Article Link**

Hayes, M., Franze, C., and Lutz, G., Community and Commercial Stormwater Ponds: Design and Function. Factsheet. *Lead Author.* February 2026. **Article Link**

Hayes, M., Franze, C., and Lutz, G., Community and Commercial Stormwater Ponds: Parish Governments. Factsheet. *Lead Author.* February 2026. **Article Link**

Hayes, M., Franze, C., and Lutz, G., Community and Commercial Stormwater Ponds: Common Impacts on Water Quality. Factsheet. *Lead Author.* February 2026. **Article Link**

Hayes, M., Franze, C., and Lutz, G., Community and Commercial Stormwater Ponds: Challenges and Best Management Practices. Factsheet. *Lead Author.* February 2026. **Article Link**

Content Created (cont.)

Hayes, M., Franze, C., and Lutz, G., Community and Commercial Stormwater Ponds: Aquatic Vegetation Management. Factsheet. *Lead Author.* February 2026. **Article Link**

Hayes, M., and Bush, E., Be on the Team to Think Downstream: Color. Fact Sheets. *Lead Author.* January 2026. Pub. # P3975-O. **Article Link**

Hayes, M., and Bush, E., Be on the Team to Think Downstream: Sulfate. Fact Sheets. *Lead Author.* January 2026. Pub. # P3975-N. **Article Link**

Hayes, M., Bush, E., and Nolan, R.*, Be on the Team to Think Downstream: Total Dissolved Solids. Fact Sheets. *Lead Author.* January 2026. Pub. # P3975-M. **Article Link**

Hayes, M., Bush, E., and Nolan, R.*, Be on the Team to Think Downstream: Total Suspended Solids. Fact Sheets. *Lead Author.* January 2026. Pub. # P3975-L. **Article Link**

Hayes, M., Bush, E., and Nolan, R.*, Be on the Team to Think Downstream: Turbidity. Fact Sheets. *Lead Author.* January 2026. Pub. # P3975-K **Article Link**

Hayes, M., Bush, E., and Nolan, R.*, Be on the Team to Think Downstream: Algae. Fact Sheets. *Lead Author.* January 2026. Pub. # P3975-J. **Article Link**

Hayes, M., Bush, E., and Nolan, R.*, Be on the Team to Think Downstream: Phosphorus. Fact Sheets. *Lead Author.* January 2026. Pub. # P3975-I. **Article Link**

Hayes, M., Bush, E., and Nolan, R.*, Be on the Team to Think Downstream: Metal. Fact Sheets. *Lead Author.* January 2026. Pub. # P3975-H. **Article Link**

Hayes, M. Experiential Learning Programs for Agricultural Water. Louisiana Agriculture. Winter 2025. Volume 69 Number 1 Page 28-30. **Article Link**