

COASTAL OPERATIONS ANNUAL REPORT 2021

Gulf Coast Research Laboratory

Gulf Park Campus

John C. Stennis Space Center

Marine Research Center

Roger F. Wicker Center For Ocean Enterprise



THE UNIVERSITY OF
SOUTHERN
MISSISSIPPI

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Dr. Shannon Campbell

Senior Associate
Vice President
Coastal Operations

The University of Southern Mississippi (USM) Coastal Operations is committed to fulfilling its vision of being a national leader in addressing issues relevant to people living in coastal and maritime settings.

USM Coastal Operations contributes to the University’s status among the top four percent of research institutions in the nation to earn the Carnegie Classification of Institutions of Higher Education’s “R1: Doctoral Universities – Very high research activity” ranking. Throughout this report, you will see a number of published research studies and grants awarded to our faculty and scientists, helping to advance research and scholarship in a number of fields.

USM Coastal Operations is working to ensure our students have amazing experiences as they prepare for in-demand careers, elevating our robust research enterprise, and offering educational outreach about the importance of preserving our oceans and coasts for generations to come.

Our Gulf Park campus in Long Beach serves as the hub for academic instruction on the Gulf Coast and is carrying out this work through three academic schools, positioning USM to expand key coastal opportunities and build on the success of coastal sites.

Our School of Coastal Resilience connects the experience of living on coastlines to the ideas, policies and disciplines that shape that experience, exploring the dynamics between communities and the coastal environment.

Our School of Leadership prepares students to succeed in the business world by offering innovative coursework, partnering with organizations, and fostering a spirit of entrepreneurship and collaboration.

Students in our School of Ocean Science and Engineering are exposed to cutting-edge technologies and field-based educational experiences, providing them with the skills necessary to obtain jobs in marine-related fields.

Through our Center for Fisheries Research and Development, Gulf Coast Research Laboratory, Gulf Coast Geospatial Center, Hy-

drographic Science Research Center, Marine Education Center, Roger F. Wicker Center for Ocean Enterprise, Thad Cochran Marine Aquaculture Center, and a fleet of research vessels, we are leading research efforts in the Gulf of Mexico.

USM researchers are working to advance sustainable marine aquaculture and fisheries, broaden the applications of hydrographic data through advancements in new technologies, develop comprehensive geospatial datasets, study coastal ecology, and expand aquatic conservation, as well as conducting research in other areas.

Work is also well underway propelling the blue economy into the future and positioning the Gulf Coast region as a global leader in ocean and maritime technologies.

The Gulf BlueSM brand was launched in June 2021, which represents the innovation sector of the blue economy. Its tagline, *Big Ideas Out of the Blue*, represents a focus on launching new startup companies, commercializing new technologies, and encouraging a new generation of future entrepreneurs.

To further advance this blue economy work, we are leading a regional coalition, Gulf BlueSM Initiative, to better leverage our collective resources by working cooperatively with federal and state agencies, community colleges, the private sector, and non-profit organizations. Our efforts are yielding early success in being awarded a grant from the Economic Development Administration’s Build Back Better Regional Challenge. Of the 562 submissions, the Gulf BlueSM Initiative was one of only 60 awarded and among four focused on the blue economy.

In 2022, our momentum will continue to pick up speed with key projects and initiatives taking shape across the Mississippi Gulf Coast.

As you read this report, I hope you will see we are embracing opportunities that will allow us to advance USM Coastal Operations and the region. Thank you for this opportunity to share progress.

HANCOCK COUNTY

HARRISON COUNTY

JACKSON COUNTY

John C. Stennis Space Center

Gulf Park Campus

Roger F. Wicker Center for Ocean Enterprise (opening 2023)

Marine Research Center

Point Cadet

Gulf Coast Research Laboratory

GULF OF MEXICO

Instruction — \$14,233,130

Research — \$19,972,443

Public Service — \$661,432

Academic Support — \$1,222,065

Student Services — \$1,671,608

Institutional Support — \$3,794,168

Operation and Maintenance — \$6,703,894

Scholarships and Fellowships — \$1,630,000

COASTAL OPERATIONS FUNDS

TOTAL — \$49,888,740

2021 Coastal Operations Leadership Team



Dr. Heather M. Annulis
Director
School of Leadership
Professor of Human
Capital Development



Lucas A. Applewhite
Interim Director
Facilities Planning and
Management
Coastal Operations



Dr. Jacob Breland
Interim Associate
Vice President
Academic Affairs
Coastal Operations



Dr. Shannon Campbell
Senior Associate
Vice President
Coastal Operations



Dr. Brian Cuevas
Director
Office of Technology
Development



Dr. Westley Follett
Interim Director
School of Coastal
Resilience
Associate Professor
of History



Dr. Robert (Joe) Griffitt
Director
School of Ocean Science
and Engineering
Professor of Ocean Science
and Engineering



Dr. Read Hendon
Director
Gulf Coast Research
Laboratory



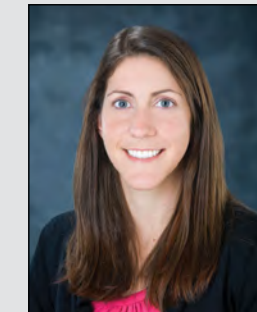
Dr. David Holt
Associate Professor
School of Coastal
Resilience



Dr. Kelly Lucas
Associate Vice President
Research
Coastal Operations
Director
Thad Cochran Marine
Aquaculture Center



Pam Moeller
Director
External Relations,
Coastal Operations



Amanda Seymour
Interim Director
Strategic Planning and
Fiscal Affairs
Coastal Operations



Dr. Jennifer Walker
Associate Dean for
Coastal Operations
College of Arts and
Sciences



Coastal Operations in the News

USM Children’s Center Cuts Ribbon on New Playground Funded by Blue Cross & Blue Shield of Mississippi Foundation

The Children’s Center for Communication and Development officially cut the ribbon on its brand-new playground on The University of Southern Mississippi’s Gulf Park campus in Long Beach, made possible by a gift from the Blue Cross & Blue Shield of Mississippi Foundation through the USM Foundation.

The playground will serve as an outdoor therapy space for children with complex disabilities who receive cost-free services from The Children’s Center, and as an inclusive play space for children in the Gulf Coast region both with and without developmental disabilities.



ERDC Partners with USM to Maximize Gulf Oyster Habitat Restoration



The U.S. Army Engineer Research and Development Center (ERDC) has announced a three-year research collaboration with Southern Miss to create an oyster reef habitat in the northern Gulf of Mexico.

The primary objectives of the project are to investigate methods for optimizing oyster habitat restoration in the area — which would ultimately lead to oyster population recovery — and enhancement of ecosystem services in coastal waters. A secondary objective is to evaluate whether the oyster reefs have any impact on the use of critical habitat by Gulf sturgeon, a federally protected species.

The project will be funded through the U.S. Army Corps of Engineers Ecosystem Management and Restoration Research Program.

USM Ocean Engineering Program Produces First Graduates, Meeting Needs of Blue Economy

The School of Ocean Science and Engineering (SOSE) at The University of Southern Mississippi recorded a historic milestone as the first students from the

NOAA Partners with USM on Uncrewed Systems

The National Oceanic and Atmospheric Administration (NOAA) and The University of Southern Mississippi signed a 10-year agreement to collaborate on ways to improve how uncrewed systems (UxS) are used to collect important ocean observation data and augment NOAA’s operational capabilities. The agreement provides a framework for collaborating with NOAA scientists and UxS operators on projects to further UxS research, development and operations.

The new agreement helps NOAA meet the objectives of the Commercial Engagement Through Ocean Technology Act of 2018, which requires the agency to coordinate research, assess, and acquire uncrewed systems with the U.S. Navy, other federal agencies, industry and academia. In fiscal year 2021, NOAA received \$13.7 million from Congress to improve and expand UxS operations across the agency, including the creation of the OMAO Uncrewed Systems Operations Center — a key goal of NOAA’s Uncrewed Systems Strategy.



University’s ocean engineering program received their undergraduate degrees.

USM’s School of Ocean Science and Engineering offers the only bachelor’s degree in ocean engineering in the state of Mississippi and one of only 10 such programs in the nation. The program features interdisciplinary coursework that integrates multiple engineering fields (e.g., mechanical, civil, electrical, computer, environmental).

USM is a recognized leader in marine science exploration and education in the Gulf South region, with world-class research facilities, such as the Gulf Coast Research Laboratory in Ocean Springs, Miss.; the Marine Research Center at the Port of Gulfport in Gulfport, Miss.; and within the John C. Stennis Space Center in Hancock County, Miss.

The ocean engineering program is housed at the University’s Gulf Park campus in Long Beach, Miss. With successful completion of its initial four-year ocean engineering curriculum, USM can take pride in providing engineers to the burgeoning blue economy workforce within Mississippi and beyond.

USM Receives \$7 Million for Ocean Enterprise Efforts

The University of Southern Mississippi was awarded \$7 million in state funding to support infrastructure associated with the Roger F. Wicker Center for Ocean Enterprise (RFWCOE). This appropriated money from both capital expense funds and the Mississippi Development Authority’s Gulf Coast Restoration Fund brings the total to \$21 million in appropriated monies to USM since 2019 for RFWCOE infrastructure, and programming.

Highlights

U.S. Secretary of Commerce Raimondo Visits Mississippi Gulf Coast and USM’s Marine Research Center

Gina M. Raimondo, U.S. Secretary of Commerce, and U.S. Senator Roger F. Wicker made a scheduled visit to the Mississippi Gulf Coast on Friday, June 25. As part of the trip, Secretary Raimondo and Senator Wicker toured The University of Southern Mississippi’s Marine Research Center at the Mississippi State Port Authority at Gulfport. The visit provided an opportunity for Secretary Raimondo to obtain a first-hand view of the significant progress being made to promote research and job creation through long-term infrastructure investments.

As part of the visit, Dr. Kelly Lucas, USM Associate Vice President for Research, Coastal Operations, shared the University’s vision of being a national leader in addressing issues relevant to people in coastal and maritime settings.

“The University of Southern Mississippi remains committed to growing coastal research and economic development initiatives, in collaboration with our coastal partners, to meet the needs of our communities, our state, and our country. We were honored to share just a sampling of this critical work with Secretary Raimondo and Senator Wicker, and we look forward to continuing to advance our collective coastal partnerships far into the future.”

President Rodney D. Bennett



USM Launches Gulf BlueSM Initiative to Elevate Mississippi’s Blue Economy

The University of Southern Mississippi, in conjunction with partner organizations across the Mississippi Gulf Coast, announced an initiative to place Mississippi on the global stage for blue economy-related work.

This initiative – Gulf BlueSM – is poised to bring “Big Ideas Out of the Blue” capitalizing on the region’s geography and maritime resources and positioning the Mississippi Gulf Coast to lead the development of world-changing innovation. Gulf BlueSM pools the knowledge of research scientists, federal agencies, industry partners and entrepreneurs to further develop the region as a global leader in ocean- and maritime-related technologies.

USM Recognizes Newest Cohort of Hydrographic Science Graduates

Nine students in the prestigious Hydrographic Science Program at The University of Southern Mississippi were recognized during graduation ceremonies held Wednesday, July 28, at the University’s Gulf Park campus in Long Beach.

USM is the only university in the United

States to offer an undergraduate program in hydrography and one of just two to offer master’s and doctoral degree programs in this challenging field.

Alberto Costa Neves became the program’s coordinator earlier this month. He notes that hydrographic science graduates can expect to enter a profession that offers a wide range of opportunities.



Alberto Costa Neves

Statewide Event: Picture a Mississippi Scientist Focuses on Diversity in STEM

The University of Southern Mississippi – in collaboration with the Mississippi University for Women, Delta State University, Mississippi State University and The University of Mississippi – hosted a film screening and panel discussion to enhance awareness of gender bias and continued lack of diversity in science, technology, engineering and mathematics (STEM) fields.

Picture a Mississippi Scientist is a feature-length documentary film chronicling a groundswell of researchers who are writing a new chapter for women scientists. Biologist Nancy Hopkins, chemist Raychelle

“This is a state-wide event to highlight the critical messaging in the film, focusing not only on the understanding and support of women in STEM, but also to begin the discussion about ways we can acknowledge, adjust, and make ways and policies to support more diversity in our STEM disciplines.”

Vice President for Research, Gordon Cannon

Burks and geologist Jane Willenbring lead viewers on a journey deep into their own experiences as scientists, overcoming brutal harassment, institutional discrimination, and years of subtle slights to revolutionize the culture of science. The film also highlights new perspectives on how to make science itself more diverse, equitable and welcoming to all.

Research Day Highlights Impressive Work by USM Faculty, Staff, Students

The outstanding work generated by faculty, staff and students at The University of Southern Mississippi received special recognition during Research Day held Friday, Nov. 12, at the Thad Cochran Center on the Hattiesburg campus.

The annual event enables the campus community to gather in celebration of the remarkable array of achievements in research, scholarship and creative activities. In addition, faculty members were invited to present research-related poster presentations.



2021 LIFETIME RESEARCH AWARDEE from USM’s Coastal Operations — Dr. Alan Shiller

“Trace Elements Dissolved in Natural Waters: How the Small Picture Matters for the Big Picture”

The afternoon session included presentations by the 2020 and 2021 Lifetime Research awardees.

Dr. Alan Shiller is a professor of marine science, Bennett Distinguished Professor in the Sciences, and 2021 Lifetime Achievement Innovation Award winner.

USM Gulf Park Campus Gets Major Upgrades to Pedestrian Pathways

Getting around The University of Southern Mississippi’s Gulf Park campus in Long Beach is starting to get easier, thanks to funding from the Mississippi Department of Transportation’s (MDOT) Transportation Alternatives Program.

The sidewalk project, deemed the Pathways Project, allows for two axes to exist on campus—one that runs north and south, and the other east and west. The Science Building, for example, was built after Hurricane Katrina, and more sidewalks were needed to connect the west side of campus where it is located.

This extension into the City of Long Beach includes plans for a future gateway entrance on the west side of campus, similar to the one at the main entrance on the south side. It also creates an opportunity for sidewalks to be placed there so that the USM campus connects to downtown

Long Beach. Such an addition would better allow students to walk to local businesses and improve campus access for city residents who exercise there or attend events.





USM Named EDA American Rescue Plan Finalist

The University of Southern Mississippi has been named one of 60 national finalists – and the only finalist in Mississippi – for the U.S. Economic Development Administration’s (EDA) \$1 billion American Rescue Plan program.

In December, U.S. Secretary of Commerce Gina M. Raimondo announced the finalists for the Build Back Better Regional Challenge – the marquee of EDA’s American Rescue Plan programs – that aims to boost economic pandemic recovery and rebuild American communities.

The 60 finalists – each a coalition of partnering entities – have proposed projects that will develop or scale industry sectors, develop and train

the workforce of today, and build resilient economies.

The Gulf BlueSM Initiative (GBI) coalition, led by USM, aims to drive economic growth through innovation and the knowledge-based blue economy in the coastal Mississippi region. The GBI is focused on an industry-driven approach to grow the region’s blue economy innovation sector and the opportunity to create high-wage jobs in science, technology, engineering, and math (STEM) and light manufacturing.

The GBI proposes to bring together coalition partners to diversify the local coastal Mississippi economy from primarily tourism to:

- grow the region’s blue economy assets,
- establish a foundation for workforce

development and sustainable job growth promoting higher-wage jobs and inclusion, and

- build capacity to support a more resilient regional economy.

The GBI coalition is comprised of:

- The University of Southern Mississippi (coalition lead),
- Jackson State University,
- Mississippi Development Authority,
- Mississippi State Port Authority at Gulfport,
- Southern Mississippi Planning and Development District,
- Mississippi Gulf Coast Community College,
- Pearl River Community College,
- Mississippi Enterprise for

Technology Inc.; and

- The University of Southern Mississippi Research Foundation.

Additionally, other partners, including private-sector companies, municipalities, Mississippi Research Consortium, and Governor Reeves’ newly established Office of Workforce Development, are helping build the Gulf Blue regional network.

Finalists were selected from a pool of 529 applicants from all 50 states and five territories. Each finalist will receive a grant of approximately \$500,000 to further develop proposed projects. According to the EDA, the \$500,000 Phase 1 grants will allow finalists to take their proposed projects to the next level.

NOAA Under Secretary Spinrad Visits USM Coastal Operations

The University of Southern Mississippi welcomed Dr. Rick Spinrad, Under Secretary of Commerce for Oceans and Atmosphere for the National Oceanic and Atmospheric Administration (NOAA), as he received an update on the University’s extensive and growing oceanographic research. Officials from the Mississippi State Port Authority at Gulfport also participated in the visit.



The University’s partnership with and presence at the Mississippi State Port Authority at Gulfport provides federal, state and private entities with access to facilities situated at the front door to the Gulf of Mexico, including the Marine Research Center and the future Roger F. Wicker Center for Ocean Enterprise.

Since the passage of the Commercial Engagement Through Ocean Technology (CENOTE) Act of 2018, authored by U.S. Senator Roger F. Wicker, new strategic partnerships have formed among USM, NOAA, Navy and private-sector companies to advance innovations supporting commerce related to the blue economy.

Internships Awarded Through Program Established in Memory of Deepwater Horizon Victims

Four undergraduate students from across the Southeast region studied various marine science-focused issues this summer with the support of an internship program established in memory of those who lost their lives in the *Deepwater Horizon* oil spill.



The *Deepwater Horizon* Memorial Undergraduate Internship Program was established by the Mississippi Based RESTORE Act Center of Excellence (MBRACE) to honor the individuals who perished in the 2010 explosion. The competitive program provides funding for undergraduate student interns to conduct research projects related to ongoing MBRACE-funded projects that address research gaps in water quality and oyster reefs and their sustainability. MBRACE is a consortium of Mississippi’s four research universities: The University of Southern Mississippi serves as the lead institution, and others include Jackson State University (JSU), Mississippi State University (MSU) and The University of Mississippi (UM).



HIGHLIGHTS

- Last year our faculty published three books: **Dr. Deanne Stephens** (History), *The Mississippi Gulf Coast Seafood Industry: A People's History*; **Dr. Tom Lansford** (Political Science) et al. (eds.), *Leadership and Legacy: The Presidency of Barack Obama*; **Dr. Tom Lansford** (ed.), with **Dr. Robert Pauly** (Political Science) and **Dr. David Holt** (Geography), *The Political Handbook of the World, 2020-2021*.
- SoCR faculty also published four peer-reviewed book chapters, nine peer-reviewed articles or creative productions, and 48 other scholarly works.
- **Dr. Greg Carter** (Geography) was appointed director of the Gulf Coast Geospatial Center.
- The Dale Center for the Study of War and Society named **Dr. Douglas Bristol** (History) to the General Buford "Buff" Blount Professorship in Military History.
- **Dr. Deanne Stephens** (History) received the Butch Oustalet Distinguished Professorship Award for Excellence in Research.
- **Dr. David Holt** (Geography) received the Butch Oustalet Distinguished Professorship Award for Excellence in Service. Holt was also the principal investigator for a \$40,000 grant working with eight students to map and conduct a ground-penetrating radar survey of Hasley Cemetery in West Monroe, La., and a co-investigator of a \$5,000 grant for an Environmental Justice Heat Mapping program.
- The Mississippi Humanities Council awarded **Dr. Chris Foley** (English) a \$2,000 grant for his project, "Ben Johnson's *The Alchemist*, the Plague and Contemporary (COVID-19) Resonances Today." Foley also received the University-wide Outstanding Service-Learning Faculty Award and the College of Arts and Sciences Faculty Advisor and Mentor of the Year Award.
- **Ms. Marlene Naquin** (Mathematics) received the College of Arts and Sciences Faculty Service Award.
- The Mississippi Association of Spatial Technologies hosted the ninth annual Mississippi Geospatial Conference at the Gulf Park campus, organized by **Dr. David Holt** (Geography).
- Alumna **Kristen McGuire** (History B.A. 2019) was named Mississippi's winner of the prestigious James Madison Foundation Fellowship, awarded to individuals pursuing graduate study to become outstanding teachers of the American Constitution at the secondary school level.



School of Coastal Resilience

The School of Coastal Resilience (SoCR) connects the human experience of living on coastlines to the ideas, policies and disciplines that shape that experience. Through research and instruction, we explore the dynamics between communities, broadly understood, and the coastal environment.

DR. WESTLEY FOLLETT, INTERIM DIRECTOR

Dr. Westley Follett was named the inaugural interim Director of the School of Coastal Resilience upon its formation on July 1, 2021. A member of the history faculty at USM since 2008, Dr. Follett has previously served as the School of Humanities programs coordinator on the Gulf Park campus and as an interim associate dean in the College of Arts and Letters.

SoCR is home to 31 research and teaching faculty in the sciences and mathematics, social sciences, and humanities. Our research and teaching interests encompass coastal processes, ecology and geography; environmental history, literature, film, policy and ethics; environmental protection and social justice;

sustainability studies and education; in short, all matters that impact human well-being and ecosystem vitality in coastal regions.

SoCR faculty have proposed two new undergraduate degree programs, currently under administrative review: a Sustainability Studies Bachelor of Arts and a Sustainability Sciences (Coastal System Dynamics) Bachelor of Science. By bridging approaches from the humanities, social sciences and natural sciences, the Sustainability Studies B.A. program will attract students with a wide range of interests and prepare them for leadership roles in environmental communication, policy and research careers. Students in the Sustainability Sciences B.S. program will

obtain a foundation in field and lab science techniques, take required electives in humanities, and complete a capstone practicum that shows applied research on topics relevant to the human habitation of coastal zones. The program's emphasis upon the physical aspects of sustainability with a holistic inclusion of the human element will prepare these students for science-grounded careers in industry, government, education and beyond. If approved, these two new degree programs will open to undergraduate majors in the 2022-23 academic year.

SoCR faculty also support several existing arts and sciences degree programs that are available now at both the Gulf Park and Hattiesburg campuses, and two programs that are only obtainable at Gulf Park campus, the Media and Entertainment Arts (Film) B.A. and the International Development Ph.D. The latter program attracts a diverse array of students from around the globe to obtain world-class, multi-disciplinary instruction on how to effect changes in security, economics and politics, both at home and abroad.

More than 3.4 billion people, some 44% of the world's population, live within one hundred miles of a coast. In the United States alone, 65 million people reside in coastal counties where virtually every facet of life, be it economic, political, social, cultural and beyond, is impacted in some fashion by coastal climates, weather events, environments, ecologies.

Coastal resilience should matter to everyone.



Dr. Heather Annulis serves as director of the School of Leadership and professor of human capital Development in the College of Business and Economic Development. With over 20 years of service at Southern Miss, Annulis helped to create the M.S. and Ph.D. degree programs in human capital development. She holds a doctorate from Southern Miss in international development with a concentration in workforce training and development and a Master's degree in organizational communication from The University of Louisiana at Lafayette.

DR. HEATHER ANNULIS, DIRECTOR

School of Leadership

The mission of the School of Leadership is to develop and advance organizational leaders at the local, national and international levels. We provide distinctive and competitive educational programs, delivered through experiential and responsive methods, to address emerging social, economic and environmental challenges. Our research focuses on the expansion of knowledge in business and technology.

Our vision is to provide multi-disciplinary educational experiences that create transformational leaders.

The School of Leadership is home to specialized centers that bring faculty, students and community partners together. From providing applied research for the transportation and supply chain industry and best practices in workplace and performance, to promoting scholarly and educational opportunities—the Centers are offering services and developing partnerships through unique offerings.

Workplace Learning and Performance Institute

The Workplace Learning and Performance Institute (WLPI) in the School of Leadership serves as a research and outreach center for best practices in workplace learning and performance. The WLPI is the only state organization, public or private sector, with the broad-based conceptual workplace learning and

performance experience and expertise needed to help build a sustainable human capital development infrastructure for Mississippi.

The WLPI has won numerous awards, including being recognized in 2005 as one of the top five programs of excellence in the U.S. by the Department of Labor in the category Educating America's 21st Century Workforce, as well as awards from NASA, Association for Talent Development, and the Southern Growth Policies Board.

School of Leadership ABET Accreditation

The School of Leadership proudly announced re-accreditation from the Accreditation Board for Engineering and Technology (ABET). Voluntary ABET accreditation provides assurance that a

college or university program meets the quality standards of the profession for which that program prepares graduates. ABET provides specialized accreditation for post-secondary programs within degree-granting institutions already recognized by national or regional institutional accreditation agencies or national education authorities worldwide. The IET programs continue to experience extensive enrollment growth. The fully online undergraduate program attract students from across the country.

USM Forms Partnership with Air Force Air University on Applied Technology Bachelor of Applied Science Program

Citing the opportunity to “open a new door” for future military students, The University of Southern Mississippi (USM) has entered into an academic partnership with the Air Force's Air University Associate to

Baccalaureate (AU-ABC) program. The partnership benefits students enrolled in USM's Applied Technology Bachelor of Applied Science program.

The University is ranked No. 3 nationally by the prestigious resource guide *Military Times*. USM is also rated No. 1 in the Southeast by *Military Times* in its “Best for Vets: Colleges 2021 Rankings.”

Full release: usm.edu/news/2021/release/air-force-applied-technology.php

Kudos

The School of Leadership newsletter “Kudos” highlights milestones and achievements of our current and former students. Link to Kudos newsletter page: usm.edu/leadership/kudos.php

Highlights

- Dr. Yuanyuan Zhang, assistant professor of industrial engineering technology, secured a \$130,000 national highway grant for her

study on “An Automated System for Pedestrian Facility Data Collection from Aerial Images” funded as part of the National Cooperative Highway Research Program (NCHRP), IDEA program, the first such grant awarded to a Mississippi university.

- Dr. Courtney Taylor, human capital development, Ph.D. alumna, was selected to serve as deputy director for strategy and programs for Accelerate Mississippi in 2021.
- Dr. Robert J. Thompson, human capital development, Ph.D. alumnus (2016), was a recipient of the McCool Breakthrough Award during the 2021 International Council on Hotel Restaurant and Institutional Education Conference held July 26 – 30, 2021.
- Courtney Isgett, a current human capital development (instructional technology and design), Ph.D. student was selected as one of 17 recipients of the USM Graduate Competitive Travels Award.



In 2021, the School of Leadership graduated 12 doctoral students.

OUR VALUES

COLLABORATION

We practice teamwork and cooperation and build partnerships.

COURAGE

We have the mental and moral strength to do what is right, try new things, and overcome obstacles.

INTEGRITY

We are honest, fair, reliable and authentic in all we do.

RESPECT

We embrace diversity and are inclusive of people, thoughts and ideas.

KNOWLEDGE

We promote discovery, invention and innovation.

Schools

- Wendi Lord, a current human capital development (instructional technology and design), Ph.D. student, was selected as a top 8 finalist for the 2021 Three-Minute Thesis Competition! She presented “Flourishing at Work Using Technology-Assisted Visualization.”
- The online Human Capital Development Master of Science program was ranked #1 by OnlineMastersDegrees.org (OMD).
- The School of Leadership faculty, staff, students and alumni collected over \$1,000 in donations for the USM Golden Basket initiative held in December 2021. This event provided gift cards, food, clothing and household items for local Southern Miss students in need.

Dr. Cyndi Gaudet – Work Hard, Have Fun, Make a Difference Scholarship

The School of Leadership has established a \$25,000 perpetual scholarship to honor human capital development Professor Emeritus Dr. Cyndi Gaudet. Upon her retirement, this scholarship honors her lasting legacy at USM and celebrates her 44-year career of excellence and service. Gaudet was a true visionary, forging the development of online programs for more than 20 years and designing executive-format delivery for graduate programs in human capital development at Southern Miss. She founded the Workplace Learning and Performance Institute (WLPI) at Southern Miss and secured a \$1.1M external donation for the Center. The WLPI provides research support to regional, national and international organizations to achieve

work-related competence through effective workplace learning.

Center for Logistics, Trade and Transportation

The Center for Logistics, Trade and Transportation (CLTT) provides a competitive advantage to logistics and supply chain industry and government agencies through its multidisciplinary activities in logistics, trade, and transportation. Logistics, trade and transportation encompass the movement of goods and people (logistics) through the most efficient means (inter-modal transportation) to achieve economic development (trade). The creation of the Center for Logistics, Trade and Transportation is the result of an integrated effort of industry, government and The University of Southern Mississippi.

USM’s CLTT provides applied

research for the growing transportation and supply chain industry. Both the private and public sector can benefit from working with the CLTT.

The School of Leadership offers an interdisciplinary master’s degree program in logistics, trade and transportation which helps fill the void of qualified job candidates in the transportation and supply chain sectors—annually, some 100 jobs in Mississippi and another 2,200-plus in Gulf South states.

Meeting the Challenge

The United States relies on a complex and ever-growing inter-modal transportation system—that is, a system using multiple modes, primarily tractor-trailer trucks, rail cars, airplanes, barges and container ships.

With imports and exports increasing, the container cargo shipping industry is expected to double, creating a strain on the rest of the nation’s transportation systems and the need for more efficiency and innovation. Rising fuel prices, increased trade with Latin America and the future expansion of the Panama Canal will be an opportunity and a challenge for the logistics, trade and transportation industries of the U.S. Gulf Coast.

The CLTT performs the following services:

- Data-driven Solutions with Applied Research: Freight System, International Trade, Economic Development
- Networking and Partnership: Government, Military, Industry, Universities
- Education and Training: Master’s Program in Logistics, Trade and Transportation



The School of Leadership faculty, staff, students and alumni commit to service projects each semester as a team.

26 EMPLOYEES | 4 GRADUATE ASSISTANTS | 15 PUBLICATIONS | 12 PRESENTATIONS



DR. JOE GRIFFITT
DIRECTOR

School of Ocean Science and Engineering

The School of Ocean Science and Engineering harnesses elements from key areas of The University of Southern Mississippi, including the Division of Coastal Sciences at the Gulf Coast Research Laboratory (GCRL) in Ocean Springs, the Division of Marine Science at the John C. Stennis Space Center in Hancock County, and the Gulf Park campus, to create a regionally, nationally and internationally recognized leader in marine and coastal science.



COASTAL SCIENCES

The division welcomed one new faculty member, Dr. Kim de Mutsert, who brings a deep expertise in coastal and estuarine fish ecology and the impacts of human activities on fisheries dynamics.

Outreach

- Coastal sciences student Alfonso Coho participated in a workforce development video project for the Jackson County Economic Development Council.



- Dr. Kim de Mutsert and Patrick Biber shared their expertise in scientific and public forums regarding sediment diversions from the Mississippi River and the impacts of sea-level rise on coastal marshes.
- Dr. Michael Andres spoke to the Mississippi Museum of Natural Sciences about the past and future of Gulf sturgeon and the habitats that support this important fish.

Research

- As a research-intensive unit, the division continued to be highly active in externally funded programs totaling over \$20M in current projects.
- 18 new projects were initiated, most supporting one or more students in the graduate program.
- Dr. Reg Blaylock led a team to a new award from NOAA to study oyster hatchery production in the Gulf of Mexico.
- Dr. Kelly Darnell was awarded a new planning grant from the NOAA Restore science program to support restoration for the Chandeleur Islands to benefit seagrasses and associated animal communities.

Awards

- Postdoctoral researcher Dr. Justyna Hampel was recognized by the Editorial Board for *Limnology* and *Oceanography* as an outstanding reviewer.
- Student Evan Grimes' thesis was selected as the USM's submission to Council of Southern Graduate Schools as a candidate for Master Thesis Awards in Life Science.
- Students Alyssa LeClair and Jillian Sower received NSF Internship awards to support their career trajectories.

MARINE SCIENCE

Academic Achievement

Ocean engineering students Drew Smith and Joseph Bell teamed up to represent USM in a national debate competition, sponsored by Lockheed Martin, called Ethics in Engineering.

Outreach

- Student Oceanographic Society (SOS) members volunteered at INFINITY Science Center for Sci-Fi Saturday with the theme of "The Science Behind Science Fiction." They discussed shark myths in sci-fi movies like *Jaws* and talked about shark conservation.
- Bethany Pertain, marine science master's student, and Leonardo Macelloni, associate research professor with the Hydrographic Science Research Center, celebrated World Reef Day (June 1) at Lynn Meadows Discovery Center by speaking to the children about coral reefs in the Gulf of Mexico.
- Gero Nootz and Kamal Cambazoglu visited Pearl River Community College and gave a lecture about ocean engineering to STEM students.
- Stephan Howden participated as an instructor in the Virtual 2021 Mini-School of the Coastal Ocean and Environment Summer School in Ghana (COESSING).

- A group of 32 students from Long Beach High School with an interest in engineering toured the Thad Cochran Marine Aquaculture Center and the MRC. OE faculty presented an overview over MAR undergraduate programs and the Iver3 Autonomous Uncrewed Vessel (AUV) demonstrated.
- Thirty-six students from Moss Point High School's engineering classes participated in hands-on experiments to simulate hydrography, oil spill science and chemistry careers.

Research

- Diana Bernstein was interviewed by *Popular Science* for an article on the latest Intergovernmental Panel on Climate Change (IPCC) report underscoring the need for swift global action on climate change.
- Maarten Buijsman was interviewed by NPR about how an internal ocean wave could possibly explain the loss of an Indonesian submarine.
- Chris Hayes gave a department seminar for Southeastern Louisiana University's Department of Chemistry and Physics titled, "Impacts of Desert Dust on Ocean Chemistry."

Awards

- Dr. Alan Shiller—2021 USM Vice President for Research, Lifetime Achievement Innovation Award,

and Grand Marshall of the Fall 2021 Commencement Ceremonies

- Dr. Kristina Mojica—2019 NASA Group Achievement Award for the North Atlantic Aerosol and Marine Ecosystem (NAAMES) for team research projects making outstanding contributions to NASA's mission and science
- Brandy Armstrong—American Meteorological Society Air-Sea Interaction Conference student competition
- Neil Redmond and Susan A. Siltanen—Graduate Student Research Symposium Award
- Sarah Raney—Outstanding Scholarship Award, Marine Technology Society-Gulf Coast Chapter
- Azadeh Razavi Ara and Kacey Lange—USM Graduate School Competitive Travel Award
- Ocean engineering students, Christian Bellew, Cierra Carter, Rachel Hamilton, David Sanderson and Matthew Tarver, received 2021-22 NASA-Mississippi Space Grant scholarships.
- Andrew Smioth and Megan Hansen, undergraduate students—Eagle SPUR awards from USM's Drapeau Center for Undergraduate Research
- Liz Hamm, DMS business manager—2021 USM College of Arts and Sciences, Staff Service Award



Summer Field Program

The Gulf Coast Research Laboratory Summer Field Program (SFP) is an undergraduate academic program of USM's School of Ocean Science and Engineering. It is administered by the Marine Education Center. Having started in 1947, the program will be celebrating its 75th anniversary in 2022. As it has through its history, the program continues to offer immersive field classes in coastal and marine sciences to undergraduate students from around the country. Many students who attended the SFP continue their educational careers as USM graduate students, and some current members of the faculty and staff are former SFP students.

In 2021, SFP staff and faculty members were excited to offer several classes onsite after all courses were held online in 2020 because of the pandemic. After careful planning, both to accommodate USM practices and to allow for unusual circumstances presented by field study, the Summer Field Program held two classes onsite during each summer session. In addition, several courses that were particularly successful online during 2020 remained online during 2021. In summary, the SFP offered eight courses worth 43 credit hours and research credit for variable hours. A total of 153 students earned 815 hours. The students were evenly split between online (76) and onsite (77) classes.



75th Anniversary Celebrated in 2022

In the summer of 1947, the inaugural class marking the official start of the Gulf Coast Research Laboratory's (GCRL) Summer Field Program (SFP) was held at Magnolia State Park in Ocean Springs. Sponsored by the Mississippi Academy of Sciences, the program consisted of two classes of students who sat on benches at wooden picnic tables shaded by live oaks. Over the last 74 years, the SFP has become a rigorous undergraduate program supported by modern classrooms with laboratories, several research vessels, a curated specimen museum, and a research library. The SFP has 63 affiliate colleges and universities from 19 states whose students can take up to 15 hours over 10 weeks. In 2017, the education programs at GCRL have grown to include pre-K through 12, the SFP, and graduate study in The University of Southern Mississippi Division of Coastal Sciences. In 2022, we will celebrate 75 years of the Summer Field Program at the Gulf Coast Research Laboratory.



CLASSES AND ENROLLMENT

FIRST TERM

- Elasmobranch Biology – 18
- Marine Conservation – 29
- Marine Invertebrate Zoology – 10
- Marine Science I – Oceanography – 18
- Research – 2 (17 hours earned)

SECOND TERM

- Marine Animal Behavior – 20
- Marine Ichthyology – 18
- Marine Mammals – 17
- Marine Science II – Marine Biology – 17
- Research – 4 (17 hours earned)

Uncrewed Maritime Systems (UMS)

Certificate Program Tier 1

The 2021 Tier 1 Program was conducted from March 15 through April 16. This was the fifth time the Tier 1 Program was offered. The class of 11 students included seven Naval Oceanographic Office employees, two Fleet Survey Team employees, and one student each from NOAA and the U.S. Army Corps of Engineers. Instructors were Max Woolsey and Kevin Martin. Students received hands-on experience with uncrewed systems and individually built a small buoyancy glider.

Certificate Program Tier 2

The 2021 Tier 2 Program, with emphasis on buoyancy gliders, was conducted from October 18 through November 19. This was the first time the Tier 2 Program was offered. All five students were Naval Oceanographic Office employees. Instructors were Neil Van de Voorde and Kevin Martin. Students were exposed to all aspects of oceanographic buoyancy glider operations for the different types of buoyancy gliders. In addition, the students participated in a buoyancy glider recovery cruise on the R/V *Jim Franks*.

Center for Fisheries Research and Development



JILL HENDON
DIRECTOR

Scientists at the Center for Fisheries Research and Development (CFRD) develop and conduct research that informs resource management. We work with state, federal and community partners to ensure that we understand scientific fishery needs and focus our research efforts on how we can promote sustainable fisheries and habitats. Our staff not only conduct the research but also sit on local, regional and federal assessment panels to ensure our data is efficiently transferred to management entities.

Hendon Named Director

Jill Hendon was named director of the CFRD. Hendon has worked as a fisheries scientist in the CFRD for the last 13 years and was most recently filling the role of interim director. Fisheries remain a significant economic factor for Mississippi and the Gulf of Mexico. Hendon emphasizes that the CFRD is committed to conducting the research

“With efficient fisheries research and monitoring, we can promote the health of our coastal ecosystem, help meet the demand for seafood, and provide economic stability for our coastal community.”

CFRD Director, Jill Hendon

essential to ensuring that these fisheries remain sustainable.



Southern Flounder (*Paralichthys lethostigma*)

Acoustic telemetry is being used to assess movement patterns of Southern flounder in St. Louis Bay, Mississippi. The tracking will help elucidate the spawning migration pathways and the habitat use of Southern flounder in this system.



Photo: Jeff Jones

Tarpon (*Megalops atlanticus*)

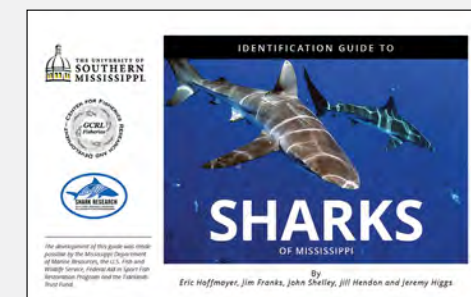
Larval and juvenile tarpon are common in Mississippi waters; however, an understanding of the early life history dynamics of tarpon are lacking. Our current work focuses on developing a Mississippi

Sound current model, which will backtrack larval tarpon captured in Mississippi waters, along current pathways to identify probable offshore spawning locations. Microchemical analysis of otoliths

from the larvae and early juveniles has also been conducted using Laser-Ablation Inductively Coupled Plasma Mass Spectrometry (LA-ICP-MS) to determine natal water signatures.

Shark Guide Released

CFRD released a new edition of the “Identification Guide to Sharks of Mississippi.” First released in 2005, this guide on sharks that inhabit the Mississippi Sound has been revised and updated. It will be a useful resource for commercial fishermen, recreational anglers and shark enthusiasts. Funding for the guide was provided by the Mississippi Department of Marine Resources Tidelands Trust Fund Program.



Awards

NANCY BROWN-PETERSON

Ms. Nancy Brown-Peterson, a senior research scientist, was awarded the 2021 Mississippi Chapter of the American Fisheries Society (MSAFS) Lifetime Achievement Award for her contributions in the area of Gulf fish reproduction throughout her career. Ms. Brown-Peterson provided the keynote address at the MSAFS annual meeting.

ANNA MILLENDER

CFRD mentored graduate student Anna Millender was awarded the Outstanding Student Achievement Award from the Gulf and Caribbean Fisheries Institute for her presented

research on the reproductive biology of the cownose ray.

Outreach

CFRD collaborated with the Mississippi Aquarium to bring Shark Week activities to the public. The event brought record-breaking numbers to the aquarium, with over 4,000 guests passing through.





Gulf Coast Geospatial Center



DR. GREG CARTER
DIRECTOR

The Gulf Coast Geospatial Center (GCGC) works with federal, state, commercial and academic partners in research, development and applications of precise geospatial data, remote sensing, and computational tools and models to enhance the understanding of relative sea level rise and its impacts, coastal change over time, and nature-human dynamics in the coastal system.

7 Full-time Staff (4 research, 3 support)

1 Faculty (summer)

2 Graduate Students

2021 Highlights

Dr. Greg Carter was named director of the GCGC. Carter has served as chief scientist of the GCGC since 2003 and has been instrumental in driving research.

Field Surveys

- 73 drone flights (Light Detection and Ranging (LiDAR) and Multi-spectral)
- 20 Global Navigation Satellite Systems (GNSS) marsh topographic surveys
- Hancock County, Pascagoula and Wolf River Marshes
- Unmanned Aerial Systems (UAS) LiDAR survey calibration and validation
- Post-Hurricane Ida UAS imagery collection

Continuously Operating Reference Stations (CORS)

- Number of registered users: 2,063 (216 registered in 2021)
- Real-Time Network (RTN) operational hours during reporting period (hours that data center provided fixed positions to end users): 66,016 hours

- 1 new CORS installation (Louisville, MS)
- 9 GPS unit and antenna upgrades to Trimble Alloy receivers equipped with Beidou and Galileo capabilities
- 37 Standard CORS and communication equipment break-fix repairs

Conference Attendance

- Society of Wetland Scientists (Annual Meeting)
- Mississippi Association for Spatial Technologies (Annual Meeting)
- Institute of Navigation NGSS + 2021 Conference (Annual Meeting)
- American Geophysical Union (Fall Meeting)
- Environmental Systems Research Institute, User Conference (Virtual Attendance)

Student Support

Carlton Anderson, Ph.D. graduated May 2021 (Geography, advisor: Dr. Greg Carter)

Funding: NOAA / NGS (Geospatial Modeling) (Research only, tuition from employee waiver)

Dissertation Title: The Role of Elevation as a Control on Salt Marsh-Upland Ecotones Along the Mississippi Gulf Coast.

Margaret Waldron, Ph.D. in progress (Coastal Sciences, advisor: Dr. Patrick Biber)

Funding: NOAA / NGS (Geospatial Modeling) (Research only, tuition from employee waiver)

Dissertation Topic (under development): Examining the expansion and biophysical characteristics of *Phragmites australis* in Mississippi's coastal marshes

Michael Amelunke, M.S. in progress (Geography, advisor: Dr. Greg Carter)

Funding: NOAA / NGS (Geospatial Modeling)

Thesis Topic: Error analysis of UAS derived LiDAR in coastal marshes

Sydni Crain, M.S. in progress

(Geography, advisor: Dr. George Raber)

Funding: NOAA / NGS (Geospatial Modeling)

Thesis Topic: Effects of bathymetric change on storm surge modeling

Justin Varga, M.S. in progress

(Geography, advisor: Dr. Greg Carter)

Funding: NOAA / NGS (Geospatial Modeling)

Thesis Topic: Coastal Research (under development)



Outreach and Service Activities

- Collaborated with the Department of Marine Resources on drone imagery collection (5 flights in the Pascagoula River Estuary)
- Consulted and coordinated with Pass Christian High School STEM teacher to incorporate remote sensing and geospatial technology and analysis into future environmental science courses
- Consulted with Long Beach High School to incorporate Geographic Information Science (GIS) into their future technical curriculum
- Instructed USM graduate and undergraduate student interns on collecting and analyzing precise elevation data using various aerial and terrestrial platforms
- Collaborated with the Grand Bay National Estuarine Research Reserve on establishing known elevations on their Surface Elevation Tables and System-wide Monitoring Program stations
- Provided input toward the development of the proposed B.S. degree in Sustainability Science: Coastal System Dynamics

Training / Mentorship

- 5 Graduate Students (3 M.S., 2 Ph.D.)
- 4 Undergraduate Interns
 - **Rachel Hamilton** (Ocean Engineering)
 - **Steven Ates** (Ocean Engineering)
 - **Daniela Ramirez-Alvarado** (Marine Science)
 - **Andrew Smith** (Ocean Engineering)
- Trimble Pivot training (all staff)
- UAV Microdrone training (all staff)
- NGS Geospatial Summit (all staff)

Hydrographic Science Research Center



The Hydrographic Science Research Center (HSRC) was established in 2001 to assess emerging trends in hydrography and implement the most promising trends into operational use. The HSRC has provided innovative solutions for hydrographic surveying, precise positioning, water level measurements, sensor development, and novel uses for hydrographic data.

DR. STEPHAN HOWDEN, DIRECTOR

In 2021, the Hydrographic Science Research Center was involved in a range of hydrography and ocean mapping research projects, from the shallow coastal ocean to the deep open ocean. Autonomous, or Uncrewed, Marine and Aircraft Systems (UMS/UAS) made up a large part of the research portfolio, which aligns with strategic goals of NOAA and the U.S. Navy, and which have been part of the solution to safe surveying in the midst of a pandemic.

Deep Sea Mapping with Autonomous Underwater Vehicles (AUVs)

The HSRC has been preparing the *Eagle Ray* (International Submarine Engineering, Ocean Explorer vessel) to allow it to operate as deep as 3,000 m, and the *Mola Mola* (SeaBED vessel) to 2,000 m in preparation for a cruise in the South Pacific as part of the Ocean Exploration Cooperative Institute. These systems provide high-resolution mapping information of the seafloor, subsurface sediment structure and water

column backscatter, and are critical resources for the Ocean Exploration Cooperative Institute.

Mapping with Uncrewed Surface Vessels (USV)

After completing the testing and final reporting using Sairdron for hydrographic surveying in the prior year, the focus shifted to *Sea Eagle*, the USM *L3Harris/ASV C-Worker 5* uncrewed surface vessel. The *Sea Eagle* has been deployed multiple times in different operational conditions with the goal of developing concepts of operations for a wide range of surveys, including hydrographic and hypoxia surveys.

HSRC research affiliates are developing a joint mapping operation concept for two uncrewed vehicles, namely *WAM-V ASV* and *Iver3 AUV*. The optical and acoustic sensors onboard both vehicles will collect oceanographic datasets, map the sea floor, and monitor water column properties. Once completed, the remote operation will allow the continuous

monitoring of seawater properties along 12-mile transect lines.

Uncrewed Aerial Vehicle (UAV) Mapping

A *WingtraOne*, fixed wing UAV with a vertical takeoff and landing, was procured and used for shallow water depth mapping and coast-lining using photogrammetry. The environmental limits of accurate data are being assessed, and pre- and post-Hurricane Ida data are being processed to look for measured change.

Improving the NOAA VDatum Tool to Better Enable Ocean Mapping

Building on the success of earlier VDatum validation studies, the work was extended into deeper waters with the first deployment of a bottom mounted system, tied to the ellipsoid via a short deployment of a GNSS equipped *EchoBoat* USV, which allows for estimating tidal datum separations in a region where small GNSS buoys

are frequently vandalized.

Low-power Mass-market Multi-constellation GNSS (LM3GNSS) Receivers to Better Enable Ocean Mapping

Prior research demonstrated that LM3GNSS receivers are a viable, low-cost alternative to expensive receivers meant for geodetic surveys, and so can help to lower the resource barriers to having the capacity to meet IHO specifications for hydrographic surveys. In 2021, the utilization of these receivers for low-coast water level measurements from a buoy or USV has begun.

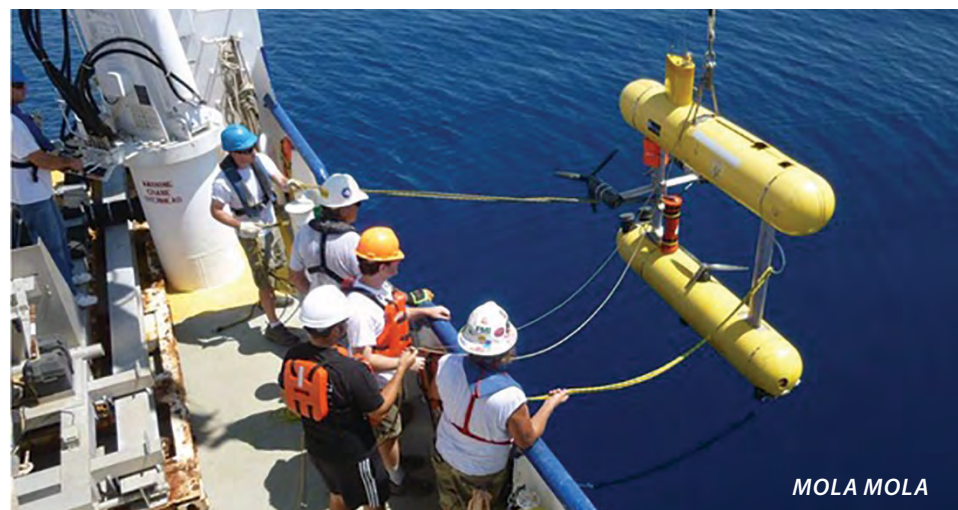
Aquaculture: Uncrewed Marine Systems (UMS)

UMS may lower the barriers to offshore aquaculture development by lowering the cost of performing Baseline Environmental Surveys (BES) for permitting. Research has commenced on how a variety of UMS can be utilized to perform BES, in addition to

traditional hydrographic mapping. As an initial effort, the HSRC partnered with USM's Roger F. Wicker Center for Ocean Enterprise, Ocean Aero and NOAA, to begin testing of the Ocean Aero's uncrewed Triton vessel to measure essential ocean variables required for BES. Plans are being made for 2022 testing.

Educational Partnerships

The HSRC works closely with the Hydrographic Science, Marine Science, Ocean Engineering and Geography programs at USM, providing graduate research assistantships and undergraduate research and work-study opportunities. The long-standing partnership between the HSRC and the Hydrographic Science academic program ensures that teaching through research has been a core of the center and the academic programs. In 2021, the HSRC supported 11 graduate research assistants and two undergraduate researchers.



Marine Education Center



DR. JESSICA KASTLER
DIRECTOR

The Marine Education Center (MEC) works across USM's coastal operations to engage members of the public in ocean sciences, promoting careers and fostering community involvement through formal and informal education programs that provide participants with a better understanding of the Gulf.



Tuskegee University

The MEC works with undergraduates from Tuskegee University through NOAA's Ocean Exploration Cooperative Institute. In 2021, MEC educators hosted a Zoom meeting of the Ocean Exploration Club for a group of 35 students at the Historically Black Colleges and Universities (HBCU). The first program intern traveled to the Gulf Coast to conduct research with USM scientists and join a cruise aboard the R/V *Point Sur*. A webinar highlighting the research, "Seek and Discover: Shipwrecks of the Past Inspiring Ocean Explorers of the Future," has been viewed over 5,000 times.

2021 Highlights

In 2021, the MEC conducted informal science education programs that reached approximately 725 people onsite, 3,200 people in-person offsite, and 19,000 people in programs developed for use online, including the GCRL Science Café produced by the Gunter Library.

K-12

After the pandemic significantly reduced onsite programming in 2020, MEC staff members were elated to offer student-centered outdoor learning experiences again in 2021, starting with summer camp. After careful planning, three summer camp sessions were held subject to mask requirements and capacity limits in classrooms and vessels. A total of 71 campers attended a week-long session of Angler Camp or Shark Fest, both of which benefited from close collaboration with the

Center for Fisheries Research and Development. In addition, through the generosity of programs and staff across USM's coastal operations, 25% of the campers could attend on need-based scholarships.

Onsite activities increased in the fall, with 390 K-12 students traveling to the MEC with their teachers and chaperones to participate in educational experiences, such as shark dissection and estuarine water quality sampling aboard the *Miss Peetsy B*. In addition, 50 in-service and pre-service teachers received professional development at the MEC, including workshops on watersheds, community resilience, and coastal monitoring. Staff members also visited 156 students in classrooms and approximately 900 at off-campus events like Pathways to Possibilities.

Much of the MEC's K-12 and teacher education was programming online

in 2021, primarily sponsored by grants acquired before the pandemic. Funding agencies worked with MEC staff to modify field experiences into formats that accommodated remote learning conditions. These were designed to retain as much outdoor, place-based field experience as possible without bringing classes onto campus. For example, a series of estuarine sample collection videos posted on Facebook was made possible by a grant from the EPA Gulf of Mexico Program; the Brown Foundation sponsored virtual field trips in community resilience; development of a resilience curriculum was sponsored by the NOAA Bay Watershed Education Training Program; and a marine debris curriculum was developed with MSU staff through funding from NOAA's Trash Free Waters program. In addition, the 10th Stewardship Summit was held virtually with teams of students from

eight schools presenting their solutions to community resilience challenges to community professionals via Zoom.

Public

The GCRL returned to the Peter Anderson Festival in November of 2021, with MEC coordinating participation and interacting with approximately 1,000 people in two days. It also coordinated and facilitated web outreach via Zoom for a variety of events and series, including the GCRL Science Café produced by the Gunter Library, the Picture a Mississippi Scientist Panel made by a cross-university committee, and the Ocean Springs Mayoral Candidate Panel Discussion produced by the Ocean Springs Environmental Committee. In addition, approximately 7,000 interacted with one of several social media campaigns associated with World Water Monitoring Day and National Estuaries Day.



Facilities

The Gulf & Ship Island Building, operated by USM's Research Foundation, is the home to the Gulf BlueSM Initiative and offers global blue tech innovators a collaborative workspace to call home while developing solutions for global challenges. In addition, innovators have access to research scientists, industry partners and federal agencies to bring new blue technology to market faster. The MRC was initially conceived and designed to serve as the operations hub for USM's 135-foot-long R/V *Point Sur* and to support the advancement of UMS and ocean data science. The MRC is poised to serve as a critical component of Gulf BlueSM-USM's initiative to drive the region's blue economy, as well as support Ocean Enterprise R&D.



As a core facility, the MRC provides access to its resources for internal and external customers. These resources include classrooms, a conference room, electronics lab, marine tech lab, deep test tank, and a prototype fabrication shop. This past year, the MRC has supported research development test & evaluation (RDT&E) and training using the 134-foot R/V *Point Sur*; the 49-foot R/V *Ken Barbor*, as well as supported a broad range of USM, federal and industry research partners

including USM's Uncrewed Maritime Systems Tier-1.

In 2021, the MRC further expanded its infrastructure. The MRC's prototype shop received the bulk of its \$1.8 million in RESTORE Act-funded equipment, greatly increasing its manufacturing, fabrication and rapid prototyping capabilities. This will allow users to test on the water, make any modifications/repairs, and return to the water quickly to maximize testing opportunities.

RDT&E and Training

The Northern Gulf of Mexico is fast becoming the go-to maritime test range for Defense Advanced Research Projects Agency (DARPA), Department of Homeland Security Science and Technology Directorate (DHS S&T), U.S. Army Engineer Research and Development Center (ERDC), Naval Research Laboratory (NRL) and other Federal R&D agencies because of Ocean Enterprise's capability to perform "Gold-Standard" Ocean/Riverine Characterization using Costal CUBenet. In conjunction with the instrumented buoys, we developed a web-accessible interactive marine data portal tailored for the testing and evaluation of UMS. Together, the portal and sensors comprise CUBenet.

In September of 2021, we instrumented an area in the Mississippi Sound near Cat Island and south of Ship Island in the Northern Gulf of Mexico to provide federal and industry partners environmental intelligence via vertical profiles from hydrodynamic models, satellites and field observations, to include UMS sensor and performance data.

Ocean Enterprise was able to support the first of many autonomous uncrewed vessels (AUVs) Operational Seminars for NAVOCEANO in February 2021. The cohort from Littoral Battlespace Sensing Unmanned Systems Program, Naval Oceanographic Office completed the AUV Operational Seminar in February 2021. Additional AUV Operational Seminars occurred in April and June 2021, with more planned for 2022.

By helping deliver innovative maritime sensing platforms using our expertise in ocean data science, oceanography and engineering, as well as promoting UMS training opportunities, USM's Roger F. Wicker Center for Ocean Enterprise, Gulf BlueSM Initiative and School of Ocean Science and Engineering, along with many industry and government partners, have collectively positioned USM to provide leap-ahead support for Mississippi's blue economy in 2022 and beyond.

Roger F. Wicker Center for Ocean Enterprise



The Center for Ocean Enterprise includes the Marine Research Center (MRC), the Roger F. Wicker Center for Ocean Enterprise (OE) Facility (opening 2023), and the Gulf & Ship Island (GSI) Building. The center brings together federal, industry and academic agencies to create a global hub for ocean-sensing systems, Uncrewed Maritime Systems (UMS) and ocean data science. The innovative power of working together in a collaborative environment accelerates the development and launching of new technology in the fast-growing ocean economy.

In 2021, the Roger F. Wicker Center for Ocean Enterprise was recognized by Mississippi's Institutes of Higher Learning as a comprehensive research and development partnership program focused on uncrewed maritime systems and blue technology innovation that provides the facilities, equipment, access, support and expertise to advance new technologies to the market.

Located centrally along the Gulf Coast at the Mississippi State Port in Harrison County, Ocean Enterprise facilities consist of the 18,000-square-foot Marine Research Center (MRC) and the 62,500-square-foot Roger F. Wicker Center for Ocean Enterprise, along with deep and shallow water access and shoreside support for large oceanographic research vessels, small research vessels and various Uncrewed Maritime Systems (UMS).



Thad Cochran Marine Aquaculture Center



KELLY LUCAS
DIRECTOR

The Thad Cochran Marine Aquaculture Center (TCMAC) is an advanced research unit centrally located in the northern Gulf of Mexico in Ocean Springs, Mississippi, at the Gulf Coast Research Laboratory's Cedar Point research site. Our research focuses on alleviating the bottlenecks that constrain the production of marine species. We work with industry, government and non-profit organizations to advance sustainable aquaculture on land and in coastal and marine environments.

Oysters (*Crassostrea virginica*)

Production totals for 2021 included 177 million eyed diploid larvae and 2 million single seed oysters. Over 90% of the single oysters were sold to industry and 25% of the eyed larvae. Another 35% of the eyed larvae were transferred to the Mississippi Department of Marine Resources to support spat-on-shell oyster reef restoration.

Additional oyster projects include the following:

- The Gulf of Mexico Research Consortium SALT (Selection of Aquaculture Lines with improved Traits) project, a Gulf-wide industry and academic program to produce improved Gulf oyster genetic lines
- Support for Mississippi Alabama Sea Grant Consortium (MASGC) Oyster Gardening project by setting 9,525 oyster shell with an estimated 172,000 spat-on-shell

- Completion of automated oyster cage prototype in conjunction with a private industry partner and USM Ocean Engineering faculty
- TCMAC staff served on The Nature Conservancy's Technical Advisory Team for the Oyster Shell Recycling Workshops and the Advisory Committee for the Oyster Robotics S3AM project with University of Maryland.



Red Drum (*Sciaenops ocellatus*)

A stock of brood red drum (*Sciaenops ocellatus*) was collected for domestication for a project funded through the Gulf States Marine Fisheries Commission to permit an offshore aquaculture farm in the Gulf of Mexico.

Offshore Aquaculture

In association with the red drum collections, phase 2 of the offshore permitting for a finfish farm in the Gulf of Mexico project was completed with a new bathymetric survey and public outreach. The permit will be submitted in the first quarter 2022. Partners for the offshore farm include Manna Fish Farms LLC, University of New Hampshire, University of Mississippi, and NOAA, NCOOS Coastal Aquaculture Siting and Sustainability.

- Collaboration continued with the University of Tamaulipas in Tamaulipas, Mexico, for training and transfer of operating procedures and hatchery management practices.

New oyster projects awarded in 2021 included the following:

- Federal funding from U.S. Department of Commerce
- NOAA for "Increasing hatchery production of larval eastern oysters"
- Funding from the Nature Conservancy for "Facilitating self-governance among stakeholders in shellfish aquaculture within the Gulf of Mexico to advance regulatory reform"

Algae (multiple species)

Peak production for the 2021 season was maintained at an average of 4 trillion cells a day of live microalgal feedstock, i.e. estimate to be a relative biomass yield of 68.6 grams per day. Feedstock requirements were sustained for oyster larvae production, copepod

maintenance, and other research purposes.

Spotted Sea Trout (*Cynoscion nebulosus*)

Over 173 million fertile eggs were produced in 2021. The 2021 Coastal Conservation Association, Ernie Zimmerman Friends and Family Live Catch Tournament helped supply brood sea trout for the program. Students from Ocean Springs High School participated in on-site work training.

Tripletail (*Lobotes surinamensis*)

Spawning trials were conducted to compare the efficiency of two hormonal induction treatments. A pilot larval rearing run comparing two feeding frequencies for the culture of larvae during the live feeds period was conducted and led to improved survival to early juveniles from previous attempts.

Blue Crab (*Callinectes sapidus*)

Technology transfer was the primary focus on the Blue Crab program

in 2021. As part of National Sea Grant funding, the Blue Crab team transferred hatchery and rearing techniques to North Carolina in support of their blue crab farming businesses.

Outreach

TCMAC continues to support industry through tours, training, site visits, extension, service and research agreements and the sale of seed and live feeds. Community tours and service this year included Jackson County Chamber of Commerce-Leadership Jackson County class, college, and high school counselors, the Long Beach High School CTE, the Biloxi High School, Moss Point High School CTE, Ocean Springs High School, the Mississippi Aquarium and McNair Scholars. Staff enjoyed participating in the coast-wide middle school job shadowing and high school students aquaculture training.



Moving Forward

Faculty, staff and students at GCRL remain focused on continued growth in our research and academic programming to support our local, regional and national needs for coastal and marine science matters. We look forward to accomplishing this by maintaining and enhancing existing programs and infrastructure and expanding efforts to meet new challenges.

Emerging research centered on effective oyster restoration strategies, in partnership with the USACE Engineer Research and Development Center, and on understanding coastal resilience from the ecosystem perspective will be next steps in our ongoing journey of discovery, academic training and community support.

Gulf Coast Research Laboratory



DR. READ HENDON
DIRECTOR

The Gulf Coast Research Laboratory (GCRL) is a research and teaching unit of The University of Southern Mississippi dedicated to the advancement of scientific discovery and promotion of academic growth in the fields of marine biology and coastal sciences. The GCRL was established by the Mississippi Legislature in 1948 as the state's designated marine laboratory and was incorporated into The University of Southern Mississippi four decades later.

The year 2021 began with a gradual return to normal operations at the University's Gulf Coast Research Laboratory (GCRL), as we emerged from the widespread health and safety responses to the COVID-19 pandemic. Through coordination within the University on deliberate transitional phases, our faculty, staff and students were able to safely and effectively return to full on-site activities and resume all aspects of research, academics and operations. As we progressed through the year, we remained mindful of the ongoing health concerns associated with the COVID variants, yet we remained – and remain – similarly vigilant in meeting our mission objectives through adaptive coordination.

A return to in-person instruction for our college Summer Field Program, held annually since 1947, and the presence of K-12 students on-site at the Marine Education Center for the summer Sea

Camps (both conducted at reduced capacity and in accordance with health/safety guidelines) were a couple of seemingly major milestones in our incremental emergence from the pandemic. Completion of repairs to the Oceanography Building at the Halstead site, damaged by both a fire and Hurricane Zeta in fall 2020, provided for the final transitional phase of a return to routine operations, as occupants of office and laboratory areas there were allowed to return from temporary space assignments. Despite these relatively positive occurrences, we all still feel the difficulties of living and working in the midst of an ongoing and evolving global pandemic, which has delayed commencement of planned projects for construction of the oyster hatchery facility and repair of the Halstead Harbor infrastructure.

R/V *Hermes* Retired

This year saw us bid farewell to the R/V *Hermes*, a 38-foot steel hull trawler acquired by GCRL in 1955 and retrofitted for service by Kramer Marine in Gulfport, MS. The vessel was the oldest in the University's fleet at GCRL and had also long been purported to be the oldest operational "vehicle" on the state of Mississippi's inventory. However, it had over its many years of service aged to the point where it was not feasible to continue its operation for academic and research purposes, as a result of persistent mechanical issues, the inability to find compatible parts, and its now relatively low student capacity. As a result, we made the



difficult decision to officially retire the R/V *Hermes* from service through a ceremony held in June at GCRL. Despite its retirement, the vessel will continue to serve the Mississippi Gulf Coast community and our coastal ecosystem in its next stage of existence, as the vessel was donated to the Mississippi Gulf Fishing Banks to be deployed as an artificial reef in our state waters (anticipated in 2022).



On the Horizon

USM to Celebrate 50th Anniversary at Gulf Park Campus

The University of Southern Mississippi's Gulf Park campus is celebrating its 50th year anniversary since it opened operations in 1972. Originally founded in 1919 by Col. J.C. Hardy, Gulf Park College for Women offered coursework at the secondary and junior college level. Classes began on September 28, 1921. Located in Long Beach, Mississippi, and filled with charm and tradition, the college provided women with unique educational experiences, activities and social events until it closed in 1971. USM reopened the campus offering

upper-level coursework to both men and women. With a nod to the rich history of the Gulf Park College for Women, the site is referred to by the University as the Gulf Park campus. Today, as the state's only beachfront campus, USM's Gulf Park campus provides a beautiful setting for learning and research offering degrees at the bachelor's, master's and doctoral levels. The Gulf Park campus serves as the hub for USM Coastal Operations across the Mississippi Gulf Coast.

Executive Education Center

During previous legislative sessions, USM received \$200,000 for planning and \$4.8 million (Phase I) construction funding for a new Executive Education



Center to be constructed at USM's Gulf Park campus. The development of an EEC creates a unique opportunity for USM's Gulf Park campus to enhance visibility and presence in the region to grow and develop executive-level leaders, especially as it relates to the blue economy.

This state-of-the-art educational center will provide training for experienced professionals and non-traditional students, enhance the infrastructure of the Gulf Park campus, and promote and develop partnerships with regional business and industry. Partnerships are anticipated to increase in number and diversity as the EEC equips organizations with the expertise to maximize the return on their human capital investment through programs that focus on their organization's strategic objectives with insight into critical business issues. These partnerships will promote economic growth and development for the Gulf Coast and blue economy, as well as other sectors.



Roger F. Wicker Center for Ocean Enterprise

The 62,000 sq. ft. Roger F. Wicker Center for Ocean Enterprise will be located at the Mississippi State Port Authority at Gulfport and is expected to open in April 2023. The Center is a comprehensive research and development partnership program focused on uncrewed maritime systems and blue technology innovation. The program includes access to prototype fabrication equipment, laboratories,

training and conference space and access to the four-dimensional shallow, medium and deepwater testing range with a command-and-control center for real-time mission support. NOAA, Office of Marine and Aviation Operations Uncrewed Maritime Systems headquarters will be located in the new building along with USM and other private partners.

USM Oyster Hatchery

In 2020, Mississippi Governor Tate Reeves announced that the U.S. Department of the Treasury approved a RESTORE Act grant award of \$7.62 million for the construction of the University of Southern Mississippi (USM) Oyster Hatchery and Research Center, located at USM's Gulf Coast Research Laboratory at Cedar Point in Ocean Springs. The grant is administered by the Mississippi Department of Environmental Quality (MDEQ).

The center in Ocean Springs will support the state's oyster restoration efforts by producing oyster larvae and conducting oyster aquaculture research. The preliminary design includes hatchery and oyster larvae production space, algae (feedstock) cultivation space, a laboratory, and support office space.

The center is currently in the design

phase, and it is anticipated that USM will provide approximately \$1.2 million in state funding for facility construction costs in addition to the RESTORE Act funding. An additional \$4 million in RESTORE Act funding was included in MDEQ's restoration planning for procurement and installation of the aquaculture systems equipment but has not yet been submitted to the U.S. Department of the Treasury pending final design.



University Research Vessels

USM has a fleet of four research vessels. The use of large vessels at USM enhances and expands the high-quality education and research opportunities the university is able to provide as a leading marine science institution, while providing valuable benefits to our students, community, and associated marine economy. Note that sea days listed below were impacted by cruise delays or cancellations associated with COVID-19.



The Hydrographic Science Research Center conducted sea trials of the Eagle Ray AUV onboard USM's R/V *Tommy Munro* in preparation of further ocean exploration under the NOAA Ocean Exploration Cooperative Institute (OECI) initiative.

Miss Peetsy B

The *Miss Peetsy B* is a 34-foot passenger vessel with a capacity of 34. The boat was originally donated to The University of Southern Mississippi by Jimmy Buffett and his sisters in honor of their mother. The vessel is used primarily by GCRL's Marine Education Center for outreach programs.

SEA DAYS: 20 | OUTREACH: 100%
PASSENGERS: 360

R/V Jim Franks

The R/V *Jim Franks* is a 60-foot aluminum catamaran designed specifically to meet the needs of USM research and educational platforms. The vessel has a maximum capacity of 40 passengers and is equipped for both day cruises and overnight trips.

SEA DAYS: 38 | RESEARCH: 100%
PASSENGERS: 445

R/V Ken Barbor

The R/V *Ken Barbor* is an Endeavor 48-foot aluminum passenger vessel with a capacity of six passengers. The research vessel was updated and refitted to serve as an offshore Research Vessel to support USM's School of Ocean Science and Engineering's deep ocean underwater surveys using various uncrewed maritime systems (UMS).

SEA DAYS: 42 | RESEARCH: 100%

R/V Tommy Munro

GCRL took delivery of the 97-foot R/V *Tommy Munro* in 1981. The vessel is used primarily for offshore research in the Gulf of Mexico and has been a platform for the Southeast Area Monitoring and Assessment Program (SEAMAP) for decades.

SEA DAYS: 56 | RESEARCH: 100%
PASSENGERS: 41

R/V Point Sur

Built in 1980, the R/V *Point Sur* is a 135-foot-long vessel accommodating 16 researchers and technicians and a crew of eight, while housing a 1,110-square-foot deck that includes a primary and wet laboratory.

SEA DAYS: 144 RESEARCH DAYS





The University of Southern Mississippi

COASTAL OPERATIONS

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