

WHAT'S NEW

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Connectivity of Experiential Learning
Program for Students and Research
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Carbon and Metal Tracing Projects for
Greenhouse Trials (Page 4)

TEACHING – PAGE 5

A PI's Perspective and IEEE
Conference

UPCOMING EVENTS

JULY

Management Development Institute
Session 5 and more P2 FARM site visits

AUGUST

Onsite Wastewater Installers Course in
Baton Rouge and case study series
coming out.

SEPTEMBER

Management Development Institute
Session 6 and getting course material
together for Spring 2027 Course

Water Quality Extension Newsletter



Photo by M.P. Hayes

Let the water flow, and students define a new status quo!

Over the last three years, the students (both graduate and undergraduate) who have done research in the Water Quality Extension Lab have set the tone for fostering scientific discovery and the team's successful extension and research products. The lab has been fortunate to have motivated and curious student scientists join the team, eager to learn and develop new skills to take with them on their career journey. Our lab continually finds new resources to leverage for projects, while striving to provide a wide range of research and extension pathways to align students' interests and passions with stakeholders' immediate needs. By coupling these two important groups, the lab has created pathways for practical solutions for Louisiana communities, while developing the future scientific workforce with relevant skills for instrumental compound identification and tools to forecast resources for project implementation.



Spring LSU Discover Day

In April this year, our undergraduate research team had four poster presentations in the agricultural session to showcase their work over the last few semesters. Three graduating seniors presented a range of projects, including: Jalayne's Gulf Scholar research investigating nutrient dynamics in urban watersheds, Maddie's honors thesis research on the effects of urbanization on soil organic matter, and Keana's LSU AgCenter-funded project for caffeine tracing from spent coffee grounds. These seniors have used their research to build valuable tools for their next step into environmental careers. Additionally, Ruth (a junior chemistry major) presented her COA-funded project on the chemical characterization of crawfish boil water. She used this project to propel her interests in instrumental analysis to summer research and hopefully her first publication this fall!



Photo by M.P. Hayes

NSF GRFP Fellow

A big congratulations to Keana Howard for her recent National Science Foundation Graduate Research Fellowship Program award! Keana has been an undergraduate researcher in the Water Quality Extension Lab for 2.5 years, working on projects with the graduate students and leading her own project with funding from A. Wilbert's Sons Internship Program for "Evaluating the Release of Caffeine and Dissolved Organic Matter to the Environment from Composted Coffee Grounds". Last year, she applied for the very prestigious NSF GRFP funding and was selected for the fellowship. For an undergraduate to earn this distinction is an extremely high honor, and now she will have the opportunity to take her lab experience to the next level in a master's or PhD position! Her proposed project was centered around "Determining the Impact of PFAS on Natural Systems using Fluorescent DOM Tracers," will showcase the binding affinity of PFAS on soils to forecast potential remediation techniques. We are all excited to see the path Keana will forge on her scientific journey. Be on the lookout in the October 2026 newsletter to see where she selects to go for her graduate school program!

Shimadzu 8060RX LCMS-TQ

Installation is inevitable for the lab's new Shimadzu 8060RX LCMS-TQ to perform advanced analytical detection of compounds like pesticides, PFAS, and short-chain fatty acids. The goal is for the instrument to be installed by the end of summer so the team can start exploring method development and establish the limit of detection. By securing the instrument for the department, the Water Quality Extension Lab hopes to provide a resource for faculty to leverage on federal grant opportunities. If you are interested in potential collaborations or discussing method packages, please email mhayes@agcenter.lsu.edu for more information.

Poultry Processor Experiential Learning Program Visit



The team (including our new freshman hire, Devony) took a trip to Wayne-Sanderson Farms in Hammond for a P2 FARM site visit this quarter. This facility provides a unique opportunity for the students to see such an advanced wastewater treatment and waste valorization process. The facility has a multistage water treatment process that showcases numerous different techniques for strategic removal of target compounds. The Wayne-Sanderson team was a gracious host and excited for potential research collaborations down the road. A few weeks after the first trip, the lab traveled back to the facility with some colleagues from the School of Nutrition and Food Sciences to discuss research in optimizing new techniques for microbial reduction in wastewater.

Bean Manufacturer Experiential Learning Program Visit

A few days later, the P2 FARM program visited Blue Runner Beans in Gonzales for another food manufacturer trip. The level of automation in the canning process and the diversity of products made at the facility were a fascinating feat of engineering. In addition to the LSU team, the Certified Louisiana program, hosted by the Louisiana Department of Agriculture and Forestry, was able to join the visit to promote opportunities for Louisiana food manufacturers to expand their resources and market their products. The Blue Runner team gave the students a great historical context for the facility and manufacturing process. We are hoping to align them with funding opportunities for new equipment initiatives as the facility continues to grow.



Pepper Farm Experiential Learning Program Visit



The Tabasco factory was one of the final stops this quarter for an agricultural and manufacturing tour for the students! These trips are extremely impactful to see the sustainable practices many of our food and agricultural producers implement into their daily operations. Tabasco Factory's onsite fertilizer production was extremely interesting as it aligned with our team's current research in waste valorization of seafood shells. The students were able to see the full circle pepper farming operations, mash house pepper aging, and manufacturing lines to understand the complete process from seed to bottle. Everyone also found out that the pepper mash fresh out of the barrel is much hotter than the sauce in the bottle.

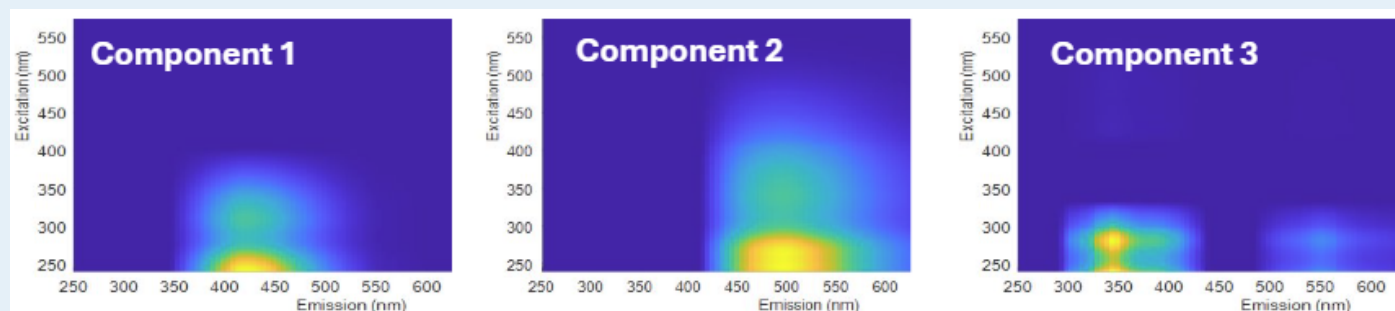
Larvae and Frass Metal Analysis for Future Research



This study demonstrates that mineral and trace element partitioning in BSF larvae and frass is dependent on the substrate. Calcium, manganese, and zinc were accumulated by the larvae to a varying extent. Elements such as aluminum, iron, boron, and copper did not accumulate in the larval tissues and concentrated in the frass. This pattern of nutrient flow is suggestive of the dual benefit of BSF bioconversion. The frass stays rich in minerals for soil use, while the larvae stay low in harmful metals. This not only ensures the safety of larvae as a feed ingredient but also confirms that seafood waste substrate can be used in BSF systems without adverse effects. In addition, it also provides insight into customizing diet blends based on elemental concentrations of waste streams to serve specific functions for feedstocks and fertilizers. As the use of BSF larvae and frass increases, proactive decisions can drive valorization opportunities in local areas to increase micronutrient availability for livestock or plant agricultural systems. Future studies should test how readily these minerals in frass are available to plants, evaluate crop and soil responses under field conditions, and explore the use of additional seafood waste streams to assess the safety and consistency of mineral partitioning during BSF bioconversion.

Carbon Tracing for Various Greenhouse Systems

Ornamental plants are a high-value segment of agriculture known as the "Green Industry" or environmental horticulture. Enamul's current research investigates critical elements of the soil matrix that impact this industry. To better understand compound retention, the study uses various blended substrates (peatlite, bark, and biochar) mixed across different amendment percentages. Collaborators conducted these studies across a six-week period to mimic grow-out conditions, and leachate was analyzed for fluorescent indicators. Across all trials and sampling dates, high HIX values were seen and expected due to the terrestrial materials used as residues, thus confirming the presence of strongly humified, terrestrially derived organic matter as the dominant fraction of leachate DOM. However, treatments with biochar-amended layers in the lower substrate position demonstrated a more pronounced filtration effect and increased BIX compared to other samples. This suggests that the filtration effect concentrates more complex carbon in the lower stratification for microbial degradation. The lower stratification (figure below) had three identified components at 240(308)/420 nm (C1), 244(338)/490 nm (C2), and 280/340 nm (C3), which correlate to fulvic-like, humic-like, and protein-like, respectively. Conversely, the upper stratified layers only have two components: fulvic-like and humic-like. This initial substrate study found that substrate architecture plays a vital role in determining the intensity of complex, humified DOM that is retained within the container system.



Teaching through Mentoring

These last three months have been a whirlwind with a strong undergraduate team graduating and two of my PhD students completing their general exams. When I switched from my industrial job as a method development chemist to academia, it was in part due to the lack of scientific curiosity in the industrial world. In many cases, analysts are only able to expand their knowledge as far as the standard operating procedure will allow. The science that I am passionate about fosters growth and expands knowledge in both the scientific community and people affiliated with the project. I have been fortunate to have a really good team of young scientists come through my lab, and it is the genuine curiosity and willingness to learn that refreshed my enthusiasm for teaching. My teaching doesn't necessarily consist of a classroom format but of field trips with the experimental learning programs and data debriefs with the graduate students. When students get behind the scenes to see how things are made, it connects them to the real world and their past experiences. This last quarter, I was able to see a glimpse of how impactful the science we are creating in the lab has been for students. One instance was Maddie Woodson, an undergraduate researcher, who used her skills in benchtop lab analysis to leverage offers from three top law programs for their environmental policy programs. Another was seeing the "click" moment when Mysha and Enamul saw the connectivity for their research data to the full picture. Science is meant to illuminate pathways, unlock potential, and expand through mentorship, and I have been fortunate to see this in many of my students at the initial stages of my academic career.

IEEE Conference

Water and electricity are typically not a good mix, but this summer we had the perfect opportunity to blend the two at the Institute of Electrical and Electronics Engineers Photovoltaic Specialists Conference hosted in New Orleans. After an invitation from the National Laboratory of the Rockies, I was able to present in the session Expanding PV Deployment Through Dual-Use Pathways, which was focused on the co-benefits of solar panels and the surrounding environment. The session host, Silvana Ovatt, did a great job introducing the concept of agrivoltaics, which led into my talk about "Scalable Floating Photovoltaics Systems in Louisiana to Forecast the Water and Energy Nexus". It was a great chance to discuss the variety of benefits for floating photovoltaics in the Louisiana landscape, ranging from wastewater treatment to agricultural irrigation. In addition, I was able to promote the unique cooperative extension program through LSU AgCenter to show how community engagement can catalyze science around the state.

Content Created

Peer Review Publication

Upadhyaya, S, Vail, V., Tweedy, D., Neff, E., and **Hayes, M.** Evaluating the use of seafood processors' waste for the rearing of Black Soldier Fly larvae. Aquaculture Report. 2026. 48:103638. [Journal Link](#)

Upadhyaya, S., **Hayes, M.**, Vail, V., Tweedy, D., Neff, E., Plumlee, J., and Abdi, D., Scaling Black Soldier Fly Bioconversion of Seafood Processing Waste to Beneficial Use Materials. ACS Sustainable Resource Management. 2026. [Journal Link](#)

Content Created (cont.)

Presentations and Demonstrations

Wagner, N. and **Hayes, M.** BlueBoat Demonstration at LSU South Farms. Ducks Unlimited Rice Stewardship Program. Crowley, Louisiana. June 25, 2026

Onsite Wastewater Installers Certification Workshop. Lead Chair. Louisiana Department of Health Sanitarian Program. Alexandria, LA. May 14, 2026.

Nolen, R., and **Hayes, M.**, Chemical Characterization of Crawfish Boil Water for Environmentally Friendly Treatment and Disposal. LSU Discovery Day. Baton Rouge, LA. April 17, 2026

Howard, K., and **Hayes, M.**, Evaluating the Release of Caffeine and Dissolved Organic Matter to the Environment from Composted Coffee Grounds. LSU Discovery Day. Baton Rouge, LA. April 17, 2026

Woodson, M., and **Hayes, M.**, Effects of Urbanization on the Availability of Soil Organic Matter. LSU Discovery Day. Baton Rouge, LA. April 17, 2026

Allison, J., Moni, E., and **Hayes, M.**, Investigating Nutrient Dynamics in Urban Watersheds Using Fluorescent Dissolved Organic Matter (fDOM) Characterization. LSU Discovery Day. Baton Rouge, LA. April 17, 2026

Extension Publications

Hayes, M., and DeBoer, E. Remote Water Quality Sensing: A Tool for Golf Course Irrigation Best Management Practice Validation. Lead Author. May 2026. [Article Link](#)

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