

# Mississippi State University Programs on the Coast

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GRI/NGI Director | March 7, 2022



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Northern Gulf Institute



## Study: Mississippi State creates \$1.8 billion annual economic impact

- ❑ **EMSI** analysis of FY 2018-2019 indicates **MSU's** annual economic impact at **\$1.8 billion** to state
- ❑ **Exceptional ROI** for taxpayers, students, and society
- ❑ Every **\$1** of public money **invested** in **Mississippi State** generates **\$2.30** in value
- ❑ **MSU** supports **29,016 jobs** — put another way, that's **one out of every 55 jobs** in Mississippi
- ❑ **EMSI** found that average bachelor's degree graduate from MSU will see **increase of \$19,400 each year** compared to a person with high school diploma or equivalent working in Mississippi
- ❑ Study also found that **societal benefits** of having a more educated Mississippi population amount to **\$4.3 billion**
- ❑ Today, you will hear about the **people** and **programs** driving this significant impact





## Enrollment, Fall 2021

- ❑ Record enrollment — **23,086**
- ❑ **Only** Mississippi university to **grow 7 straight years**
- ❑ Added **860** students since Fall 2019
- ❑ **5.1% growth rate** in first-time **freshmen** at a time when many colleges are seeing dramatic enrollment declines
  - **114** Valedictorians and **85** Salutatorians
  - **83** Student Body Presidents
  - **80** Star Students
  - **100** Eagle Scouts
  - **12** Girl Scout Gold Award Winners
- ❑ **Graduate School** enrollment grew **8%**
- ❑ **No. 1 college choice** for Mississippi high school grads
- ❑ Also set **Winter Session 2021** and **Spring 2022** records





# Access, Diversity & Inclusion

- ❑ MSU **enrolls higher percentage** of African Americans — by a wide margin — than any other university in the **Southeastern Conference**
- ❑ By an equally wide margin, **Mississippi State** enrolls a **greater proportion** of African Americans than any other historically white land-grant university in the United States
- ❑ Enhancing diversity among **faculty ranks** and **student body** key priorities
- ❑ Increasing **access** and **degree completion** for under-represented students central to land-grant mission to serve
- ❑ **Ra'Sheda Forbes** named **Vice President for Access, Diversity and Inclusion**, Fall 2020





## Research Impact

- ❑ **Carnegie Foundation R1**: Doctoral Universities-Very High Research Activity
- ❑ **Highest-ranked** university in Mississippi by **NSF** and only one in **Top 100** in **FY 2020**
- ❑ **No. 88** overall and **No. 59** among public universities
- ❑ Record **\$280 million** in R&D expenditures
- ❑ Mississippi State research is **55%** of state's total
- ❑ Ranked **No. 14** nationally in ag research
- ❑ **Social Sciences, No. 19** — leading SEC
- ❑ **Engineering: Top 25 rankings** for Aerospace, Industrial and Mechanical
- ❑ **Proposals submitted** and total **funds awarded** continues to **grow**, even during pandemic
- ❑ **Research culture** embraces **problem solving** and values and builds **productive partnerships**



# High Performance Computing



- ❑ **High Performance Computing Collaboratory** at **MSU** is **5th most powerful** academic site in U.S.
- ❑ **“Orion”** system capable of over **5 petaFLOPS**, or Trillion Floating Point Operations Per Second, of computing power
- ❑ **Top500 list:** HPC<sup>2</sup> has been on **20 of the last 31** lists.
- ❑ **Orion** enables **MSU** to pursue much more **advanced research**
- ❑ NGI’s latest 5-year CI award from **NOAA: \$86 million ceiling**
- ❑ Other **HPC<sup>2</sup>** partners include **USDA, NASA, NSF, DoD, DoE, DHS, state** and **federal agencies**
- ❑ New **\$30 million** high performance **data center** to be built



# MSU Extension Service



- ❑ Serving **diverse communities** and stakeholders in **every county** in Mississippi
- ❑ Meeting modern 21<sup>st</sup> Century needs by **delivering latest science** to growers and fishers, government and business, schools and community organizations, and more
- ❑ Priorities include **youth development, community resource and economic development, enterprise economics, family and consumer sciences, forestry, wildlife and fisheries**, and more
- ❑ Also **working with state and local officials** to prepare for and respond to **natural disasters**
- ❑ **Developing programs** with partners, including UMMC, to address **healthcare challenges** and **enhance access** to care



# Coastal Research and Extension Center (CREC)

- ❑ Formal approval in February 2021 to build **Northern Gulf Aquatic Food Research Center** in Jackson County to enhance **CREC's** many contributions to region's **seafood industry** (preliminary rendering shown here)
- ❑ MSU's **Coastal Region covers 21 counties** with 120 employees
- ❑ MSU Extension **office in every county** offering programs on agriculture, natural resources 4-H, resource development, and more
- ❑ MAFES and Extension researchers and staff addressing **ecology, economics, sea level rise and coastal restoration, forestry, horticulture, and marine fisheries**, and more
- ❑ **Coastal Region** also home to the **Crosby Arboretum** and **South Mississippi Branch Experiment Station**





# Gulf Coast Community Design Studio



- ❑ Established in Biloxi in **response to Hurricane Katrina**; now located in MSU's **Mitchell Building** in Gulfport
- ❑ **Gulf Coast Community Design Studio** provides architectural design services, landscape and planning assistance, educational opportunities and research
- ❑ Provides professional assistance that **increases capacity** of local communities and organizations to address issues of **housing, public space, and neighborhood development**
- ❑ Expands design education by providing opportunities for students and interns to explore **community-based design, design-build, and sustainability**
- ❑ **Provides leadership** that advances the local, regional, and national dialogue on issues of design, affordable housing, coastal resiliency, and sustainable development



# Mississippi Aquarium Partnerships with MSU

- ❑ **College of Agriculture and Life Sciences (CALs), College of Forest Resources (CFR), College of Veterinary Medicine (CVM), GRI, and NGI** currently working with **Mississippi Aquarium (MSAQ)**
- ❑ **Academics**
  - ❑ Several MSAQ veterinary and research staff are MSU **adjunct faculty** with CALs, CFR, and/or CVM
  - ❑ Five MSU **students interned** at MSAQ in Summer 2021 in research and education
  - ❑ **Dr. Holley Muraco**, MSAQ's research director, received her PhD from MSU
- ❑ **Outreach and Extension**
  - ❑ MSAQ's **education department** is working closely with MSU Coastal Extension to **develop curriculum**
  - ❑ Science and Education at Sea (**SEAS**) Program for middle/high school students conducted by **NGI** and MSAQ
- ❑ **Research**
  - ❑ MSU's **Geosystems Research Institute** and MSAQ using UAS to **survey barrier islands** for sea turtle activity
  - ❑ CFR and MSAQ engaged in **satellite tagging of great hammerhead sharks**, the largest of all hammerhead species
  - ❑ CFR and MSAQ researching **effect of using drones** on nesting shorebird behavior
- ❑ **Other**
  - ❑ **Scott Willard**, CALs dean and MAFES director, serves on **MSAQ Operations Board of Trustees**





# Institute for Marine Mammal Studies

- ❑ College of Veterinary Medicine's partnership with the **Institute for Marine Mammal Studies** (IMMS) funded by grant provided through Mississippi Department of Environmental Quality by the Gulf Environmental Benefit Fund
- ❑ Partnership offers CVM **faculty, residents, interns, and students** exposure to variety of different species of marine animals
- ❑ As a result of the partnership, MSU's CVM is **one of only two U.S. colleges** of veterinary medicine able to offer all students **marine animal medicine training**



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# Mississippi Cyber Initiative

- ❑ Started with **support** of **Keesler Air Force Base** and modeled after Georgia Cyber Center in Augusta, Georgia
- ❑ **MSU** asked to lead, along with **Keesler AFB** and **Mississippi Gulf Coast Community College**
- ❑ **MCI** creates a **statewide ecosystem** to address **cybersecurity threats** and **opportunities** by focusing on:
  - ❑ **Meeting** the cybersecurity **training needs** at Keesler Air Force Base
  - ❑ **Addressing** complex cybersecurity **issues** for the State of Mississippi
  - ❑ **Delivering** timely cybersecurity **workforce training** and **education**
  - ❑ **Attracting** innovative cyber and advanced technology **industries**
  - ❑ **Increasing** public **awareness** through effective **outreach**



*President Mark E. Keenum visits with Keesler representatives on campus in July 2020*



# Mississippi Cyber Initiative

- ❑ Will be headquartered in new, state-of-the-art **Mississippi Cyber & Technology Center** in Biloxi adjacent to Keesler
- ❑ **MCI's** success based on **strong partnerships** and **stakeholder collaboration**



- ❑ **Leverages** academia, government, law enforcement, DoD, National Guard and industry **expertise**
- ❑ Vision for and capabilities of the **Mississippi Cyber & Technology Center** include:
  - ❑ Offering **full scope of services** necessary to prepare workforce and address partner cyber challenges
  - ❑ **Mississippi Cyber & Technology Center** becomes **hub** for creating and updating training and development **curricula**
  - ❑ **Cyber range** provides **opportunities** for cyber defense, operations, and research not possible in “live” environments
  - ❑ Home for essential **coordinated effort** for all state and federal agencies in cybersecurity
  - ❑ **Technology incubator** for **private sector** development in cybersecurity



# ASSURE FAA UAS Center of Excellence

- ❑ **MSU** leads ASSURE alliance of **25 universities** and approximately **100 industry partners**
- ❑ ASSURE is **bringing industry** to Mississippi
- ❑ MSU and ASSURE focused on how to **safely integrate uncrewed aircraft** into nation's airspace utilizing **robust research** program
- ❑ Also **developing training, certification, standards**, and UAS first responder **credentials**
- ❑ FAA Safety Center headquartered at **MSU's Raspet Flight Research Laboratory**, one of the **nation's leading** academic flight lab
- ❑ Major **MSU UAS activity** on coast **at Singing River Island**
- ❑ UAS economic potential in **billions of dollars**



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# Bachelor of Applied Science

- ❑ **IHL Board of Trustees** approved in August 2019
- ❑ **MSU** may accept up to 45 **technical credit hours** toward new bachelor's degree
- ❑ Targets **community college grads**, many of whom are in the workforce
- ❑ **Multiple MOUs** in place with **community colleges**
- ❑ **Partner** with U.S. Air Force's **Air University Associate-to-Baccalaureate Cooperative** program
- ❑ **Online options** enhance flexibility
- ❑ **MSU-Meridian** and **Center for Distance Education** coordinating our programs
- ❑ **Working with business and industry** – tuition remission, for example
- ❑ Helping **more Mississippians compete for jobs** now and in the future



# BAS: How It Works

- ❑ **39 hours** from **core curriculum** that includes English composition, humanities, fine arts, social sciences, natural sciences and labs, college algebra, and others
- ❑ **30 hours** from student's **emphasis areas** with approximately **40 options**, including **cybersecurity, operations management engineering (OME), uncrewed systems, business**, and more
- ❑ **6 hours** from **MSU's core electives**
- ❑ **45 hours** of **general electives** that may include approved **technical credit**
- ❑ **120 hours** to **graduation** and **Bachelor of Applied Science degree**





# Engineering on the Coast

- ❑ Productive partnership with **Mississippi Gulf Coast Community College**
- ❑ Classes started at MGCCC in **2016**
- ❑ Averaging **112-115 students** per year
- ❑ Degrees offered in **Electrical Engineering, Mechanical Engineering,** and **Industrial Engineering**
- ❑ More than **77 total graduates** with two thirds in past two years
- ❑ **Companies hiring** students include Ingalls, Hol-Mac/Huber, Seeman Composites, Dynetics, Chevron, Entergy, VT Halter Marine, SUPSHIP, and International Paper, as well as Keesler and more
- ❑ **6** full-time faculty, **1** full-time staff, and **1** part-time staff
- ❑ External financial support from **Mississippi Power, Chevron, International Paper,** and **Hearin Foundation**



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# MSU Science and Technology Center

- ❑ Located at **Stennis Space Center** in Hancock County
- ❑ Collaborative initiative features **NOAA's National Center for Environmental Information** and **MSU's Geosystems Research Institute** and **MSU-led Northern Gulf Institute**
- ❑ **38,000 square feet** with research, office, classroom and seminar space
- ❑ Built to **NASA requirements** and category 3 hurricane rating
- ❑ Additional **hub** for **MSU research** activities on Coast



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# Northern Gulf Institute



NGI is a NOAA Cooperative Institute that collaborates with many universities, federal and state agencies, and non-governmental organizations (NGOs) to conduct research focused on the Gulf of Mexico

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# NGI Research Themes

- ❑ **Climate Change** and Climate Variability **Effects** on Regional Ecosystems
- ❑ **Coastal Hazards**
- ❑ **Ecosystem** Management
- ❑ Effective and Efficient **Data Management** Systems Supporting a Data-driven Economy



# NGI/MSU

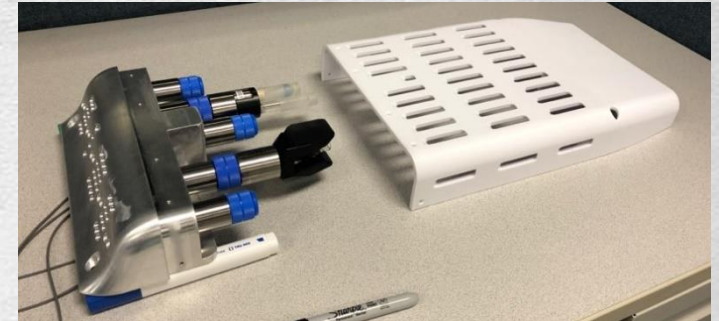
- ❑ OAR: AOML
- ❑ NESDIS: NCEI/SSC
- ❑ NWS: LMRFC
- ❑ NMFS: SEFSC
- ❑ NOS: OCM
- ❑ OMAO: UxS



# Persistent Autonomous Mobile Monitoring of Waterborne Biochemical Agents



Stern Mounted Sensors:  
pH, Conductivity, & Temperature



Moonpool Sensors:  
Dissolved Oxygen,  
Chlorophyll, CDOM, etc.



# Sensors Integrated onto SeaTrac

- Stern Mounted
  - pH
  - Temperature
  - Conductivity
- Moonpool
  - Dissolved oxygen (DO)
  - Chlorophyll
  - Colored dissolved organic matter (CDOM)
  - Phycocyanin / Phycoerythrin
  - Turbidity at 595 & 700 nm
  - pCO<sub>2</sub>
  - Backscattering at 470 nm, 532 nm, and 650 nm
  - Oxidation-Reduction Potential (ORP)
  - Photosynthetically Available Radiation (PAR)



# Maritime Domain Awareness Project

- ❑ USM is the lead; large team
- ❑ **MSU**'s role is to develop an inter-vehicle network communications system for telemetry / sensor data transmission
- ❑ Exploiting GFE vessels manufactured by **OceanAero**







Questions?



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