

LUMCON 2019 ANNUAL REPORT





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EXECUTIVE DIRECTOR'S MESSAGE

Just before writing this message, I met with LUMCON's senior leadership team. We spoke of 2019 and our plans moving into 2020. During that meeting a member of the team noted, "2019 may be the most important year in LUMCON's history since its beginning." The rest of the senior leadership nodded in agreement. As you read below about the accomplishments and success that permeate across LUMCON—including the growth of existing programs, the addition of new programs, the award of operator of a Regional Class Research Vessel, and the expansion of LUMCON's footprint to a new innovative campus—it is difficult to envision what greater success would entail. In 2018, I stated our strategy was to start with moonshots and work backwards. This **no barriers** strategy is exemplified in all the successes in 2019 by a small marine lab down the bayou.

I cannot be more proud of what the leadership, staff, collaborators, supporters, and friends of LUMCON accomplished in 2019. In the last few years as Executive Director, I have been privileged to see LUMCON move from healing and stabilizing to growing and innovating. The community of LUMCON has delivered progress by **connecting** through building and expanding collaborations and removing barriers to research, **enriching** through enabling the next generation of marine scientists and ocean-literate citizens, and **transforming** through building a thriving intellectual community contributing directly to science and conservation.

LUMCON's list of the 20 greatest achievements for 2019 include accomplishments in nearly every aspect of our mission.

1. The National Science Foundation awarded the Gulf-Caribbean Oceanographic Consortium (GCOC), led by LUMCON and the University of Southern Mississippi as operator of the third Regional Class Research Vessel (RCRV). The RCRV will be named after civil rights advocate Dr. Gilbert Mason.
2. LUMCON completed with the firm of Eskew-Dumez-Ripple designs of Blue Works, a new technology and engineering teaching and research facility as part of the Houma Maritime Campus.
3. LUMCON secured capital outlay funding for a Marine Operations Center (\$12.1 million), received several non-specific commitments for Blue Works that will be completed as planning for the building is completed, and started the process of building relationships that will provide additional commitments to Blue Works in 2020-2021.
4. In FY 2017, LUMCON welcomed approximately 3,500 K-12 students. In 2019, that total has risen almost 50% to more than 5,200.
5. LUMCON faculty were awarded 9 new awards totaling ~\$6.5M. These awards were received from the National Science Foundation (NSF), National Aeronautics and Space Administration (NASA), Bureau of Ocean Energy Management (BOEM), United States Geological Survey (USGS), Sloan Foundation, Brown Foundation, Louisiana Board of Regents, and Louisiana Sea Grant.
6. LUMCON continued to improve administrative and financial operations. LUMCON administration successfully implemented the set-up and transferring of data from the Checkfront Reservation System into Quickbooks, completed the reorganization of the Human Resource Department, implemented—with the BOR and DOA Office of State Travel/Procurement—a revised P-Card Program, and successfully closed out the FY19 with final expenditures processed totaling \$14,427,595. This is an impressive amount considering all of this work is done by a small staff of 4 individuals.



7. LUMCON experienced increased scientific usage in 2019. LUMCON's DeFelice Marine Center and Fourchon lab were used as a base of operations for a total of 903 person-days in 2019 with 732 of those days being in support of LUMCON consortium members.
8. LUMCON continued to build new Education and Outreach programs. E&O received funding from Chevron for three projects: LEAD camp, which last year was held at zero cost to students and their families; Marine Science Club, which will open up access to marine science to students on 4 different campuses; and a ROV workshop, which will allow LUMCON to host a marine technology-based camp for high school students in June of 2020. Through a VWR grant, E&O and Development secured funding for a 3-D printer lab now located in the library. E&O received funding from the Brown foundation to host a teacher workshop called Coding for Marine Science. This workshop is the beginning of LUMCON redefining how teacher workshops are done and established its presence as a marine science technology education provider.
9. LUMCON established new partnerships and relationships with organizations that value diversity in marine science. An MOU with the Intertribal Council of Louisiana, lasting partnership with the Point-aux-Chene tribe, and discussions with groups like Empower 225 will help LUMCON's mission to serve communities that are underserved and underrepresented in marine science. LUMCON developed stronger ties and programs with HMSIs in Louisiana. LUMCON continues to raise funds for scholarships that reduce financial barriers. Importantly, naming the RCRV after a civil rights advocate is the first step in a call to action to continue to bolster our initiatives.
10. Several individuals with LUMCON were recognized for excellence in their respective fields. Dr. Marshall Bowles was awarded a Hanse Wissenschaftskolleg Fellowship (Delmenhorst, Germany) that has him conducting research in Germany for a total of 6 months in 2019 and 2020. Dr. Alex Kolker was awarded a Fulbright Fellowship to study in Morocco for nine months in 2019 and 2020. Murt Conover, Associate Director Education and Outreach, was awarded the Louisiana Informal Science Educator of the Year.
11. Institutionally LUMCON received recognition in the press for securing the operation of the RCRV as part of GCOC, being part of a regional effort to secure \$238M in funding for the project, being co-lead on a new task force to develop a maritime campus in Houma, and being a "bright spot in a down economy".
12. LUMCON continued to maintain an active research fleet. Vessel Operations having a robust 2019 schedule with the R/V Pelican, R/V Point Sur and R/V Acadiana completing 187, 145, and 88 days at sea respectively.
13. Several facilities projects occurred across the DeFelice Marine Center in 2019 including renovations and improvements to the wet lab, external electrical, outside seating areas, dormitory courtyard area, plant beds, entry paving, two research labs, entry platform, and dormitories.
14. Hurricane Barry, a category one hurricane caused ~6 feet of flooding at the DeFelice Marine Center on a Saturday. Through a combined effort of all LUMCON staff, the Marine Center was back in operation by the end of the day on Monday and open to the public on Wednesday. This quick recovery is a testament not only to our preparedness, but our dedication, efficiency, and continued resiliency.

15. LUMCON's IT department made big strides in 2019. In June 2019 LUMCON hired Amber Bonvillain as the new Data Manager. Her addition to the LUMCON team, along with new leadership of John Conover, Associate Director of Library and Information Sciences, revitalized a department that had struggled to keep up with new technological demands. Early in 2019, IT staff member Bruce Benoit coordinated the transfer of needed IT-related equipment such as routers and servers. This equipment transfer from the Board of Regents and additional IT help from LONI helped to standardize IT components between the institutions, making communications and IT tasks/troubleshooting much easier due to the compatibility of equipment between LUMCON and the Baton Rouge-based agencies. IT fixed multiple issues related to the IT infrastructure at BTNEP. This work also allowed LUMCON IT to synchronize equipment functionality of BTNEP's servers, easing tasks and troubleshooting of issues between LUMCON and BTNEP. In order to improve efficiency of communication with LUMCON staff during emergencies, IT established a multi-level emergency notification system. IT installed a multimedia server to allow the transmission of video and slides throughout LUMCON public areas. In early 2019, a foundation grant from VWR Scientific enabled the IT staff to install the multiple pieces that comprise a new 3D lab for the library.
16. LUMCON's new Development Program continued to see an increase in donations and grants. LUMCON raised money from LUMCON alumni, friends and others for scholarship and education programs. Fundraising totaled over \$200,000, up from \$117,000 in 2018. Some of these funds covered the renovation of the education laboratory, distance learning classroom, and 3-D print laboratory in the library.
17. LUMCON changed its view toward increased flooding in 2019. Bolstered by the output of an internal working group, LUMCON began to see flooding as an opportunity. In 2019, the working group GRAPPLE finished, published, and received recognition for their report providing a comprehensive plan for how a coastal center engages and becomes resilient to flooding. This led to developing new flood curriculum, facilities upgrades, and seeking opportunities to leverage research and education. This year LUMCON began work to submit grant applications to FEMA to secure funding for a new roof for the Marine Center (\$878,000) and to the Economic Development Agency to secure a new "road-level" parking lot at the Marine Center (\$2 million).
18. LUMCON's resurrected dive operations program, under the leadership of Dive Safety Officer David Munch, increased both resources and programs including a new dive van, new dive locker, increased research divers, and dive training.
19. Environmental monitoring finished the herculean effort of curating the complete time series of data from the Marine Center. The dataset from the Marine Center includes meteorological and hydrographic data from 2000 to present. Years 2000 to 2007 include daily, hourly, and minute data. Years 2008 to 2012 include daily, hourly, and 15 minute data. Years 2013 to present have 15 minute data.

I intentionally end with number 20 as it is the greatest win for this year, the sense of excitement for LUMCON. As I noted in my 2018 message, we are building "a reputation of LUMCON as a different kind of place with a different kind of thinking." At the year's end our regional newspaper stated "Amid the troubles Houma-Thibodaux's economy has faced, one of the bright spots has been the progress on upgrading the state marine research center in Terrebonne Parish... Congratulations, LUMCON. And congratulations to the community it benefits." The recognition comes from more than just LUMCON'S growth but through our continued innovation. I am bolstered by the continued support and recognition of our efforts. I can feel the energy at LUMCON from the staff, during guest visits, and in my travels across the region, state, and nation. As we look forward to 2020, we do so with a limitless view.

No barriers,



Craig R. McClain
December 2019



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CONNECT





CONSORTIUM HIGHLIGHTS:

In 2019, LUMCON's consortium activities continued to thrive. They include a broad set of activities including:

- cross campus visits;
- students and researchers participating in research and educational programs at LUMCON;
- researchers utilizing LUMCON facilities, locations, and vessels;
- shared research projects, papers, and grants between consortium and LUMCON faculty;
- shared mentoring of undergraduate and graduate students between consortium and LUMCON faculty;
- taught courses and invited lectures on consortium campuses;
- and partner, regional, state, and national initiatives between LUMCON and consortium on broad programs and projects.

Several highlights of consortium partnerships are notable. Dr. Kevin Roberson with **Grambling State** joined the LUMCON Advisory Council and worked with Dr. McClain to lay plans for establishing an internship program. LUMCON partnered with **Louisiana Tech University** to begin the LUMCON/LA Tech internship program. Faculty from both institutions worked on collaborative research projects with LA Tech students. LUMCON hosted seven LA Tech students through the internship program from August 12 to 30, 2019. The SEA-PHAGES program was accepted by HHMI for **Nicholls State University** (NSU) and involves NSU faculty members Drs. Landry, Hollander, and Shields and LUMCON faculty member Dr. Bowles. LUMCON faculty member Dr. Bockus assisted Dr. Roldan Valverde, **Southeastern Louisiana University**, in curriculum development for a new course in Marine Biology incorporating LUMCON field trips into the course. Drs. Roberts and Rieucan were awarded a grant and began a collaborative research project funded by BOEM with lead PI Dr. Nelson (**University of Louisiana – Lafayette**) and co-PI Dr. Xu (**Louisiana State University**) to study Ship Shoal. Drs. Zito and Podgorski of **University of New Orleans** are collaborating with LUMCON faculty members Drs. Roberts, Bockus, and D'Andrilli on projects including ocean acidification, oil impacts, aquaculture feed development, and fluorescence spectroscopy. Continued research collaborations occur between Louisiana State University and LUMCON faculty including the GoMRI-funded Coastal Waters Consortium-II (CWC-II) project (no-cost extension ended in December 2018) and Coastal Waters Consortium-III (CWC-III) project (Jan 2018-Dec 2019) with LUMCON/LSU PI Dr. Rabalais, LUMCON co-PI Dr. Roberts, and LSU faculty (DOCS: Drs. Turner, Justić, Polito, Huang, and Mariotti; ENVS: Drs. Overton and Hooper-Bui; SRNR: Drs. Stauffer, Taylor). This project continues to support eight LSU Ph.D. graduate students (Daniel Alt (Roberts), Linlin Lui (Huang), Mario Hernandez (Polito), Lauris Hollis (Turner), Greg Olson (Overton), Alireza Payandeh (Justić), Anna Perez-Umphrey (Taylor), Kendall Valentine (Mariotti)) and 3 M.S. students (Karen Callicot (Hooper-Bui), Ron Scheuermann (Roberts), Allison Snider (Taylor)). Continued collaboration between the research groups of Dr. Maiti and Dr. Roberts on an ongoing ocean acidification project led to an NSF RAPID grant examining impacts of 2017 hurricanes. Dr. Bockus collaborated with Dr. Snyder on a proposal submission to the National Sea Grant (NOAA) program. Drs. Bowles and Roberts submitted a collaborative proposal to NSF with Dr. Maiti and Dr. Schutte (Rowan University). Dr. Bockus and Dr. Green (RNR) collaborated on a project supported by the Board of Regents. Seven **University of New Orleans**, two **Louisiana State University in Shreveport**, and one **Nicholls State University** undergraduate students were enrolled in the LUMCON's Changing Coastal Oceans course. Under the mentorship of LUMCON faculty Dr. Bockus, two **Southern University in New Orleans** students participated in research at LUMCON. At **Tulane University**, LUMCON faculty Dr. Kolker continued to collaborate with Dr. Lewis (ByWater Institute) and Drs. Farrer and Ferris (Tulane) on a wetland project funded by the Brown Foundation. LUMCON's Associate Director of Education and Outreach, Murt Conover, is working with the Biology Department at **River Parishes Community College** to establish the first Marine Science Club Chapter on the RPCC campus. The inaugural meeting of the LUMCON Marine Science Club Chapter at **Delgado Community College** took place on September 18. They elected officers and agreed on their charter for the club.





Visiting student conducts a field study of plants on LUMCON grounds to determine height and species abundance.

ENRICH







In 2019, LUMCON Education and Outreach (E&O) had significant achievements. One such achievement includes an increase in LUMCON's press coverage from 12, 25, and 58 times to 146 times from 2016 to 2019 respectively.

E&O established new partnerships and relationships with organizations that value diversity in marine science. An MOU with the Intertribal Council of Louisiana, a lasting partnership with the Point-aux-Chene tribe, and discussions with groups working to increase diversity in STEM will help LUMCON's mission to serve communities that are underserved and underrepresented in marine science. Along these lines an additional staff position was filled in February within education and outreach. In continuing its tradition of hiring skilled educators who resemble the LUMCON audiences, Aaron Bacala was brought on board. Mr. Bacala not only lends a scientist's skills and knowledge to the team but also brings his talent as a naturalist.

The need to address the future of university courses at LUMCON has become necessary as the needs and wants of consortium member students has changed since LUMCON courses were first developed. Towards this end, an advisory group for university education was established. This group brings together consortium member faculty, high school educators, and other stakeholders to provide guidance on the design, implantation, and course topics of the university classes offered by LUMCON. The result of the discussion of this group in 2019 led to the creation and development of a new semester course titled "The Oceans and Society". This new course will be put into alternate rotation with "Changing Coastal Oceans". The Ocean and Society course will effectively utilize the knowledge and passion of the junior faculty members at the Marine Center. Conversations with the Advisory group and LUMCON faculty began to address the focus of future summer courses. The emphasis on updating the LUMCON courses will anchor LUMCON's reputation as an innovator of marine science education.

E&O made considerable efforts to update education spaces and outreach resources available to educators in 2019. The teaching lab received much needed updates to its physical components. The upgrades allow educators to expand programs, use space more efficiently, and conduct lab activities more effectively. The addition of a teaching microscope with camera, large marker board, expanded sink/cleaning area, new student microscopes, and additional work space make this lab more relevant to the needs of program activities.

An investment was also made in outreach tools and equipment to improve LUMCON brand awareness. The development and purchase of a custom 10X10-foot tent allows LUMCON E&O to be highly visible at community events and festivals. Continued renovations to an education trailer now allow LUMCON to increase programming and engagement at outreach events. This investment will be heavily utilized as the presence of LUMCON at outreach events is increasingly requested. These investments will also help meet a growing demand for hands-on activities that promote STEM education relevant to Louisiana. Another update to education space, due to a \$10,000 contribution by the Arthur Blank Foundation, will focus on the Distance Learning Video Classroom in 2020. This much needed upgrade will increase the usefulness and effectiveness of this room as a teaching space. These updates and changes signify LUMCON's continued commitment to enable the next generation of marine scientists and ocean-literate citizens.

LUMCON believes that meaningful education opportunities are built on strong collaborative relationships between scientists, educators, students, and the community. The generous support of many partners in 2019 ensured E&O can continue to be at the forefront of marine science education that is accessible, relevant, meaningful, and focused on Louisiana environmental issues. A new 3-D printing lab is such an example. E&O and the Development Director secured funding for a 3-D printing lab through a VWR Foundation grant. The 3-D printer lab is located in the library and accessible to students, visiting scientists, LUMCON faculty, and staff. E&O also received funding from Chevron for three projects: LEAD camp,

which in 2019 was held at no cost to students and their families; Marine Science Clubs, which will open access to marine science to students on 4 different campuses; and an ROV workshop, which will allow LUMCON to host a marine technology-based camp to high school students in June of 2020. Finally, E&O received funding from the Joe W. and Dorothy Dorsett Brown Foundation to host a teacher workshop “Coding for Marine Science”. This workshop is the beginning of LUMCON redefining teacher workshops and establishing a presence as a provider of marine science technology. Looking forward, Blue Works programs coming online will help entrench LUMCON’S place in this science and technology landscape.

Below is a summary of the 2019 activities for each of the programs offered through LUMCON Education & Outreach.

UNIVERSITY EDUCATION:

Semester Field Trips: In 2019, LUMCON was utilized by 28 consortium and 6 non-consortium instructors for course field trip experiences. A total of 559 university students from Louisiana, Tennessee, New York, Florida, Connecticut, and Texas utilized LUMCON facilities, vessels, and education staff support. LUMCON E&O staff provided just over 250 hours of support for 21 of the groups, resulting in 3,312 contact hours for the year.

Semester Courses: The CCO course attracted 10 student participants in the spring of 2019. Students from UNO, LSUS, and Nicholls were enrolled and participated in 22 video conference lectures and a three-day field trip. The number of consortium member involvement was lower in 2019 because of the development of an MOU for semester courses. The MOU between LUMCON and consortium member schools allows LUMCON to receive payment for offering the course to cover expenses such as administration costs, educator time, and field trip expenses. These courses allow for the broadening of student knowledge, experience, and interest while allowing a greater number of working and non-traditional students to engage in a marine science course.

Skill-Based Courses: In 2019 LUMCON also offered an Academic Scientific Diving course. The course required classroom and pool sessions, as well as training dives. To make the course accessible, the LUMCON Dive Safety Officer developed an on-line component to deliver some of the course content via Moodle. This portion of the course was self-paced and allowed for more time to be dedicated to swimming pool sessions for critical skill development. This course was offered to LUMCON staff and LSU faculty members with the need for certification as scientific divers.

Summer Courses: No credit courses were offered in the summer 2019 due to low enrollment. However, LUMCON was able to offer a two-week Scientific Diver course in July. The course had 10 participants from three Consortium member institutions, three out-of-state universities, and two commercial businesses. Students participated in moodle-based academic training, swimming pool training sessions, and training dives from LUMCON small boats. Like the semester course, some content is offered through the LUMCON moodle site, so the academic requirements can be self-paced and completed away from the Marine Center. This allowed for face-to-face instruction to focus slowly on skill-building during pool training and open water dives.

Marine Science Clubs: In 2019, LUMCON was able to establish four campus chapters of the LUMCON Marine Science Club. This program is funded by a grant from Chevron. The Marine Science Club is a new program providing undergraduate students with an opportunity to engage with and gain access to LUMCON resources on their own campuses. Club Chapters develop and participate in their own service project having a real and significant impact on their local communities. The Marine Science Club brings together club members from across the state during events designed to strengthen collaboration between chapters.



Otter trawl deployed for collecting specimens during an educational cruise aboard the R/V *Acadiana*.



RESEARCH EXPERIENCES FOR UNDERGRADUATES (REU) PROGRAM

2019 Cohort: 2019 saw the completion of the 9th year of LUMCON's REU Program in Interdisciplinary Research Experiences in Changing Coastal Environments. The main REU site program was supported by a grant awarded to Drs. Brian Roberts and Craig McClain (NSF OCE-1757887). This year's REUs were directly supported by the NSF grant as well as a research grant to Drs. Rabalais and Roberts from the Coastal Waters Consortium via the Gulf of Mexico Research Initiative. One student who participated in REU activities was funded directly by Southern University of New Orleans with additional support from Louisiana Sea Grant. The 2019 cohort consisted of six students from across the country that completed a 10-week internship from June through mid-August during which they worked with a mentor and/or mentor team to identify a research question, develop and orally present a research proposal, conduct their research project, and participate in a series of career and skill-building workshops and activities. The program is directed by Dr. Roberts and this year's mentors included Drs. McClain, Roberts, Clif Nunnally, Marshall Bowles, Abigail Bockus, Ryann Rossi, and Charles Schutte. The program concluded on August 9th with the annual LUMCON Summer Student Research Symposium. All six REUs gave presentations in the research conference style symposium.



The 2019 REU cohort pose with LUMCON research mentors and Education staff following their final research presentations.

The presentations were:

- Alizia Barnes (Louisiana Tech University), "The Impact of Oil Contamination on Denitrification Rates in Salt Marsh Soil"; Mentors: Roberts / Schutte
- Hanna Hertzler (Vassar College), "Composition of Deep-Sea Woodfall Communities Determined by Wood Type"; Mentors: McClain / Nunnally
- Moshe Steyn (Brown University), "The Dispersal and Ecology of Petroleum Reservoir Microbes"; Mentor: Bowles
- Briante Brumfield (Southern University at New Orleans), "Exploring How Temperature Affects Hypoxia Tolerance in Gulf Killifish"; Mentor: Bockus
- Naiyiri-Blu Brooker (CUNY Lehman College), "Temporal and Spatial Distribution of Macrofauna Benthic Communities across Terrebonne Bay"; Mentors: McClain / Nunnally
- Harrison Coker (Texas A & M University), "Spartina alterniflora Response to Oil Spills"; Mentors: Roberts / Rossi

In 2019 the impact of LUMCON's REU activities were enhanced because of the involvement of Louisiana Sea Grant. Their commitment to supporting activities, sharing expertise, and providing coordination for field trips proved valuable. By providing the REU students a unique perspective about the local fishing communities and the working coast. Additional outside participation in the 2019 REU program included.

LUMCON/LOUISIANA TECH INTERNSHIP PROGRAM

LUMCON welcomed seven students from Louisiana Tech University (LA Tech) to its DeFelice Marine Center in August 2019 as the inaugural class of the Coastal Research Internship Program. Students spent three weeks conducting research while in residence at the coast, then analyzed and presented their results during the fall 2019 semester at LA Tech. Each student in the program earned credit for an independent research course through LA Tech.

Participating in LUMCON programs can be difficult for LA Tech students because of distance and LA Tech's quarter system. This partnership provided students with coastal research opportunities, highlighted common research themes between each of the institutions, and overcame some of the barriers students experience when pursuing coastal internships and research opportunities. The program also led to joint research initiatives developed between LUMCON and LA Tech faculty.

Below is a list of the students that participated in the 2019 Internship program:

- Chardonnay Boyd, Junior; Mentors: Schultz (LA Tech) and Bockus (LUMCON)
- Maggie Herrmann, Senior; Mentors: Clay (LA Tech) and McClain (LUMCON)
- Brittany Hutton, Junior; Mentors: Hill (LA Tech) and Rieucan (LUMCON)
- Katheryn Steffins, Freshman; Mentors: Hill (LA Tech) and Rieucan (LUMCON)
- Grace Cohenour, Sophomore; Mentors: Giomo (LA Tech) Bowles (LUMCON)
- Richard David Johnson, Junior; Mentors: Earl (LA Tech) and Roberts (LUMCON)
- Adam Broussard, Senior; Mentors: Adams (LA Tech) and Roberts (LUMCON)



Student participants from the Louisiana Tech/LUMCON Internship Program pose on the ramp behind the DeFelice Marine Center in August, 2019.

K-12 EDUCATION

K-12 Field Trips: 80 K-12 groups (both in-state and out-of-state) utilized the education program for field trip experiences in 2019 for a total of 2,923 students that participated in the place-based, skill-based programming offered by LUMCON E&O. The education staff completed 918 hours of active teaching which generated 16,882 contact hours for the year. The map below breaks Louisiana down by region. The accompanying table (below) shows the numbers of trips and schools from each region of Louisiana that participated in LUMCON field trip programs. Accompanying the table is a map that defines the corresponding region for Louisiana schools visiting the Marine Center.

Region	Number of Trips	Number of Schools
Northwest Louisiana	2	2
Northeast Louisiana	3	3
Central Louisiana	3	3
Southwest LA	0	0
Acadiana	0	0
Greater Baton Rouge	5	5
Florida Parishes	1	1
Greater New Orleans	10	9
Southeast Louisiana	49	28
Total	73	51



Table and accompanying map listing 2019 K-12 visits to LUMCON by geographical region. 72% of participating schools came from the Southeast Louisiana/Greater New Orleans areas in 2019.

Summer Camps: LUMCON Summer Camps are designed to help promote stewardship, strengthen scientific knowledge, introduce STEM careers within marine science, and teach communication skills. These highly successful and in-demand programs have been the premiere summer marine science education experience in Louisiana for over a decade. In 2019, LUMCON offered two summer camps for students in grades 7-12.

- **LEAD Camp:** Chevron provided funding support for LEAD Camp this year. This funding allowed LUMCON to offer the camp to all participants at no cost. This resulted in a more diverse group of students. A total of 15 students from Louisiana (13), Maryland (1), and Illinois (1) spent one week at the Marine Center in June.
- **Field Marine Science:** 12 students from Louisiana, Colorado, Missouri, and Mississippi were selected to attend FMS camp in July. Unfortunately, the occurrence and impacts of Hurricane Barry prevented the camp from being held.

PUBLIC AND EVENTS

Festivals & Events: Festivals & Events: LUMCON education staff attended seven community and partner events/ class visits in 2019. LUMCON education staff impacted 2,204 people by attending public outreach events in 2019. Events included the Chauvin Heritage Festival (Chauvin), STEM Quest (Covington), Rougarou Fest (Houma), Voice of the Wetlands (Houma), Louisiana Sea Grant's Ocean Commotion (Baton Rouge), High School Leadership Seminar (Hammond), Joe W. and Dorothy Dorsett Brown Foundation's Service Learning Event (Kenner), Galvez Middle School (Prairieville), Lacache Middle School (Chauvin), Tulane University (New Orleans), and Camp Grant Walker Education Center Fall Program (Pollock).




OCEANDOTCOMM: In 2019, the formation of an advisory group for OCEANDOTCOMM (ODC) was established and includes ODC 2017 participants, event organizers, and science communication influencers. This group was created to lend their expertise and experience to event planning, recruitment, promotion, and inclusion. A proposal was submitted to the NSF to fund ODC 2020. ODC events promote innovation, influence the development of a new conference model, advance collaboration among science and science communicator groups, broaden diversity in science communication, and create new and innovative products that will be publically available.

White Boot School: White Boot School events took on a different feel this summer with more emphasis placed on experience-based activities. These activities included field trips designed to encourage the interaction of interns, visiting science groups, and employees. Some offered activities highlighted Louisiana's changing landscape, its rich culture and heritage, and skill-building.

SOCIAL MEDIA

LUMCON'S Social Media Program experienced significant growth and maturation during 2019. The LUMCON audiences grew by a significant percent between 2018 and 2019. The LUMCON Twitter audience grew by 87%, the Facebook audience grew by 90%, and the Instagram audience grew by 86%. The Twitter and Facebook accounts also had significant growth in post reach and engagement levels between 2018 and 2019. Meaning that each post (while fewer in count from 2018) resulted in more people liking, sharing, commenting, or clicking on a link within the post than posts in 2018. These metrics indicate that more audience members are taking an interest in the posts and interacting with LUMCON in ways they did not in the past. Dedicating resources to the social media program has resulted in border awareness of LUMCON, LUMCON programs, and made LUMCON a trusted source of information.

Program growth (by follower counts) for 2019 is summarized below.

LUMCON Social Media Program Growth 2017-2019			
	2017	2018	2019
	803	1745	2009
	2396	3682	4126
	324	1123	1303

The program has continued to build a reputation of being innovative, creative, engaging, and a leader in changing the way institutions communicate science online. The program strives to be diverse and engage people on a personal level that is currently lacking in institutional science communication. With continued investment in a formal social media program, LUMCON stands to be a leader and creator of future online science communication.

The 2019 program activities are summarized below.

- A social media workshop was given by the Social Media Coordinator at the Gulf of Mexico Oil Spill & Ecosystem Science Conference in February.
- Considerable time and effort was given to replying to post engagement with LUMCON audiences when certain events occurred. Engagement efforts were increased after Hurricane Barry, a fiddler crab driving event, a video about the *Deepwater Horizon* site, release of the Gulf of Mexico Hypoxia cruise results, the naming process of the R/V *Gilbert R. Mason*, and rare animal finds. This was done in an attempt to determine if increased replies could be used to increase and diversify the audience, create “teachable” moments online, and increase the view of LUMCON as a trusted source of information for the general public. All three goals were achieved.
- Three Facebook live events were held during the 2019 LEAD camp.
- The posts highlighting the impacts of and response to Hurricane Barry received national attention thanks to sharing by some high profile accounts like the Weather Channel and NOAA.
- An examination of type and tone of posts began in August of 2019 and will continue to seek where institutional accounts fit into the online science communication landscape.



Students are shown a male blue crab picked up during a trawl in Terrebonne Bay.

EDUCATION & OUTREACH GOALS FOR 2020

The year 2020 will bring with it many new opportunities and challenges. LUMCON Education & Outreach will continue to:

Diversity

LUMCON E&O will continue to serve Louisiana's diverse communities including groups that are traditionally underserved and under-represented in marine science. This includes training of educators in new teaching methods and cultural competency. In 2020, E&O staff will work to expand programs to better reflect the needs of all visitors and make all education relevant to the diverse users of the education programs.

Amplify

LUMCON E&O will increase the impact of the programs by hiring an additional educator. Brining the number of educators back up to full staff levels will allow E&O to offer more programming at the Marine Center and outreach events. E&O will intensify the public awareness about LUMCON by increasing the efforts to engage audiences through the social media program and increased outreach efforts like classroom visits. Upgrades to equipment, spaces, and new technologies available to E&O will allow development of more activities and updating of the current activities to enhance the experiences and skills acquired by LUMCON visitors. As a result E&O will be better positioned to offer a richer experience and promote more STEM career options. More effort will also be placed on answering questions about how social media audiences engage with LUMCON on-line. The answers to these questions will help LUMCON better understand how different types of audiences engage with science in the on-line landscape.

Unify

The E&O staff understands and prizes the LUMCON core value on being welcoming to EVERYONE. The E&O staff improves inclusivity through the understanding that inclusive education happens primarily through acceptance, understanding, and attending to student differences and diversity, which can include multiple components (academic, physical, emotional, social, cognitive). Therefore, a fundamental need exists for ongoing training in pedagogies designed to better serve diverse audiences. In 2020, the Associate Director of Education & Outreach will work with LUMCON faculty to further enhance the integration of research and education at the Marine Center. Identifying areas where mentorship, summer, and intersession programing opportunities will become a priority in 2020. To increase programming that further unify the research and education programs will serve to create a culture of learning, creativity, and innovation.

TRANSFORM





LUMCON MARINE CENTER FACULTY

LUMCON faculty was productive in 2019. This included the continued development of the research programs of our three junior faculty members, Drs. Bockus, Bowles, and Rieucan, who joined our ranks in the summer of 2017 and the continued development and growth of the research programs of senior research faculty Kolker, McClain, Rabalais, and Roberts. 2019 also saw growth in our faculty with the hiring of new faculty members Drs. Juliana D'Andrilli and Stephanie Archer. This year included continued productivity in terms of research grant funding and scientific publications (which are highlighted in other sections of this report). Here we touch on some of the major research highlights and accomplishments of the research faculty and their lab groups in 2019.

NEW FACULTY HIRES:



Dr. Stephanie Archer

joined the LUMCON faculty in November 2019. Dr. Archer earned a B.S. in Ecology from the University of Georgia and then completed a M.S. in Ecology at Utah State University. After completing a Ph.D. in Zoology from North Carolina State University, Stephanie became a Natural Sciences and Engineering Research Council of Canada Visiting Postdoctoral Fellow (NSERC-VF) with Fisheries and Oceans Canada (DFO) and a Postdoctoral Research Fellow with the Canadian Healthy Oceans Network 2 (CHONe2). She served as a research scientist at Fisheries and Oceans Canada

prior to joining the LUMCON faculty as an ecologist. Her research program focuses on exploring the fundamental principles that underpin the structure and function of biogenic habitats using a combination of observational and experimental approaches to elucidate the role that habitat forming species play in maintaining biodiversity and ecosystem function. The three broad focus areas of Dr. Archer's research (1) revealing the factors that maintain biodiversity and ecosystem function, 2) identifying drivers of decline in biogenic habitats, and 3) developing monitoring and restoration techniques for biogenic habitats) will benefit from having the capability to identify microbial communities and quantify the rates of their activity in biogenic systems. Dr. Archer has already begun submitting proposals as lead and co-PI through LUMCON as she expands her research program beyond the active projects she is continuing from her previous positions.



Dr. Juliana D' Andrilli

joined the LUMCON faculty in August 2019 after serving as an Assistant Research Professor at Montana State University, first in Chemical and Biological Engineering and most recently in Land Resources and Environmental Sciences. Dr. D'Andrilli earned a B.S. in Chemistry from Mary Washington College and a Ph.D. in Physical Chemistry from Florida State University. Juliana then completed two postdoctoral positions at MSU prior to joining their faculty. In 2019, she has continued her research in carbon cycling and dissolved organic matter (DOM) processing in

aquatic and terrestrial environments. Dr. D'Andrilli continues to mentor graduate students and postdoctoral research associates funded by the National Science Foundation and the Danish Research Council and has joined new collaborative teams centering on carbon cycling in the Arctic Ocean, in the Greenland ice sheet, in globally distributed glacial headwater streams, in montane beaver ponds, and throughout the Amazon Rainforest. The chemical characterization of dissolved organic matter, or DOM (microscopic components of aquatic, terrestrial, and atmospheric biospheres), in our environment serves as an indicator of how it was cycled in the past and how it is currently cycling as well as provides insight into its impact with climate warming. In 2019, Dr. D'Andrilli published five research articles in scientific journals that highlight how we can better understand carbon cycling in various environments including Louisiana precipitation, Arctic and Antarctic perennially frozen lakes, semi-arid soils under diverse cropping systems, the headwaters of the Yellowstone River, and what analytical chemistry techniques advance DOM research at the molecular level. Currently, the DOM research community is divided by instrument bias challenges and a lack of communication among members. Dr. D'Andrilli is leading two efforts that focus on two separate challenges in the community in order to close analytical chemistry knowledge gaps and promote problem solving as a unified team. These efforts translated into effective working groups and conference proceedings as well as ongoing field and laboratory research and publications in 2019 and into 2020.



JUNIOR FACULTY:



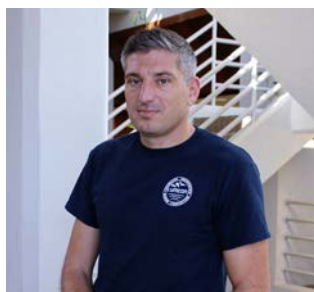
Dr. Abigail Bockus

In 2019, Dr. Bockus was awarded a Louisiana Board of Regents, Research Competitiveness Subprogram grant with collaborators at LSU and the U.S. Fish and Wildlife Service (Bozeman, MT); a Gulf States Marine Fisheries Commission Marine Aquaculture Pilot grant with collaborators at the Gulf Offshore Research Institute, LSU, Innovasea Systems Inc., and NOAA; a Louisiana Sea Grant Undergraduate Research Opportunities Program grant in collaboration with Southern University at New Orleans; and was one of 18 participants chosen for the 2019 NSF UNOLS Chief Scientist Training Program. She participated in a 10-day oceanographic research cruise aboard the R/V Kilo Moana, submitted one research manuscript currently under review, and co-mentored four interns from the University of New Orleans, Southern University at New Orleans, and Louisiana Tech University. Further, Dr. Bockus and her lab members presented at four scientific conferences, and Dr. Bockus presented departmental guest lectures at LSU, UNO, and Southeastern Louisiana University. Abigail conducted a number of outreach and extension activities, including acting as an invited guest judge for the A.I. Family Challenge (Technovation, Los Angeles, CA), an educational program with participants from over 30 countries; serving as an advisory board member for Nicholls State University's M.S. in Marine and Environmental Biology; and participating in LUMCON's Voice of the Wetlands and Louisiana Sea Grant's Ocean Commotion educational events. Dr. Bockus also co-taught LUMCON's Changing Coastal Oceans distance learning course and made significant improvements to LUMCON's experimental research infrastructure.



Dr. Marshall Bowles

had a very productive 2019 in terms of conducting cutting edge research, top-tier publications, numerous proposal submissions, providing the research community services by co-organizing multiple meetings or sessions, and mentoring. Within the framework of a competitive fellowship at the Institute for Advanced Study in Delmenhorst, Germany, Dr. Bowles is using advanced technologies to discern novel molecular trends in salt marsh sediments. Along these lines Marshall procured a state of the art 2D Planar Optode system enhancing LUMCON's (and Louisiana's) ability to analyze sediments with high spatial resolution. Additionally, Dr. Bowles was lead or co-author on four publications in 2019 with placement in high impact journals such as Nature Geosciences and Science Advances. Dr. Bowles submitted a total of four NSF proposals (two as PI, two as co-PI) and one National Sea Grant proposal, with total values of more than \$2.5 million. Marshall has focused on becoming a leader within his research field by co-organizing sessions at international meetings such as ASLO and AGU. He also hosted an international meeting at LUMCON with representatives from eight countries, which was funded by the Sloan Foundation. The meeting topic was 'The Biotic Fringe' with the goal to procure funding for future workshops. A total of three undergraduate students and one graduate student, funded by the Sloan Foundation, worked in Dr. Bowles' research lab this summer, and as a result of his mentorship, Dr. Bowles will continue to serve on the students' reading and thesis committees.



Dr. Guillaume Rieucou

pursued his research and led the coastal behavioral ecology laboratory at LUMCON. He conducted research projects on fish and marine mammal ecology in different coastal environmental systems in south Louisiana, the Gulf of Mexico, Mexico, and the Caribbean Sea. He was actively developing in-state, out-of-state, and international collaborations. Guillaume's research program is currently funded by the Louisiana Sea Grant Project Development Seed program and the Bureau of Ocean Energy Management. Dr. Rieucou co-lectured the Changing Coastal Ocean course at LUMCON. Dr. Rieucou is leading the development of a new course entitled "The Ocean and Society" to be offered to undergraduate and graduate students from consortium institutions at LUMCON in 2020. He guest-lectured for classes at Florida Atlantic University and the University des Antilles, Guadeloupe. At LUMCON, Dr. Rieucou mentored two undergraduate students under the joint LA Tech University/LUMCON internship program. He has presented his research as an invited speaker at national and international conferences. Dr. Rieucou is appointed as an adjunct faculty at ULL and NSU, and his appointment at the Department of Biological Sciences at LSU has recently been approved. Guillaume continues to publish his research (two published articles) in peer-reviewed journals. He acted as an Academic Editor (Peer J) and reviewer for several journals and funding agencies. In addition, Dr. Rieucou is also involved in the development of the wetlab and aquaculture facilities at LUMCON. Finally, Dr. Rieucou participated in several outreach activities (e.g., "Science Rocks! Solid Science Fair").

SENIOR FACULTY:



Dr. Alex Kolker

was awarded a Fulbright Scholarship—the State Department’s prestigious scholar program—and is spending the 2019-2020 academic year in Rabat, Morocco. While there, he is studying how sea level fluctuates across the Atlantic Ocean and what impact sea-level rise has on Morocco’s coast. Specifically, he is investigating seasonal controls along the coast of Morocco, potential interactions between seasonal sea level cycles, and the seasonal intensification of the trade winds. This work builds on a data-driven approach to understanding the modern geological era and is informed by coastal similarities between Morocco and Louisiana with respect to ports, fisheries, mineral resources, and tourism. In Louisiana, Dr. Kolker finished leading efforts to develop LUMCON’s plans to adapt to changing environmental conditions through the Growth and Planning (GRAPPLE) panel. He also met with staff and contractors from Louisiana’s Coastal Protection and Restoration Authority who are working on the Master Plan team to help advise them on how to include nuisance flooding in Master Plan models. Dr. Kolker was awarded funding through the Brown Foundation to continue collaborations with scientists from The Salk Institute for Biological Sciences, Tulane University, Lake Pontchartrain Basin Foundation, and the Water Institute of the Gulf. This work is focused on investigations of genetics, land building, and carbon sequestration in wetland plants. 2019 also saw three of Dr. Kolker’s graduate students earn degrees with Molly Keogh earning a Ph.D. and Catherine Fitzpatrick and Celeste Woock completing M.S. degrees.



Dr. Craig McClain

served as PI for seven submitted grants this year including: LUMCON serving as co-operator of Regional Class Research Vessel, mechanisms impacting biodiversity under climate change, and continued funding for OCEANDOTCOMM. Dr. McClain’s research focused on an NSF-funded program to investigate how changes in the carbon cycle will impact biodiversity. The McClain lab spent time analyzing and processing experimentally deployed wood falls collected from the deep sea in early 2019. The long-term field benthic sampling program of Terrebonne, beginning in 2017, continued regularly in 2019. The research group had four publications this year in PLoS One, Royal Society Open Science, Paleobiology, and PeerJ. Dr. McClain served as advisor for two research scientists, a Ph.D. student at ULL, an undergraduate at Nicholls State University, and two REU students.

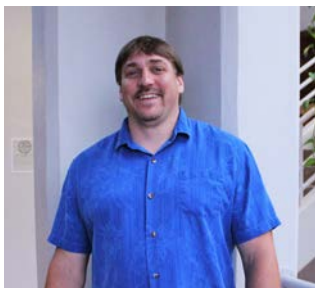




Dr. Nancy Rabalais

continued several offshore and inshore projects through 2019. The summertime area of bottom-water hypoxia determined by a research cruise on the R/V Pelican documented a bottom-water low oxygen area of 18,000 square kilometers that ranked the eighth largest among the 33 years measured since 1985. The Mississippi River flood of 2019 predicted a larger size of the low oxygen area but brought with it harmful algal blooms and stressed fisheries in the spring and summer. The smaller than expected size was the result of Tropical Storm Barry as it crossed the central and southwestern coastline of Louisiana in the week before the cruise. Dr. Rabalais provides the summer data for the

use of the Mississippi River Nutrient/Hypoxia Task force as it attempts to lower nutrient loads in the Mississippi River and their effects on the offshore ecosystem. In addition to the studies of low oxygen, the area is also subject to decreased concentrations of CO₂ in surface waters and increased levels in bottom waters. The increased CO₂ at the bottom leads to the global increase of ocean acidification. This project, funded by the National Science Foundation and collaborative with the University of Delaware, is nearing completion. A multi-collaborative program of the effects of the Deepwater Horizon (DWH) oil spill continued in the marshes of southeastern Louisiana and with marsh mesocosms at the LUMCON Marine Center. Further marsh investigations continue with restored salt marshes in southeastern Louisiana as part of the NOAA RESTORE Food Web studies.



Dr. Brian Roberts

continued to serve on the executive committee and lead the biogeochemistry, microbial ecology, and plant ecology components of the GoMRI-funded Coastal Waters Consortium project with the main focus for 2019 being on a large-scale marsh mesocosm oiling experiment. The Roberts lab participated in research cruises as part of NSF-funded projects examining the coastal carbon cycle, ocean acidification, and the impacts of Hurricane Harvey in the Gulf of Mexico. His lab continued to contribute to a multi-year NOAA RESTORE project focused on the impacts of salinity alterations and marsh creation projects on food webs, a LA Sea Grant project focused on evaluating how Gulf ribbed

mussels enhance living shoreline restoration projects (supports two LSU graduate students), and a project studying an assimilation wetland project with colleagues from ULL. New projects in 2019 included a BOEM-funded project examining the impacts of dredging on the ecology of Ship Shoal, a NASA project monitoring and forecasting coastal wetland carbon exchanges, and a USGS-funded project examining the impacts of wildfires on tidal and managed wetland nitrogen cycling. Dr. Roberts is heavily involved in GoMRI-led synthesis activities evaluating the impacts of the Deepwater Horizon oil spill including leading the overall wetland synthesis effort. Dr. Roberts is the program director for LUMCON's NSF-funded Research Experiences for Undergraduates (REU) program and, this year, mentored interns from LA Tech and Texas A&M and two interns in the LA Tech/LUMCON internship program. Dr. Roberts also was lead instructor for LUMCON's Changing Coastal Oceans course.

LUMCON GRANTS - 2019:

Continuing

Klevjer TA, **Rieucan G**, et al (5 total PIs); "SWARM: From Swarming Behaviour to Trophic Interactions: Forecasting Krill Dynamics in Ecosystem Hotspots Using Behaviour-Based Models", Norwegian Research Council--Norwegian Antarctic Research, 2017-2020; \$950,000

Kolker AS et al. (4 total PIs); "A Changing Landscape in a Future Without Action: The Geological Evolution of the Southeast Mississippi River Delta", Louisiana Sea Grant/LA Coastal Protection and Restoration Authority, 2018-2021; \$75,000

McClain C et al; "The Energetic Assembly of Invertebrate Communities: A Test With Experimental Wood Fall", NSF Biological Oceanography, 2017-2020; \$833,270

Polito M, **Roberts BJ, Rabalais NN**, et al (9 total PIs); "Linking Community and Food Web Approaches to Restoration: An Ecological Assessment of Created and Natural Marshes Influenced by River Diversions", NOAA RESTORE, 2017-2021; \$2,040,845

Rabalais NN; "Collaborative Research: pH Dynamics and Interactive Effects of Multiple Processes in a River-Dominated Eutrophic Coastal Ocean", NSF Chemical Oceanography, 2016-2019; \$177,417

Rabalais NN, Roberts BJ et al (22 total PIs); "Coastal Waters Consortium III: Oil Spills as Stressors in Coastal Marshes: The Legacy and the Future", Gulf of Mexico Research Initiative, 2018-2019; \$4,800,000

Rieucan G; "Implementing Video Analysis and Automated Tracking to Unmanned Aerial Vehicle (UAV) Surveys for the Study of Distribution, Movement and Behavior of Gulf Menhaden (*Brevoortia patronus*) in Louisiana's Coastal Zone", LA Sea Grant - Project Development Seed program, 2018-2020; \$9,896

Roberts BJ et al. (5 total PIs); "Collaborative Research: A RAPID Response to Hurricane Harvey's Impacts on Coastal Carbon Cycle, Metabolic Balance and Ocean Acidification", NSF Chemical Oceanography, 2017-2019; \$42,686

Roberts BJ, McClain CM; "REU Site: Interdisciplinary Research Experiences in Changing Coastal Environments", NSF OCE, 2018-2021; \$238,102

Roberts BJ, Rietl A, Chelsky A; "Core: Incorporating Life into Living Shorelines: Can Gulf Ribbed Mussels Reduce Shoreline Erosion and Enhance Restoration Practices?", Louisiana Sea Grant, 2018-2020; \$144,000



New

Bockus AB, Green CG, Gaylord TG; “Assessing the Physiological Effects of Feed pH on Postprandial Processing and Growth in Marine Finfish”, Louisiana Board of Regents Research Competitiveness Subprogram, 2019-2022; \$130,947

Bockus AB; “Characterizing the Effects of Temperature on Hypoxia Tolerance in Gulf Brown Shrimp to Support Directed Fishing Efforts Offshore”, LA Sea Grant Undergraduate Research Opportunity Program; \$2,200

Holmquist J, **Roberts BJ**, et al. (8 total PIs); “Data-Model Integration for Monitoring and Forecasting Coastal Wetland Carbon Exchanges: Serving Local to National Greenhouse Gas Inventories”, NASA CMS, 2019-2022; \$1,123,976

McClain CM, Malbrough J, Roberts BJ; “Collaborative Proposal: Proposal for the Operation of Regional Class Research Vessel #3 in the Gulf of Mexico, Caribbean Sea, and Southwestern Atlantic Ocean”, NSF, 2019-2024; \$3,173,061

Nelson J, **Roberts BJ, Rieucan G**, Xu K, Johnson D; “Ecological Function and Recovery of Biological Communities within Sand Shoal Habitats within the Gulf of Mexico”, Bureau of Ocean Energy Management, 2019-2022; \$1,999,985

Roberts BJ; “Soil Biogeochemistry of Pacific Coastal Wetlands”, USGS cooperative agreement G19AC00447, 2019-2021; \$15,000

Rossi R, Roberts BJ; “Exploring the role of biological factors in widespread mangrove die-off: A citizen science based approach”, National Geographic, 2019-2021; \$28,900

MENTORSHIP OF GRADUATE STUDENTS AND POSTDOCS

Graduate Students:

PhD Students: Daniel Alt, Louisiana State University CEE (co-advised by Roberts), graduated May 2019; Molly Keogh, Tulane University Earth and Environmental Sciences (Kolker), graduated May 2019; Skyler Flaska, University of Louisiana-Lafayette Biology (co-advised by Roberts); River Dixon, University of Louisiana-Lafayette Biology (McClain)

MS Students: Ronald Scheuermann, Louisiana State University DOCS (Roberts); Celeste Woock, University of New Orleans Earth and Environmental Sciences (Kolker), graduated May 2019; Catherine Fitzpatrick, Tulane University Earth and Environmental Sciences (Kolker), graduated May 2019; Jordan Logarbo, Louisiana State University RNR (Roberts); Sarah Catherine LeBlance, Louisiana State University RNR (Roberts)

Postdoctoral Research Associates: Shivakumar Shivarudrappa (Rabalais); Ryann Rossi (Roberts)

SCIENTIFIC INFRASTRUCTURE

2019 saw significant advances in our scientific research and experimental infrastructure at the Marine Center. These improvements took place in several locations throughout the Marine Center facility and grounds and provide benefits to scientists in residence as well as throughout the consortium.

Shared Equipment Room: We were able to make additional improvements to this shared space with the installation of a new autoclave and improvements to the supply and drainage of water from the area. We also added an ancillary drying oven and provided space for visiting scientists to set up and run gas chromatographs as part of ongoing projects at the Marine Center.

Experimental Wet Lab Facilities: There was significant progress in the re-design and expansion of our experimental wet lab and aquaculture facilities in the large lab at the end of the wet wing of the Marine Center that originally began in the fall of 2017. Our experimental tank systems in the wet lab have seen significant improvements in the plumbing with several systems being used in 2019, and the remaining tank systems are scheduled to fully come on line in 2020. Additionally, the redesign of the culture room has seen great progress throughout 2019. It is anticipated that all of the experimental systems and culture room in the redesigned wet lab will be fully operational in 2020. This effort has been led by Dr. Abigail Bockus and Dr. Guillaume Rieucan with input from Dr. Brian Roberts and Dr. Craig McClain.

Marsh Mesocosm Facility: Construction of LUMCON's marsh mesocosm facility was completed in 2019 on the Marine Center grounds with funding to the Coastal Waters Consortium research team from the Gulf of Mexico Research Initiative. The facility consists of 12 experimental tanks (10' diameter, 5' tall) and paired tidal surge tanks (6' diameter, 5' tall) enclosed in aviary-proof netting. Briefly, water is pumped from the bayou adjacent to the Marine Center through two settling tanks, then to the tidal surge tanks. Water is moved between each tidal surge tank and its paired mesocosm via air blowers on each tidal cycle. The facility was designed to conduct a long term study of impacts of oil exposure on *Spartina alterniflora* (smooth cordgrass) salt marsh ecosystems. The transplanting of intact sections of marsh containing *S. alterniflora* and soil was completed in January 2018 and instrumentation and sampling of baseline conditions began in spring 2018 and continued until oiling which took place on 8 July 2019. The oiling experiment has thus far involved collaborators from LSU and UNO as well as out-of-state collaborators from the Marine Biological Laboratory, Connecticut College, University of Florida, Florida State University, and USGS. The goal is to track the impacts of oil exposure for multiple years post-oiling. By including control tanks in the design, the facility will continue to allow scientists to address non-oil related questions while the oiling experiment takes place.



Volunteers and BTNEP/LUMCON Educational staff gather for a photograph during post-Hurricane Barry grounds cleanup.



LEAD Camp student holds a female blue crab with eggs ("sponge crab") captured in the surf.

INFRASTRUCTURE





ACADIANA

RigNet



FACILITIES

Renovations: A number of faculty-focused renovations were undertaken and/or completed in 2019. This included completion of the wet lab area, massive renovations of the D'Andrilli and the Archer labs, and clearing out old office spaces for new faculty hires. The teaching lab also underwent significant changes as physical components of the lab were updated. New electrical outlets were added to allow for the installation of the 3-D lab housed in the library. Many of the dormitories and all of the apartments were upgraded with new appliances, furniture, and window treatments.

Repairs: Many repairs were made at the Marine Center over the course of this year, including many related to high water and storm events. Additionally, a large number of general repairs were made with the successful completion of more than 200 work requests submitted into the work order system by LUMCON staff.

Upgrades to Facility and Grounds: Many upgrades were performed throughout the year including clearing out badly overgrown plant beds, replacing the bench seating at the back ramp area, and refurbishing the courtyard area below the apartments. Parking lots and driveways were graded and a much needed new entrance to the driveway was poured. The walk-in coolers were emptied, cleaned, and refitted with new shelving to allow for more organized storage by faculty and scientists. The storage cages for housing research field equipment were upgraded and several new built, allowing for more organization.

Assorted and Special Projects: The main electrical feed for the facility was completely replaced, allowing for a long service of reliable power. The lower lobby raised deck area was demolished due to years of flood-related deterioration, and a new sustainable deck was built that also serves as a "screen" for display of recorded video. The electrical system for the mesocosm had to be completely rewired due to damage from Hurricane Barry. Two vehicles were also purchased through LPAA, providing LUMCON with safer, more efficient vehicles for official work.

VESSELS

R/V Gilbert R. Mason

On April 4, 2019, NSF released a solicitation for the Operator Selection for Regional Class Research Vessel (RCRV) #3. LUMCON and USM along with 15 Gulf and Caribbean universities established a Gulf-Caribbean Oceanographic Research Consortium (GCOC). LUMCON and USM submitted an Operations Proposal to NSF in June 2019. In early August, NSF announced LUMCON, USM, and the rest of the GCOC were awarded as Operating Institutes of the #3 Regional Class Research Vessel. A cooperative agreement was signed with NSF and during September, a RCRV #3 naming committee was formed. Nominations were accepted through a public forum and the name R/V Gilbert R. Mason was selected by the committee as the name for the Gulf of Mexico and Caribbean's newest future academic research vessel. LUMCON's Marine Superintendent, Joe Malbrough, is the lead Operating Institute's (OI) representative and regularly attends weekly, biweekly, and quarterly RCRV management, construction, progress, marine technical, and OI logistical planning meetings. LUMCON and USM representatives have multiple inputs on exterior colors, interior design, regional differences, change requests, and outfitting supply requests. Construction of the Gilbert R. Mason will officially begin in March of 2020 and will coincide with the vessel's keel laying ceremony.

R/V Pelican

2019 proved to be a fully subscribed year for the R/V Pelican. Our flagship UNOLS vessel, the R/V Pelican spent 185 days offshore in support of marine science and education, up from 159 in 2018. The vessel's 10-year average is 191 day at sea. Of these, NSF funded the vessel for 84 days and NOAA for a total of 37 days. The R/V Pelican supported various data collection cruises of both the physical and chemical environments in the Gulf. In addition, the R/V Pelican completed two annual inspections: her annual American Bureau of Shipping (ABS) load-line survey and an annual OVID (Offshore Vessel Inspection Database). The R/V Pelican was fully subscribed performing 43 days of "live boating" deep water remotely operated vehicle (ROV) scientific missions and multiple days of hypoxia and ocean acidification research along the Louisiana and Texas coast. Multiple mooring cruises utilized the vessel and its systems which includes a combination of the vessel's folding knuckle boom crane, multipurpose winch and stern A-frame to systematically deploy and recover multiple offshore buoy scientific mooring and weather stations.

R/V Acadiana

The R/V Acadiana completed 82 in sea days in support of busy educational and research seasons. She conducted 46 days total of education cruises and 36 days devoted to research.

R/V Point Sur

The R/V Point Sur conducted 140 days of support of oceanographic research and 7 in support of marine education in 2019. The R/V Point Sur's presence in the Gulf was critical in aiding the scientific community needs. As with the R/V Pelican, the crew of the R/V Point Sur provided excellent service.

Small Vessels

In 2019 LUMCON's small boat fleet aided researchers for a total of 286 days. Research-related work accounted for 191 charters conducting work over 230 research days. Small boats were used by the education department for a total of 51 days. Vessel Operations and LUMCON have been diligent in their efforts to accommodate the boating needs of scientists. Drawing from years of scientific boating experience, our fleet of small vessels have been thoughtfully combined and have spanned the coast of Louisiana from Venice to west of Marsh Island.

ENVIRONMENTAL MONITORING

Program Modifications: Environmental Monitoring (EM) purchased needed spare instruments for the stations. A new YSI sonde for hydrographic readings will allow shorter to no gaps in hydrographic data. A Pro-DDS handheld device was purchased to aid in the quality assurance and quality control procedures. This instrument allows monitoring to take hydrographic readings next to the deployed sondes in real time, assuring EM personnel that deployed sondes are taking accurate readings. This handheld instrument will also allow EM to take hydrographic samples during environmental events or assist with readings for scientists at research sites.

Program Achievements: EM staff spent the majority of 2019 curating the Marine Center station's historical dataset. This dataset began in the fall of 2000 and continues into the present. During 2000-2012 the data was available in hourly and minute increments only. Monitoring was able to reformat this data into 15 minute increments to standardize past and present data. Monitoring has worked tirelessly to make sure quality data is available for scientific and public use. With this quality-controlled dataset, LUMCON will have environmental data spanning 20 years with 10 different parameters.

Dr. Beth Stauffer at the University of Louisiana at Lafayette was awarded a NOAA-funded grant to test the compatibility of Systea's Water In Situ Analyzer with active monitoring stations. LUMCON's monitoring program was selected for one of the five deployment sites for this nutrient sensor. Monitoring technician Amanda Fontenot attended training on this nutrient sensor at the University of Louisiana at Lafayette. Dr. Stauffer, Amanda Fontenot, and the participants from the four other host sites are working together closely to determine the best way to integrate this instrument into their monitoring stations. The group is working to have the instruments deployed in 2020.

DIVE OPERATIONS

Program Highlights: Throughout 2019 the Diving Safety Program went through ongoing revisions with a goal of establishing permanent, full time infrastructure, administration, and oversight of LUMCON diving. Key changes made included the creation of a working dive locker with gear and support equipment, migration of all records and documents to the LUMCON server as well as updating and adding tracking and diving forms, revision of the LUMCON Diving Safety Manual, and compilation of a Safety Manual for Working (non-scientific) dives. A formal charter was approved granting oversight of the Diving Program to the Diving Safety Committee.

Scientific Diving: Efforts have been underway through 2019 to establish a state-wide scientific diving network accessible to all consortium members which allows pooling of divers and resources to conduct research diving operations. Two Scientific Diver courses were completed, certifying thirteen scientific divers from four consortium member universities, one private company, and three out-of-state universities. Additionally, eight trained scientific divers became affiliated and active as LUMCON divers. At present there are sixteen active scientific divers affiliated with LUMCON representing four consortium member universities and one application for affiliation in process, which will add representation of a fifth consortium member university.

Diving Operations: During 2019, 288 dives were logged by LUMCON-affiliated divers or divers engaged in training at LUMCON with an average depth of 40fsw and deepest depth of 78fsw. LUMCON-affiliated divers participated in training dives in the Gulf of Mexico waters near LUMCON and in Florida at Panama City and Vortex Springs. Research dives were conducted in the Gulf of Mexico and at the Florida Keys National Marine Sanctuary on Greys Reef and off Summerland Key. In addition, LUMCON-affiliated divers engaged in diving operations collaborating with NOAA, the Florida Fish and Wildlife Conservation Commission, and Mote Marine Laboratory.



Louisiana Universities Marine Consortium Dive Statistics

Reporting Period: January 1-December 31, 2019

Total Number of Dives Logged during this reporting cycle	288
Total Number of Divers Logging Dives during Report Period	21
Total Number of Dive Plans Submitted	20
Scientific Diver Courses Taught	2
CPR First-Aid Certifications	20
Scientific Divers Trained	13
Scientific Divers Reactivated or Transferred to LUMCON	6
Letters of Reciprocity to other Organizational Member Institutions	10
Diving Incidents/Accidents this cycle	
Incidents	0
Accidents	0

INFORMATION TECHNOLOGY

New IT Manager: In June, Amber Bonvillain joined the LUMCON/BTNEP staff as the newest IT Manager. Working with longtime IT specialist Bruce Benoit, under the supervision of Associate Director for Library and Information Science John Conover, Amber quickly became acclimated to the IT department.

Donation: The Louisiana Board of Regents made a generous donation of used computer equipment, for both personal computing as well as for IT use. This allowed LUMCON to update servers, office computers, and also offer PCs to faculty in need of computers in their research laboratories. To do this, IT created a spreadsheet with specifications of each donated computer and paired each PC with a location given the need of each person and the capability of each computer.

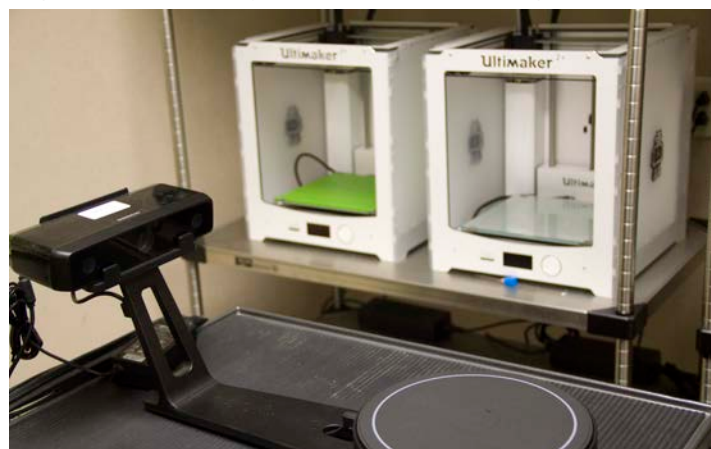
BoR/LONI Assists: IT worked with the IT personnel from both the Board of Regents and LONI to help standardize LUMCON's IT router and server configurations between the agencies. Before this, LUMCON was using outdated equipment no longer used at the state level, so troubleshooting assistance from the BoR and/or LONI was overly complicated. Now, LUMCON is using similar equipment to the Baton Rouge agencies, which makes problem solving easier when equipment stops functioning correctly.

BTNEP: IT fixed multiple issues related to the IT infrastructure at BTNEP. This work also allowed LUMCON IT to synchronize equipment functionality of BTNEP's servers, easing tasks, and troubleshooting of issues between LUMCON and BTNEP.

Emergency Notification System: LUMCON's Executive Director and Management Team identified a reliable emergency notification system for staff as an important component of LUMCON's hurricane preparation document. Based on this, the IT staff identified a redundant system of emergency notification, using a text alert system in combination with a web-based emergency update method of keeping staff alerted to conditions at the DeFelice Marine Center during storm and flooding events.

LIBRARY

Technology: The LUMCON Library continued to add new technologies to the department in 2019. Thanks to the work of the education and development departments, a foundation grant from VWR Scientific was secured in early 2019. This grant allowed the purchase of a 3D Printing Lab, which is housed next to the computer lab in the library. The 3D Printing Lab now offers two Ultimaker 2+ printers, two Monoprice Maker Select 3D printers, one EinScan SE 3D scanner, and two Levono ThinkStation P3300 computers attached to the EinScan SE for creating 3D print files from scanned objects. After nearly a decade of not having any print/photocopy/scan functions in the department, the library added a WiFi printer in 2019. This allows library users to print articles from any computer being used in the laptop brought in by a patron that is logged into LUMCON's Public WiFi signal. A 2019 donation of computer-related equipment from the Louisiana Board of Regents enabled the library to update all existing public use PCs in the computer lab.



Components of the Library 3D lab. Shown here are two Ultimaker printers and an EinScan 3D scanner.

Donation: Retired faculty member Dr. Edward Chesney donated approximately 80 books, reports, and journal issues related to fisheries and aquaculture.

Institutional Repository: In September, the library added the 500th record to the LUMCON Institutional Repository. In December, the library completed the archiving, cataloging, and uploading of the published output of Dr. Nancy Rabalais. This collection amounts to just under 240 individual items published between 1975 and 2018.

Reference: The reference area was long overdue for reorganization, weeding, and updating of the collection. Money diverted from journal subscription cancellations was, in part, targeted towards this area. Recently published subject-specific encyclopedias, field manuals, laboratory manuals, and handbooks were purchased and added. This area should be an essential resource for summer classes, REU students, laboratory workers, graduate, and postdoc researchers interested in accepted field-based and lab-based methods.



INFRASTRUCTURE IN 2020

Facilities will complete upgrades in the Archer lab, updating and resolving the ongoing issues with existing fume hoods and installation of new ones, completion of repairs related to Hurricane Barry, and installation of the kayak launch. Facilities will assist in the installation of automatic storm shutters, oversee upgrades to the tower area, and the beginning stages of a future elevated drive and parking structure.

Vessels will continue to operate vessels in a safe and efficient manner with proper seamanship and provide the best oceanographic instrumental data quality feasible for the 2020 scientific missions. The R/V *Pelican* crew will work diligently to ready their vessel to complete an upcoming National Science Foundation ship inspection which will take place in 2020. The R/Vs *Pelican* and *Point Sur* currently have 148 and 115 scheduled days at sea for research next year. Meanwhile, LUMCON will be exploring and working with potential federal, state, and private sector funders to generate \$36 million for a replacement for the *Pelican*. Preliminary planning for the 120-foot *Pelican* replacement has been completed by Glosen, the marine architecture firm that has developed plans for LUMCON's new Regional Class Research Vessel (RCRV) *Gilbert R. Mason*. We anticipate that the final plans for the Pelican replacement will be underway by the end of 2020. Meanwhile, the keel for the new R/V *Gilbert R. Mason* will be laid at Gulf Island Fabrication in Houma on March 3, 2020, with construction expected to be completed in late 2023. While the *Gilbert R. Mason* is being built, LUMCON will be planning and constructing a Marine Operations Center at the Houma Marine Education Campus, which will serve as the new vessel's home port. Finally, the small vessels department will continue to provide unparalleled service to all consortium users, researchers, and marine educators.

Environmental Monitoring will focus on quality control of the Terrebonne Bay station's historic dataset, which is expected to be completed in 2020. EM will be submitting a letter of intent to the Gulf of Mexico Coastal Ocean Observing System (GCOOS) for 2020 funding. It is hoped that recently reestablishing connections with GCOOS will help to secure this funding. As always, EM is committed to exploring new funding options to help expand the footprint of LUMCON monitoring stations along the Louisiana coast.

Dive Operations will work to increase the number of certified divers both within the LUMCON faculty and staff and throughout consortium member universities. We will also seek to become a full service dive program, a provider of divers and trainers when needed, and an assistance on internal and external research projects.

IT will continue to improve connectivity and functionality at LUMCON. This will include updating observation cameras, streamlining internet wiring and port availability, and improving bandwidth, as money allows.

The Library will continue to digitize and add materials to the Institutional Repository, using archived LUMCON annual reports to identify published research articles, reports, and book chapters by former faculty and postdocs over the last thirty-five years.



A photograph showing the back of a man's head and shoulders. He is wearing a blue button-down shirt and looking towards a bright, clear sky. The image has a soft, slightly blurred quality.

FINANCES & DEVELOPMENT



Administration, Finance, and Budget

LUMCON Administration had internally reorganized and created an accounts receivable department with the 2017 hiring of Ms. Deana Corbitt, our Accounts Receivable Officer. Ms. Corbitt came to LUMCON with over twenty years of accounting experience while working with local CPA and oilfield corporations. The objectives to be met by the department in 2019 were:

New Reservation System: Streamlining and implementing the new LUMCON reservation system which includes all department reservations and billings of cafeteria, dormitories, facility, education, and vessel processes.

Decreasing Payment Timelines: Implementing a new deposit requirement policy on all bookings with the objective of decreasing the length of time from invoicing to payment date. This included LUMCON's change to accepting credit card and P-Card payments for a speedier turnaround on invoice payments.

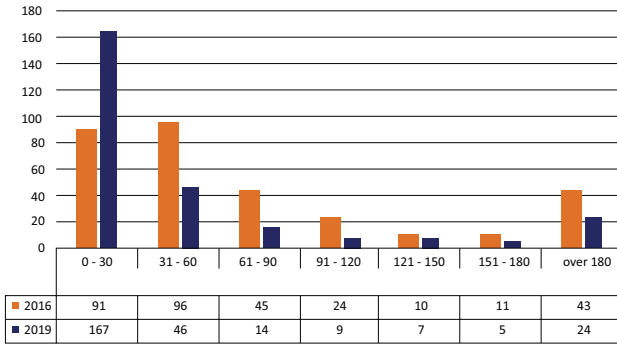
Foundation Support: Implementing procedures to provide support and oversight of the consortium's growing development and outreach departments by providing a primary point of contact with LUMCON's foundation partners and affiliated accounts.

Reporting: Working with the Board of Regents and LOSFA to streamline internal processes for the reporting of accounts receivables to the Office of Statewide Reporting and Accounting Policy and the Office of Debt Recovery for collection of bad debt.

Due to the successful reorganization and creation of the accounts receivable department, LUMCON has decreased receivables of over 180 days from \$264,795 in 2016 to \$16,111 (a reduction of 94%) in 2019. This has also brought LUMCON's eligible bad debt not expected to be realized to \$1,529.

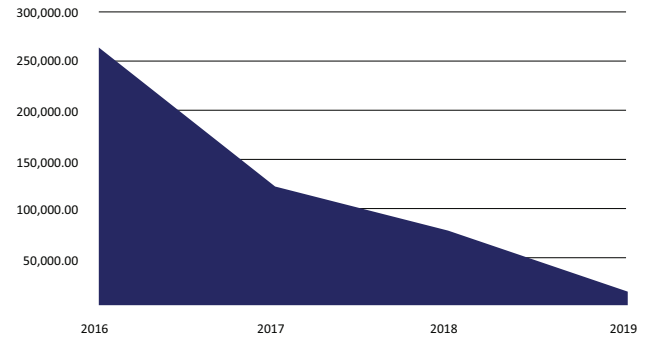


Invoice to Payment Date Realized



This chart shows a reduction in days between invoice and payment received, with approximately 60% of invoices now being paid within 30 days, versus 30% within one month in 2016.

Accounts Receivable over 180 days



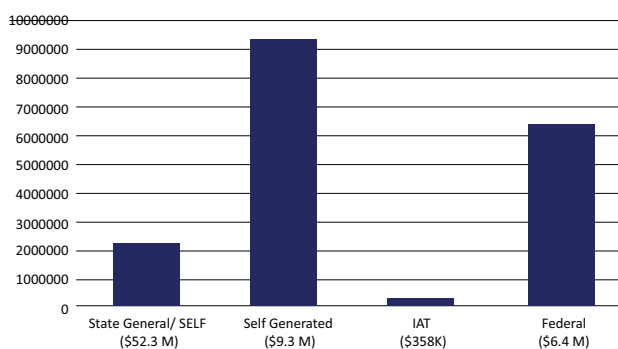
In 2019, Accounts Receivable saw a 94% decrease by dollar amount of outstanding payments ("bad debt") over 180 days compared to 2016 data.



LEAD Camp students sort through organisms captured with a fishing net.

Revenue Investment: LUMCON continued to increase its funding sources over the past year by implementing multiple strategies that have resulted in the realization of increased revenues that are outlined elsewhere in this report. Various constituents recognize the importance of LUMCON and have invested in the institution accordingly. Through this achievement LUMCON finances have continued to grow on an annual basis. In 2019, LUMCON Revenue (including state support) Recognized was \$18.4M. With state support of \$2.2M annually, this leaves a continued increase of return on investment by the state of 9:1.

LUMCON Revenue Recognized (\$18.4M)-FY19



Self-Generated and Federal funds continue to be the biggest source of revenue for LUMCON, with the State funds accounting for 12% of revenue.

System Upgrades: LUMCON, along with the Board of Regents and LOSFA, has begun the process and development of the LaGOV ERP Wave 2020 Implementation. This is the continued statewide transition of the state accounting systems from ISIS to LaGOV ERP. The finance department began working with the implementation team in October 2019 for the anticipated Go Live Date of July 1, 2020. This implementation will also include LUMCON property and fleet departments.

Development

Just as 2019 was a year of growth for LUMCON overall, it was a particularly apt description of our development efforts during the course of the year.

- Cash and pledges at the end of the year reached \$200,000, up from \$117,000 in 2018. Highlights included funds to renovate LUMCON's distance learning classroom, initial sponsorships for Meet the Fleet 2020, and increased funding for education and outreach.
- \$12 million was secured in capital outlay funding for LUMCON's Marine Operations Center in Houma. Initial planning for the facility will commence in early 2020. Major grant applications were submitted to FEMA and the Economic Development Agency of the U.S. Department of Commerce for projects to replace the roof and renovate the parking lot at the DeFelice Marine Center, respectively.

Just as 2020 is anticipated to be a year of transformation at LUMCON, our development efforts will reflect that emphasis.

- Much effort was expended in 2019 to lay the groundwork for funding for the replacement of the R/V Pelican in 2020, with a view toward an effort to secure capital outlay funding for the vessel in the 2020 session of the legislature.
- As planning for Blue Works and the Houma Maritime Campus proceeded in 2019, a fundraising plan was developed for the \$5-\$10 million which will be needed to equip, staff, develop, and maintain programming at the new complex when it opens in 2022. Implementation of the plan began in the second half of 2019 as potential donors were identified and began to be cultivated for support.





Scientific diver holding a piece of debris found under an oil rig in the Gulf of Mexico.

BARATARIA-TERREBONNE NATIONAL ESTUARY PROGRAM



BTNEP staff and officials from Plaquemines and Jefferson parishes pause during experimental tree planting as part of CPRA's Grand Liard Ridge Marsh Creation project

During 2019 the BTNEP staff has been making great progress toward implementing the updated BTNEP Comprehensive Conservation and Management Plan (CCMP).

Water Quality: With water quality as the main focus of the program, during 2019 BTNEP worked to address non-point source water pollution related to fecal coliform, dissolved oxygen, nitrate/nitrite, and total phosphorus. Malfunctioning individual sewage treatment systems present significant nutrient, solids, and pathogen loading problems for many local bayous. Because surface water is also the local drinking water source, it is especially susceptible to contamination from nonpoint sources of pollution. BTNEP and its foundation received two grants from the EPA's Gulf of Mexico Division (GMD) to provide cost-share incentives and educational programs to homeowners in the estuary. Funds from GMD are being used as a cost incentive (50% of costs up to \$1,000) to pay for repairing or replacing the onsite disposal systems for 400 homes with malfunctioning systems in targeted parts of the watershed.

Ridge and Marsh Restorations: Born out of the work BTNEP did with our partners establishing woody species beneficial to Neotropical migratory songbirds on a manmade ridge in Fourchon, Louisiana, BTNEP continues to be involved in the establishment of woody species on ridge projects throughout coastal Louisiana. Since the establishment of almost 10,000 trees on the Fourchon Maritime Forest Ridge and Marsh Restoration project over about a decade, three more ridge and marsh projects have come online and another is set to be constructed in 2020. BTNEP collected seed and grew out woody species for use in two new projects: Bayou Dupont Marsh and Ridge Restoration (BA-48) and Grand Liard Marsh and Restoration (BA-68) partnering with the National Marine Jefferson and Plaquemines Parishes. BTNEP also collected, grew out, and planted 2,800 seedlings for use in the U.S. Army Corps of Engineers (USACE), CPRA, and Plaquemines Parish Spanish Pass Ridge project in Venice, La. BTNEP is currently collecting seed for use in the Bayou Decade Marsh and Ridge Restoration Project (TE-138) sponsored by NMFS, CPRA, and Terrebonne Parish. Trees established on these ridges will provide habitat, food, and a resting place for migrating birds on their long journeys each spring and fall. The tree-lined ridges also provide protection from storm surges during extreme weather events. Shell Oil Company and the Greater Lafourche Port Commission at Port Fourchon have been longtime supporters of many of these efforts.

Volunteer Program: BTNEP's volunteer program works hand in hand with all of its habitat restoration projects and water quality improvement projects. BTNEP hosted the annual Bayou Lafourche Cleanup with approximately 1,000 volunteers helping to remove marine debris from the waterway. Additionally, hundreds of volunteers helped to plant native species in the estuary and rebuild vital habitat.

Threatened and Endangered Species: BTNEP has long been involved with the protection and restoration of threatened and endangered species. During this year BTNEP and its partners studied the status, distribution, and connectivity of the federally threatened rufa subspecies of Red Knot (*Calidris canutus rufa*). A shorebird, the Red Knot is one of the longest distance migrants in the world, typically traveling over 12,000 miles in a year between its breeding grounds, stopover locations, and wintering sites. During October, BTNEP was awarded an additional \$50,000 for “Red Knot Census on the Chandeleur Islands and Grand Isle” by the U.S. Fish and Wildlife Service. The objectives are to gather additional mark-recapture information needed for estimating survival rates and population size to develop recovery criteria and conservation strategies for the northwestern Gulf of Mexico.

BTNEP conservation actions in 2019 also included the establishment of nest box trails for the threatened Prothonotary Warbler throughout the estuary. Research included nest monitoring and data collection, community outreach, and the use of geolocators to identify connectivity between breeding and wintering grounds. BTNEP constructed and installed 86 nest boxes across 4 different sites within the estuary; over the years, the project boxes have provided Prothonotary Warblers a place to nest and raise more than 800 young.

Education and Outreach: BTNEP also seeks to play an active role in environmental education. Environmental education connects people of all ages to nature and encourages long-term stewardship. BTNEP has always used its education programs to help the public understand how they, as individuals, can make informed and responsible daily decisions. During 2019, BTNEP has paid particular attention to educating youth on the prevention of nearshore and marine debris. Funding provided students with an opportunity to visit Elmer’s Island and participate in ongoing research to identify sources of the waste.

Additionally, adult education continues to be of value to BTNEP. BTNEP staff members are leaders in the Louisiana Master Naturalist Program. This program requires adult citizens to sharpen their natural science skills with both classroom education and field experiences. Once certified, the Louisiana Master Naturalists are required to use their talents to educate others and assist programs that promote and protect Louisiana’s natural heritage.



Reddish egret (*Egretta rufescens*) hunting for food on LUMCON grounds.

LIST OF SCIENTIFIC PUBLICATIONS IN 2019

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Bernhard A.E, A. Chelsky, A.E. Giblin, and **B.J. Roberts**. 2019. Influence of local and regional drivers on spatial and temporal variation of ammonia-oxidizing communities in Gulf of Mexico salt marshes. *Environmental Microbiology Reports*, 11(6):825-834. doi:10.1111/1758-2229.12802

Boswell, K.M., M.E. Kimball, **G. Rieucou**, J.G. Martin, D.A. Jacques, D. Correa, and D.M. Allen. 2019. Tidal stage mediates periodic asynchrony between predator and prey nekton in salt marsh creeks. *Estuaries and Coasts*, 42(5):1342-1352. doi:10.1007/s12237-019-00553-x

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Du, J., K. Park, J. Shen, Y.J. Zhang, X. Yu, F. Ye, Z. Wang, and **N.N. Rabalais**. 2019. A hydrodynamic model for Galveston Bay and the shelf in the northern Gulf of Mexico. *Ocean Science*, 15(4):951-966. doi:10.5194/os-15-951-2019

Guillas, K.C., A.S. Kahn, N. Grant, **S.K. Archer**, A. Dunham, and S.P. Leys. 2019. Settlement of juvenile glass sponges and other invertebrate cryptofauna on the Hecate Strait glass sponge reefs. *Invertebrate Biology*, 138(4):e12266. doi:10.1111/ivb.12266

Harris, J.M., J.A. Nelson, **G. Rieucou**, and W.P. Broussard III. 2019. Use of drones in fishery science. *Transactions of the American Fisheries Society*, 148(4):687-697. doi:10.1002/tafs.10168

Jensen, O.P., C.W. Martin, K.L. Oken, F.J. Fodrie, P.C. López-Duarte, K.W. Able, and **B.J. Roberts**. 2019. Simultaneous estimation of dispersal and survival of the gulf killifish *Fundulus grandis* from a batch-tagging experiment. *Marine Ecology Progress Series*, 624:183-194. doi:10.3354/meps13040

Jiang, Z.-P., W.-J. Cai, B. Chen, K. Wang, C. Han, **B.J. Roberts**, N. Hussain, and Q. Li. 2019. Physical and biogeochemical controls on pH dynamics in the northern Gulf of Mexico during summer hypoxia. *Journal of Geophysical Research-Oceans*, 124(8):5979-5998. doi:10.1029/2019JC015140

Jiang, Z.-P., W.-J. Cai, J. Lehrter, B. Chen, Z. Ouyang, C. Le, **B.J. Roberts**, N. Hussain, M.K. Scaboo, J. Zhang, and Y. Xu. 2019. Spring net community production and its coupling with the CO₂ dynamics in the surface water of the northern Gulf of Mexico. *Biogeosciences*, 16(18):3507-3525. doi:10.5194/bg-16-3507-2019

Joyce, R.E., H. Lavender, J. Farrar, J.T. Werth, C.F. Weber, **J. D'Andrilli**, M. Vaitilingom, and B.C. Christner. 2019. Biological ice-nucleating particles deposited year-round in subtropical precipitation. *Applied and Environmental Microbiology*, 85(23):e01567-19. doi:e10.1128/AEM.01567-19

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Kölling, M., I. Bouimetarhan, **M.W. Bowles**, T. Felis, T. Goldhammer, K.-U. Hinrichs, M. Schulz, and M. Zabel. 2019. Consistent CO₂ release by pyrite oxidation on continental shelves prior to glacial terminations. *Nature Geoscience*, 12(11):929-934. doi:10.1038/s41561-019-0465-9

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Reeves, D.B., **E.J. Chesney**, R.T. Munnely, D.M. Baltz, and K. Maiti. 2019. Trophic ecology of sheepshead and stone crabs at oil and gas platforms in the northern Gulf of Mexico's hypoxic zone. *Transactions of the American Fisheries Society*, 148(2):324-338. doi:10.1002/tafs.10135

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2019 MEDIA AND PRESS

The work of LUMCON researchers and staff were featured in the following print/radio/web-based media outlets in 2019:

<i>Al Jazeera</i>	<i>Marine Log</i>
<i>Aquaculture North America</i>	<i>Maritime Herald</i>
<i>Atlas Obscura</i>	<i>The Mirror (UK)</i>
<i>Axios</i>	<i>National Geographic</i>
<i>Baton Rouge (La.) Advocate</i>	<i>NBC Nightly News</i>
<i>Biloxi (Ms.) Sun Herald</i>	<i>New Orleans City Business</i>
<i>Business Insider</i>	<i>NOLA.com</i>
<i>Canadian Broadcasting Corporation</i>	<i>New York Post</i>
<i>Charlotte Observer</i>	<i>New York Times</i>
<i>Chicago Tribune</i>	<i>New Yorker</i>
<i>CNN</i>	<i>Ontario Star (Canada)</i>
<i>Common Dreams</i>	<i>Orlando (Fla.) Sentinel</i>
<i>Continental Telegraph</i>	<i>PBS NewsHour</i>
<i>Deep Carbon Network</i>	<i>Popular Mechanics</i>
<i>Delta Dispatches</i>	<i>Popular Science</i>
<i>Earth.com</i>	<i>RT in Spanish</i>
<i>EarthSky</i>	<i>San Francisco Chronicle</i>
<i>Eos</i>	<i>ScienceAlert</i>
<i>Forbes</i>	<i>Scientific American</i>
<i>Fox News</i>	<i>Smithsonian Magazine</i>
<i>Fuji News Network</i>	<i>Southern Fried Science</i>
<i>Geek.com</i>	<i>St. Louis Public Radio</i>
<i>Geo (France)</i>	<i>Thibodaux (La.) Daily Comet</i>
<i>Gizmodo</i>	<i>ThinkProgress</i>
<i>Great Lakes Ledger</i>	<i>Time</i>
<i>Hakai Magazine</i>	<i>US News and World Report</i>
<i>Houma (La.) Daily Courier</i>	<i>USA Today</i>
<i>Huffington Post</i>	<i>Washington Post</i>
<i>IFLScience</i>	<i>WDSU New Orleans</i>
<i>The Inertia</i>	<i>Weekend Edition (National Public Radio)</i>
<i>KPEL 96.5 FM Lafayette (La.)</i>	<i>WGNO New Orleans</i>
<i>Live Science</i>	<i>WVUE New Orleans</i>
<i>Louisiana: The State We're In (LPB)</i>	<i>WWL 870 AM New Orleans</i>
<i>Marie Claire (France)</i>	<i>WWNO Public Radio</i>



A consortium member student going through scientific diver training.

VESSEL OPERATIONS SCHEDULES:

R/V PELICAN CALENDAR YEAR 2019 SHIP SCHEDULE

(146 Research Days, 3 Education Day)

Cruise Dates	Map Index/ Area/ Purpose	P.I./ Institution/ Proposal NO.	Ports	Days/ Agency/ Status/ Clearance
06 JAN 13 JAN	NA9/ GOM/ RAPID/ Flood Plankton	Robinson, k/ ULL/ 1760704	Cocodrie Cocodrie	8/ NSF/ OCE/ BIO/ F/ No
17 JAN 26 JAN	NA9/ GOM/ Coastal OA	Cai, W/ UDEL/ 1559279	Cocodrie Cocodrie	10/ NSF/ OCE/ CO/ F/ No
02 FEB 06 FEB	NA9/ GOM/ Mooring maintenance	Ogle, M/ FGEOS/ N/A	Cocodrie Cocodrie	5/ OTHER/ F/ No
18 MAR 23 MAR	NA9/ GOM/ RAPID/ Flood Plankton	Robinson, k/ ULL/ 1760704	Cocodrie Cocodrie	8/ NSF/ OCE/ BIO/ F/ No
25 MAR 28 MAR	NA9/ GOM/ Harvey freshwater	Thyng, K/ TAMY_CS/ 1762157	Cocodrie Cocodrie	4/ NSF/ OCE/ PO/ F/ No
30 MAR 30 MAR	NA9/ GOM/ Meteotsunami	Li, C/ LSU/ 1736713	Cocodrie Cocodrie	1/ NSF/ OCE/ PO/ F/ No
06 APR 12 APR	NA9/ GOM/ Mooring Rotation	Ogle, M/ FGEOS/ N/A	Cocodrie Cocodrie	7/ OTHER/ F/ No
13 APR 21 APR	NA9/ GOM/ Mooring deployment	Fuller, C/ CU/ N/A	Cocodrie Cocodrie	9/ OTHER/ F/ No
24 APR 26 APR	NA9/ GOM/ Coastal OA	Cai, W/ UDEL/ 1559279	Cocodrie Cocodrie	3/ NSF/ OCE/ CO/ F/ No
03 MAY 11 MAY	NA9/ GOM/ Rhodoliths in NWGMx	Frederiq, S/ ULL/ 1754504	Cocodrie Cocodrie	9/ NSF/ BIO/ DEB/ F/ No
12 MAY 16 MAY	NA9/ GOM/ Mooring deployment	Aronchick, E/ WHGRP/ N/A	Cocodrie Cocodrie	5/ OTHER/ F/ No
17 MAY 24 MAY	NA9/ GOM/ Glider testing	Sidorovskaia, N/ ULL/ N/A	Cocodrie Cocodrie	8/ GOMRI/ F/ No
25 MAY 29 MAY	NA9/ GOM/ Mooring maintenance	Aronchick, E/ WHGRP/ N/A	Cocodrie Cocodrie	5/ OTHER/ F/ No
31 MAY 02 JUN	NA9/ GOM/ Mooring deployment	Fuller, C/ CU/ N/A	Cocodrie Cocodrie	3/ OTHER/ F/ No
13 JUN 17 JUN	NA9/ GOM/ Mooring Rotation	Ogle, M/ FGEOS/ N/A	Cocodrie Cocodrie	5/ OTHER/ F/ No
19 JUN 21 JUN	NA9/ GOM/ Groundfish	Dean, C/ LDWF/ N/A	Cocodrie Cocodrie	3/ NOAA/ NMFS/ F/ No

VESSEL OPERATIONS SCHEDULE CONTINUED:

Cruise Dates	Map Index/ Area/ Purpose	P.I./ Institution/ Proposal NO.	Ports	Days/ Agency/ Status/ Clearance
22 JUN 24 JUN	NA9/ GOM/ REU: Ocean Observing	Campbell, L/ TAMU/ 1455851	Cocodrie Cocodrie	3/ NSF/ OCE/ F/ No
26 JUN 28 JUN	NA9/ GOM/ Coastal OA	Cai, W/ UDEL/ 1559279	Cocodrie Cocodrie	3/ NSF/ OCE/ CO/ F/ No
03 JUL 03 JUL	NA9/ GOM/ Meteotsunami	Li, C/ LSU/ 1736713	Cocodrie Cocodrie	1/ NSF/ OCE/ CO/ F/ No
09 JUL 10 JUL	NA9/ GOM/ RAPID/ Sediment Trap	Reynolds, C/ USGS N/A	Cocodrie Cocodrie	2/ USGS/ F/ No
11 JUL 12 JUL	NA9/ GOM/ Chemical	Lee, R., J/ TAMUG/ RS2018	Cocodrie Cocodrie	11/ OTHER/ FF/ No
23 JUL 30 JUL	NA9/ GOM/ Gulf Hypoxia	Rabalais, N/ LUMCON/ N/A	Cocodrie Cocodrie	8/ NOAA/ F/ No
01 AUG 08 AUG	NA9/ GOM/ FGB_Harvey_ Rapid	Sylvan, J/ TAMU_CS/ 1800904	Cocodrie Cocodrie	8/ NSF/ OCE/ BIO/F No
14 AUG 17 AUG	NA9/ GOM/ Coastal OA	Cai, W/ UDEL/ 1559279	Cocodrie Cocodrie	4/ NSF/ OCE/ CO/ F/ No
18 AUG 22 AUG	NA9/ GOM/ Sediment geochemical	Maiti, K/ LSU/ 1756788	Cocodrie Cocodrie	5/ NSF/ OCE/ CO/ F/ No
28 AUG 02 SEP	NA9/ GOM/ Mooring deployment	Gehring, H/ LEIDOS/ N/A	Cocodrie Cocodrie	6/ OTHER/ F/ No
26 SEP 28 SEP	NA9/ GOM/ Sediment trap/ NIOZ	Malbrough, J/ LUMCON/ N/A	Cocodrie Cocodrie	3/ NSF/ NIO/ F/ No
30 SEP 01 OCT	NA9/ GOM/ Mooring retriecal	Pozin, K/ WHOI/ N/A	Cocodrie Cocodrie	2/ INST/ WHOI/ F/ No
12 OCT 12 OCT	NA9/ GOM/ Meteotsunami	Li, C/ LSU/ 736713	Cocodrie Cocodrie	1/ NSF/ OCE/ PO/ F/ No
14 OCT 21 OCT	NA9/ GOM/ Mooring maintenance	Ogle, M/ FGEOS/ N/A	Cocodrie Cocodrie	8/ OTHER/ F/ No
29 OCT 06 NOV	NA9/ GOM/ Mooring rotation	Sidorovskaia, N/ ULL/ N/A	Cocodrie Cocodrie	9/ GOMRI/ F/ No
03 DEC 03 DEC	NA9/ GOM/ Meteotsnumani	Li, C/ LSU/ 1736703	Cocodrie Cocodrie	1/ NSF/ OCE/ PO/ F/ No
09 DEC 19 DEC	NA9/ GOM/ Mooring maintenance	Ogle, M/ FGEOS/ N/A	Cocodrie Cocodrie	11/ OTHER/ F/ No

VESSEL OPERATIONS SCHEDULES:

R/V POINT SUR CALENDAR YEAR 2019 SHIP SCHEDULE

(132 Research Days, 7 Education Days)

Cruise Dates	Map Index/ Area/ Purpose	P.I./ Institution/ Proposal NO.	Ports	Days/ Agency/ Status/ Clearance
08 JAN 21 JAN	NA9/ GOM/ Equipment Testing	Manley, L/NAVY/ N/A	Gulfport Gulfport	14/DOD/F/No
26 JAN 31 JAN	NA9/ GOM/ ROV	Peterson, R/ CCU/ N/A	Gulfport Gulfport	6/GOMRI/F/No
04 FEB 05 FEB	NA9/ GOM/ Bottom Survey	Fuselier, J/ T BAKER/ N/A	Gulfport Gulfport	2/ OTHER/ F/ No
20 MAR 23 MAR	NA9/ GOM/ Glider/ Mooring	Martin, T/ CSA/ N/A	Gulfport Gulfport	2/ OTHER/ F/ No
06 APR 07 APR	NA9/ GOM/ Education Trip	Graham, M/ USM/ N/A	Gulfport Gulfport	2/ INST/ F/ No
27 APR 03 MAY	NA9/ GOM/ Mooring/ Survey	Winkler, K/ LEIDOS/ N/A	Gulfport Gulfport	7/ DOD/ F/ No
06 MAY 08 MAY	NA6/ GOM/ Mooring Maintenance	Aronchick, E/ WHG/ N/A	Gulfport Gulfport	3/ OTHER/ F/ No
19 MAY 21 MAY	NA9/ GOM/ Mooring Maintenance	Aronchick, E/ WHG/ N/A	Gulfport Gulfport	3/ OTHER/ F/ No
10 MAY 18 MAY	NA9/ GOM/ Air Quality	Thompson, A/ NASA/ N/A	Gulfport Gulfport	9/ NASA/ F/ No
23 MAY 26 MAY	NA9/ GOM/ CTD Survey	Weiderwohl, C/ TAMU/ N/A	Gulfport Gulfport	4/ TAMU/ F/ No
28 MAY 05 JUN	NA9/ GOM/ Sargassum	Hernandez, F/ USM/ N/A	Gulfport Gulfport	9/INST/ F/ No
06 JUN 23 JUN	NA9/ GOM/ ROV Survey	Johnsen, S/ DUKE/ N/A	Gulfport Gulfport	18/ OTHER/ F/ No
25 JUN 28 JUN	NA9/ GOM/ ROV Survey	Hamdan, L/ USM/ N/A	Gulfport Gulfport	4/ NOAA/ F / No
16 JUL 18 JUL	NA9/ GOM/ Mooring Deployment	Ogle, M/ FUGRO/ N/A	Gulfport Gulfport	3/ OTHER/ F/ No

VESSEL OPERATIONS SCHEDULE CONTINUED:

Cruise Dates	Map Index/ Area/ Purpose	P.I./ Institution/ Proposal NO.	Ports	Days/ Agency/ Status/ Clearance
20 JUL 21 JUL	NA9/ GOM/ Marine Mammals	Lee, L/ USM/ N/A	Gulfport Gulfport	2/ INST/ F/ No
29 AUG 30 AUG	NA9/ GOM/ Mooring Deployment	Ranson, J/ FUGRO/ N/A	Gulfport Gulfport	2/ OTHER/ F/ No
03 SEP 03 SEP	NA9/ GOM/ Mooring Deployment	Dufour/ N/A Gulfport	Gulfport Gulfport	1/ NSF/ F/ No
11 SEP 11 SEP	NA9/ GOM/ Glider	Martin, K/ USM/ N/A	Cocodrie Cocodrie	1/ INST/ F/ No
17 SEP 18 SEP	NA9/ GOM/ Glider Testing	Griffin, S/ Proteus/ N/A	Gulfport Gulfport	2/ OTHER/ F/ No
20 SEP 21 SEP	NA9/ GOM/ Education Trip	Buijsman/ USM/ N/A	Gulfport Gulfport	2/ INST/ E/ No
30 SEP 11 OCT	NA9/ GOM/ ROV Survey	Brooke, J/ FSU/ N/A	Gulfport Gulfport	11/ FSU/ F/ No
12 OCT 18 OCT	NA9/ GOM/ Rov Survey	Wang, A/ WHOI/ N/A	Gulfport Gulfport	7/ WHOI/ F/ No
21 OCT 27 OCT	NA9/ GOM/ AUV Testing	Diercks, A/ USM/ N/A	Gulfport Gulfport	7/ INST/ F/ No
28 OCT 03 NOV	NA9/ GOM/ Glider/ Mooring	Winkler, F/ LEIDOS/ N/A	Gulfport Gulfport	7/ OTHER/ F/ No
04 NOV 06 NOV	NA9/ GOM/ Education Trip	Hamdan, L/ USM/ N/A	Gulfport Gulfport	3/ INST/ F/ No
09 NOV 10 NOV	NA9/ GOM/ Education Trip	Nootz, G/ USM/ N/A	Gulfport Gulfport	2/ INST/ F/ No
13 NOV 15 NOV	NA9/ GOM/ Mooring Recovery	Hamden, L/ USM/ N/A	Gulfport Gulfport	3/ DARPA/ F/ No
20 NOV 20 NOV	NA9/ GOM/ Mud Grab Survey	Book, J/ NAVY/ N/A	Gulfport Gulfport	1/NRL/F/No

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REU student takes a ride aboard a small vessel in LUMCON's fleet.

APPENDIX





CONSORTIUM CONNECTIONS:

	# of Leadership Visits	# of Undergraduate Visitors	# of Class Visits	# of Faculty Visits	# of Room Nights at Lum-con
University of Louisiana System					
Grambling State University	1	0	0	1	0
Louisiana Tech University	2	32	1	7	35
Nicholls State University	2	6	0	1	6
Northwestern State University	0	0	0	1	0
Southeastern Louisiana University	0	0	0	1	8
University of Louisiana-Lafayette	5	55	4	38	83
University of New Orleans	0	31	1	2	0
Louisiana State University Systems					
Louisiana State University	11	124	7	58	41
Louisiana State University in Alexandria	0	12	1	1	2
Louisiana State University in Eunice	1	0	0	1	0
Louisiana State University in Shreveport	0	2	0	0	0
Louisiana Community and Technical College System					
Baton Rouge Community College	0	47	2	3	2
L.E. Fletcher Technical Community College	4	0	0	0	0
South Louisiana Community College	0	0	0	4	0
Nunez Community College	1	0	0	0	0
Southern University System					
Southern University in Baton Rouge	0	0	1	1	0
Southern University in New Orleans	0	0	0	0	68
Louisiana Private Institutions					
Louisiana College	1	0	0	0	0
Loyola University	0	0	0	1	3
Tulane University	2	77	4	5	6
Totals	30	386	21	125	254

**University visitor numbers do not include REUs, graduate students or out-of-state schools*

	# of Small Vessels Rented	# of Research Collaborators with LUMCON Faculty	Co-authored Publications	Funded Grants
University of Louisiana System				
Grambling State University	0	0	0	0
Louisiana Tech University	8	0	0	0
Nicholls State University	3	0	0	0
Northwestern State University	0	0	0	0
Southeastern Louisiana University	0	0	0	0
University of Louisiana-Lafayette	65	7	3	2
University of New Orleans	2	5	0	0
Louisiana State University Systems				
Louisiana State University	43	11	17	11
Louisiana State University in Alexandria	2	0	0	0
Louisiana State University in Eunice	0	0	0	0
Louisiana State University in Sheveport	0	0	0	0
Louisiana Community and Technical College System				
Baton Rouge Community College	2	0	0	0
L.E. Fletcher Technical Community College	0	0	0	0
South Louisiana Community College	0	0	0	0
Nunez Community College	0	0	0	0
Southern University System				
Southern University in Baton Rouge	0	0	0	0
Southern University in New Orleans	0	0	0	1
Louisiana Private Institutions				
Louisiana College	0	0	0	0
Loyola University	2	0	0	0
Tulane University	4	5	1	3
Totals	131	28	21	17

EDUCATION AND OUTREACH TOTALS (no. of people):

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
K-12 (field trips, summer camps)	2282	2595	2275	2426	2426	2201	2171	2102	2538	2743
University (field trips)	488	690	703	406	535	445	486	308	456	559
Semester Courses	0	23	18	0	13	9	16	0	38	10
Summer Courses	10	18	4	28	13	32	17	29	22	10
Teacher	101	176	128	223	194	89	60	59	43	88
Public (groups)	93	61	56	368	107	312	207	123	108	263
Public (individuals)	-	-	-	-	-	-	-	920	1189	994
Total (at the marine center)	2974	3563	3184	3451	3288	3088	2957	3541	4394	4667
Outreach Events *	5578	5152	3652	6420	5062	6719	3636	2380	2010	2204
Overall Program Totals	8852	8715	6836	9871	8350	9807	6593	5921	6404	6871

FACULTY PUBLICATIONS & GRANTS:

	2016	2017	2018	2019
# of Publications	21	31	25	35
Institutional H-index	78	81	83	86
Grant Dollars Generated	\$8,070,621.49	\$8,176,765.49	\$7,117,461.74	\$9,587,468.44
Proposals Submitted	-	36	39	44
Proposals Accepted	9	12	7	7
Pending Proposals	-	1	12	9

FACULTY MENTORS :

Faculty Mentors	2018	2019
Bockus	2	3
Bowles	3	2
Kolker	11	3
McClain	6	5
Rabalais	2	1
Rieucan	2	2
Roberts	7	10
Total	33	26

STUDENT VISITORS BY YEAR:

Student Visitors	2014	2015	2016	2017	2018	2019
K-12	2245	2201	2136	2700	2545	2948
University	N/A	476	515	334	483	559

VESSEL DAYS AT SEA:

Vessels	2014	2015	2016	2017	2018	2019
<i>Acadiana</i>	82	90	72	49	178	85
<i>Pelican</i>	200	210	192	196	160	193
<i>Point Sur</i>	N/A	141	140	198	142	149
Small Vessels	N/A	188	217	303	453	478

*small vessels include kayaks

SMALL VESSEL RENTALS:

Small Vessels	2018	2019
Vessels	224	251
Kayaks	229	227
Total	453	478





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