Sea Grant
Mississippi-Alabama

2021 Impacts and Accomplishments

Mississippi-Alabama Sea Grant Consortium

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Impact or Accomplishment: Impact
PIER ID Number: 34483

Sea Grant Oil Spill Science Outreach Team work used during multiple international and domestic oil spills

Recap:
During several large oil spills over the seven-year life of the Sea Grant Oil Spill Science Outreach Team, team members coordinated contacts and provided communication guides and outreach publications in response to requests for assistance from other Sea Grant extension professionals, oil spill responders and members of the international community.

Relevance:
In the years following the Deepwater Horizon oil spill, the Sea Grant Oil Spill Science Outreach Team built a reputation for engaging with multiple stakeholder groups - including local leaders, oil spill responders, researchers and other extension professionals - on issues related to oil spill response and communicating with the public. Oil spills continue to occur domestically and internationally leaving many of these stakeholders in search of science-based resources and unsure of how to respond to the disaster.

Response:
During multiple domestic and international oil spills, the Sea Grant Oil Spill Science Outreach Team provided insight on establishing lines of communication during and after a spill, facilitated connections between oil spill responders, researchers and extension professionals, and provided lessons learned about sharing science-based information with the public. Team members also participated in round-table discussions and at an international workshop about best practices before, during and after an oil spill.

Results:
Team members presented at a workshop, co-hosted by the U.S. and Brazil to establish international relationships between researchers, responders and leaders. Later, the team provided science resources after a 2021 ship fire off Sri Lanka. Multiple Sea Grant programs consulted with the oil spill team when responding to people impacted by the spill and to better understand and support response efforts during the 2019 Jekyll/St. Simons Island, 2020 Delaware Bay and 2021 Huntington Beach oil spills.

Healthy Coastal Ecosystems Impacts

Focus Area: Healthy Coastal Ecosystems
Impact or Accomplishment: Impact
PIER ID Number: 34502

Mississippi-Alabama Sea Grant living shorelines outreach efforts lead to protection of over 7.7 miles of shoreline

Recap:
Living shorelines education and extension efforts led to the protection of 115 acres of marine habitat that included more than 7.7 miles of shoreline and has an annual ecosystem service value approaching $7.8 million.

Relevance:
Erosion is a common issue for most shoreline property owners and resource managers. To combat erosion, property owners often harden their shorelines with bulkheads or seawalls. While these methods are somewhat effective at reducing erosion, they also are associated with continual maintenance and a loss of intertidal habitat. This intertidal habitat is extremely important for producing the ecosystem functions and services necessary to maintain a healthy coastal ecosystem.

Response:
The Mississippi-Alabama Sea Grant Consortium's Living Shorelines Program seeks out and evaluates alternatives to hardened shorelines, such as living shorelines, for environmental and economic benefits. This program gathers information to produce outreach materials for a range of stakeholders, such as environmental managers, contractors and property owners, about the pros and cons of different methodologies. During this reporting period, the program provided 60 presentations, routine site visits and 34 publications on improving the effectiveness and ease of implementing living shorelines.

Results:
Extension specialists informed decision-making on protection, restoration or enhancement of more than 7.7 linear miles of shoreline in Mississippi and Alabama. Their efforts led to protecting about 115 acres with an annual ecosystem service value approaching $7.8 million (based on ecosystem service values from Costanza et al. 2014).

Focus Area: Healthy Coastal Ecosystems
Impact or Accomplishment: Impact
PIER ID Number: 34503

Sea Grant-trained master naturalists provide 2,289 volunteer hours, improve 662 acres

Recap:
During the past year the Mississippi Master Naturalist Program increased awareness of environmental issues in Mississippi and Alabama, provided 2,289 volunteer service hours (valued at $65,786), educated 1,957 people and improved 662 acres during this reporting period.

Relevance:
Lack of environmental knowledge often promotes poor stewardship of natural resources. Additionally, many environmentally conscious individuals are eager to provide volunteer service, but these opportunities are often difficult to find.

Response:
The Mississippi-Alabama Sea Grant-supported Mississippi Master Naturalist Program was formed with the mission of developing an organization of knowledgeable volunteers to help promote conservation and management of Mississippi's natural resources through education, outreach and service within their communities. Master Naturalists must complete a 40-hour course of field and classroom instruction. They must also complete 8 hours of advanced training and 40 hours of volunteer service each year.

Results:
In 2021, program participants documented 2,289 volunteer service hours valued at $65,786. Through these volunteer hours, participants reached or educated more than 1,957 people and improved 662 acres through stewardship activities.

Focus Area: Healthy Coastal Ecosystems
Impact or Accomplishment: Impact
PIER ID Number: 34504

Volunteer oyster gardeners produce 65,000 oysters for restoration in Alabama and Mississippi

Recap:
Mississippi-Alabama Sea Grant Consortium extension specialists worked with volunteers from coastal Alabama and Mississippi to produce 65,000 oysters for local restoration efforts.

Relevance:
Oyster reefs have been heavily damaged across coastal Alabama and Mississippi over the past century. Recent excessive freshwater events have magnified this loss of critical estuarine habitat.

Response:
In Alabama and Mississippi, Mississippi-Alabama Sea Grant Consortium extension specialists worked with stakeholders to introduce, train and establish oyster gardening sites across the coastal region. Stakeholders actively participated in the nursery phase of producing restoration-quality oysters for local restocking efforts.

Results:
In 2021, 213 volunteers produced 65,000 oysters with a restorative potential of 3.2 acres and an economic value of $75,703. Oyster gardeners volunteered a total of 3,829 hours yielding a program total value of $184,982.

Focus Area: Healthy Coastal Ecosystems
Impact or Accomplishment: Impact
PIER ID Number: 34507

Gulf of Mexico Sea Grant Science Outreach Program gathers input, causes NOAA partner to make significant changes to online tool

Recap:
The Gulf of Mexico Sea Grant Science Outreach Team assisted developers at NOAA's Deep-Sea Coral Research and Technology Program during a planned upgrade to their website and interactive mapping tool. The upgrade called for developing and implementing an end-user engagement plan to inform NOAA of information requests from key audiences and help determine relevant data to include in the update. The update aimed to enhance user experience, modernize design and improve access to content.

Relevance:
NOAA's Deep-Sea Coral Research and Technology Program (DSCRTP), in partnership with NOAA's National Centers for Environmental Information (NCEI), planned an overhaul of the DSCRTP website and interactive map viewer (https://deepseacoraldata.noaa.gov/) to improve access to data, enhance end-user experience and modernize the interface. To help ensure that the planned updates were aligned with end-user needs, NCEI and DSCRTP required stakeholder input.

Response:
NCEI and DSCRTP collaborated with the science outreach team to create and implement an end-user engagement plan, including a digital survey and a series of virtual stakeholder focus groups, to gain feedback from target audiences that could be used to improve the end product. The team gathered, organized and shared notes from the survey and focus groups with the DSCRTP team to help inform them for the future overhaul.

Results:
The science outreach team gave DSCRTP a list of stakeholder suggestions, which informed the planned overhaul and led to a more successful end-product. The results of this collaboration, and the ensuing interface updates, were highlighted in a poster at the international Ocean Sciences Meeting, which ocean specialists from over 75 countries attended.

Focus Area: Healthy Coastal Ecosystems
Impact or Accomplishment: Impact
PIER ID Number: 34594

The Mississippi Coastal Cleanup Program removes 7.1 tons of marine debris

Recap:
The Mississippi Coastal Cleanup Program, coordinated by a Mississippi-Alabama Sea Grant extension specialist, removed over 7.1 tons of litter from the coastal environment while educating more than 1,650 youth and adult volunteers about marine debris.

Relevance:
Litter is an issue that impairs the environment, stormwater infrastructure, tourism and industry along coastlines. A Mississippi-Alabama Sea Grant-funded extension specialist leads the coordination and training duties for the long-running Mississippi Coastal Cleanup Program with the mission of preventing and removing litter from the coastal environment through education, outreach, research and cleanup events.

Response:
The Mississippi-Alabama Sea Grant-supported Mississippi Coastal Cleanup organized or facilitated 32 cleanup events during 2021.

Results:
The 2021 cleanup events attracted 1,650 volunteers who contributed 4,950 volunteer hours and removed 7.1 tons of litter, which carries a conservative ecosystem service impact of $23,430. Volunteers also collected data on the types of litter to identify sources and design targeted prevention methods, a value that exceeded $142,236.

Focus Area: Healthy Coastal Ecosystems
Impact or Accomplishment: Impact
PIER ID Number: 36332

Coastal resource managers increase on-the-job use of sea-level rise science and a strategic decision-making framework for climate change

Recap:
Coastal natural resource managers enhanced their consideration of future conditions in decision-making due to a training developed and given by the Mississippi-Alabama Sea Grant Consortium-supported Program for Local Adaptation to Climate Effects: Sea-Level Rise.

Relevance:
National resource management has traditionally managed to historical baselines; however, as climate change continually shifts baselines and creates a more dynamic environment, natural resource managers are forced to develop novel approaches for managing in a changing system. This requires understanding the available science, the related uncertainties, potential management options and frameworks for connecting all this information while considering stakeholder needs and values.

Response:
This Dauphin Island Sea Lab project, administered by Mississippi-Alabama Sea Grant, conducted a detailed in-water submerged aquatic vegetation survey following the Gulf of Mexico Alliance's Seagrass Community of Practice tiered monitoring strategy based from the National Park Services methods. Using a grid of tessellated hexagons for selecting sampling locations in the mesohaline and polyhaline portions of coastal Alabama waters, we will 1) test the ease of these protocols and 2) determine the adequate hexagon size. Additionally, this survey provides a baseline for future work.

Results:
In a six-month follow-up survey, 100% of respondents (n=2) said the workshop changed the SLR scenarios they were considering, increased the frequency of how often they incorporated SLR in their work (Respondent 1 increased from "never" to "occasionally," and Respondent 2 from "occasionally" to "often"), increased the frequency of using the RAD approach within their management efforts (one respondent changed from "never" to "rarely" and another respondent went from "occasionally" to "often") and identified multiple tools they had used from the workshop. They also used their new knowledge and tools to consider SLR in habitat management planning and land acquisition.

Resilient Communities and Economies Impacts

Focus Area: Resilient Communities and Economies
Impact or Accomplishment: Impact
PIER ID Number: 34505

Sea Grant developed inventory results in multi-million-dollar investment in restoration projects and additional acres of restored coastal habitats

Recap:
The network of Sea Grant extension professionals in the Gulf of Mexico was able to build an inventory of sites that required hydrologic restoration that was used by the Department of Commerce and Gulf Coast Ecosystem Restoration Council to fund multiple large-scale restoration effort including a recent project that was completed that restored 118 acres.

Relevance:
Hydrologic barriers to the natural flow of coastal waters has adversely impacted coastal fisheries and communities throughout the Gulf of Mexico. With advanced technology and new approaches the natural flow of coastal areas can be restored and enhance the ecosystem.

Response:
The four Gulf of Mexico Sea Grant college programs collaborated with the NOAA Restoration Center on a community-based restoration program, which concluded in 2014. Part of this project included Sea Grant extension professionals working with local communities and restoration experts to identify hydrological restoration sites throughout the Gulf of Mexico. Mississippi-Alabama Sea Grant developed an inventory of the sites and shared it broadly. The results of the project, including the inventory, are located here: http://masgc.org/hydrorestoration.

Results:
Resource managers used the inventory to identify and fund restoration using RESTORE funding. Approximately $2.17M was initially allocated to NOAA to plan restoration of three inventory projects. Since then one project, Robinson Preserve, was funded and completed. This project ultimately restored 118 acres creating high quality estuarine subtidal habitats and linking coastal upland, wetland and estuarine areas. Without the inventory, these projects may not have been funded or identified as priorities.

Focus Area: Resilient Communities and Economies
Impact or Accomplishment: Impact
PIER ID Number: 34509

Mississippi-Alabama Sea Grant provides technical assistance, ensures beach access rights in Fairhope, Alabama

Recap:
After landowners improperly posted their beach as private property/no trespass, Mississippi-Alabama Sea Grant explained to the City of Fairhope, Alabama, via an article in its legal publication, "Water Log," that the public has a constitutional right to access beaches in Alabama and ensured access for everyone.

Relevance:
Part of Sea Grant's mission is to inform the public on natural coastal resources, and the information from the Mississippi-Alabama Sea Grant Legal Program explained the right of public access to beaches below the mean high tide line. In Alabama, common law requires allowing the public access is to areas below the mean high tide. However, some waterfront property owners and local municipalities are not aware of the laws that maintain this access.

Response:
A Fairhope, Alabama, code enforcement officer turned to the Mississippi-Alabama Sea Grant Consortium (MASGC) for help regarding public beach access after new homeowners next to a city marina posted private beach/no trespassing signs to prevent people from walking the beach. An MASGC attorney provided her article "Shifting Sands, Bedrock Law: Public Ownership of Tidelands," which explains how centuries of common law protect the right of the public to access beaches below the mean high tide line in Alabama.
http://masglp.olemiss.edu/waterlog/pdf/sep20/wl40.3_article4.pdf

Results:
Because of Mississippi-Alabama Sea Grant Legal Program expertise, members of the public in a small town are able to enjoy access to a beach that homeowners posted as private.

Focus Area: Resilient Communities and Economies
Impact or Accomplishment: Impact
PIER ID Number: 34532

Mississippi-Alabama Sea Grant-created Program for Public Information plan allows Biloxi to gain points in the Community Rating System

Recap:
Sea Grant worked with city staff in Biloxi, Mississippi, to update the city's Program for Public Information (PPI) plan, which led to the city securing 115 points during a Federal Emergency Management Agency Community Rating System cycle visit.

Relevance:
Biloxi experiences hurricanes and high annual rainfall, which can result in severe flash flooding - the impacts of which will intensify with sea level rise. In response to these flood risks, Biloxi enrolled in the Community Rating System (CRS) program. By engaging in CRS activities, such as developing a Program for Public Information (PPI), the city can improve its CRS score and lower flood insurance premiums. The PPI also provides city staff with a method to evaluate the effectiveness of local flood outreach.

Response:
In anticipation of the CRS cycle visit, Sea Grant staff modified the PPI document to incorporate new changes in city flood outreach. A 2021 annual report was also written. The report highlighted flood outreach in 2021, summarized projects that might impact future flood communication and indicated changes made to the PPI activities sheet. Sea Grant staff shared the annual report and revised PPI document during an online PPI committee meeting that they organized.

Results:
Biloxi received 288 points for CRS activity 330, which provides credit for information outreach and the PPI documentation process. In total, following the 2021 CRS Cycle review, Biloxi received 2,162 points, resulting in a Class 6 rating. This means activity 330 contributed to 13 percent of the total score. Communities with a PPI receive a 40 percent multiplier, so by multiplying activity 330 points by 40%, the total points attributable to the PPI is 115.

Focus Area: Resilient Communities and Economies
Impact or Accomplishment: Impact
PIER ID Number: 36303

Coastal professionals successfully access tools for climate resilience and spread awareness to other stakeholders

Recap:
Reaching sectors across the coastal climate resilience spectrum, the Mississippi-Alabama Sea Grant-supported Program for Local Adaptation to Climate Effects: Sea-Level Rise (PLACE: SLR) ran a series of Gulf regional trainings that increased stakeholder access to climate resilience tools, which stakeholders incorporated into their work in various ways.

Relevance:
The Gulf Tools for Resilience Exploration Engine (Gulf TREE), a filter-based search engine for climate resilience tools, is an asset for stakeholders across the Gulf of Mexico who are interested in incorporating resilience into their work. However, since its release in 2018, the Gulf region's Sea Grant programs, National Estuarine Research Reserves and other outreach and extension professionals have requested advanced trainings to increase their capacity to support and encourage application of Gulf TREE within their networks.

Response:
The Gulf TREE Train the Trainer series consisted of seven trainings with 88 participants and focused on different regions of the Gulf Coast. Trainings taught participants about climate resilience tools and how to find them quickly, easily and confidently, with 85% of participants feeling their access to climate resilience tools increased. Participants were tasked with multiple scenarios, all inspired by real situations, to explore independently in groups. The scenarios gradually increase in difficulty.

Results:
In a follow-up survey six months after the trainings, 43% of respondents (n=9) had used their training to train others on Gulf TREE, reaching an additional 84 stakeholders; 15% (n=3) had used Gulf TREE to support their own climate resilience work; and 10% (n=2) had supported others using Gulf TREE in their climate resilience work.

Focus Area: Resilient Communities and Economies
Impact or Accomplishment: Impact
PIER ID Number: 36305

Magnolia Springs, Alabama, gains additional resilience from flood reduction and water quality improvements

Recap:
With assistance from the Mississippi-Alabama Sea Grant-supported Program for Local Adaptation to Climate Effects, the Baldwin County Soil and Water Conservation District and local partners have secured funding for a constructed wetland to transform a borrow pit into a regional detention site, thus mitigating flooding and improving water quality.

Relevance:
The Magnolia River, a primarily agricultural sub-watershed in Baldwin County, Alabama, identified flood mitigation as a need for many years. Community members consider flooding a high concern - and an increasing one - as land cover changes, sea levels rise and heavy rain events occur more often. Further, the increasing risk of flooding is a double-edged sword as residents are also noting a growing concern with pollution in their river and streams.

Response:
Inspired by an idea co-developed with community members and local specialists, the Baldwin County Soil and Water Conservation District (BCSWCD) partnered with the Town of Magnolia Springs and Friends of Magnolia River Committee to obtain a $60,000 small grant and support from the Mississippi-Alabama Sea Grant-supported Program for Local Adaptation to Climate Effects: Sea-Level Rise's (PLACE: SLR) Resilience to Future Flooding project. With the support and funding, they assessed multiple sites for constructed wetland design, flood detention capacities, feasibility, costs and benefits.

Results:
After BCSWCD identified the most feasible and beneficial site for a constructed wetland, it used that information to successfully obtain funding to begin moving forward with construction of a wetland. The Baldwin County engineer of record applied for $12,000,000 for acquisition, planning and design, and construction. They have currently been awarded the Phase One funding of $4,000,000 for acquisition and planning and design. This multi-phased project was possible as a direct result of PLACE: SLR's support.

Focus Area: Resilient Communities and Economies
Impact or Accomplishment: Impact
PIER ID Number: 36331

Coastal decision-makers consider sea-level rise in more comprehensive ways to enhance coastal community resilience

Recap:
Technical support enabled more robust pursuit of resilience in the region through access and understanding of the most up-to-date sea-level rise science.

Relevance:
Sea-level rise is a ubiquitous stressor and negatively impacts nearly all aspects of coastal ecosystems and communities. To adequately adapt to these changes, it is vital that coastal stewards of the built and natural environments have the tools, products and services needed to understand and address changing conditions as accurately as possible. However, even with a multitude of resources available, coastal professionals often need additional support in answering questions and interpreting data.

Response:
Mississippi-Alabama Sea Grant Consortium-supported programs (Northern Gulf of Mexico Sentinel Site Cooperative and Program for Local Adaptation to Climate Effects: Sea-Level Rise) provided technical support and assistance to municipal and state coastal decision-makers and extension professionals. The programs provided one-on-one technical assistance (data interpretation, synthesis of current knowledge and best practices, data formatting and access) that was otherwise unattainable given stakeholders' expertise or skill. Additionally, the programs trained extension professionals to enhance their ability to provide similar support.

Results:
At least seven state and local officials improved the ways they addressed SLR in their work as a direct result of the programs' technical support. One example is that the State of Florida Department of Environmental Protection newly required communities to consider changes in storm surge, high-tide flooding and stormwater drainage in vulnerability assessments. Another example is that the Jackson County Utility Authority (Mississippi) prioritized septic tanks for future infrastructure improvements based on the weighting scheme (which the programs helped design) to identify the most at-risk septic tanks due to SLR and flood issues. Additionally, at least 1 of extension trainees applied their knowledge in their work supporting coastal professionals.

Focus Area: Resilient Communities and Economies
Impact or Accomplishment: Impact
PIER ID Number: 36333

Sea Grant Gulf of Mexico Oil Spill Science Outreach Team resources are being used to train the next generation of oil spill responders

Recap:
The Sea Grant Oil Spill Science Outreach team acted as a catalyst for engagement between scientists, emergency responders and the oil industry by hosting seminars, organizing workshops and training, providing resources and sharing publications that were incorporated into trainings for the response community.

Relevance:
From 2014-2021, the Sea Grant Oil Spill Science Outreach Team worked with audiences from multiple sectors - including emergency response, academic research and the oil industry - to connect the latest oil spill science to people who needed answers. These target audiences expressed a strong desire for outreach publications tailored to their interests along with increased opportunities to interface as a group and find ways to more effectively work together prior to another major oil spill.

Response:
The team developed more than 50 outreach publications addressing topics of interest to the emergency response community. Additionally, the team partnered with local, state and federal oil spill response leaders to host a workshop series for these audiences. The events included input sessions and featured representatives from the oil industry, federal, state, and university researchers. The events focused on sharing respective roles and challenges faced during oil spills, discerning needs and providing a place to network and collaborate.

Results:
The workshops and input sessions brought together over 200 attendees, positioning the Oil Spill Science Outreach Team as a trusted resource, a catalyst for engagement and a community connector. The National Oil Spill Control School, an oil spill response course in the Canary Islands, the Louisiana Oil Spill Coordinator's Office, and the Bureau of Safety and Environmental Enforcement requested and used the team's publications. In addition, during the COVID-19 pandemic, the team facilitated a HAZWOPER training that provided annual certification for 24 emergency responders in Florida.

Sustainable Fisheries and Aquaculture Impacts

Focus Area: Sustainable Fisheries and Aquaculture (Research)
Impact or Accomplishment: Impact
PIER ID Number: 36141

Scientific team estimates 118.5 million red snapper in Gulf, three times previous NOAA estimate

Recap:
Researchers estimated there to be 118.5 million red snapper in the northern Gulf of Mexico using a multitude of common and novel sampling techniques.

Relevance:
The U.S. Gulf of Mexico red snapper fishery stock assessment is hindered by a lack of robust data. To address this need, a $12.5 million research program, was launched, and Congress made available $10 million in funding for a 2-year research project designed to independently estimate Gulf red snapper abundance using best available technologies.

Response:
A team of 21 leading scientists from 12 institutions designed and implemented a large-scale population survey to independently estimate the abundance of age-2+ red snapper in the northern Gulf across 3 habitat types, 3 depth zones and 5 regions on the continental shelf. They sampled natural reefs, artificial reefs and uncharacterized bottom and within 3 depth strata. This last strata turned out to be very important as it was estimated to harbor a majority of the fish, due to its sheer size. The Gulf of Mexico Sea Grant programs, led by Mississippi-Alabama Sea Grant funded the research.

Results:
The scientific team estimated a total of 118.5 million red snapper. The regional breakdown was: Texas, 22 million; Louisiana, 17.4 million; Alabama and Mississippi, 8.5 million; Florida, 70 million; and Pipelines (Gulf-wide), 0.5 million. This abundance estimate was nearly three times the previous NOAA Fisheries estimate, and it showed that while red snapper predominate the natural and artificial reefs, there is a large relatively unaccounted for population of red snapper found throughout the undefined bottom. New catch advice was generated using updated estimates of absolute abundance for red snapper derived from the Great red snapper count.

Environmental Literacy and Workforce Development Accomplishments

Focus Area: Environmental Literacy and Workforce Development
Impact or Accomplishment: Accomplishment
PIER ID Number: 34480

Engagement team blog informs about research, upcoming opportunities

Recap:
The Mississippi-Alabama Sea Grant engagement and education team's 49 blogs about its diverse areas of expertise reached Twitter and Facebook feeds more than 50,600 times, had 1,755 social media engagements and were viewed more than 4,850 times.

Relevance:
Mississippi-Alabama Sea Grant communications consistently works to increase visibility of the programs and its work. With a large engagement team that specializes in legal, planning, water issues, fisheries, restoration, education, resilience, marine economics and other topics, it is important to know what team members are doing in their communities and to share that information with a broader audience. The team has a goal of sharing current research, data and developments with stakeholders in its diverse areas of expertise.

Response:
Outreach and education team members wrote 49 blogs to increase Mississippi-Alabama Sea Grant's visibility and share information about research, outreach efforts, events and new developments. Through social media, the communications team connected stakeholders and MASGC social media followers with the blogs, which were posted on http://masgc.org/news/category/blog.

Results:
The 49 staff blogs had at least 8,870 unique page views, 677 Facebook post clicks, 1,085 Facebook engagements and a Facebook reach of 24,277. Tweets based on the blogs garnered 26,382 Twitter impressions and 671 Twitter engagements.

Focus Area: Environmental Literacy and Workforce Development
Impact or Accomplishment: Accomplishment
PIER ID Number: 34481

Legal program publishes a database on laws, regulations and enforcement options regarding aquatic invasive species in the Gulf, Southeast

Recap:
The Mississippi-Alabama Sea Grant Legal Program compiled the laws and regulations pertaining to aquatic invasive species in a nine-state region, including those states' agriculture, environment and natural resource agencies, into a one-stop online guide for learning which activities are lawful and where.

Relevance:
Healthy ecosystems are threatened by invasive species, which frequently are introduced by the illegal use of bait, but no one source compiles the laws and regulations of different Southeastern and Gulf states making it difficult for fishers to understand what is allowed from state to state.

Response:
The Mississippi-Alabama Sea Grant Legal Program compiled a database on the laws and regulations pertaining to aquatic invasive species for nine Gulf and Southeastern states. The unique database includes sources from departments of natural resources, environment and agriculture to provide information on laws that restrict how invasive species are used, what behavior is restricted and what enforcement measures are available.

Result:
Anybody seeking information on state laws or regulations on aquatic invasive species in the Southeast and Gulf states can use the database that the Mississippi-Alabama Sea Grant Legal Team compiled and published. The site was visited more than 80 times in the first year it was available.

Focus Area: Environmental Literacy and Workforce Development
Impact or Accomplishment: Accomplishment
PIER ID Number: 34482

Mississippi-Alabama Sea Grant Legal program develops 'Guide to Fishery Management'

Recap:
The Mississippi-Alabama Sea Grant Legal Program's "Guide to Fishery Management" explains the how and why of fishery management to readers at any interest level.

Relevance:
Sea Grant is a leader in fishery management to provide safe and sustainable supply of seafood products, and the "Guide to Fishery Management" explains the law and process on how that goal is accomplished under the Magnuson-Stevens Fishery Conservation and Management Act, enhancing environmental literacy.

Response:
The Mississippi-Alabama Sea Grant Legal Program researched science, economics and law related to federal fishery management under the Magnuson-Stevens Fishery Conservation and Management Act and produced the online "Fishery Management Guide" as a unique source of data, including a glossary and acronym index. Legal program specialists wrote the guide for readers of all levels and provided links to specialized sources for more in-depth information. The guide also cross-links Federal Register notices and cases to explain arcane fishery concepts.

Results
The Mississippi-Alabama Sea Grant Program developed the online "Guide to Fishery Management" (http://masglp.olemiss.edu/fisherymanagement/index.html) to assist people seeking information on the economics, law and science associated with fisheries management. The site was visited more than 80 times in the first year it was available.

Focus Area: Environmental Literacy and Workforce Development
Impact or Accomplishment: Accomplishment
PIER ID Number: 34484

External summative survey reveals regional Sea Grant program delivered highly-rated extension programming

Recap:
A final evaluation of a regional Sea Grant program focused on oil spill science revealed that 75-90% of respondents rated the relevance, credibility and quality of programming to be high or extremely high.

Relevance:
The four Gulf of Mexico Sea Grant college programs created a regional oil spill science outreach program after the Deepwater Horizon oil spill. Supported by the Gulf of Mexico Research Initiative, the program reached out to Sea Grant's existing and new audiences interested in oil spill science results. As the regional program concluded, the Sea Grant team sought input on the effectiveness of the program in providing relevant, credible, and high-quality programing to the intended audiences.

Response:
The Sea Grant oil spill science outreach program worked with an external social science research center to conduct an independent, final evaluation of the program. Sea Grant developed the questions, and the Mississippi State University Social Science Research Center reviewed the questions and administered the survey so that respondents could freely express their thoughts and results would be confidential.

Results:
More than 225 people provided feedback through the survey, and respondents included representatives from all target audiences. People rated the relevance, credibility and quality of the programming on a scale from 1 (not relevant/not credible/lowest quality) to 5 (extremely relevant/extremely credible/highest quality). The majority of people chose 4-5 for relevance (75%), credibility (92%) and quality (90%).

Focus Area: Environmental Literacy and Workforce Development
Impact or Accomplishment: Accomplishment
PIER ID Number: 34487

Sea Grant Science Outreach Program helps industry improve oil spill communication to stakeholders

Recap:
Sea Grant oil spill publications helped an oil spill response cooperative share complex topics with their customers, member companies, other cooperatives and response contractors.

Relevance:
The science behind oil spills is complex, as are the response options available to reduce the impacts of spills. Even oil spill response cooperatives face challenges clearly communicating the impacts of oil on humans and the environment and the tradeoffs of using different tools to combat a spill.

Response:
The Sea Grant Science Outreach Program produced outreach publications and short videos translating the latest peer-reviewed oil spill science discoveries. These publications targeted a wide array of audiences that may not have a science background.

Results:
An oil spill response cooperative (Clean Gulf Associates) used the Sea Grant publications to improve messaging to customers, including member companies, sister cooperatives and oil spill science contractors throughout the U.S. They expressed that the topics were provided in a "concise package" that was "clearly referenced" and had "taken the guesswork out of explaining the use of dispersants, fate and effects of oil spills, in situ burning of oil and the effects of all on humans and other species."

Focus Area: Environmental Literacy and Workforce Development
Impact or Accomplishment: Accomplishment
PIER ID Number: 34488

Sea Grant Oil Spill Science Outreach Team produces original content to share science with thousands

Recap:
During its seven-year tenure, the Gulf of Mexico Sea Grant Oil Spill Science Outreach Team produced four outreach videos that earned more than 32,000 online views and created 76 outreach publications that were accessed online more than 240,000 times, as well as distributed broadly as hardcopies.

Relevance:
The Gulf of Mexico Research Initiative (GoMRI) formed following the Deepwater Horizon oil spill to study oil spill effects on the environment and public health. In 2014, GoMRI funded the Gulf of Mexico Sea Grant Oil Spill Science Outreach Team to share GoMRI findings with audiences who use oil spill science in their lives and jobs. The team produced original oil spill science content for lay audiences using peer-reviewed research produced by GoMRI and others.

Response:
The team first queried the target audiences to discover their oil spill science needs. Then, the specialists reviewed scientific literature produced by relevant researchers and synthesized the findings into original products designed to answer target audience questions. Team members used a rigorous review process that included GoMRI research board members and other researchers, NOAA scientists and Sea Grant leaders and specialists to ensure their accuracy and readability.

Results:
Between 2014 and 2021, the team produced 80 publications and videos. Four short, animated videos gained over 32,000 views online, and one for NOAA's Science-on-a-Sphere project ran in science centers. The team's 76 outreach publications, viewed online over 240,000 times, were shared with audiences in person and shipped all over the country and world upon request to people in places as far as England, Norway, Greece and Australia.

Focus Area: Environmental Literacy and Workforce Development
Impact or Accomplishment: Accomplishment
PIER ID Number: 34489

Science Oil Spill Science Outreach Team utilizes web to share oil spill science with thousands

Recap:
The Gulf of Mexico Sea Grant Oil Spill Science Outreach Team, a regional team dedicated to sharing peer-reviewed oil spill science findings with target audiences who need the information for work or play, successfully used online tools, including a redesigned website and social media outlets, to reach thousands of users around the world.

Relevance:
The Gulf of Mexico Research Initiative (GoMRI) funded the Gulf of Mexico Sea Grant Oil Spill Science Outreach Team in 2014 to share peer-reviewed oil spill science findings with non-traditional audiences. The team determined that the internet would be one way to reach them. However, the team inherited a bare bones website originally formed for regional storm response and had no social media presence, so a communications plan was created to find a way to harness the web.

Response:
The team updated an existing but outdated regional Sea Grant website (gulfseagrant.org), revamped the look, streamlined placement of the program's products, and created content - including short videos - designed to lure search engines. To additionally boost tits profile, the team piggybacked on the already strong social media presence of the Mississippi-Alabama Sea Grant Consortium to post original videos and blog posts and to live-stream webinars along with promoting traditional content like publications and seminars.

Results:
The website refresh garnered an initial 20% traffic increase and steady growth thereafter. Gulfseagrant.org has now had over 130,000 total views from worldwide audiences. Team publications housed on a different server have been viewed more than 240,000 times. Additionally, a team-designed table on reporting oiled animals reached approximately 68,000 viewers after it was shared almost 800 times, capping strong social media engagement on Facebook and Twitter.

Focus Area: Environmental Literacy and Workforce Development
Impact or Accomplishment: Accomplishment
PIER ID Number: 34490

Sea Grant Oil Spill Science Outreach Team presentations and seminars allows thousands to connect with researchers

Recap:
The Gulf of Mexico Sea Grant Science Outreach Team shared oil spill science with approximately 17,000 people around the country and across the world during the past seven years through in-person and web-based presentations and science seminars, which also afforded audiences opportunities to interact directly with leading researchers.

Relevance:
In 2014, the Gulf of Mexico Research Initiative (GoMRI) funded the four Gulf Sea Grant college programs to create a regional outreach team dedicated to sharing peer-reviewed oil spill science following the Deepwater Horizon oil spill. The goal was to find unique ways to share GoMRI-supported and other oil spill science with specific audiences, such as commercial fishers or oil spill responders, who might not access it otherwise.

Response:
As part of a larger outreach plan, the team delivered science in person via presentations by team members and larger seminar events that allowed leading oil spill scientists to present their own research and take questions from the audience. From the program's start, the team offered these seminars to in-person and live online audiences (becoming entirely virtual in 2020) and also shared presentation recordings on the team's web page (https://gulfseagrant.org/oilspilloutreach/presentations/).

Results:
Over the seven years of the program, the team gave 213 presentations that reached approximately 9,000 people. Additionally, they hosted 49 live science seminars, both in-person and online, that allowed audience members to interact directly with 313 leading oil spill science researchers. These live events-and the associated video recordings shared on the website afterward - reached more than 8,000 people.

Focus Area: Environmental Literacy and Workforce Development
Impact or Accomplishment: Accomplishment
PIER ID Number: 34491

Diversification of education programs continues to allow thousands of P-12 students to increase their environmental literacy

Recap:
More than 22,000 P-12 students increased their understanding of healthy coastal ecosystems, fisheries and resilience and improved their STEM skills by direct participation in Mississippi-Alabama Sea Grant Consortium-supported environmental education programs at Discovery Hall Programs-Dauphin Island Sea Lab, the Environmental Studies Center- Mobile County Public School System, and the Marine Education Center-The University of Southern Mississippi.

Relevance:
Experiential educational opportunities for P-12 students increase environmental literacy as well as science, technology, engineering and math (STEM) skills. Student experiences that address coastal issues, integrate learning new skills and provide field experiences in coastal habitats increase student understanding of the need to conserve coastal habitats, ensure the sustainability of coastal resources and make responsible decisions concerning coastal resources.

Response:
Mississippi-Alabama Sea Grant Consortium-supported environmental centers in Mississippi and Alabama diversified educational programs to continue to provide learning experiences for P-12 students and address pandemic-associated impacts on student opportunities. Virtual field trips, summer camps, drop-in programs, classroom visits and traditional on-site field programs provided students with programs that increased their environmental literacy. These experiential programs explicitly referenced national and state educational standards, ocean and climate literacy principles and Sea Grant focus areas.

Results:
Mississippi-Alabama Sea Grant-supported environmental education programs resulted in 22,363 P-12 students actively engaged in learning about healthy coastal ecosystems, resilience and fisheries through active field programs, virtual field trips, classroom experiences and summer activities. Assessment data for on-site programs indicated statistically significant gains in student content knowledge (Environmental Studies Center, average 16% gain, 2 classes, 386 students; Discovery Hall Programs, average 30% gain, 27 classes, 506 students).

Focus Area: Environmental Literacy and Workforce Development
Impact or Accomplishment: Accomplishment
PIER ID Number: 34492

P-12 teachers increase environmental and STEM literacy through educational programs and workshops

Recap:
A total of 405 P-12 educators increased their knowledge of healthy coastal ecosystems, fisheries and coastal resilience through Mississippi-Alabama Sea Grant Consortium-supported field experiences, workshops and educational programs.

Relevance:
Direct experiences with students and professional learning opportunities increase educators' knowledge and confidence on topics relating to healthy coastal ecosystems, fisheries, coastal resilience and knowledge of career opportunities for students in coastal-oriented scientific disciplines. Educators who participate in these programs share their experiences, information and activities learned with students increasing student environmental literacy.

Response:
On-site field experiences for students guided by Mississippi-Alabama Sea Grant Consortium (MASGC)-supported education staff provided teachers with direct experience in coastal environments. MASGC-supported professional learning workshops for classroom teachers and informal educators in FY21 covered a diversity of topics including Gulf of Mexico coastal habitats, Gulf of Mexico environmental issues, fisheries, remotely operated vehicles, Gulf of Mexico watersheds, coastal resilience and outdoor education pedagogy.

Results:
MASGC educators provided 405 educators with 2,907 contact hours of professional learning in workshops and field experiences. Single-session virtual and single- and multi-day on-site professional learning opportunities increased content knowledge, provided resources, explored classroom activities, shared lesson plans and increased confidence among participants. Where evaluations were conducted, a large percentage of participants rated these workshops highly (Discovery Hall Programs, > 90% as very valuable or valuable: Environmental Studies Center, 98% strongly agreed program objectives were met).

Focus Area: Environmental Literacy and Workforce Development
Impact or Accomplishment: Accomplishment
PIER ID Number: 34493

Internships, jobs and career presentations provide students with learning opportunities in environmental education

Recap:
Internships and jobs provided on-the-job training for high school and undergraduate students considering careers in environmental education while career days expose P-12 students to STEM careers.

Relevance:
Career presentations in schools, paid part-time jobs and internships provide career-connected learning experiences for K-12 students. Exposure to coastal science careers for K-8 students allows them to explore possibilities and envision their paths. Part-time jobs and internships for high school students provide valuable experiential learning opportunities and development of essential job skills. Paid internships for undergraduate students afford on-the job training for specific careers within an equitable environment.

Response:
Summer internships in environmental education and part-time jobs in animal care provided hands-on learning opportunities for high school and undergraduate students. Internship experiences included training and teaching field classes, day camps, overnight camps, virtual programs, educator professional development and public outreach. These opportunities increased participating students' environmental literacy, developed students' essential job skills and provided exposure to Sea Grant careers. Participation in schools' career days provided exposure to environmental careers for young students.

Results:
Paid summer internships at Marine Education Center and Discovery Hall Programs (DHP) engaged two high school and three undergraduate students in environmental education. A part-time job at the Environmental Studies Center provided one undergraduate with animal care experience. Through these opportunities, students increased their knowledge of Gulf Coast ecosystems, gained experience in leading and teaching student groups and improved job skills. DHP participation in four school career days provided exposure to environmental and STEM careers.

Focus Area: Environmental Literacy and Workforce Development
Impact or Accomplishment: Accomplishment
PIER ID Number: 34494

Programs and outreach activities provide public with credible information on Gulf Coast ecosystems and issues

Recap:
Discovery Hall Program and Marine Education Center staff educators participated in environmentally themed events for the public that reached more than 10,000 individuals with engaging activities and credible information on coastal ecosystems and issues.

Relevance:
Staff of Sea Grant education centers are well positioned to translate scientific research and activities and provide credible and understandable information on coastal ecosystems and issues to the public. On-site informal programs and participation in environmentally themed festivals and science expos reach a self-selected portion of the general public with engaging activities and information.

Response:
On-site science cafes at the Marine Education Center and Boardwalk Talks at the Dauphin Island Sea Lab provided opportunities for individuals to learn more about coastal topics. Festivals and expos, rebounding from the pandemic, allow education staff to converse with the public. Family and group on-site programs developed during the pandemic have been sustained and continue to reach a segment of the engaged public. Virtual programs through targeted zoom and non-targeted social media events reach additional individuals.

Results:
Discovery Hall Programs and the Marine Education Center educators participated in 52 environmental and science festivals and expos, science cafes, boardwalk talks, day programs, family camps and virtual library programs and reached 10,445 members of the public with credible information on Gulf of Mexico coastal ecosystems, ocean STEM and environmental issues. By reporting interactions and not event attendance, programs likely increased environmental literacy among participants.

Focus Area: Environmental Literacy and Workforce Development
Impact or Accomplishment: Accomplishment
PIER ID Number: 34495

Middle and high school students propose solutions to authentic problems in community resilience

Recap:
Middle and high school students learned local impacts of climate change through classroom lessons, outdoor experiences and teamwork to solve an authentic problem in community resilience, sharing their solutions with community resilience professionals at the Marine Education Center Stewardship Summit (at The University of Southern Mississippi).

Relevance:
Student-centered learning that includes sustained instruction integrated into classroom content and outdoor learning experiences promote understanding of the local environment and community resilience and cultivate environmental stewardship.

Response:
The Classroom Course in Community Resilience builds on the Coastal Community Resilience Index, which Mississippi-Alabama Sea Grant-supported professionals created, to promote student awareness of local climate change impacts and community resilience through classroom and field instruction. Student teams explore community hazard scenarios (e.g., flooding) and develop solutions to minimize disruption of human activities and make their communities more resilient. Teams compete to present their solutions to a panel of community resilience professionals at a Stewardship Summit. Mississippi-Alabama Sea Grant-supported staff directed the course program and developed community hazard scenarios for it.

Results:
Since 2016, 927 students from 12 schools have completed the Community Resilience program. Seven Stewardship Summits were judged by 27 community resilience professionals (twice online). Upon completion, pretest and post-test scores of content knowledge showed a significant increase of 19.6% ($p<0.001$) among students, with a 32% increase in the number of students who could identify actions that strengthen community resilience. In April 2022, the project will receive the Gulf Guardian Award, First-Place for Youth Engagement.

Focus Area: Environmental Literacy and Workforce Development
Impact or Accomplishment: Accomplishment
PIER ID Number: 34496

Mississippi-Alabama Sea Grant leads multi-Sea Grant regional effort to translate and deliver oil spill science

Recap:
The Mississippi-Alabama Sea Grant Consortium (MASGC) provided leadership for a four-Sea Grant regional project that delivered oil spill science to diverse audiences, led activities and developed products that reached more 100,000 people.

Relevance:
After the Deepwater Horizon oil spill, there were a tremendous number of questions that required scientific research. The Gulf of Mexico Research Initiative (GoMRI) was established to fund research to answer these pressing questions, and it wanted to reach audiences broader than the science community. Concurrently, many coastal businesses and communities sought answers that GoMRI research could provide.

Response:
The Mississippi-Alabama Sea Grant Consortium worked with GoMRI to develop a model outreach program that included all four Gulf-based Sea Grant programs. MASGC hired the program manager and communicator to provide leadership and coordination for the overall effort. It also hired one of the four oil spill science extension specialists.

Results:
The outreach program started as a two-year pilot, and GoMRI renewed the program three times, which lasted the duration of GoMRI's funding cycle. MASGC professionals on this project produced 17 science seminars that reached almost 2,000 people, authored 30 extension and related publications with more than 100,000 online hits, and delivered 86 presentations that reached more than 3,400 people. Two additional funding entities (National Academy of Sciences, Engineering and Medicine's Gulf Research Program and NOAA's National Center for Environmental Information) invested in the regional program to assist them in their outreach efforts.

Focus Area: Environmental Literacy and Workforce Development
Impact or Accomplishment: Accomplishment
PIER ID Number: 34500

Educators using "Sea-Level Rise in the Classroom" curriculum change their behavior

Recap:
Coastal educators who participated in the testing and early roll-out of the "Sea-Level Rise in the Classroom" curriculum, which a Mississippi Alabama Sea Grant Consortium-supported Program for Local Adaptation to Climate Effects: Sea-Level Rise-led team developed, continue using the lessons with students.

Relevance:
Educators expressed interest in connecting classroom lessons to locally relevant sea-level rise (SLR) and climate change impacts, but often cited uncertainty in data sources, lack of confidence in climate science fundamentals and minimal available resources as barriers. This gap in education leads to a population of coastal residents that lack a comprehensive understanding of ongoing changes that directly and indirectly impact their well-being.

Response:
The Mississippi-Alabama Sea Grant Consortium-supported Program for Local Adaptation to Climate Effects: Sea-Level Rise collaborated with a team of subject matter experts and high school science and social studies educators to develop the "Sea-Level Rise in the Classroom" curriculum. The four-module curriculum uses science-based lessons to describe causes of, impacts from, and solutions to SLR. The curriculum development team supported educators throughout pilot testing, and educators provided student and educator feedback to enhance the curriculum.

Results:
Educators continued to apply the curriculum even without fiscal support from the project team. Three educators used the curriculum with their students and continued using the curriculum beyond the project period. These educators demonstrated a behavior change in how they search for and incorporate content into their lessons. They use the sea-level rise and climate curriculum with their students.

Focus Area: Environmental Literacy and Workforce Development
Impact or Accomplishment: Accomplishment
PIER ID Number: 34501

Program for Local Adaptation to Climate Effects increases technical capacity to address sea-level rise among coastal professionals

Recap:
The Mississippi Alabama Sea Grant-supported Program for Local Adaptation to Climate Effects: Sea-Level Rise gave several high-impact talks to technical audiences and increased knowledge of how to interpret and apply sea-level rise science.

Relevance:
Sea-level rise (SLR) is a ubiquitous stressor, negatively impacting nearly all aspects of coastal ecosystems and communities. To adequately adapt to these changes, it is vital that coastal stewards of the built environment have the tools, products and services needed to understand and address changing conditions as accurately as possible. These resources come in a variety of formats and levels of accessibility, making it difficult for coastal stewards to find and utilize them.

Response:
The Mississippi-Alabama Sea Grant Consortium-supported Program for Local Adaptation to Climate Effects: Sea-Level Rise (PLACE: SLR) gave training presentations, webinars, workshops and lunch 'n' learns to a variety of technical audiences to increase awareness, knowledge and capacity on how to integrate SLR impacts into project planning and design.

Results:
PLACE: SLR hosted or contributed to 17 trainings reaching over 700 coastal professionals ranging from natural resource managers to planners to engineers to port managers, increasing their ability to understand and apply SLR science. Participant evaluation surveys indicated that >90% of respondents found the trainings to be a good use of time and that they learned something they would apply to their work in the future.

Focus Area: Environmental Literacy and Workforce Development
Impact or Accomplishment: Accomplishment
PIER ID Number: 36135

Over 1,000 participants in Mississippi-Alabama Sea Grant Paddle the Gulf events

Recap:
Five paddling events were supported, additional trails were added to the mapping application, and additional trails were highlighted.

Relevance:
Through the paddling events, participants were educated about natural resources.

Response:
Through the paddling events, over 1000 participants increased their understanding of our natural resources and learned the importance of stewardship.

Results:
Through the paddling events, participants are better informed of the need to conserve our natural resources.

Healthy Coastal Ecosystems Accomplishments

Focus Area: Healthy Coastal Ecosystems
Impact or Accomplishment: Accomplishment
PIER ID Number: 34506

Sea Grant helps Center of Excellence facilitate communication between scientists, resource managers about potential restoration sites

Recap:
The Mississippi-Alabama Sea Grant Consortium led a process that enabled oyster researchers to share their results and recommendations regarding oyster restoration considerations with resource managers that are investing millions of dollars into restoration.

Relevance:
Wild oyster populations in coastal Mississippi are at record lows due to a confluence of stressors. The Mississippi Based RESTORE Act Center of Excellence (MBRACE) is investing millions of dollars into oyster research to understand the causes of the decline and help inform restoration activities. Concurrently, the Mississippi Department of Environmental Quality (MDEQ) and the Mississippi Department of Marine Resources (MDMR) are investing millions of dollars in restoration and identified several key locations for restoration to occur.

Response:
Sea Grant worked with MBRACE leadership during the MBRACE annual meeting to develop a process to allow researchers to provide feedback on potential restoration sites and inquire directly with resource managers leading the effort to understand more about the objectives of the restoration efforts.

Results:
Dozens of researchers provided research-based feedback on seven restoration sites and suggested others for consideration. The resources managers heard first-hand the researchers' thoughts and concerns and were able to address a range of questions. A mapping exercise produced site-specific feedback that Sea Grant and MBRACE leadership shared with MDEQ and MDMR to help inform their decision-making process moving forward.

Focus Area: Healthy Coastal Ecosystems (Research)
Impact or Accomplishment: Accomplishment
PIER ID Number: 36155

Scientists successfully track microbial source of fecal contamination in oyster growing areas

Recap:
Incorporating DNA-based methods for tracking human and non-human contamination sources could enhance watershed assessments and decision making for aquaculture harvesting areas.

Relevance:
Current regulatory methods for monitoring fecal contamination in shellfish harvesting areas cannot differentiate between human and non-human sources. Yet, level of risk varies depending on the source of contamination. Microbial source tracking (MST) is a molecular scientific approach that utilizes DNA and PCR to identify species-specific source contamination. The information gathered through this approach could enhance watershed assessments for stakeholders and decision makers, as well as provide baseline data for potential future watershed comparisons.

Response:
Mississippi-Alabama Sea Grant-funded scientists generated and tested a set of microbial source tracking (MST)-specific plasmid vectors based on human and non-humanmicrobial sequences. They applied the MST source biomarkers to West Fowl River water samples. The number of closures of shellfish harvesting areas could be reduced if microbial source tracking methodologies based on molecular methods were used to differentiate between human and non-human sources pollution sources and were added to current water quality monitoring approaches.

Results:
Scientists detected human and non-human source contamination from DNA extracted from the water samples. Only the human source marker was above the limit of quantification in analyzed samples.

Focus Area: Healthy Coastal Ecosystems (Research)
Impact or Accomplishment: Accomplishment
PIER ID Number: 36161

Urban runoff influences tidal creek salinity regime and net ecosystem metabolism

Recap:
The impact of urban land use on tidal creeks and related habitats was demonstrated and potential measures to reduce aquatic habitat impacts were investigated.

Relevance:
Urbanization is known to increase runoff and stream flashiness while reducing water quality. In coastal areas, this may ultimately change creek conditions and alter important functions. Information is needed to determine how changing runoff related to increased urban land use may reduce suitability of salt marsh habitat for resident fish. By better understanding watershed runoff impacts on tidal habitats, we can improve stormwater policy and identify urbanized tidal creeks that might be enhanced.

Response:
This Mississippi-Alabama Sea Grant-supported project provided evidence of an urban impact to runoff generated changes in salinity and ecosystem metabolism of tidal creeks. In-kind support for this project came from the Weeks Bay NERR and included data collection at 12 tidal creeks across an urban gradient for over one year. Results from our work have been communicated to municipalities and watershed planners along the northern Gulf of Mexico looking to reduce urban runoff effects.

Results:
Urban communities addressing water quality issues in rapidly urbanizing areas will benefit by knowing how storm water runoff may impact tidal creeks. They can use this information to better design and target urban best management practices. Our study showed relationships in both creek salinity and ecosystem metabolism were related to various urban watershed measures. Opportunities for retroactive storm water control measures have been encouraged to mitigate for some runoff impacts.

Focus Area: Healthy Coastal Ecosystems (Research)
Impact or Accomplishment: Accomplishment
PIER ID Number: 36163

Resident salt marsh fish in tidal creeks respond to residential development

Recap:
Scientists assessed the impact of urban land use in the watershed of small tidal creeks by examining shifts in resident fish abundance, diet and condition along an urban gradient.

Relevance:
Previous studies have shown that urban land use can reduce the habitat of resident salt marsh fish, such as Fundulus grandis (Gulf killifish), which are an important indicator species and prey item for larger fish. Information is needed to determine how altered runoff patterns and other urban impacts may reduce habitat for resident fish. By understanding watershed runoff impacts on tidal habitats, we can improve stormwater policy and identify tidal creeks that might be enhanced.

Response:
Mississippi-Alabama Sea Grant-supported scientists sampled resident salt marsh fish in 12 tidal creeks across an urban gradient of Alabama and west Florida. Fish were sampled per creek using a passive trapping devices across three seasons. A subsample of fish were analyzed for gut contents (n=512) and measures of condition (caloric analysis and liver somatic index) to detect possible trends across urban sites. Scientists communicated the study results to municipalities, agencies and other organizations involved with coastal waters.

Results:
Results showed that F. grandis and total fish abundance and condition were not related to increasing watershed urbanization (residential/commercial development). Gut analyses showed fish were the most important prey item across sites, a fairly uncommon finding compared to other studies. These results indicate that resident fish may be resilient to a low- to moderate-level of urbanization assuming marsh edges are available.

Focus Area: Healthy Coastal Ecosystems (Research)
Impact or Accomplishment: Accomplishment
PIER ID Number: 36165

Environmentally relevant mixtures of PFAS may not adversely affect the health of oysters along the Alabama Coast

Recap:
Oysters appear to efficiently depurate environmentally relevant concentrations of PFAS from their bodies without using up a lot of energy that could otherwise go towards growth and reproduction, which means some of the impacts of PFAS exposure to oysters in the wild and in off-bottom aquaculture may not be as severe as initially suspected.

Relevance:
Previous studies have shown that although some bivalve species are very good at getting rid of contaminants like PFAS after it enters their bodies, the depuration process may require a lot of energy and have negative impacts on growth and reproduction.

Response:
No response described yet as we are still analyzing data for the project.

Results:
Results thus far indicate that oysters are able to quickly and efficiently depurate PFAS from their tissues without incurring substantial energetic costs and without changing the expression of genes associated with stress. This is good news for oyster conservation as well as oyster fisheries and oyster farmers.

Focus Area: Healthy Coastal Ecosystems (Research)
Impact or Accomplishment: Accomplishment
PIER ID Number: 36167

Recovery of ecosystem functions following marsh restoration varied with marsh age and restoration strategy

Recap:
Scientists quantified recovery of ecosystem functions at 16 reference and restored tidal marshes in summer 2021, thereby providing information to partners on the outcomes of their restoration efforts.

Relevance:
Tidal marsh restoration can recover important ecosystem services, including the accumulation of soil organic matter (SOM), sequestration of blue carbon (C), and removal and retention of of nitrogen (N), yet restoration projects often fail to reach equivalence with reference wetlands. To inform restoration strategies and improve outcomes, it is important to evaluate the trajectories and magnitudes of recovery following restoration and compare outcomes across different types of restoration projects.

Response:
Working in partnership with stakeholders at their properties, a Mississippi-Alabama Sea Grant-funded team conducted a field campaign at 16 natural and restored marshes along the Mississippi-Alabama Gulf Coast. Scientists quantified SOM, soil C, N removal, and N retention at each site. The restored sites differed in age (7-34 years) and restoration technique (e.g., living shoreline, large-scale beneficial use, habitat conversion) and were compared to reference sites to gauge the extent of functional recovery.

Results:
Reference marshes stored more SOM and removed more N than restored marshes. Within restored sites, SOM in the upper 5 cm increased with marsh age and differed among restoration types, with converted habitats storing more SOM than beneficial use and living shoreline sites. Recovery of N-removal capacity also varied with restoration type, with converted habitats and beneficial use sites removing less N than other sites.

Focus Area: Healthy Coastal Ecosystems (Research)
Impact or Accomplishment: Accomplishment
PIER ID Number: 36168

Metric-based indicators can assess recovery of ecosystem functions following tidal marsh restoration

Recap:
Researchers constructed preliminary metric-based models that can be used to estimate the recovery of difficult-to-measure ecosystem functions in restored tidal marshes. Restoration practitioners can use this approach to easily measure marsh restoration outcomes.

Relevance:
Because of time and budget constraints, the recovery of carbon storage and nitrogen process rates is often not measured to evaluate the success of restoration projects. Thus, restoration practitioners would benefit from metric-based indicators that can be used to estimate functional recovery in restored tidal marshes using simple and inexpensive measures.

Response:
Leveraging data collected from 16 reference and restored tidal marshes in summer 2021, Mississippi-Alabama Sea Grant-funded scientists developed a preliminary metric-based indicator of functional recovery. To construct the model, scientists calculated percent recovery of ecosystem functions at restored marshes by pairing them with their reference counterparts and then determined the combination of site characteristics that best explained recovery using backwards model selection.

Results:
Preliminary model results suggested that recovery of soil carbon storage can be estimated using site age and bulk density, while recovery of carbon stocks can be estimated using site age and percent plant cover. Based on these relationships, the team generated metrics to score functional recovery at each of the restored sites. Data collected in 2022 will be used to validate the models and improve estimates of recovery that were developed this year.

Focus Area: Healthy Coastal Ecosystems (Research)
Impact or Accomplishment: Accomplishment
PIER ID Number: 36170

Study finds that restoration of tidal marsh habitat supports robust populations of aquatic invertebrates

Recap:
Leveraging ongoing research, a research team conducted a survey of aquatic invertebrate communities at 14 reference and restored marshes in summer 2021, thereby providing additional information to partners on the success of their restoration efforts.

Relevance:
Many invertebrate species are important components of food webs and play significant roles in nutrient cycling. Consequently, coastal wetland restoration projects would benefit from incorporating measures of aquatic invertebrate recovery. By establishing habitats that support ample invertebrate prey communities, restoration can help sustain populations of threatened and endangered species, as well as locally important fisheries.

Response:
Leveraging ongoing work, a Mississippi-Alabama Sea Grant-funded research team quantified aquatic invertebrate abundance, richness, evenness, diversity and community composition at 14 of the 16 marshes using passive samplers and vertical tows. This effort provided additional information about the recovery of biological structure at restored sites of different ages and of different restoration types. It also addressed a gap in the scientific literature about the recovery of aquatic invertebrate communities in restored tidal marshes of the Gulf Coast.

Results:
Scientists collected ~1.5 million aquatic invertebrates, predominantly comprised of crustacean nauplii, Asplanchnidae, Brachiopoda, Ostracoda and Malacostraca. They found that total abundance, richness and composition were comparable among reference and restored sites, but evenness and diversity were lower in restored sites. Collectively, these results suggest that aquatic invertebrates have largely recovered following restoration, and by supporting large populations of aquatic invertebrate prey items, these sites likely help support ecologically and economically-important species in coastal food webs.

Focus Area: Healthy Coastal Ecosystems (Research)
Impact or Accomplishment: Accomplishment
PIER ID Number: 36171

Outreach efforts allowed K-12 teachers to access information on local tidal marsh restoration projects

Recap:
As part of the Education, Outreach and Implementation plan, a scientist presented an overview of coastal wetland restoration and the goals of the Sea Grant project to K-12 teachers participating in the Dauphin Island Sea Lab's Teacher Workshop on Gulf of Mexico Environmental Issues.

Relevance:
Science education gaps are increasingly evident in states across the nation, with some southern states, like Mississippi and Alabama, ranked lowest in K-12 science competency. Thus, outreach that targets K-12 education and provides resources to support science teachers is an effective way to close the science education gap.

Response:
A scientist presented a one-hour talk on the principles of coastal restoration and the objectives of a Sea Grant project to 25 K-12 teachers. The presentation was followed by a question and answer session. Participation in this event supported the outreach and training efforts of one of Mississippi-Alabama Sea Grant partners (Dauphin Island Sea Lab) and provided educational content to 25 local teachers.

Results:
A scientist presented at a workshop that provided educational content on current environmental issues facing the Gulf Coast region to 25 local school teachers. The K-12 teachers were roughly evenly split between elementary and middle/high school teachers. All teachers were provided a PDF copy of the presentation as a reference and for use when planning future lesson plans.

Focus Area: Healthy Coastal Ecosystems (Research)
Impact or Accomplishment: Accomplishment
PIER ID Number: 36801

Project sets baseline for future SAV mapping, monitoring efforts that may lead to early detection of changes in Coastal Alabama

Recap:
Low-cost, annual, in-water visual surveys of submerged aquatic vegetation provide resource managers a closer look at the health and status of this vital coastal habitat so that protection and conservation management efforts can occur before negative changes become irreversible.

Relevance:
Aerial mapping of submerged aquatic vegetation is often costly (more than $100,000 per survey) and provides limited information on the health and condition of submerged aquatic vegetation (SAV). While these maps can be used to look at changes in extent, because they are spaced many years apart, they do not provide resource managers information to protect SAV against irreversible losses. This project set out to determine adequate survey parameters that will improve resource management at a lower cost.

Response:
This project conducted a detailed in-water submerged aquatic vegetation survey following the Gulf of Mexico Alliance's Seagrass Community of Practice tiered monitoring strategy based from the National Park Services methods. Using a grid of tessellated hexagons for selecting sampling locations in the mesohaline and polyhaline portions of coastal Alabama waters, we will 1) test the ease of these protocols and 2) determine the adequate hexagon size. Additionally, this survey provides a baseline for future work.

Results:
The results from this project sets the baseline for future SAV Tier 2 mapping and monitoring efforts that can be used to detect negative changes before losses become irreversible. The research team was able to verify reliable and repeatable field methods for freshwater SAV and is continuing to work with the Gulf of Mexico Seagrass Community of Practice on survey site distances (i.e. how big hexagons can be to reliably detect change).

Resilient Communities and Economies Accomplishments

Focus Area: Resilient Communities and Economies
Impact or Accomplishment: Accomplishment
PIER ID Number: 34508

Sea Grant, Smart Home America expand FORTIFIED training and continuing education to additional stakeholder groups

Recap:
The Mississippi-Alabama Sea Grant Consortium and Smart Home America provided continuing education and outreach to over 40 individuals representing key stakeholder groups and expanded its resilient communities outreach to private industry stakeholders, including real estate agents, insurance agents and contractors.

Relevance:
To encourage sustainable building, it is necessary to get buy-in from private stakeholders. Realtors, contractors and insurance agents are critical audiences that can spread the message on FORTFIED, a Smart Home America-administered national standard that allows individuals to strengthen their property against storm damage. Increased acceptance of FORTIFIED standards by private stakeholders will result in adoption of the standards at the state and local level, thereby advancing Sea Grant's goal of more resilient communities.

Response:
In 2021, Sea Grant staff organized a presentation to the South Alabama Flood Engagement Team (SAFE-T). The SAFE-T webinar had 24 total participants, with representation from two additional stakeholder groups: the construction industry and insurance industry. Sea Grant staff also participated in a Severe Weather Awareness Expo to spread knowledge of FORTIFIED to Mississippi residents. Sea Grant also organized a FORTIFIED webinar for realtors. Two realtor continuing education credits were provided, and 14 individuals participated.

Results:
Over 40 individuals participated in these workshops and outreach events. Three continuing education credits were provided across two workshops. Between the two workshops, continuing education credit was offered to three key resilient communities stakeholder groups: planners, floodplain managers and realtors. Representatives from the construction and insurance industries were also in attendance for the April SAFE-T webinar. The Severe Weather Awareness Expo communicated the value of the FORTIFIED standard to Mississippi residents and non-profits.

Focus Area: Resilient Communities and Economies
Impact or Accomplishment: Accomplishment
PIER ID Number: 34531

Mississippi-Alabama Sea Grant Legal program provides county with information about resources available to address wastewater treatment issues

Recap:
The Mississippi-Alabama Sea Grant Legal Program provided a Quitman County (Mississippi) supervisor with information about three federal grant and loan opportunities that could help address the county's wastewater treatment problems.

Relevance:
Part of Sea Grant's goal in achieving healthy ecosystems and resilient communities, especially disadvantaged communities with fewer resources, is to help those communities develop water pollution management controls, such as improving wastewater treatment. A Mississippi Delta fellow contacted the Mississippi-Alabama Sea Grant Legal Program and asked for help in providing Quitman County (Mississippi) with information on financing resources it could use to improve its wastewater treatment system.

Response:
The Mississippi-Alabama Sea Grant Legal Program researched federally funded programs available to low-income communities to improve wastewater treatment. MASGC specialists provided the compiled federal grant information and other resources to Quitman County, Mississippi.

Results:
The Mississippi-Alabama Sea Grant Legal Program compiled and shared grant sources for addressing wastewater treatment issues with a county with limited resources.

Focus Area: Resilient Communities and Economies
Impact or Accomplishment: Accomplishment
PIER ID Number: 34533

Coastal stakeholders use regional Sea Grant program's outreach materials related to human dimensions of oil spills

Recap:
The Sea Grant Science Outreach Program successfully increased knowledge and understanding about human-related impacts following oil spills by sharing peer-reviewed research through outreach publications, seminars, and workshops with members of the public, including the oil spill response community.

Relevance:
More than 10 years after the Deepwater Horizon oil spill, questions continued to be asked about the potential impacts to humans from spilled oil and chemical dispersants used in response to spills. Perceptions of risk to community members, as well as limited access to data on human health impacts, led to an increased demand for high-quality, science-based information from trusted sources.

Response:
The Mississippi-Alabama Sea Grant Consortium extension specialist served as the human dimensions lead on the Sea Grant Oil Spill Science Outreach Team, which produced six publications and hosted 10 seminars and workshops about human impacts following oil spills. Team members led events that allowed the response community, policy makers and public to engage with leading experts in human-related research. The experts heard concerns and answered questions, which helped build trust and show the need for continued research.

Results:
Multiple stakeholders have used the team's work on human-related impacts. For example, an end-user survey showed stakeholders incorporated materials into their engagement activities or shared publications with family. Others stated that through the team's work "fear was replaced by rational thinking" and that their work showed "professional scientists how their work was perceived." One local Gulf resident even stated that they "opted into a health study" because of the team's work.

Focus Area: Resilient Communities and Economies
Impact or Accomplishment: Accomplishment
PIER ID Number: 34534

Sea Grant helps Saunders Yachtworks become first certified Clean and Resilient Marina in Alabama

Recap:
Mississippi-Alabama Sea Grant helped Saunders Yachtworks in Gulf Shores, Alabama, became the first facility in the state to earn the Clean and Resilient Marina certification.

Relevance:
The Clean and Resilient Marina Program calls for the "promotion and expansion of resilient and environmentally responsible operations and best management practices at marinas." It builds on the Gulf of Mexico States' proven Clean Marina Certification Programs. This program complements Clean Marina practices already in place and provides additional recommendations to strengthen local marinas' ability to withstand natural and man-made disasters.

Response:
Sea Grant staff worked with Saunders Yachtworks to certify it as a Clean and Resilient Marina. To receive this certification, the company utilized best management practices to protect and promote clean water and reduce water pollution. Areas for certification included marina design and siting; emergency preparedness; evacuation procedures; stormwater management and erosion controls; climate adaptation and sea level rise; and outreach and education for marina operators and boaters.

Results:
Saunders Yachtworks in Gulf Shores became is the first facility in Alabama to earn the Clean and Resilient Marina certification.

Focus Area: Resilient Communities and Economies
Impact or Accomplishment: Accomplishment
PIER ID Number: 34535

National Water Extension Program contributes to addressing water issues, societal needs

Recap:
The National Water Extension Program provided 19 extension products, gave 36 presentations reaching over 1,000 individuals and hosted 17 meetings and workshops.

Relevance:
In the United States and around the world, water security is at risk. Too much water, too little water or water of poor quality endangers life, property, economies and ecosystems. Unfortunately, these threats are intensifying, and risk is difficult to predict. Stakeholders across the U.S. have revealed the need for consistent, high spatiotemporal resolution, integrated water data to address critical unmet information and service gaps.

Response:
In 2017, NOAA, The University of Alabama and the Mississippi-Alabama Sea Grant Consortium created the National Water Extension Program at the National Water Center in Tuscaloosa, Alabama. The program's goal was to facilitate the delivery of resources to help communities and organizations make planning decisions about the safety and security of their citizens and water resources. During a four-year period, the program provided 19 extension products, gave 36 presentations reaching over 1,000 individuals and hosted 17 meetings and workshops.

Results:
The National Water Extension Program successfully provided access to NOAA data, tools, products and services and contributed to addressing water issues and bridging gaps. Further, the program augmented the application of NOAA research within the Sea Grant network and end-user communities and enhanced the relevancy of NOAA research to address societal needs.

Focus Area: Resilient Communities and Economies
Impact or Accomplishment: Accomplishment
PIER ID Number: 34567

Staff leads professional development webinars on resilience issues and solutions

Recap:
In response to limited professional development opportunities, Mississippi-Alabama Sea Grant organized, hosted and facilitated three online webinars for floodplain managers, planners and other local decision-makers on topics of interest (Risk Rating 2.0, elevating homes in the floodplain, wellness in tough times).

Relevance:
During 2021, COVID-19 continued to keep practitioners, local decision-makers and professionals at home, thus creating a void of in-person meetings and conferences where professional development and networking usually occurs. It was important to find a way to share success stories about resilience projects within the region.

Response:
Mississippi-Alabama Sea Grant Consortium staff conducted webinars on coastal resilience topics that were identified during previous needs assessments and recruited speakers to discuss elevating structures in the floodplain, Risk Rating 2.0 and mental health and wellness during the pandemic.

Results:
Three online webinars reached 170 participants. Seventy-one people received certificates that were good for two continuing education credits: one credit for American Institute of Certified Planners and one credit for Association of State Floodplain Managers. Other professionals could receive three hours of professional development at their institutions if they attended all three webinars. An average of 57.14% of participants strongly agreed and 42.6% agreed the webinars were a good use of their time.

Focus Area: Resilient Communities and Economies
Impact or Accomplishment: Accomplishment
PIER ID Number: 34587

VORTEX-SE outreach and engagement prepares vulnerable audiences for severe weather

Recap:
Sea Grant reached 394 people with severe weather presentations, events and trainings (both in-person and virtual and partnered) with 19 new organizations to produce programming, meet local needs and develop severe weather curriculum.

Relevance:
In 2021 alone, the southeast experienced two flooding events, eleven severe storm events, and four tropical cyclone events. Of those events, 114 deaths occurred as a direct result of severe weather. Between 1980-2021, severe storms have caused the highest number of billion-dollar disaster events (143) and are responsible for the third highest number of deaths (1,880). MASGC is working to reduce these numbers by increasing engagement on severe weather preparedness and sheltering options.

Response:
In order to address stakeholder gaps and needs, a new engagement program was created to identify and connect social networks that can assist neighborhoods in building skills to prepare for, respond to and recover from severe weather events. The Verification of the Origins of Rotation in Tornadoes EXperiment-Southeast (VORTEX-SE) Outreach Program places particular emphasis on identifying options for safe spaces for vulnerable populations, putting mechanisms in place for ongoing engagement, learning and action.

Results:
The program provides opportunities to change behavior due to severe weather preparedness and builds greater self and group efficacy with the aim of helping to save lives and reduce the impacts from tornadoes. During the past year, Sea Grant reached 394 people with severe weather presentations, events and trainings (both in-person and virtual) and partnered with 19 new organizations to produce programming, meet local needs and develop severe weather curriculum.

Focus Area: Resilient Communities and Economies (Research)
Impact or Accomplishment: Accomplishment
PIER ID Number: 36139

Team finds green infrastructure is integrated in comprehensive plans, but barriers to implementation exist

Recap:
Researchers found that GI is well integrated into Mississippi-Alabama coastal cities' comprehensive plans and planning practice; however, there are constraints related to leadership, comprehensive plan oversight and implementation, collaboration and resources.

Relevance:
Growth and development can threaten the ecosystems of a city as undeveloped land is converted into impervious surfaces. This is an issue particularly for coastal cities as their location makes them susceptible to natural disasters, such as flooding and hurricanes. Green infrastructure (GI), which includes multifunctional networks of open space and nature-based multi-scalar stormwater management projects, is a tool for minimizing the negative impacts of growth and development. The Mississippi-Alabama coastal region has seen increases in population density and the number of housing units, disrupting natural landscape patterns and reducing wetlands and vegetation, putting them at flooding risk.

Response:
In this Mississippi-Alabama Sea Grant-funded research project, an evaluation of comprehensive plans, a survey, and interviews, as well as advanced GIS and OLS regression analyses of over 1200 sub-basins in the project's watershed, demonstrated the importance of this planning strategy.

Results:
There is a high level of plan quality and GI engagement within the cities' comprehensive plans, which is supported by survey and interview data. However, it is recommended that cities focus on plan implementation, monitoring and evaluation, while promoting greater political leadership, more effective collaborations and increased resources for GI planning. An increased proportion and more connected wetlands and vegetation are significantly associated with a reduction in runoff, a strategy that should be prioritized.

Focus Area: Resilient Communities and Economies (Research)
Impact or Accomplishment: Accomplishment
PIER ID Number: 36151

Research assesses effectiveness of types of green infrastructure, long-term costs and benefits identifies green infrastructure to reduce stormwater on small sites.

Recap:
Mississippi-Alabama Sea Grant-funded researchers used computer modeling to assess the costs and effectiveness of green infrastructure on reducing stormwater runoff.

Relevance:
Communities can be resilient economically if they take steps to mitigate the impacts of stormwater and flooding. Acting with grant funds from MASGC, the researchers are assessing the effectiveness of using green stormwater infrastructure on sites smaller than 5 acres in Northern Gulf of Mexico municipalities. Green infrastructure can improve water quality, resilience and habitat. The researchers are also assessing barriers to the implementation of green infrastructure, such as city ordinances and life-cycle costs.

Response:
The researchers used computer modeling to analyze stormwater runoff data, testing the effectiveness of three forms of green stormwater infrastructure based on site limitations. Additional modeling analyzed the long-term costs associated with that infrastructure. Researchers coordinated with municipal staff in Orange Beach, Alabama and Biloxi, Mississippi, who identified lifetime maintenance costs and restrictive ordinances as obstacles to employing more green infrastructure. The researchers analyzed those cities' stormwater and zoning ordinances to suggest regulatory improvements.

Results:
The researchers identified effective forms of green stormwater infrastructure for 5-acre sites in the Northern Gulf of Mexico and are revising ordinances for the municipal partners to adopt. Communication with the city staff resulted in better data by focusing on city priorities: financially feasible stormwater requirements for sites in small communities without difficult long-term maintenance issues. Computer modeling assessed the effectiveness of types of green infrastructure as well as the long-term costs and benefits.

Sustainable Fisheries and Aquaculture Accomplishments

Focus Area: Sustainable Fisheries and Aquaculture
Impact or Accomplishment: Accomplishment
PIER ID Number: 34588

Sea Grant specialists develop new course to extend practical, science-based information about fisheries-related topics

Recap:
Mississippi-Alabama Sea Grant Consortium (MASGC) specialists developed and offered the "FISHES: Fishermen Invested in Science, Healthy Ecosystems, and Sustainability" course, and people taking the course improved their knowledge of fisheries management, fisheries science and sustainability.

Relevance:
Mississippi-Alabama Sea Grant Consortium (MASGC) specialists possess valuable knowledge of fisheries-related topics. Additionally, these specialists recently recognized a need for a way to effectively communicate information regarding fisheries management, fisheries science and sustainability to fishermen and fish enthusiasts (such as teachers) in the north-central Gulf of Mexico region.

Response:
MASGC specialists developed the "FISHES: Fishermen Invested in Science, Healthy Ecosystems, and Sustainability" course, which they designed to extend practical, science-based information in a straightforward format. The course includes five classroom sessions and one field excursion. Specialists recruited recreational and commercial fishermen, as well as fish enthusiasts, to enroll in the first offering of the course. The course was taught for the first time in fall 2021.

Results:
All 12 participants who participated in the inaugural iteration of the course reported that their knowledge of fisheries management, fisheries science and sustainability increased as a result of taking the course. Post-test scores increased 27% when compared to pre-test scores. Participant satisfaction was also high, with participants reporting an average satisfaction score (with course content, format, lecturers and networking opportunities) of 4.8 out of 5.

Focus Area: Sustainable Fisheries and Aquaculture
Impact or Accomplishment: Accomplishment
PIER ID Number: 34589

Marine Fisheries Ecology programming extends science to stakeholders for navigating regionally important fisheries issues

Recap:
By engaging with stakeholders in Mississippi and Alabama, the Marine Fisheries Ecology program extended research findings to help promote sustainable commercial and recreational fisheries.

Relevance:
Healthy fisheries are fundamental to the cultural and economic well-being of northern Gulf of Mexico residents, yet overfishing, habitat loss and changing environmental conditions threaten the sustainability of these resources. The Mississippi-Alabama Sea Grant Consortium helps support staff who are part of the Mississippi State University Marine Fisheries Ecology Program.

Response:
The Marine Fisheries Ecology program engaged with recreational and commercial stakeholders through formal events, informal events and digital platforms, such as Facebook, Instagram and the Gulf Coast Fisherman newsletter. Content included information about Gulf of Mexico fishes and fisheries along with updates on Marine Fisheries Ecology program projects.

Results:
Extension specialists engaged more than 3,000 people at 16 events, published 88 social media posts reaching more than 350,000 and distributed four Gulf Coast Fisherman newsletter editions to 500+ subscribers. Most event attendees, social media followers and newsletter subscribers (> 90%) reported an increase in knowledge about fish and fisheries. Moreover, 71% of event attendees identifying as fishermen and 65% of followers/subscribers identifying as fishermen reported that they would change their future fishing practices.

Focus Area: Sustainable Fisheries and Aquaculture
Impact or Accomplishment: Accomplishment
PIER ID Number: 34590

Sea Grant purchases oysters for restoration, increases oyster farms' resilience to disasters

Recap:
Mississippi-Alabama Sea Grant purchased 203,400 live oysters from 10 oyster farms that had lost markets because of COVID-19 and placed the oysters on non-harvestable wild reefs for restoration enhancement.

Relevance:
Wild oyster reefs have been in decline due to over harvesting and environmental impacts for decades. Oyster farmers were suffering economic losses due to their product being too large to sell after being held on the farms due to restaurant closures caused by COVID-19.

Response:
During 2020-2021, Mississippi-Alabama Sea Grant Consortium (MASGC) specialists worked with stakeholders to develop and administer a program that purchased oversized oysters from farmers and placed them on reefs for restoration purposes.

Results:
Mississippi-Alabama Sea Grant purchased 203,400 live oysters from 10 oyster farms that had lost markets because of COVID-19 and placed the oysters on non-harvestable wild reefs for restoration enhancement. Commercial oyster farmers realized at least $51,420 in economic benefits that they otherwise would not have received because their oysters were oversized for markets.

Focus Area: Sustainable Fisheries and Aquaculture
Impact or Accomplishment: Accomplishment
PIER ID Number: 34595

Mississippi-Alabama Sea Grant extension specialists provide training and technical assistance to the off-bottom oyster aquaculture industry

Recap:
Mississippi-Alabama Sea Grant Consortium extension specialists provided training and technical assistance to at least five new and approximately 20 current commercial oyster farmers to start and/or improve their oyster farming operation.

Relevance:
The natural reef harvests of the native eastern oyster (Crassostrea virginica) has been in decline for decades, in part due to wild harvest and environmental impacts. Culturing oysters spawned from brood stock in hatcheries is a sustainable resource for food supply and has a beneficial economic impact in the community.

Response:
Mississippi-Alabama Sea Grant Consortium specialists worked with stakeholders to develop and administer resources to improve and expand the commercial oyster farming industry through four virtual and in-person workshops and two training events for business planning and storm preparation.

Results:
In 2021, at least 5 million oysters were harvested from commercial farms along the Mississippi and Alabama coasts, and, while farm gate values are difficult to quantify, an estimate would be of at least a $2.5 million farm gate value.

Focus Area: Sustainable Fisheries and Aquaculture
Impact or Accomplishment: Accomplishment
PIER ID Number: 34596

Sea Grant Network Aquaculture Research, Education and Engagement Plan

Recap:
Sea Grant identifies aquaculture research, education and engagement needs to guide funding decisions

Relevance:
Sea Grant invests approximately $25 million in federal funds annually to support aquaculture, research, education and engagement. Sea Grant should continuously engage with farmers and other stakeholder to understand the short- and long-term needs of the aquaculture industry to effectively and efficiently expend the funds Congress appropriates each year.

Response:
The aquaculture liaison conducted internal and external Sea Grant online needs assessment survey. The survey gathered 110 responses from stakeholders on research, communication, education, extension and legal needs using open-ended questions based on the five focus areas in the Sea Grant 10-Year Aquaculture Vision. The liaison also analyzed 19 existing industry, state, regional and national aquaculture research, extension and education needs assessments.

Results:
The aquaculture liaison created the Sea Grant Aquaculture Research, Education and Engagement plan, which provides the results of the Sea Grant-supported Great Lakes and marine aquaculture research, education and engagement needs assessment. The plan is organized around six focus areas: commerce, permitting and policies; current and emerging species; production systems; seafood safety and quality; aquaculture literacy; and workforce development. Needs in the plan are actionable items that Sea Grant could address.

Focus Area: Sustainable Fisheries and Aquaculture (Research)
Impact or Accomplishment: Accomplishment
PIER ID Number: 36147

Project analyzes viability, economic impact and management measures for future success of U.S. aquaculture

Recap:
The provision of critically important economic and marketing research information is anticipated to reduce the asymmetries in the information flow and available knowledge base to domestic aquaculture producers.

Relevance:
Economic analyses with primary farm-level datasets will be more realistic reflections of commercial farm realities.

Response:
This Sea Grant-funded project facilitates the development of comprehensive non-proprietary business management tools that will provide readily accessible economic feasibility indices that would help existing aquaculturists, aquaculture entrepreneurs, investors and lenders.

Results:
Primary data collected from several aquaculture sectors such as oysters, clams, mussels, catfish, baitfish, ornamental fish and salmonids are being evaluated for the generation of enterprise budgets with oysters, catfish and trout budgets being complete. Structural design and metrics for comparison are all standardized. IMPLAN dataset is purchased for the estimation of the economic contribution of US aquaculture. Findings from the catfish sector are suggestive of production risk being the major risk contributor.

Focus Area: Sustainable Fisheries and Aquaculture (Research)
Impact or Accomplishment: Accomplishment
PIER ID Number: 36157

Rearing oysters with blue crabs, oyster drills prior to placement in the field grew heavier, stronger shells and significantly increased survival

Recap:
Oysters respond to predators by growing stronger shells. Using predator cues in oyster hatcheries and nurseries causes oysters to grow strong shells, thus improving oyster survival when placed on natural reefs or in oyster farms.

Relevance:
Oysters are economically and ecologically important, but their populations are declining. Considerable investments are being made to restore oyster populations and increase aquaculture. Oysters react to potential predators by growing heavier, stronger shells, and scientists investigated the applicability of using predator cues in nurseries to bolter oyster toughness to improve restoration and aquaculture success. Their technique may significantly improve return-on-investment of oyster restoration and aquaculture operations.

Response:
The Mississippi-Alabama Sea Grant-supported team partnered with the Auburn University Shellfish Laboratory and the Point Aux Pins Oyster Farm to conduct experiments. They obtained oysters as either single seed or spat-on-shell from the shellfish lab, grew them with blue crabs or oyster drills or in controls without predators for 1 month, then placed them onto oyster farms or natural oyster reefs.

Results:
Oysters reared with blue crabs and oyster drills for four weeks prior to placement in the field grew heavier, stronger shells which significantly increased their survival. At all seven study locations (5 natural reefs, 2 oyster farms), oyster survival significantly increased when grown with predator cues, suggesting this approach may be useful to bolster oyster restoration and aquaculture success. This information was shared with state agencies in Alabama and Mississippi as they develop oyster restoration programs as well as oyster farmers who are considering growing oysters on bottom.

Focus Area: Sustainable Fisheries and Aquaculture (Research)
Impact or Accomplishment: Accomplishment
PIER ID Number: 36172

High school students operate commercial oyster farm, develop skills in Mississippi-Alabama Sea Grant-supported program

Recap:
Mississippi-Alabama Sea Grant provided technical assistance and training to help high school students from Bryant Career Tech Center (Alabama) operate a student-operated commercial oyster farm in Grand Bay, Alabama, and two high school students acquired skills and knowledge that better prepared them to enter the industry.

Relevance:
The off-bottom oyster aquaculture industry, which has expressed a strong need for skilled, reliable employees.

Response:
In partnership with Mississippi-Alabama Sea Grant and Auburn University Shellfish Lab, Bonus Point Oyster Company, a 501(c)(3), was established in Alabama to provide a vocational platform for local high school students. Mississippi-Alabama Sea Grant extension professionals provided technical assistance and training, and students learned the basics of growing oysters using off-bottom aquaculture methods on the oyster farm.

Results:
Two high school students gained valuable practical experience on the oyster farm and learned the basics of growing oysters using off-bottom aquaculture methods.