

WHAT'S NEW

EXTENSION – PAGE 3

Expanding extension audiences across the state with association meetings and workshops. (Page 3)

RESEARCH – PAGE 4

Summer research has officially kicked off with sample analysis, sensor data interpretation, and new method development. (Page 4)

TEACHING – PAGE 5

The first look at the revival of the EMS 4040: Environmental Instrumental Analysis (Page 5)

UPCOMING EVENTS

JULY

Presentation at Hammond and Red River Workshops

First Waste Materials Analysis Completed

AUGUST

Third Wastewater Installers Workshop to be hosted in Baton Rouge

Summer Undergraduates Proposal for LSU Discover Announced

SEPTEMBER

Multiple Grants Announced for New Water Quality Programs

Water Quality Extension Newsletter



Photo by M.P. Hayes

Let the water flow, and waste piles get low!

A summer priority for our lab is to work with partnering industries to characterize waste and wastewater effluent leading to recommendations on reduced disposal cost or beneficial uses for byproducts. The progressive culture of environmental sustainability demands manufacturers to minimize their negative social and environmental impact but provides an inadequate framework for innovative solutions to waste issues. Previous assessments have paired shrimp processors with plant nurseries to offer compostable materials as nutrient sources. Our team's network of partners provides endless opportunities for resources and collaborations. Our team is currently working with eight different waste streams to provide insight for the companies into alternative uses or partnerships for waste reduction. We hope to expand these partnerships to any industry or farm interested in wastewater or byproduct analysis in hopes of finding waste valorization pathways throughout the state.



New Technology for Research

The Water Quality Extension Lab has a new research toy for collaborations! This BlueBoat is an "uncrewed surface vessel" that be used for water quality surveying in many different pond and open water locations. We are in the process of outfitting this boat with a YSI Sonde for temperature, nitrate and dissolved oxygen measurements (with more probe ports available). The software allows users to preselect sampling locations on the map, time intervals for stops and speed between distances for the vessel to run its mission with ease. Much like a drone for field research, our team is targeting digital agriculture collaboration and funding opportunities by using this vessel to map dissolved oxygen and nutrient cycling. Our first major project will be assessing the water column nutrients and energy optimization of aeration in Louisiana crawfish farms. If there are any faculty members interested in leveraging this equipment for grants or using it for a class, I am happy to set up a demonstration once we have the software and programs running.



Photo by M.P. Hayes

Undergraduate Student Research

The lab has added many new faces for the summer hosting four undergraduate student researchers from various disciplines around campus. Karrie Cheng is a junior majoring in mass communications at LSU and is interested in a career in environmental policy. She is mapping seafood processors (shrimp, crab, crawfish, etc.) to identify areas of concentrated seafood wastewater and solids. Ruth Nolen is a senior double majoring in chemistry and soil systems with a long-term goal of becoming an environmental scientist. Her summer research focus overlaps the biosorbent materials project by putting together datasets of water quality parameters that have the highest impact on Louisiana. Nick Wagner is a senior biological and agricultural engineering major who is interested in graduate school for energy and agriculture. His current project is mapping the energy potential of floating solar on non-economic waterbodies around Louisiana. Tara Bui is a senior in environmental engineering with a career interest in microplastic pollution in various waterways. She works with our agricultural stakeholders on sustainability visits to promote recommendations in water conservation and pollution prevention.

Deployable Water Quality Sensors

The lab is home to multiple sets of YSI EXO2 multiparameter sondes for deployable water quality research. Each sensor has space for six probes plus a wiper blade for long-term deployment. Our sensors are currently monitoring a wastewater treatment facility and agricultural irrigation pond for a range of parameters including nitrate, ammonium, temperature, dissolved oxygen, turbidity and algae. We are excited to use these sensors for an array of research opportunities. If interested in a collaboration, feel free to reach out to Dr. Hayes at mhayes@agcenter.lsu.edu.

Southwest Region Agricultural Career Day

Middle and high school students joined agents, graduate students and faculty at the LSU AgCenter Sugar Research Station for the Southwest Region Career Day in April. Dr. Hayes presented with Dr. Setiyono on a day in the life of an Agricultural Engineer. During the presentation, students were offered a hands-on opportunity to use deployable water quality sensors and see how various water samples can have vastly different chemical compositions. These students are among the generation that will propel technology into the agricultural setting through different career pathways. The sondes used in the Water Quality Extension Lab are an ideal example of user-friendly technology that enhances future agricultural science. Students were able to see real-time responses in water quality from increased mixing and aeration. Dr. Hayes used this demonstration opportunity to encourage students to look at water quality parameters in their local community using resources like LSU AgCenter and the Louisiana Water Quality Integrated Report from the Department of Environmental Quality.



Photo by Kiki Fontenot

Water Extension through Association Meetings

This last quarter, Dr. Hayes was able to speak at two different association meetings to promote sustainable water and energy conservation through the USDA REAP experiential learning program. Making a visit to Abbeville for the Louisiana Alligator Farmers and Ranchers Association (LAFRA) meeting and Denham Springs for the Louisiana Meat Processors Association (LAMP) meeting, Dr. Hayes was able to speak to over 58 stakeholders on the opportunities for funding and sustainable practices. Since the presentations, the WQEL team has traveled to an alligator processor to conduct a site visit and scheduled trips to local meat processors for water assessments. These partnerships have also led to a proposal that (if funded) would establish a Pollution Prevention for Food and Agricultural Rural Manufacturers (P2-FARM) Program to provide facilities with water quality resources and recommendations for sustainable practices.

Rain Catchment and Water Quality Workshop

Doeville Farms in Violet, Louisiana, hosted the LSU AgCenter Rainwater Catchment and Water Quality Workshop in late June for gardeners, nursery growers and enthusiasts. This workshop outlined materials and construction plans for small-scale solar distillation,



Photo by Anna Timmerman

rainwater harvesting using 55-gallon drums, micro-irrigation plans, and general water quality handhelds for salinity and pH readings. Dr. Hayes was able to build multiple different design plans for participants to fit their facility needs. Overall, the workshop yielded 31 participants and provided ample opportunity for hands-on demonstrations. The constructed units have been outlined in LSU AgCenter extension publications giving participants the ability to see the scalability of these projects. A big thank you to Anna Timmerman (St. Bernard Assistant Extension Agent) for putting the plans into motion and getting her community to participate!

Non-Hazardous Industrial Waste Streams for Research

A strong network of industrial partnerships paved by the Water Quality Extension Lab's experiential learning programs has provided research avenues for waste valorization from non-hazardous industrial waste. This has prompted the lab's recently approved HATCH project for "*Evaluating non-hazardous industrial waste as biosorbent for anthropogenic contaminant and nutrient absorption*". In early June, the team took a trip and collected various materials to align with different projects to provide value-added opportunities for manufacturing facilities. These samples included rice husk, sawdust, casting sand, fly ash, shrimp shells, crab shells, coagulated dissolved air flotation protein, and shrimp wastewater and fish farm wastewater effluent. The samples are currently being characterized for fat, fiber, protein, nitrogen, phosphorus, potassium and ICP metals using instruments from the LSU AgChemistry Lab. These preliminary datasets will help link waste materials to projects in the field of biosorbent material for the edge of crop runoff mitigation, oyster restoration and frass production from insect rearing, while also being leveraged for future funding opportunities. Each of the partnering stakeholders will get a write-up for the characterization of their waste materials. Dr. Hayes' lab is always on the lookout for new materials to test. A few materials of interest are bulk apple snail shells (from crawfish farmers), brewery wastewater and fish processors wastewater effluent. If you know of a manufacturer/farm with a non-hazardous solid waste or wastewater effluent that is interested in an analysis, please email mhayes@agcenter.lsu.edu to discuss the possibility of a partnership.

Water Quality and Seafood Wastewater Effluent



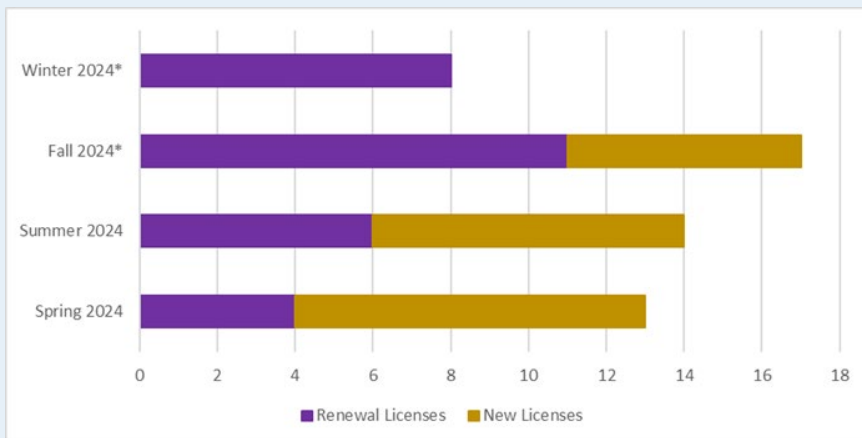
Photo by Shristi Upadhyaya

In the early stages of this research, the lab is running nutrient testing for nitrate, nitrite and phosphate for wastewater effluent samples at aquaculture processors. Methods are also being built and validated to detect amino acids from effluent samples to identify the potential protein in the wastewater. With these measurements, Dr. Hayes' lab looks to offer recommendations for water conservation practices and chemical optimization at facilities. There are many opportunities for processors to adopt strategies such as concurrent rinsing or waste stream separation to more effectively manage the water quality of their effluent. The concept behind these strategies could reduce the overall volume of water required in the processes by pushing "cleaner" water from the end of the process line toward the main rinsing stage at the beginning. The Water Quality team hopes to do a full investigation of major points of protein and phosphorus input from processors by sampling each stage of the process. This

will help determine which waste streams can be separated for a more concentrated treatment. From trends in preliminary data of seafood processors' wastewater effluent, phosphorus concentrates are elevated. This can be reduced gradually by optimizing preservatives like sodium tripolyphosphate (STPP) or the introduction of large-scale dissolved air floatation treatment. The lab is excited to work with processors of various seafood backgrounds to produce more sustainable water practices around the state.

Onsite Wastewater Installer Workshop Update

With two successful workshops completed, the Spring and Summer courses have yielded 27 participants. Of these sanitarians, 17 were taking the course for the first time to be issued new licenses. The Spring course had a 100 percent pass rate, while the Summer course results are still being processed. Dr. Hayes will be continuing to teach the Onsite Wastewater Installers course this Fall and Winter with an additional 25 sanitarians currently enrolled. The course is slowly gaining interest with increased numbers of participants at each session. By partnering with the Louisiana Department of Health, Dr. Hayes plans to open the course for a non-license track for industry personnel, faculty and agents. The course materials are also being converted into an extension series for homeowners to better understand their septic units and preventative maintenance for the longevity of the system. *Astericks in table indicates planned workshops and current enrollment numbers.*



EMS 4040: Preview

If all goes as planned, in Spring 2025, Dr. Hayes will be teaching the EMS 4040: Environmental Instrumental Analysis for SPESS students. Last taught in 2018, this course will be designed to showcase a range of instrumentation from handheld, field-based sensors to large, benchtop analytical instruments. The course will provide students with educational material for environmental pollution, sampling techniques, and analysis for a range of environmental matrices (soil, water, crop, etc.). With a background in analytical chemistry, Dr. Hayes will introduce topics of sample quality control, data interpretation, validations, processing, and report writing. The Water Quality Extension Lab will also provide a range of hands-on opportunities through field-based, donated and research instruments. During the lab portion of the course, students will be able to collect, analyze and interpret results from their projects with immediate resources. This course will help develop students' ability to determine major sources of agricultural and water pollution through the use of advanced technologies and analytical instrumentation.

Content Created

Hayes, M., 2024. Water Quality Factors that Increase Summer Pond Problems. Louisiana Nursery and Landscape. Summer 2024

Hayes, M. LSU AgCenter's Water and Energy Conservation Program. Louisiana Meat Processors Association (LAMPA) Board Meeting. Baton Rouge, LA. May 9, 2024. (50 attendees)

Hayes, M. LSU AgCenter's Water and Energy Conservation Program. Louisiana Alligator Farmers and Ranchers Association (LAFRA) Meeting. Abbeville, LA. April 9, 2024 (8 attendees)

Rain Catchment and Water Quality Workshop. Louisiana Agricultural Center and Plaquemines Parish Office. Violet, LA. June 26, 2024. (31 attendees)