



Gulf of Mexico Division

Protecting and Preserving
the Gulf of Mexico

2021 Annual Report

Our Mission

EPA's Gulf of Mexico Division is focused on the health, productivity and restoration of the Gulf of Mexico and the communities that rely on this national resource.

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Message from the Director

From the headwaters of the Mississippi River to the beautiful, deep waters of the Gulf of Mexico, the Gulf of Mexico Watershed is critical not only to our nation's natural resources but also to the economy of this great country. This year's FY 2021 Annual Report for the Gulf of Mexico Division (GMD), which highlights our work and accomplishments from October 1, 2020, to September 30, 2021, unveils the hard work of our staff and partners in helping sustain and improve this precious resource.

During FY 2021, we continued to face issues with the COVID-19 crisis that required staff to adapt and continue to persevere to complete our goals for the year. It is a testament to the highly qualified and wonderful staff at GMD. GMD's \$11 million investment in environmentally sound agricultural practices through the Farmer to Farmer program, the \$9 million investment in the Healthy and Resilient Gulf of Mexico Request for Applications, and the \$1 million investment in community resilience continue to propel restoration efforts. These financial investments, along with our research initiatives and public education and outreach, have created positive impacts on the Gulf of Mexico Watershed. Although FY 2021 has been challenging to say the least, GMD staff have endured and, as usual, have exceeded my expectations.

This report is dedicated to the partners of GMD. During my second year as director, GMD has looked for visionary ways to implement innovative techniques to improve the water quality and habitat of the watershed. Our partners have been there, hand in hand, with staff to work through the COVID-19 challenges and to propose and implement measures to enhance the watershed. It is their tenacity and aspirations that will continue to improve the quality of the Gulf of Mexico and make it a better place for future generations. To my staff, thank you for continuing to go above and beyond to make GMD exceed expectations.

Sincerely,



Marc Wyatt
Director, Gulf of Mexico Division

Who We Are

The Gulf of Mexico Division (GMD) is one of EPA's Great Water Body Programs whose geographic focus is on the major environmental issues of the Gulf of Mexico region and its watershed.

GMD is committed to voluntary, nonregulatory actions and solutions that are based on sound scientific and technical information as substantiated by our work with partners and the public.

Our program consists of two teams of experienced staff:



Science Integration and Analysis Team

Promoting and implementing science to benefit the Gulf of Mexico and its communities, this team assists Gulf of Mexico stakeholders by participating in activities such as collecting and testing water samples in the watersheds that flow into the Gulf to monitor water quality.



Partnerships Team

Encouraging positive behavioral practices and promoting awareness of resources, technologies and environmental practices or initiatives, this team works closely with Gulf partners to identify environmental concerns and provides up-to-date education on how shifts in behavior among Gulf stakeholders and tourists can effect change.

What We Do

The Gulf of Mexico is recognized worldwide as a vast and productive body of water with tremendous value in ecological, economic and social terms. The Gulf of Mexico Watershed is made up of 33 major rivers draining from 31 U.S. states and a large portion of Mexico. The U.S. Gulf of Mexico coastline is 1,630 miles long. Environmental challenges facing the Gulf of Mexico include excess nutrients that can cause hypoxic conditions, marine debris and degradation of natural features such as wetlands that provide vital ecosystems services.

The Science Integration and Analysis Team and the Partnerships Team work with Gulf of Mexico stakeholders to explore methods to:

- Support the assessment, development and implementation of programs, projects and tools that strengthen community resilience.
- Promote and support environmental education and outreach to inhabitants of the Gulf of Mexico Watershed.
- Protect, enhance and restore coastal and upland habitats within the Gulf of Mexico Watershed.
- Restore and/or improve water and habitat quality to meet water quality standards in watersheds throughout the five Gulf states and the Mississippi River Basin.



Active Investments

LOCATION	DOLLAR AMOUNT	AGREEMENTS
Mississippi	\$8,997,714	11 Cooperatives, 5 Grants
Iowa	\$7,460,937	6 Cooperatives, 2 Grants
Louisiana	\$5,437,131	12 Cooperatives, 3 Grants
Florida	\$4,978,714	10 Cooperatives, 4 Grants
Alabama	\$3,662,597	7 Cooperatives, 3 Grants
Texas	\$3,053,506	6 Cooperatives, 4 Grants
Wisconsin	\$2,985,255	3 Grants
Maryland	\$2,300,000	2 Interagencies
Virginia	\$1,999,594	3 Cooperatives, 1 Grant
Tennessee	\$1,195,064	1 Interagency
Arkansas	\$1,150,000	1 Cooperative
Oklahoma	\$932,516	2 Grants
District of Columbia	\$853,866	1 Grant
Kansas	\$750,000	1 Grant
Georgia	\$300,000	1 Cooperative
Total	More than \$46 million	

4 Performance Measures

GMD works with each of the five U.S. Gulf Coast states and other stakeholders in the Gulf of Mexico Watershed including the six Mexican Gulf Coast states on projects that support the following priority areas:



Water Quality

GMD continuously works with Gulf Coast states to maximize efficiency and utility of water quality monitoring efforts for local managers. GMD supports efforts to improve water and habitat quality to meet water quality standards throughout the five Gulf states and Mississippi River Basin.



Target: Improve 6 water quality health indicators



Results: Improved indicators in 70 water bodies



Environmental Education and Outreach

These efforts are cornerstones to environmental stewardship. GMD's goal is to heighten citizens' appreciation of the Gulf, which leads to positive behavior practices. This can be accomplished by developing hands-on environmental initiatives and engaging residents in restoration programs/projects.



Target: Reach 10,000 individuals



Results: 22,382 individuals reached



Habitat Restoration

Through funding and partnerships, GMD is restoring habitat in the Gulf states, especially related to wetlands, coastal prairies and stream banks corridors. This work helps provide for protection from storm damage; supports commercial and recreational fisheries; provides nesting and foraging habitat for birds and other wildlife; protects pollinators; and improves water quality for recreational use and aquatic life.



Target: Restore 350 acres



Results: 69,719 acres restored



Community Resilience

Resilience is the capability to anticipate, prepare for, respond to, and recover from significant multi-hazard threats with minimum damage to social well-being, the economy and the environment. GMD supports community capacity building through vulnerability assessments and development of adaptive capacity or resilience plans to assist communities in preparing for potential changes in the environment or future, disruptive events.



Target: Reach 40 communities



Results: 132 communities reached

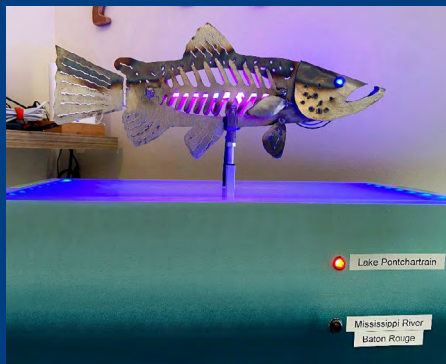


Water Quality

Village Blue – Lake Pontchartrain

Partners

- EPA (Office of Research and Development, Region 6, GMD)
- U.S. Geological Survey
- Pontchartrain Conservancy
- U.S. Army Corps of Engineers



Summary

Village Blue Lake Pontchartrain is a real-time water quality monitoring project initiated by EPA and the U.S. Geological Survey (USGS) at the New Canal Lighthouse on the south shore of Lake Pontchartrain. Village Blue sensors are taking hourly measurements of algae, chlorophyll, dissolved oxygen, pH, temperature, specific conductance, salinity, turbidity and nitrate to be displayed in near real time on the USGS National Water Information System website.

These data can be used by residents as well as professional scientists to develop a greater understanding of water quality issues, such as the ways that heavy rainfall could contribute to changes in nutrients, algae growth, turbidity and dissolved oxygen levels in water bodies like Lake Pontchartrain.

In addition to displaying Village Blue water quality data in real time online, EPA and partners at Pontchartrain Conservancy plan to develop an outreach program around a kinetic sculpture that visualizes the data in a creative, three-dimensional format that looks like a fish. The sculpture uses electronics and LED lights that change color and appear to move, indicating changes in the water quality data. For example, the height of the sculpture changes relative to turbidity, the speed at which the tail moves reflects dissolved oxygen, the color of the fish represents salinity concentrations, and the color of the base corresponds to algae concentrations. Designed and constructed by EPA, the sculpture is located at the New Canal Lighthouse.

Cumulative Results

Since Pontchartrain Conservancy's Learning Lab opened in the summer of 2020, **over 750 people** have visited and learned about the project.

Integrating Immersive Virtual Reality and Litter Gitters to Prevent and Remove Land-Based Litter in the Mississippi Gulf Coast Region

Summary

This project is developing innovative immersive virtual reality (VR) technology to increase participants' awareness of hazards of litter. Pictured is an image from a VR experience where the user is removing trash from a waterway using a net. In addition to the VR development, trash capture technology is improving stream habitat and water quality in Keegan Bayou and Bayou Auguste, Mississippi. Education on impacts of litter will be completed in local postsecondary and secondary schools and restaurants using the VR modules to encourage people to take action.

Partner

- Mississippi State University



Cumulative Results

350 pounds of trash removed



Water Quality Improvement, Education and Outreach in the Bayou Lafourche Watershed

Partners

- Barataria-Terrebonne National Estuary Program
- South Central Planning and Development Commission

Summary

The project is demonstrating, through monitoring of water quality, the benefit of providing incentives and training to private citizens to repair their malfunctioning sewage system. This project reduces water quality pollution and provides education and training about water quality pollution and the benefits of sewage system maintenance to the public at meetings, festivals, summer camps and other educational venues.

Anticipated Results

5% improvement in fecal coliform; **over 16,480 families** will be trained on maintenance of their individual home sewage systems with a minimum of **200 homes** receiving cost-share assistance

A Flood-First Approach to Water Quality Improvement in an Iowa Watershed

Partners

- University of Iowa
- Iowa Institute of Hydraulic Research
- Iowa Watershed Approach Campaign
- Iowa Flood Center
- Middle Creek Watershed Authority
- Iowa Geological Survey

Summary

This project is leveraging partnerships and funding from the multiyear Iowa Watershed Approach to install more than \$1 million in built practices to reduce downstream flooding and improve water quality in a rural HUC 12 watershed within the Mississippi River Basin. This project is also measuring and assessing nitrate reduction associated with the built practices and developing a comprehensive outreach program.

Cumulative Results

145 individuals reached, **3 water bodies** improved, **50 acres** restored. Stormwater wetland development has begun. Real-time nitrate and stage sensors are collecting data, which are visualized on the Iowa Water Quality Information System. The PCSWMM model is calibrated and ready for use to evaluate the impact of project demonstrations.



Top: Iowa Institute of Hydraulic Research (IIHR) staff and students collecting data at the inlet of the Jellison wetland. Bottom: Personal Computer Stormwater Management Model calibration locations.



Habitat Restoration

Jefferson Parish Cypress Tree Planting

Partner

- Jefferson Parish, Louisiana

Summary

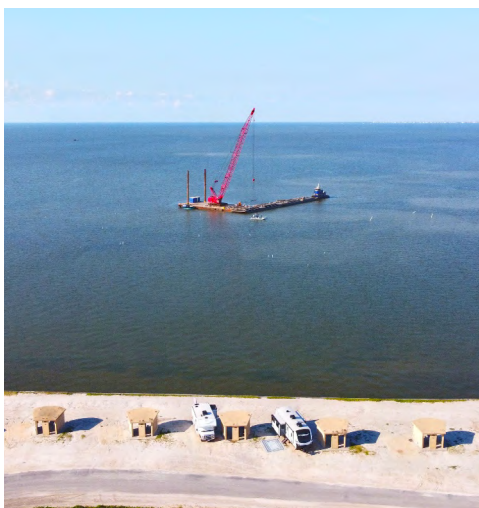
Coastal erosion and sea-level rise are drastically reducing land availability, important habitat, biodiversity, and the fisheries-based economy and culture of southeastern Louisiana. Reducing coastal erosion by planting native species protects the biodiversity of plethora migrating species that utilize southeastern Louisiana. This project is observing reductions in shoreline erosion via sediment retention and biodiversity improvements, especially among avian populations. Additionally, the influx of indigenous bald cypress trees will result in improvements to water quality, storm surge protection and carbon sequestration rates.

Cumulative Results

1,700 cypress trees planted across **377 acres** of wetland habitat in Lafitte, Louisiana



Oyster Reef Restoration in Aransas Bay, Texas



Partners

- Texas A&M Corpus Christi
- Harte Research Institute
- Ed Rachal Foundation
- Palacios Marine Agricultural Research, Inc.

Summary

This project led to the restoration of an oyster reef complex adjacent to Goose Island State Park. This restoration expands upon previous Goose Island Reef restoration efforts. This effort enhances oyster population viability through increasing the amount of available substrate and creates important habitat for use by reef-associated organisms.

Cumulative Results

2.8 acres of oyster habitat restored



Steinhatchee Seagrass Protection and Restoration

Partners

- Florida Department of Environmental Protection
- Taylor County Sheriff Department
- Florida Sea Grant
- Nature Coast Biological Station
- Sea Hag Marina
- Lower Suwannee National Wildlife Refuge

Summary

This project addresses the Steinhatchee Seagrass Protection and Restoration Project through community engagement. This project is restoring 2,400 square feet of the critical seagrass habitat in Deadman Bay in Steinhatchee, Florida.

Cumulative Results

Restored **2,400 square feet** of habitat, **548 derelict crab traps** removed, which equates to **7,280 pounds** of marine debris. Engaged **197 community members**. Developed brochure for marine debris.



Enhancing Shoreline Habitat to Increase Resilience and Raise Awareness About Sustainable Erosion Control Options in Florida's Central Gulf Coast



Partners

- University of Florida
- Florida Coastal Management Program
- Gulf Climate and Resilience Community of Practice
- City of Cedar Key

Summary

The project will use innovative approaches to create marsh and oyster reef habitats in areas presently devoid of riparian buffers. These activities will reduce and prevent the entry of land-based pollutants from the urbanized watershed into adjacent estuarine areas and increase the removal and cycling of nutrients. In addition, these activities create a series of demonstration sites where homeowners, city and municipal staff, and marine contractors can learn about the benefits of living shorelines and their development in a real-world, hands-on fashion, facilitating the extension of pollution prevention and reduction benefits to other communities.

Anticipated Results

1,662 linear feet of shoreline habitat planted (note: an additional 405 linear feet was planted prior to June 2020). **0.08 acres** of low energy beach and **1.05 acres** of salt marsh/dune (coastal wetland) restored (note: an additional 0.28 acres of salt marsh was restored prior to June 2020). **13,680 plants** installed. **0.12 acres** of oyster reef installed. **4 communities** reached. **598 individuals** reached (in person).





Environmental Education and Outreach

Strategic Watershed Awareness & Monitoring Program

Partners

- Mobile Baykeeper, Inc.
- LeFlore High School
- Mobile Area Education Foundation



Summary

The Strategic Watershed Awareness & Monitoring Program (SWAMP) addresses the water quality issues of an urban watershed through actively engaging local youth using a multi-faceted approach:

- Interactive educational presentations to K-12 schools throughout the Three Mile Creek watershed
- Teacher implementation of the SWAMP module (includes six lesson plans) into LeFlore High School science classes
- Training students to be citizen scientists who actively monitor water quality and pollution
- Coordination of monthly sampling on specific, local waterways for trained monitors
- Use of web-based technology to assist data analysis and interpretation
- Student-based solutions to water quality issues identified through monitoring

Students who are educated and trained to monitor specific waterways will be equipped to solve water quality issues in their local watershed by filling in critical data gaps. Due to COVID-19 restrictions, students have been participating in virtual presentations without field trips to actively monitor water quality and pollution. Activities will resume as restrictions ease up.

Cumulative Results

446 students reached

BTNEP Marine Debris Education Program

Summary

This project engages Louisiana students in coastal restoration activities on Elmer's Island, Grand Isle, Louisiana, in Jefferson Parish. Students in coastal Louisiana have limited access to beaches and wetlands. Many of the schools involved in BTNEP's Marine Debris Education Program are Title I and serve underserved/underrepresented students. Elmer's Island is the largest coastal restoration project in Louisiana and is a perfect example of the many challenges—in particular, marine debris—the world faces with a growing population and vanishing resources. Students from local high schools will spend one day per month in the field with BTNEP's Education and Outreach Coordinator. Students participate in a marine debris accumulation study; walk on the largest coastal restoration project in Louisiana; view coastal birds/reptiles and fish in their natural habitats; learn about barrier island ecology, wetland ecology, water quality and microplastics; and tour Port Fourchon.

Cumulative Results

5 field trips
185 students making an impact on Elmer's Island

Partners

- Louisiana Universities Marine Consortium
- Barataria-Terrebonne National Estuary Program (BTNEP)
- Lafourche Parish schools
- Terrebonne Parish schools



We Back the Bay and the Gulf in Texas!



Partners

- The Artist Boat, Inc.
- Galveston Bay Estuary Program
- Pasadena Independent School District

Summary

This project is reducing nonpoint source pollution and improving water quality in Galveston Bay and the Gulf with the student and teacher community of Pasadena Independent School District in Harris County. This project works across 10 middle school campuses to model and demonstrate EPA's environmental education through 1) raising awareness and knowledge through field-based workshops and adventures by kayak that engage critical thinking skills about water quality and sources of pollution, 2) providing opportunities for critical thinking and problem-solving through decision-making as the students and teachers design a WaterSmart landscape feature for their campus, and 3) engaging students in actions and stewardship as they build the WaterSmart landscape feature and launch "We Back the Bay & Gulf!" outreach messages for the regional community.

Cumulative Results

.013 acres enhanced, restored and/or protected. **9 professional development workshops**. **385 students** participated in Eco-Art Workshop. **356 students** participated in Eco-Art Adventure. **56 students and teachers** participated in building WaterSmart landscapes.

Keep the Gulf Clean: Promote Trash-Free Watersheds

Summary

This project is improving water quality by removing trash from urban drainage systems and providing community education on trash prevention. It helps to restore habitats by encouraging green infrastructure and other best water management practices in three Gulf of Mexico watersheds (Mississippi River/Lake Pontchartrain Basin, Trinity River and Galveston Bay, and Mobile Bay). Also, it improves community resilience through targeted youth training, community education and information sharing.

Together, Groundwork New Orleans, Groundwork Dallas and Groundwork Mobile County seek to improve the health of the Gulf of Mexico by reducing nonpoint source pollution and restoring habitats in crucial waterways. The project is directly improving resilience of coastal communities by engaging youth, community members and businesses in trash prevention and reduction; developing outreach and education programs about the impacts of trash on local waterways; and sharing and communicating best practices and lessons learned between these disparate Gulf communities. By establishing a long-term collaboration between organizations along the Gulf Coast, the project is extending its impact and reach to other coastal communities by developing replicable strategies for reducing nonpoint source pollution and engaging communities.

Cumulative Results

1,217 individuals educated and engaged. **7 communities** strengthened. **485 acres** enhanced. **35,192 pounds** of trash removed in various areas in Texas, Louisiana and Alabama.

Partners

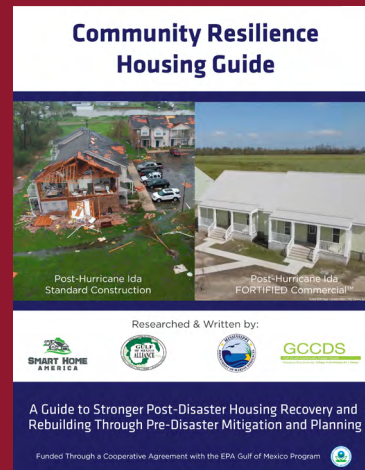
- Groundwork New Orleans
- Groundwork Dallas
- Groundwork Mobile County
- Water Wise Gulf South
- Water is Alive
- The Trust for Public Land
- The Nature Conservancy





Community Resilience

Community Resilience Housing Guide: Creating a Stronger Post-Disaster Housing Framework for the Gulf Coast



Partners

- Smart Home America
- Gulf Coast Community Design Studio
- Mississippi Department of Marine Resources
- Gulf of Mexico Alliance

Summary

This project will develop and implement a post-disaster Community Resilience Housing Guide, with participation from public sector officials and private sector professionals, to increase the resilience of Gulf of Mexico coastal communities. This project will empower communities to determine the pace and direction of their housing recovery through pre-planning and guidance, instead of relying solely on federal assistance to dictate their temporary housing, retrofit, and rebuilding needs and schedule. Post-disaster coordination typically involves public-facing resources and issues, and this project aims to mobilize and bring the private sector into the planning and recovery processes through coordination, resources and authority to streamline the rebuilding process.

The Housing Guide will enhance the resilience of Gulf of Mexico communities by addressing identified gaps, improving pre-event planning, and increasing the capacity to transition to a resilience-minded housing recovery post-disaster. The Housing Guide will then help communities lay the groundwork for a strong recovery by allowing them to identify solutions that would not only benefit them during recovery, but also can be implemented proactively.

Anticipated Results

This project will **increase the resilience of 3 to 4 communities** by enhancing their capacity to plan for and expedite the recovery of their local housing stock post-disaster. It will also create one new tool (the Housing Guide), form a new network of professionals, and train up to **60 public and private officials**. Direct outreach will include community meetings such as leadership forums and training sessions for professionals.



Addressing Climate Resiliency Post-Harvey in the Houston Area by Strengthening Water Conservation Tools That Build Strong Communities

Summary

This project aims to strengthen climate resiliency in the Houston area by furthering the development of the Water My Yard tool (www.watermyyard.org), a website that offers outdoor watering recommendations to Houston area residents. In addition, a mobile app has been developed that allows residents to easily access real-time information about the amount of water they should apply to their lawns on a weekly basis, based on location, type of irrigation system and distance between sprinkler heads. Additionally, a robust marketing campaign has been implemented to expand the reach of the tool and increase the number of users. By strengthening water conservation practices in Houston, adequate amounts of freshwater inflows can continue to enter Galveston Bay to support a healthy environment and reduce threats to the ecosystem and communities around it.

Anticipated Results

10 municipalities expected to adopt Water My Yard

Cumulative Results

2,637,821 individuals reached. **38,670** website users. **13,197** app subscriptions. **8** interviews (3 radio, 5 TV).

Partners

- Galveston Bay Foundation
- Texas A&M AgriLife Extension Service
- Harris-Galveston Subsidence District



Developing a Coastal Resilience Index for Use with Indigenous Communities in the Gulf of Mexico Region to Support Coastal Hazards Preparedness

Summary

The research team will work with a state-recognized Native American community in Terrebonne and Lafourche parishes of Louisiana to evaluate and enhance the community's well-being and resilience to natural hazards as a pilot project that will focus on creating a Coastal Resilience Index (CRI) customized for use with tribes in general. The project team will work with the Pointe-au-Chien Indian Tribe (PACIT) in this collaborative research through the use of participatory mapping and inclusion of locally relevant visualization and decision-support tools, combined with the sophisticated knowledge base of the ecosystem in which members of the PACIT function, referred to as their Traditional Ecological Knowledge (TEK). The communities and tribes in Terrebonne and Lafourche parishes were hit very hard by the brunt of Hurricane Ida on August 29, 2021. Those communities, like Pointe-aux-Chenes, are devastated. Ida's second landfall was in the PACIT's territory, and the eye passed directly through it.

Anticipated Results

The target audience for the pilot project is the PACIT in Terrebonne and Lafourche parishes; however, there is great potential to transfer project results and apply the Tribal Community Resilience Index (T-CRI) to other indigenous communities once developed. In Terrebonne and Lafourche parishes alone, the population of Native American communities is estimated to be between **700 and 2,200 individuals**. It is estimated that the resilience enhancement efforts implemented in the pilot community will impact all residents of the community because of the associated benefits that the nearby communities will receive. Another objective of this project is to train facilitators across the five Gulf states on the application of the T-CRI so that tribes across the region will be able to utilize this tool to identify and implement resilience-enhancing solutions in their home communities.

Partners

- Louisiana State University
- Terrebonne Parish
- Louisiana Department of Natural Resources
- Lafourche Levee District
- Terrebonne Parish Levee District
- Gulf of Mexico Alliance
- National Oceanic and Atmospheric Administration
- Louisiana Sea Grant
- Lowlander Center
- South Central Climate Adaptation Science Center
- MS/AL Sea Grant





Farmer to Farmer

Connecting Rural and Peri-Urban Farmers to Demonstrate and Disseminate Innovative Nutrient and Sediment Reduction Practices

Partner

- University of Iowa

Summary

This project will focus exclusively on oxbow restorations, alternative tile intakes and nitrogen-removing wetlands/ponds. In addition to improving water quality, the selected practices provide flood storage, which watershed residents have identified as a high priority. To maximize the number of watershed residents who interact with the demonstration sites, we have chosen strategic rural locations near highways and paved county trails, and a 160-acre, peri-urban location on the outskirts of Iowa City, Iowa.



Anticipated Results

5% or greater reduction of: nitrate concentration in the Clear Creek stream segment, nitrate concentration in the tile water exiting the drainage network at the Johnson County Historic Poor Farm, and sediment delivery to a community-selected stream segment

Integrating Conservation of Habitat and Sustainable Agriculture Through Partnerships in the Chipola Basin



Partners

- Southeastern Association of Fish and Wildlife Agencies
- University of Florida Institute of Food and Agricultural Sciences
- Florida Department of Agriculture and Consumer Services
- Northwest Florida Water Management District

Summary

Partners are working with local landowners and facilitating conservation measures to improve aquatic habitat and overall ecological condition and educate farmers about aquatic conservation. Best Management Practices (BMPs) have been selected to reduce nutrient and sedimentation runoff impacting in-stream habitat for a host of listed species. Partners hope to create local champions who will increase awareness of compatible conservation measures and increase public trust of federal, state and local agencies and their associated programs. Building this community of practice where landowners can be educated on BMPs and water conservation techniques allows local staff to expand regional capacity and encourages new landowners to adopt these techniques.

Cumulative Results

9,700 acres of agricultural BMPs; **4,135 acres** of riparian habitat protected



Show Me the Data! Empowering Conservation Champions with Innovative, Real-Time Soil Metrics

Partners

- University of Minnesota
- Local farmers

Summary

Sand County Foundation is in the early stages of its three-year project involving on-farm demonstrations that integrate remote sensing and soil probes with the collection of soil health metrics. This information is helping farmers make in-season management decisions based on real-time soil moisture and temperature data. Results are addressing growing management concerns among those challenged by extreme (abundance or deficit) precipitation events.

Together with the University of Minnesota, 30 farmers across Minnesota and Wisconsin will have sensors installed by Farmers Edge over 15 sets of paired fields. Each pair has soils with similar texture and land position. Sites with varying management practices were identified to quantify how infiltration, water holding capacity, soil trafficability, leaching potential, aggregate stability and other soil properties critical to improving resiliency and reducing nutrient transport are influenced.

In addition to annual soil health and routine sample collection, a Farmers Edge technology subscription to in-field, soil temperature and moisture probe data was employed at each field to provide the collaborating farmers access to real-time data on their mobile devices. The knowledge gained and shared between the farmer cooperators are guiding their longer term management toward a more resilient agricultural system that reduces nutrient loss, improves water quality and enhances productivity.

Cumulative Results

Improvements in **7 water segments**



Farmer-Driven Water Quality Through Conservation Grazing in the Kickapoo River Watershed

Summary

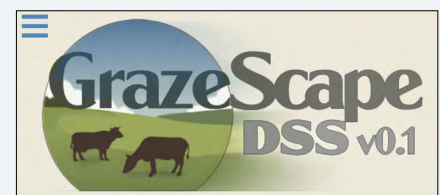
Working with the Tainter Creek Farmer-Led Watershed Council and local partners, the Wallace Center is using farmer-to-farmer outreach and technical support to increase the adoption of conservation grazing practices, which will increase farmer incomes and improve water quality. The project is developing a cutting-edge land management decision-support tool to guide management decisions and using rigorous science to evaluate improvements in water quality.

Cumulative Results

Demonstrated a technical assistance approach to integrating conservation grazing plans with cost share into farm operations. This approach has been replicated in several states, and it will become more accessible with the development of the **GrazeScape farm-scale decision-support tool**. The tool, currently in the testing phase, integrates the four steps of Winrock's technical assistance approach by creating a map of the farm, which allows the technical service provider to explore scenarios of new grazing practices (including impacts on yield, erosion, phosphorus loss and rain runoff/infiltration), map the chosen grazing plan, and utilize the information and estimated costs for implementation of cost-share applications.

Partners

- Winrock International
- Kickapoo River Watershed – Valley Stewardship Network
- Tainter Creek Farmer-Led Watershed Council





Trash-Free Waters



Freshwater Land Trust Trash Abatement Program

Partners

- Freshwater Land Trust
- Osprey Initiative, LLC
- Black Warrior Riverkeeper
- Cahaba Riverkeeper
- City of Birmingham
- City of Bessemer
- City of Homewood
- City of Vestavia Hills
- Jefferson County Department of Health
- Jefferson County Conservation District
- Jefferson County Department of Development Services
- Village Creek Society

Summary

The trash abatement program officially kicked off in 2020. The program is a partnership between Freshwater Land Trust and 12 community partners to develop a system of in-stream Litter Gitters to collect trash and build support and interest in facilitating cleaner waterways and awareness about littering. The six Litter Gitters quickly inspired area communities and businesses to add five more devices, bringing the total number to 11.

Signage has been erected at each site, and numerous cleanups have been conducted around the sites by Black Warrior Riverkeeper and Cahaba Riverkeeper subcontractors and other organizations. High school students in the area have participated in a companion Litter Quitters education program, making videos about a trash-free environment that were entered into a televised competition for prizes for their schools. A film of the activities is also in progress to document the project, which has generated interest from other cities around the U.S. wanting to learn how they can begin a similar project.

Cumulative Results

Over 10,400 pounds (over 4,100 cubic feet) of litter in 19 months have been removed. **About 25% of that debris** collected has been recycled, about 55% of which was plastic and about 28% was styrofoam.



Comprehensive Strategy to Create Trash-Free Waters

Partners

- Tampa Bay National Estuary Program
- Mobile Bay National Estuary Program

Summary

Throughout the nation, marine debris in urban and coastal waters is an increasing environmental and economic problem. Discarded trash, litter and consumer packaging are commonly conveyed through urban stormwater infrastructure and ultimately become the sources of marine debris in the estuarine and near-coastal environment. The accumulation of plastics in marine waters is now an urgent and pressing global issue due to their persistence and direct impacts on water quality, wildlife, the marine ecosystem and human health.

This project has installed 12 marine debris removal technologies, including three Litter Gitters, and four Seabin and five Water Goat devices. These devices help to improve water quality by directly removing trash from two estuaries of national significance in the Gulf of Mexico. This project is also engaging with private sector entities and sources “upstream” in the supply chain to encourage litter management, packaging alternatives or policy changes that will address marine debris at the source.

Cumulative Results

12 marine debris removal technologies installed
Over 2,200 pounds of trash collected so far



Reduction and Prevention of Trash in Texas and the Gulf of Mexico

Partner

- Keep Texas Beautiful

Summary

This project provides technical assistance, programmatic solutions and educational best practices related to litter cleanup and prevention in three areas of Texas: Houston-Galveston, San Marcos and South Padre Island-Lower Rio Grande Valley. Keep Texas Beautiful and partners are conducting community site visits, leading stakeholder meetings and developing individual work plans for each community. They are also assisting with the plan implementation and will summarize findings to create best practices to share throughout the state and beyond.

Cumulative Results

10,000 pounds of trash removed
10 miles of beach enhanced
4 communities reached
200 individuals reached



Plastics and Trash Pollution Reduction and Prevention Along the Texas Upper Coast Through Coordinated Cleanups and Community Engagement

Partner

- American Bird Conservancy

Summary

The American Bird Conservancy (ABC) has implemented its Stopping Plastics and Litter along Shorelines (SPLASH) program. Through this effort, an extensive amount of trash has been removed over the last year, and over 39 acres of habitat have been enhanced. In addition, outreach events have been able to educate numerous school groups about the impacts that litter can have on the environment and wildlife. To further utilize the information gained through this effort, ABC in collaboration with Gulf Coast Bird Observatory, Black Cat GIS, Houston Advanced Research Center and Keep Texas Beautiful are making its trash collection data available via txlitter.org for a variety of stakeholders to view and use. ABC has also begun developing story maps on splashtx.org that summarize trash data collected at all cleanups funded under the Trash-Free Waters program.

Cumulative Results

Over 39 acres of habitat enhanced

Geauxing Green: Sustainable Festival Planning

Summary

This project is improving water quality through the reduction of waste through prevention and is enhancing community resilience through education. The Satchmo SummerFest was single-use-plastic free and provided recycling and composting. The festival prevented waste by promoting sustainable, reusable, recyclable or compostable products, and supplying numerous specialized reusable sorting stations. This ensured the waste was sorted correctly between recycling, composting and landfill destinations. Volunteers were present at each of the stations to educate festivalgoers and helped prevent contamination of the recyclable products.

Restaurants and vendors at the festival were required to use sustainable alternatives to plastic. They served food on biodegradable and compostable materials. In exchange for their cooperation, they received a stipend to purchase sustainable material and a certificate advertising them as a "Geauxing Green Festival Vendor."

The French Quarter Festival and Rougarou Festival will be organized and carried out the same way as the Satchmo SummerFest.

Cumulative Results

The Satchmo Festival was held July 30–August 1. **5,900 visitors** attended the festival and were exposed to the Sustainable Festival Project where approximately **17% of recyclable waste** was diverted from the landfill.

Anticipated Results

85% reduction in waste collected at the festivals
2 million people reached during the project

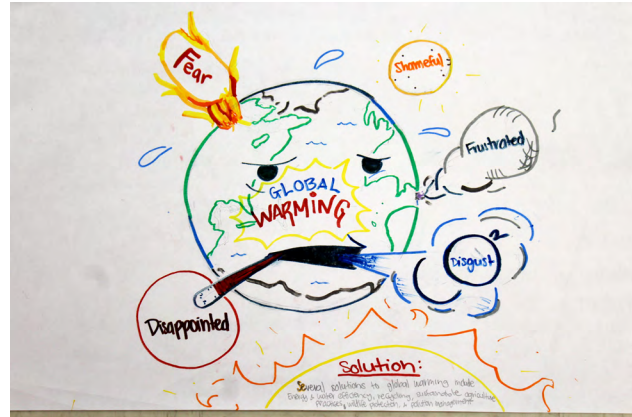
Partners

- Louisiana Universities Marine Consortium
- Barataria-Terrebonne National Estuary Program
- French Quarter Festivals, Inc.
- South Louisiana Wetlands Discovery Center





GMD Spotlight



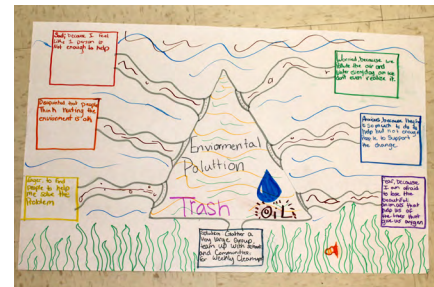
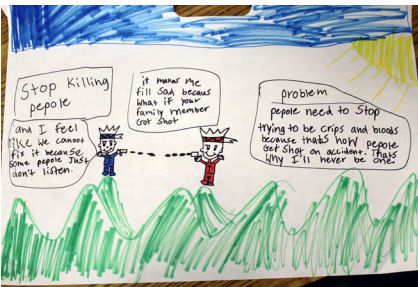
Mind Mapping as a Tool for Environmental Education

Mind mapping is a tool or technique used to visually organize associative information. It is often used as a method of brainstorming, studying, structuring, organizing and more. At GMD, the mind mapping technique has been adapted to identify, evaluate and discuss environmental concerns of students and gauge their overall environmental knowledge so that educators can positively respond to the thoughts and feelings of their students.

During the exercise, students are asked to reflect on what they perceive as the largest environmental threat and create a mind map centered around that threat that includes their feelings/emotions, belief in solutions, knowledge of causes and effects, and more. Through individual and classroom discussion, students are provided an outlet to share their perspectives and think critically about the issues and possible solutions.

Though young people are our future decision-makers, their voices often go unheard or are underappreciated. The primary aim of the mind mapping project is to take a student-centered approach to environmental education and provide students with an opportunity for their voices to be heard and to reflect on environmental problems and solutions to empower them to enact change. In addition, educators are provided with educational resources focused on the responses of the students for a more targeted approach to environmental education.

It should be noted that understanding environmental concerns of students is one example of how mind mapping can be used, and there are variations in how it can be executed. Some educators have used the project to introduce students to environmental topics or to start the foundation of student research papers, while others have focused on social or economic issues in disadvantaged and underprivileged communities. The exercise can be focused on a particular local water body, protected area or environmental/social/economic issue, and can also be used outside of the classroom with colleagues or with the general public to identify, evaluate and discuss a variety of topics.





Deepwater Horizon Natural Resource Damage Assessment and Restoration

The April 2010 explosion of the *Deepwater Horizon* (DWH) drilling rig resulted in the largest marine oil spill in U.S. history, causing the loss of 11 lives and extensive natural resource injuries. The oil spread from the deep ocean to the surface and nearshore environment from Texas to Florida, prompting an extensive response and Natural Resource Damage Assessment (NRDA). In 2016, the historic BP settlement required the company to pay up to \$8.8 billion over 15 years—the largest ever for natural resource injuries.

As a member of the DWH NRDA Trustee Council, EPA supports eight Trustee Implementation Groups (TIGs). GMD staff serve as primary and alternate EPA Trustee representatives on the TIGs for Alabama, Florida and Mississippi, as well as the Region-wide TIG. Supporting the Office of Water lead for NRDA, GMD staff also provide technical expertise to the five Gulf states related to monitoring and adaptive management, and approaches to restore oysters and sturgeon injured by the oil spill. As a result of the NRDA restoration efforts, measurable results-oriented projects are being implemented to restore the Gulf of Mexico ecosystem and the natural resources injured by the DWH oil spill by restoring and conserving habitat, restoring water quality, replenishing and protecting injured coastal and marine species, and providing and enhancing recreational opportunities.



GMD staff members Jerry Binninger and Calista Mills (pictured at left) and Phil Lee and Tripp Boone (pictured at right) sampling on the Upper Pascagoula River Watershed.

Examples of specific DWH NRDA work being supported by GMD staff

Florida TIG

In 2021, the DWH NRDA Trustees published the Florida TIG Final Restoration Plan 2 and Environmental Assessment that provided \$62 million in funding for 18 projects addressing five natural resource restoration types: Birds, Sea Turtles, Marine Mammals, Habitat Projects on Federally Managed Lands, and Provide and Enhance Recreational Opportunities.

Louisiana TIG

The Louisiana TIG Trustees released via a [web story](#) on September 22, 2021, the LATIG's Monitoring and Adaptive Management (MAM) Strategy. The purpose of the MAM Strategy is to outline an approach for the TIG to prioritize MAM activities and \$225 million in MAM allocations in Louisiana for effective and efficient evaluation of the restoration of resources injured by the DWH oil spill.

GMD staff represented EPA on the MAM workgroup in developing the strategy document and continues to represent EPA on the TIG's MAM workgroup.

Region-wide TIG

The Region-wide TIG released its first Restoration Plan and Environmental Assessment, which includes projects to restore Birds, Oysters, Marine Mammals and Sea Turtles. The Restoration Plan includes \$99.6 million for 11 restoration projects to be implemented across the Gulf states and offshore waters. It also targets specific locations in Mexico and on the Atlantic coast of Florida.

Mississippi TIG

The Mississippi TIG began drafting its third Restoration Plan and Environmental Assessment, which includes the restoration types of: Habitat Projects on Federally Managed Lands, Sea Turtles, Marine Mammals, Birds, and Provide and Enhance Recreational Opportunities. GMD staff continued water quality monitoring for the Upper Pascagoula River nutrient reduction project.

Texas TIG

The Texas TIG completed review and approval of engineering designs for possible oyster restoration projects in Galveston Bay.

Open Ocean TIG

In 2020, the Open Ocean TIG released the Open Ocean Monitoring and Adaptive Management Strategy. In 2021, the Trustees began identifying opportunities to address the MAM priorities in the strategy and developing potential MAM activities.

GMD staff continue to support the EPA Office of Water on the MAM workgroup in developing OO TIG ecosystem-level objectives and potential MAM activities. GMD staff also provided subject matter expertise for sturgeon projects.



Gulf Coast Ecosystem Restoration Council

Following the catastrophic 2010 *Deepwater Horizon* oil spill, Congress passed the Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast Act of 2012 (RESTORE Act). The RESTORE Act established the Gulf Coast Ecosystem Restoration Council (the Council) and the Gulf Coast Restoration Trust Fund. The Council membership includes the governors of the states of Alabama, Florida, Louisiana, Mississippi and Texas, as well as the secretaries of the U.S. Departments of Agriculture, Army, Commerce, Homeland Security and the Interior, and the Administrator for EPA. EPA currently serves as the chair of the Council. If you are interested in reading more about the RESTORE Act or the Council, please visit: www.RestoreTheGulf.gov

On April 28, 2021, the RESTORE Council voted to approve the final FPL 3b, with Administrator Michael Regan voting as the Chair. FPL 3b supports funding 20 activities to address ecosystem needs across the Gulf.



Water samples were filtered for Chlorophyll a and Enterococci during the National Coastal Condition Assessment intensification at a site in Bayou La Batre launch, AL.



A scenic vista from Cockroach Preserve in Tampa, FL.



A volunteer planting event at Cockroach Preserve in Tampa, FL.



Celebrating National Estuaries Week with a free guided paddle at Indian Bayou, FL.

Pensacola & Perdido Bays Estuary Program (PPBEP)

Awarded \$2 million in 2018

- The PPBEP Management Conference has been established and is made up of the Policy Board, the Technical Advisory Committee, the Education and Outreach Committee and the Business Advisory Committee.
- Committees are actively participating in the development of PPBEP's first Comprehensive Conservation Management Plan (CCMP).
- The PPBEP has also been successful in securing additional funding from the Florida State Legislature as well as other sources to further the goals of the program and to help ensure the long-term sustainability of this new estuary program.

Conservation Enhancement Grant Program

Awarded \$2.5 million in 2021

This project will enhance public-private partnerships that support land protection and conservation across the Gulf Coast region:

- Funding Opportunity issued selected eight projects for funding across the region
- RESTORE Council will enter into an interagency agreement with EPA
- GMD will enter into cooperative agreements with selected projects

Tampa Bay Estuary Program (TBEP)

Awarded \$1.4 million in 2018

The TBEP will implement five water quality and habitat improvement projects throughout the Tampa Bay watersheds:

- Biosolids to Energy (City of St. Petersburg)
- Copeland Park Stormwater Enhancements (City of Tampa)
- Coastal Invasive Plant Removal/Cockroach Bay Aquatic Reserve (Hillsborough County)
- Robinson Preserve Water Quality and Habitat Restoration (Manatee County)
- Ft. De Soto Recirculation and Seagrass Recovery (Pinellas County)

Mobile Bay National Estuary Program (MBNEP)

Awarded \$1.65 million in 2020

This project will:

- Restore approximately 1,800 linear feet of stream on the headwaters of Twelve Mile Creek, a tributary of Three Mile Creek
- Implement an extensive Invasive Species Control Plan in priority areas identified in the Three Mile Creek Watershed
- Address stressors affecting water quality and habitat in the Three Mile Creek Watershed



Oak Ridge Institute for Science and Education (ORISE) Participants

The Internship and Research Participation Programs at EPA are managed by the Oak Ridge Institute for Science and Education (ORISE) under an interagency agreement between EPA and the U.S. Department of Energy. The ORISE Internship and Research Participation Programs at EPA are STEM-related educational and training programs designed to provide students, recent graduates and university faculty opportunities to participate in project-specific EPA research and developmental activities.



Amy Moody

During this year, Amy Moody has been working on processing the data that were collected to determine the link between submarine groundwater discharge (SGD) and hypoxia in the Mississippi Sound. With this data, she has been able to determine that groundwater is a major constituent of nutrient inputs to the Sound and therefore may have significant impacts on the coastal biota. She also applied for a research exchange through ASLO (Association for the Sciences of Limnology and Oceanography), and has been given the opportunity to study in Sweden and learn more about different ways to sample water quality parameters such as pharmaceuticals and bacteria. She plans to use this experience to better study the Mississippi Sound and to guide future research in her career.

Amy has also been working with collaborators from Mississippi State University and the University of Alabama on an MBRACE (Mississippi Based RESTORE Act Center of Excellence) grant to help oyster reef restoration. The goal is to understand the influence of groundwater on oyster habitats and how we can use our understanding of groundwater to help repopulate the oyster reefs. This work will inform policy decisions and will further our understanding of the role of groundwater in the Mississippi Sound ecosystem.

Huy Vu

Dr. Huy Vu has partnered with Dr. Steven Pennings to expand the pocket prairie at the University of Houston – Main Campus. Once completed, the project will triple the size of the current pocket prairie, provide students and the surrounding community with green space, and provide educational opportunities for various undergraduate labs. In addition, Dr. Vu collaborated with Dr. Elizabeth Robinson at Louisiana State University to develop a research plan examining the feasibility of using off-bottom oyster beds to harvest peeler blue crabs. The implementation stage and data collection for both projects have been delayed due to COVID-19 restrictions and Hurricane Ida. He plans on resuming work for both projects once restrictions are lifted.

Dr. Vu assisted Region 4 grant specialists in the review of proposals from EPA's 2021 Brownfields Multipurpose, Assessment, and Cleanup Grant and GMD's Healthy and Resilient Gulf of Mexico Grant. He is currently working on a spatial-based assessment tool that will enable grant managers to evaluate the benefits of proposed projects throughout GMD's geographic focus area.





Richard Grady

Richard Grady has been working on developing his qPCR and molecular microbiology detection skills in the USM community laboratory in preparation for future projects. He continues to work remotely on a literature review publication exploring the best available molecular monitoring methods for agricultural applications. He has plans to return to the local Turkey Creek water quality monitoring project and to further assist with the source tracking and water quality assessment of the Mobile Bay RARE project in coordination with ORD and FDA when COVID-19 restrictions are lifted.

Taylor Screws

Taylor Screws completed approximately 117 hours of virtual ArcGIS courses, including five instructor-led courses, and used some of this training in creating maps from water quality data. He attended the 2021 virtual GOMA Conference and a variety of virtual seminars. In addition, he researched high school aquaculture programs in Mississippi and Alabama, as well as harmful algal blooms and microplastics in the Gulf region through ongoing projects.

Over the summer, Taylor completed the 24-hour Field Health and Safety Training prior to participating in field work. He assisted with collecting discrete samples in Mississippi Sound. He also went on a boat trip with a team from the EPA lab in Athens, Georgia, where he helped collect SOD data with sonde detection equipment and observed a team of divers overseeing and collecting deployed equipment.



Jenny Paul

This year, Jenny Paul assisted the Pensacola & Perdido Bays Estuary Program (PPBEP) and Escambia County Natural Resources Management for GMD, and focused on data analysis, writing and presentation for the EPA Gulf Ecosystem Measurement & Modeling Division (GEMMD).

Jenny served as a science advisor for the PPBEP. She was invited to sit in on stakeholder meetings and helped identify top water and sediment concerns for the bays, as well as the endpoints needed to objectively evaluate them. She also served as field crew for the 2021 National Coastal Condition Assessment, which was facilitated through EPA's Office of Water and conducted by the PPBEP and support crews. She has also been excited about learning sediment profile imaging (SPI). Her analysis of images from Bayou Chico assists GEMMD project objectives and informs Escambia County in strategizing for cleanup activities. Her analysis of images from Pensacola Bay will be used to inform the estuary program in long-term monitoring efforts.



EPA Awards

National Honor Awards

The EPA National Honor Awards are EPA's highest awards, given to celebrate the extraordinary achievements of EPA employees and their contributions to EPA's mission of protecting human health and the environment.

Bronze Medal Award

The Bronze Medal Award is the third highest honor award given by EPA. It can be granted to an individual or group for significant service or achievements in support of EPA's mission or for demonstration of outstanding accomplishments in supervision and leadership.

The Bronze Medal Award recognizes significant acts and achievements that materially aid or effect the successful accomplishment of EPA's mission: which service the public interest or which clearly demonstrate outstanding merit in supervision and leadership.

GMD staff were recipients of two Bronze Medal Awards this year.

Gerry Martin received a Bronze Medal for Sound and Prudent Management of Funds. She was recognized for trailblazing efforts that have enhanced internal controls over expenditures and adept financial management. Those practices led to more than 121 projects crucial to improving water quality, restoring habitats, enhancing resiliency and increasing environmental education within the Gulf of Mexico Watershed ecosystem.

Jeanne Allen, Matt Beiser, Jerry Binninger, Tripp Boone, John Bowie (retired), Rachel Houge, Phil Lee, Gerry Martin, Kathryn Millard, Calista Mills, Amy Newbold, LaKeshia Robertson, Danny Wiegand and Marc Wyatt received a Bronze Medal for the GMD Funding Recommendation Process Improvements. This team was recognized for exceptional efforts in improving efficiency of Funding Recommendation packages by focusing GMD's Lean Management initiatives on streamlining the FR development and submittal process. This work resulted in a 64% reduction in time taken to prepare and submit Funding Recommendations to the Grants Management Office.





Protecting Human Health and
the Environment



GMD | GULF OF MEXICO DIVISION
www.epa.gov/gulfofmexico

2510 14TH Street, Suite 1212 • Gulfport, MS 39501
(P) 228-679-5915 (F) 228-679-5921