

Tell-Tail Signs of Louisiana Crawfish

In the summer of 2017, packages of Louisiana crawfish tail meat were being rejected by the Louisiana Department of Agriculture and Forestry (LDAF). Since Louisiana is home to more than 90 percent of the nation's crawfish farms, it was a concern.

So, what in the tail was going on with Louisiana crawfish meat? "LDAF detected that there were some frozen crawfish tails underweight," said Evelyn G. Watts, seafood technology specialist with Louisiana Sea Grant (LSG) and the LSU AgCenter.

LDAF is responsible for promoting and protecting agriculture, and consequently inspects and tests locally produced foods. Its Weights and Measures Division ensures impartiality for both sellers and buyers. The crawfish tails' rejection was a major setback for many processors, most of whom had to recall their products.

"The industry reached out to me to ask if there was any information or if it was possible that I could provide technical information between producers and the Department of Agriculture," Watts said. Processors feared that the LDAF's test procedures were executed inaccurately.

"We agreed to review the method for measuring the fat on the tail meat and conduct a study on the tails to determine if the standard LDAF has for loss of fat on a tail of 10 percent maximum was okay," said Watts.

The study spanned more than a year in which Watts and other researchers explored the mystery behind the excessive fat loss on frozen crawfish tails. They had a hunch that different peeling methods might affect resulting weight loss.

"During the season, in Louisiana, there are some facilities that cook and peel the crawfish hot. A few other facilities cook, chill and then peel the crawfish. And so, we thought that doing these different methods it would change the percent of fat on the tail," said Watts.

So, do peeling methods influence the "pass or fail" test? The answer is complicated. It turned out crawfish tails being sold in stores were not under packed. But closer examination revealed that the problem stems from the meat being frozen and thawed under not ideal conditions.

"It's a two-component thing," said Watts. "With frozen product there will be weight loss from drip loss as well as the loss of fat on the tail," said Watts. "If you put crawfish in a bag, after six months of being frozen you expect to see 12 percent weight loss, which includes fat and drip loss."

Consequently, the frozen crawfish could not adhere to the 10 percent rule. LDAF's testing methods are better suited for fresh, refrigerated product, Watts concluded. Their standards for evaluation don't account for processing differences.

Currently, Watts is working on a new standard for frozen product that will help solve this problem. During meetings with industry and regulators, Watts recommended forming a committee with representation from industry, consumers and regulatory agencies to review crawfish tail meat standards and inspection procedures. New standards are expected to be ready by the end of Summer 2019.

The committee also needs to develop Good Processing Practices to ensure compliance with updated standards. Changes in state law may be required to acknowledge the new standards.



New Hires at Louisiana Sea Grant

Louisiana Sea Grant has three new faces.



Olivia Maggiacomo is a research associate at LSG's oyster research lab on Grand Isle working on the diploid and triploid oyster breeding program.

Maggiacomo graduated from the University of Tampa in May 2018. She majored in marine science and biology while also having a minor in chemistry. As an undergraduate, she was a teaching assistant for marine zoology and interned at the

Florida Aquarium. During Maggiacomo's summers, she worked as a science and nature specialist at the YMCA in Camp Cedar Mill located in Rowley, Mass.



Virginia Morejon also is a research associate at the oyster lab.

Morejon graduated from Florida International University in Miami in 2017. She majored in marine biology and her research focused on what influences the feeding preferences of marine herbivores. The importance of the research is because of substantial degradation in many seagrass ecosystems. After graduation, she returned to Ecuador

for an internship at the Galapagos National Park.



Brookes Washington is a new communications coordinator located on Louisiana State University's Baton Rouge campus.

Washington graduated from Nicholls State University in Spring 2017 with a bachelor's in biology and English. As an undergraduate, she was assistant editor at Nicholls' literary magazine and on the editorial board. Before coming to Sea Grant, she was a lab analyst for Johnson & Johnson testing plastics used for food storage.

Callam Named Oyster Lab Director

After an international search, Louisiana Sea Grant (LSG) has appointed Brian Callam, PhD, to be the new director of the Grand Isle Oyster Research Lab (GIORL). Operated through a partnership between Louisiana Department of Wildlife and Fisheries and LSG, the GIORL helps support the work of the



Michael C. Voisin Oyster Hatchery. As director of GIORL, Callam will develop a program of research and extension in support of both the wild and farmed oyster industry, looking for innovative approaches to adapting to future environmental changes to the coast.

Callam already had extensive experience working with triploid oysters, stemming back to his master's degree work in Virginia. While at the Virginia Institute

of Marine Science, he held positions as an oyster restoration assistant, a field and hatchery technician and ultimately a graduate research assistant.

In 2014, he arrived in coastal Louisiana to begin work on his PhD dissertation entitled "Transforming lives in coastal communities through economic development: Breeding *Crassostrea virginica* for alternative oyster culture". After defending, Callam stayed on as research associate at GIORL. This year will mark half a decade of his effort at the facility.

In an industry bracing for change, Callam has a strong vision for the future of the lab and what it will be able to provide. That vision includes working in research, extension and education to address the concerns of multiple stakeholders.

"The burgeoning oyster aquaculture industry in the Gulf of Mexico offers a wealth of potential; I am interested in developing, improving and expanding shellfish aquaculture. I intend to conduct collaborative research with industry partners to develop and adapt both oyster aquaculture gear and practices for conditions specific to Gulf of Mexico oyster farms and hatcheries," said Callam.

Callam has numerous lines of inquiry he would like to follow, some of which include exploring differences in genetics across populations, chromosome set manipulation, further examining shellfish physiology and expanding shellfish husbandry techniques and technologies.

"The Research Lab has had a close working relationship with the oyster industry. It is my goal to continue to strengthen this relationship to better guide research questions to have maximum positive impacts," said Callam.

"We are thrilled to have the leadership of Dr. Callam to develop LSG efforts in research and extension at GIORL in collaboration with LDWF and the oyster industry to promote innovation in a time of coastal change," said Robert Twilley, Louisiana Sea Grant executive director. "We see increased national investments in research and development for the aquaculture and seafood industry, and we need leadership at LSG to bring those investments to our seafood industry here in Louisiana."

UROP 2019 Announced

Since its establishment in 1992, Louisiana Sea Grant's (LSG) Undergraduate Research Opportunities Program (UROP) has provided assistance to more than 150 talented undergraduate students interested in pursuing advanced studies in marine-related disciplines. The program awards grants up to \$3,000 each to assist with a hands-on research, student wages, travel and supplies.

Amber Jarrell, Dominique Angibeau, Megan Devine, Alison Carrier, and Claire Stansbury, Louisiana State University (LSU)



Chitosan is a sugar polymer created from crustacean shells and has been shown to have antimicrobial properties. The undergraduate team of Jarrell, Angibeau, Devine, Carrier, and Stansbury will determine the effectiveness of a chill system that sprays chitosan to reduce *Listeria* levels from shrimp, all while maintaining the quality of the product.



Briante Brumfield, Southern University at New Orleans

Advisor: Abigail Bockus, Louisiana Universities Marine Consortium (LUMCON)
Characterizing the Effects of Temperature on Hypoxia Tolerance in Gulf Brown Shrimp to Support Directed Fishing Efforts Offshore

Shrimp support the most valuable commercial fishery in Louisiana. Each year, parts of the coast are threatened with periods of low oxygen (hypoxia) and it's important to know how these species will respond. Brumfield will study how changes in temperature affect brown shrimp's ability to tolerate hypoxia, providing valuable information for the shrimp industry.



Noel Dudeck, LSU

Advisor: Giulio Mariotti, LSU
Waves, Mixing and Resuspension in University Lake: Restoration Implications

Previous efforts at restoring the lakes adjacent to LSU have not met with long-term success, especially concerning water quality. Dudeck hopes to address this by determining how wind-driven waves in University Lake drive sediment resuspension and deposition, mix water and affect water aeration. This information can better inform potential dredging in hopes of lasting, cost-efficient restoration.



Megan Guidry, LSU

Advisor: Morgan Kelly, LSU
Variation in the Microbiome of the Eastern Oyster: Environmental Influences and Effects on Oyster Health

Little research has been conducted on oyster microbiomes. Guidry will correct this by studying different oyster reef microbiomes over time and looking at the interactions between the microbiome communities, salinity

and dermo infection state. These Louisiana-specific results will provide a predictive tool for monitoring populations at risk of dermo infection.

Brian Heath, LSU

Advisor: Navid Jafari, LSU

Biomechanical Properties of Wetland Vegetation for Quantifying Wave Attenuation

Wetland plants provide important benefits to Louisiana's coast, but it's unclear how well they protect against storms. Even less clear is how vegetation stems respond to the stress from storm activity. Heath will study the vegetative properties of *Spartina alterniflora*'s and determine its biomechanical and physical properties. This will clarify vegetation bending and breakage which ultimately affects wave attenuation.



Matthew Hutchins, LSU

Advisor: Maria Teresa Gutierrez-Wing, LSU
Hydrogel-based System for Microalgal Cultures Dewatering

Photosynthetic microalgae have many advantages for product development. While initial efforts focused on biofuels, these microorganisms are sources of valuable products like pharmaceuticals and food. Dewatering the microalgal biomass is an expensive part of the process. Hutchins will determine how physical and chemical variables affect dewatering performance of highly absorbent polymers, called hydrogels, in cultures made from microalgae.



Erik Johnson, Tulane University

Advisor: Caroline Taylor, Tulane
Avian Coastal Ecology: Survival and Movement in Beach-nesting Birds using Radio Telemetry

Louisiana's coast is threatened by sea-level rise, putting beach-nesting birds on the front lines. One such species of concern is the Wilson's plover, to which Louisiana is home for 30 percent of the U.S. population. Johnson will investigate how movements and habitat quality affect the survival of newly-hatched chicks of this understudied species.

Katerine Kjos, LSU

Advisor: Michael Polito, LSU
Identifying the Geographical Origin of Domestic and Imported Crawfish Using Stable Isotope Analysis

Louisiana leads the nation in crawfish aquaculture, but farmers face competition from imports. Regulations require producers to identify the country of origin, but currently there is no way to independently verify and enforce these labeling laws. Kjos will use stable isotope analysis on packaged crawfish tail meat to provide much needed validation of geographic origin and harvest status product labeling.

Claire Lanclos, LSU

Advisor: Subramaniam Sathivel, LSU Agricultural Center
Reducing Pathogen Loads on Shrimp with Water Soluble Bacteriocins of Lactic Acid Probiotic Bacteria

Concerns exist about pathogenic microorganisms in seafood, creating high demand for safe products with little to no additives. Water soluble bacteriocins from probiotics may reduce pathogenic loads. Lanclos will evaluate the effectiveness of environmentally friendly bacteriocins in reducing *Listeria* loads when they are added to shrimp.



Grace Nguyen, LSU
 Advisor: Todd Monroe, LSU
Development of a Standardized Artificial Inseminator for Freshwater Live-bearing Fishes

Small, freshwater fish are important for aquaculture, the aquarium trade and environmental biomonitoring. Rearing the live-bearing fish, however, is challenging as current methods haven't

been updated since the 1950s. Nguyen will work to modernize the protocol by developing a standardized inseminator to assist in the artificial insemination of these species.



Juan Touza, LSU
 Advisor: Evelyn Watts, LSU AgCenter
Effect of Lactic Acid on Shelf Life of Fresh Crawfish Tail Meat

The shelf life of fresh seafood is limited. To reach larger, more distant markets, processors need to extend this shelf life. Applying lactic acid during chilling can result in seafood staying fresher longer. Touza will determine the effect of 0 to 2 percent lactic acid on the shelf life of

fresh crawfish tail meat, allowing the industry to expand beyond regional markets.

UROP is open to full-time undergraduates at all public and private Louisiana colleges and universities who have some science background. In addition to the grants, a student may receive academic credit for his or her project, if his or her school allows it. Generally, junior and senior-level students are best suited for UROP, but any undergraduate with a faculty mentor will be considered. Applications submitted by faculty members are accepted annually in November and December.

More information on UROP, application instructions and a list of current and past research projects can be found online at www.laseagrant.org/urop.

Keeping Skinny Oysters off the Menu

Louisiana is an oyster epicenter. More eastern oysters (*Crassostrea virginica*) are harvested here than any other state. Their economic value in the last decade has been over half a billion dollars. And oysters provide more than commercial benefit by providing ecosystem services like water filtration, shoreline stabilization and enhancing other fisheries.

Oysters are particular about where they grow, they have a sweet spot. They need some salt to grow, struggling in areas with lots of freshwater input. However, when the salinity gets too high, oysters are susceptible to parasites and predation. They need it just right.

That is why many in the state are concerned about the status of Louisiana oysters. Coastal habitat is rapidly changing, through both natural and manmade efforts. These shifting environmental conditions threaten that oyster sweet spot. When an oyster becomes stressed – from changes in temperature or salinity – they expend more energy, but don't eat as much. "And skinny oysters taste bad. You don't see people marketing low-fat oysters," said Morgan Kelly, Louisiana State University (LSU) assistant professor of biology.

In an attempt to keep skinny oysters off the menu, Kelly is studying how a region's unique environment can influence an oyster's health and growth. There are persistent differences in salinity across Louisiana. Some places in Barataria approach freshwater conditions (0 ppt salinity). Other regions are saltier. "We're trying to figure out if oysters are locally adapted to salinity," said Kelly.

Graduate student Scott Riley, post-doctoral fellow Kevin Johnson and Kelly have been comparing oysters from Calcasieu Lake (highest salinity), Sister Lake and Vermilion Bay (lowest salinity). The researchers were particularly interested in exploring the combined effects of temperature and salinity had on the oysters.

Oysters from each region were collected, brought to the Grand Isle Oyster Research Lab, spawned and reared to juvenile size. Then the juveniles were transplanted back into the field, but to a different site than their parents' origin to test whether the environment was impacting the oysters' genetics.

And it appears that environment is influencing oyster genetics. While growth was fairly uniform across the different sites, there was a difference in disease susceptibility, in particular Dermo. Oysters whose parents came from Calcasieu Lake, showed greater resistance to disease, even when grown in Sister Lake or Vermilion Bay. And this difference in Dermo susceptibility became more pronounced as temperatures grew.

Now the challenge is finding out how an oysters' genes correlate with this better defense, which is where Johnson's work comes in. He is measuring the genetic difference between the stocks, looking for genetic hotspots. These hotspots result from the addition of a chemical element (a methyl group) to the DNA. Depending on where it is added, the genetic expression changes result in added benefit or harm.

A better understanding of oyster genetics provides insight into the oyster's habitat suitability. Research from Kelly and her lab can tell us which oysters are best suited for commercial or restoration plans. "Given Louisiana's changing environment, the ideal oyster would be able to stand long periods of freshwater inflow and be disease resistant," said Riley.

Like most Louisianans, oysters are really tough. They have already survived some big freshwater events – the floods of 2016 and Hurricane Harvey. It remains to be seen how they will respond to proposed diversions. And Kelly is optimistic; there will be oysters in Louisiana's future. "Humans will move them, or they will move themselves, but they will still be there," she said.



Checking an oyster's health.

High Water Mark Initiative begins in St. Tammany Area

It's said that those who forget history end up repeating it. In southeast Louisiana, Sea Grant personnel are leading an effort to ensure locals don't forget their communities' flooding past.

"We've been discussing the Federal Emergency Management Agency's (FEMA) High Water Mark Initiative for a while," said Carol Franze, Louisiana Sea Grant and LSU AgCenter Extension agent for St. Tammany and Tangipahoa parishes. She is spearheading the project locally with communities including St. Tammany Parish and the cities of Slidell, Mandeville and Covington.

Flooding is the top natural disaster in the United States, according to FEMA. Yet, only about one-third of respondents to a national flood risk awareness survey believed their communities were at risk of flooding. In response to those survey results, FEMA created the High Water Mark (HWM) Initiative to raise flood risk awareness. Communities opting into HWM earn Community Rating System (CRS) points, which can lower local National Flood Insurance Program premiums.

One aspect of HWM is to erect signs that indicate how high flood waters rose at that particular location, as well as provide information about that specific flood. "The partner communities will decide where the signs will go. But the locations need to be impactful. So, they're looking at sites that experienced repetitive flooding losses," said Franze.

Sign locations should be determined sometime in the spring, with eventually five to ten signs in each community. They will represent areas of recreational, commercial and residential interest. Phase one signage will focus on the area from the coast to US 190. Subsequent phases will focus on past flood locations further north.

"Another aspect of the program is educational," added Franze. "Education and outreach activities will be geared toward adults – homeowners and business owners. There also will be training for teachers so they can teach their students about flooding and flood risks. And later, there will be educational activities geared toward children. All of this will focus on general flood knowledge, flood prevention and flood preparation. We'll also touch a little bit on wetlands."

More information on HWM can be found at www.fema.gov/high-water-mark-initiative. Franze can be reached at cfranze@agcenter.lsu.edu.



Photo by FEMA

While Louisiana Sea Grant Executive Director Robert Twilley is on sabbatical, "A Coastal View" – written by Sea Grant sponsored graduate students – will replace "A Message from the Executive Director."

A Coastal View

Trees record stories of the environment through annual growth rings. A select group of scientists, known as dendrochronologists, translate these tree-ring stories into information useful to humans; an even smaller group of scientists use this science for coastal landscapes. I belong to the latter group of researchers. My work along the Gulf of Mexico aims to translate the stories of coastal trees affected by frequent hurricanes and accelerating sea level rise.

There is no shortage of "ghost forests" and saltwater-altered trees in Louisiana. However, we have a shortage of scientists producing data for the coast. To aid in our effort, we tap into the local knowledge of our state's residents. Citizen scientists gather data for everything, from simple questionnaires to collecting rainwater from hurricanes. This community approach is really a two-way exchange. In one direction, scientists collect more data than in the past. And in the process, the general public is learning more and more about what science is and how it is done.

Children can be citizen scientists, too. The Louisiana State University (LSU) Coastal Roots program has nearly 50 K-12 schools from across the state participating in planting trees along our coast. As a middle school student, I witnessed the impact of this program first-hand. My school joined shortly after the program's inception, and it was here I met its founder, Pam Blanchard, then part of the Louisiana Sea Grant (LSG) education team. Fast-forward 15 years, my graduate student self remembered "Dr. Pam" (as kids call her) and sought to combine her experience with early childhood education and my tree-ring research.

Through a grant funded by LSG, with the support of five LSU professors (Jill Trepanier, Blanchard, Mark Schafer, Ed Bush and Andy Nyman) and another graduate student (James Jordan), we are now incorporating tree-ring science into the Coastal Roots program and teaching middle and high school students how to be citizen scientists. We are showing Louisiana youth how to select trees in the field, core them and take measurements that are valuable for future analyses in the lab.

Throughout the spring and summer, we will evaluate the students to see how much they have learned about the scientific process. Their tree ring data will also be included into my PhD dissertation. Citizens are a growing part of science. Children already receive classroom instruction on how science works, but we are excited to share our research with a hands-on experience and believe it will bolster Louisiana K-12 environmental literacy.

Clay Tucker,
Tree Ring Scientist and
Graduate Research
Assistant, Department
of Geography and
Anthropology, LSU





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Coastal Clips

Become a Louisiana Sea Grant LaDIA Faculty Fellow

Louisiana Sea Grant (LSG) is offering one-year fellowships to faculty whose careers are focused on coastal innovation. Applications are being accepted through April 5.

LaDIA (Louisiana Discovery, Integration and Application) Faculty Fellows participate in three, three-day retreats over the course of the 2019-20 academic year. “The retreats are designed to broaden fellows’ knowledge of coastal concerns, hone their communication skills and expand their ability to address coastal challenges,” said Robert Twilley, LSG executive director.

Tenure-track faculty members from any Louisiana university or college may apply. Applicants represent a diversity of disciplines, including, but not limited to, the fields of anthropology, biology, design, ecology, economics, engineering, environmental justice, geography, geology, history and sociology. Fellows must commit to attending all three expense-paid retreats.

“The retreats will be led by specialists in the fields of science communication, public policy and outreach,” said Twilley. “Sea Grant marine extension agents will also provide their perspectives on how coastal issues affect communities, and there will be opportunities to network with local leaders.”

For more information or application materials, visit www.laseagrant.org/outreach/ladia/fellowships/, or contact Dani DiIullo at ddiullo@lsu.edu.